ANEJO Nº 6. ESTRUCTURAS

4.2 Puentes

4.2.1 Puente E-1502.0

INDICE

1º DEFINICION GEOMETRICA

2º CALCULO DEL TABLERO

3º CALCULO DE PILAS

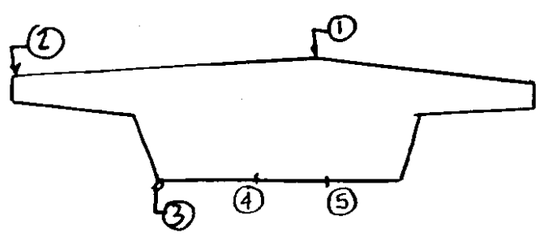
4º CALCULO DE ESTRIBOS

5º PROYECTO DE PRUEBA DE CARGA

PUENTE E-1502.0

1º DEFINICION GEOMETRICA

NOMBRE del EJE : t0070
TRAMO donde se situa la estructura: 10
CASO en que se encuentra la estructura(0-1-2)
0 .... La seccion de la carretera tiene calzada unica
1 .... La estructura se situa en la calzada DERECHA
2 .... La estructura se situa en la calzada IZQUIERDA
CASO= 0
NUMERO de VANOS del tablero: 3
PK Estribo n§1 : 1544.550
PK Pila n§ 1 : 1566.670
PK Pila n§ 2 : 1592.670
PK Estribo n§2 : 1614.790
Distancia eje REP.PLANTA al de la ESTRUCTURA: .000
ESPESOR del pavimento (en metros): .000
NUMERO puntos DE REPLANTEO: 5
PUNTO n§.. 1 X= .000 Y= -.238
PUNTO n§.. 2 X= -4.750 Y= -.143
PUNTO n§.. 3 X= -1.750 Y= 1.512
PUNTO n§.. 4 X= -1.200 Y= 1.612
PUNTO n§.. 5 X= 1.200 Y= 1.612
NUMERO de puntos que acompaan a los bordes: 0
VANO n§.. 1 NUMERO de secciones NORMALES: 10
VANO n§.. 2 NUMERO de secciones NORMALES: 10
VANO n§.. 3 NUMERO de secciones NORMALES: 10
NUMERO de secciones ESVIADAS a calcular: 0
TIPO de tablero (1-2-3-4): 1
VANO.. 1 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
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VANO.. 2 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
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VANO.. 3 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 5 Variac. HORIZONTAL tipo: 1



ESQUEMA DE PUNTOS DE REPLANTEO

VAN-SEC-PUNTO	P.K.	AZ(g)	X	Y	Z
1 1 1	1544.550	201.441	666029.409	4610866.689	316.364
1 1 2	1544.550	201.441	666029.516	4610871.438	316.269
1 1 3	1544.550	201.441	666029.449	4610868.439	314.614
1 1 4	1544.550	201.441	666029.436	4610867.889	314.514
1 1 5	1544.550	201.441	666029.382	4610865.489	314.514
1 2 1	1547.008	201.378	666031.866	4610866.635	316.373
1 2 2	1547.008	201.378	666031.969	4610871.384	316.278
1 2 3	1547.008	201.378	666031.904	4610868.384	314.623
1 2 4	1547.008	201.378	666031.892	4610867.834	314.523
1 2 5	1547.008	201.378	666031.840	4610865.435	314.523
1 3 1	1549.466	201.316	666034.323	4610866.583	316.382
1 3 2	1549.466	201.316	666034.421	4610871.332	316.287
1 3 3	1549.466	201.316	666034.359	4610868.332	314.632
1 3 4	1549.466	201.316	666034.348	4610867.782	314.532
1 3 5	1549.466	201.316	666034.298	4610865.383	314.532
1 4 1	1551.923	201.253	666036.781	4610866.533	316.391
1 4 2	1551.923	201.253	666036.874	4610871.282	316.296
1 4 3	1551.923	201.253	666036.815	4610868.283	314.641
1 4 4	1551.923	201.253	666036.804	4610867.733	314.541
1 4 5	1551.923	201.253	666036.757	4610865.333	314.541
1 5 1	1554.381	201.191	666039.237	4610866.486	316.399
1 5 2	1554.381	201.191	666039.326	4610871.235	316.304
1 5 3	1554.381	201.191	666039.270	4610868.236	314.649
1 5 4	1554.381	201.191	666039.260	4610867.686	314.549
1 5 5	1554.381	201.191	666039.215	4610865.286	314.549
1 6 1	1556.839	201.128	666041.695	4610866.441	316.407
1 6 2	1556.839	201.128	666041.779	4610871.190	316.312
1 6 3	1556.839	201.128	666041.726	4610868.191	314.657
1 6 4	1556.839	201.128	666041.716	4610867.641	314.557
1 6 5	1556.839	201.128	666041.674	4610865.241	314.557
1 7 1	1559.297	201.065	666044.153	4610866.399	316.414
1 7 2	1559.297	201.065	666044.232	4610871.148	316.319
1 7 3	1559.297	201.065	666044.182	4610868.149	314.664
1 7 4	1559.297	201.065	666044.173	4610867.599	314.564
1 7 5	1559.297	201.065	666044.133	4610865.199	314.564
1 8 1	1561.754	201.003	666046.610	4610866.359	316.422
1 8 2	1561.754	201.003	666046.685	4610871.108	316.327
1 8 3	1561.754	201.003	666046.638	4610868.109	314.672
1 8 4	1561.754	201.003	666046.629	4610867.559	314.572
1 8 5	1561.754	201.003	666046.591	4610865.159	314.572
1 9 1	1564.212	200.940	666049.067	4610866.321	316.429
1 9 2	1564.212	200.940	666049.138	4610871.071	316.334
1 9 3	1564.212	200.940	666049.093	4610868.071	314.679
1 9 4	1564.212	200.940	666049.085	4610867.521	314.579
1 9 5	1564.212	200.940	666049.050	4610865.121	314.579
1 10 1	1566.670	200.878	666051.525	4610866.286	316.435
1 10 2	1566.670	200.878	666051.590	4610871.036	316.340
1 10 3	1566.670	200.878	666051.549	4610868.036	314.685
1 10 4	1566.670	200.878	666051.542	4610867.486	314.585
1 10 5	1566.670	200.878	666051.508	4610865.086	314.585
2 1 1	1566.670	200.878	666051.525	4610866.286	316.435
2 1 2	1566.670	200.878	666051.590	4610871.036	316.340
2 1 3	1566.670	200.878	666051.549	4610868.036	314.685
2 1 4	1566.670	200.878	666051.542	4610867.486	314.585
2 1 5	1566.670	200.878	666051.508	4610865.086	314.585
2 2 1	1569.559	200.804	666054.414	4610866.248	316.443
2 2 2	1569.559	200.804	666054.474	4610870.998	316.348
2 2 3	1569.559	200.804	666054.436	4610867.998	314.693
2 2 4	1569.559	200.804	666054.429	4610867.448	314.593
2 2 5	1569.559	200.804	666054.398	4610865.048	314.593
2 3 1	1572.448	200.730	666057.302	4610866.213	316.450
2 3 2	1572.448	200.730	666057.357	4610870.963	316.355
2 3 3	1572.448	200.730	666057.322	4610867.963	314.700
2 3 4	1572.448	200.730	666057.316	4610867.413	314.600
2 3 5	1572.448	200.730	666057.288	4610865.013	314.600
2 4 1	1575.337	200.657	666060.191	4610866.182	316.457
2 4 2	1575.337	200.657	666060.240	4610870.932	316.362
2 4 3	1575.337	200.657	666060.209	4610867.932	314.707
2 4 4	1575.337	200.657	666060.203	4610867.382	314.607
2 4 5	1575.337	200.657	666060.178	4610864.982	314.607
2 5 1	1578.226	200.583	666063.080	4610866.154	316.463
2 5 2	1578.226	200.583	666063.124	4610870.903	316.368

2 5 3	1578.226	200.583	666063.096	4610867.904	314.713
2 5 4	1578.226	200.583	666063.091	4610867.354	314.613
2 5 5	1578.226	200.583	666063.069	4610864.954	314.613
2 6 1	1581.114	200.510	666065.969	4610866.129	316.469
2 6 2	1581.114	200.510	666066.007	4610870.879	316.374
2 6 3	1581.114	200.510	666065.983	4610867.879	314.719
2 6 4	1581.114	200.510	666065.978	4610867.329	314.619
2 6 5	1581.114	200.510	666065.959	4610864.929	314.619
2 7 1	1584.003	200.436	666068.858	4610866.107	316.475
2 7 2	1584.003	200.436	666068.890	4610870.857	316.380
2 7 3	1584.003	200.436	666068.870	4610867.857	314.725
2 7 4	1584.003	200.436	666068.866	4610867.307	314.625
2 7 5	1584.003	200.436	666068.849	4610864.907	314.625
2 8 1	1586.892	200.363	666071.746	4610866.089	316.480
2 8 2	1586.892	200.363	666071.773	4610870.839	316.385
2 8 3	1586.892	200.363	666071.756	4610867.839	314.730
2 8 4	1586.892	200.363	666071.753	4610867.289	314.630
2 8 5	1586.892	200.363	666071.739	4610864.889	314.630
2 9 1	1589.781	200.289	666074.635	4610866.074	316.485
2 9 2	1589.781	200.289	666074.657	4610870.824	316.390
2 9 3	1589.781	200.289	666074.643	4610867.824	314.735
2 9 4	1589.781	200.289	666074.640	4610867.274	314.635
2 9 5	1589.781	200.289	666074.630	4610864.874	314.635
2 10 1	1592.670	200.216	666077.524	4610866.063	316.489
2 10 2	1592.670	200.216	666077.540	4610870.813	316.394
2 10 3	1592.670	200.216	666077.530	4610867.813	314.739
2 10 4	1592.670	200.216	666077.528	4610867.263	314.639
2 10 5	1592.670	200.216	666077.520	4610864.863	314.639
3 1 1	1592.670	200.216	666077.524	4610866.063	316.489
3 1 2	1592.670	200.216	666077.540	4610870.813	316.394
3 1 3	1592.670	200.216	666077.530	4610867.813	314.739
3 1 4	1592.670	200.216	666077.528	4610867.263	314.639
3 1 5	1592.670	200.216	666077.520	4610864.863	314.639
3 2 1	1595.128	200.153	666079.982	4610866.056	316.493
3 2 2	1595.128	200.153	666079.993	4610870.806	316.398
3 2 3	1595.128	200.153	666079.986	4610867.806	314.743
3 2 4	1595.128	200.153	666079.985	4610867.256	314.643
3 2 5	1595.128	200.153	666079.979	4610864.856	314.643
3 3 1	1597.586	200.090	666082.440	4610866.051	316.496
3 3 2	1597.586	200.090	666082.446	4610870.801	316.401
3 3 3	1597.586	200.090	666082.442	4610867.801	314.746
3 3 4	1597.586	200.090	666082.441	4610867.251	314.646
3 3 5	1597.586	200.090	666082.438	4610864.851	314.646
3 4 1	1600.043	200.028	666084.897	4610866.049	316.499
3 4 2	1600.043	200.028	666084.899	4610870.799	316.404
3 4 3	1600.043	200.028	666084.898	4610867.799	314.749
3 4 4	1600.043	200.028	666084.898	4610867.249	314.649
3 4 5	1600.043	200.028	666084.897	4610864.849	314.649
3 5 1	1602.501	199.965	666087.355	4610866.049	316.502
3 5 2	1602.501	199.965	666087.352	4610870.799	316.407
3 5 3	1602.501	199.965	666087.354	4610867.799	314.752
3 5 4	1602.501	199.965	666087.354	4610867.249	314.652
3 5 5	1602.501	199.965	666087.356	4610864.849	314.652
3 6 1	1604.959	199.903	666089.813	4610866.051	316.504
3 6 2	1604.959	199.903	666089.806	4610870.801	316.409
3 6 3	1604.959	199.903	666089.810	4610867.801	314.754
3 6 4	1604.959	199.903	666089.811	4610867.251	314.654
3 6 5	1604.959	199.903	666089.815	4610864.851	314.654
3 7 1	1607.417	199.840	666092.271	4610866.056	316.506
3 7 2	1607.417	199.840	666092.259	4610870.806	316.411
3 7 3	1607.417	199.840	666092.267	4610867.806	314.756
3 7 4	1607.417	199.840	666092.268	4610867.256	314.656
3 7 5	1607.417	199.840	666092.274	4610864.856	314.656
3 8 1	1609.874	199.777	666094.728	4610866.064	316.508
3 8 2	1609.874	199.777	666094.712	4610870.814	316.413
3 8 3	1609.874	199.777	666094.722	4610867.814	314.758
3 8 4	1609.874	199.777	666094.724	4610867.264	314.658
3 8 5	1609.874	199.777	666094.733	4610864.864	314.658
3 9 1	1612.332	199.715	666097.186	4610866.074	316.509
3 9 2	1612.332	199.715	666097.165	4610870.824	316.414
3 9 3	1612.332	199.715	666097.178	4610867.824	314.759
3 9 4	1612.332	199.715	666097.181	4610867.274	314.659
3 9 5	1612.332	199.715	666097.192	4610864.874	314.659
3 10 1	1614.790	199.652	666099.644	4610866.086	316.510
3 10 2	1614.790	199.652	666099.618	4610870.836	316.415
3 10 3	1614.790	199.652	666099.634	4610867.836	314.760
3 10 4	1614.790	199.652	666099.637	4610867.286	314.660
3 10 5	1614.790	199.652	666099.650	4610864.886	314.660

PUENTE E-1502.0

2º CALCULO DEL TABLERO

GINPROSA

ASUNTO

CARGAS ACTUANTES E. 1502.0

1) Peso propio $\gamma = 2{,}5$ t/m³

2) Carga muerta

Traviesas + carriles — 0,52+0,12 = 0,64 t/m.

Balasto —— 5,40 x 0,70 x 1,60 = 6,05 t/m.

Cables + Conductos — 0,30 x 2 = 0,60 t/m.

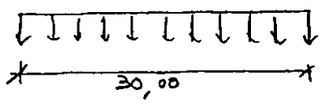
Barreras —— 0,75 x 2 = 1,50 t/m.

TOTAL CARGA MUERTA —— 8,8 t/m.

3) Cargas en pasos 0,5 t/m² x 1,75 x 2 = 1,75 t/m.

4) TREN TIPO B (IPF-75)

Se supone una carga de 10 t/m aplicada como si fuese una sobrecarga de uso y los 2 t/m de exceso de peso debido a la maquina se aplican como un tren de cargas puntuales.

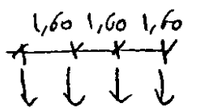


11 cargas puntuales $P = \frac{2 \times 30}{11} = 5{,}5$ ton

5) TREN TIPO LH71

Carga uniforme de 8 t/m.

4 cargas puntuales de 12,2 ton.



6) TREN SW/0

Sobrecarga 13,3 t/m.

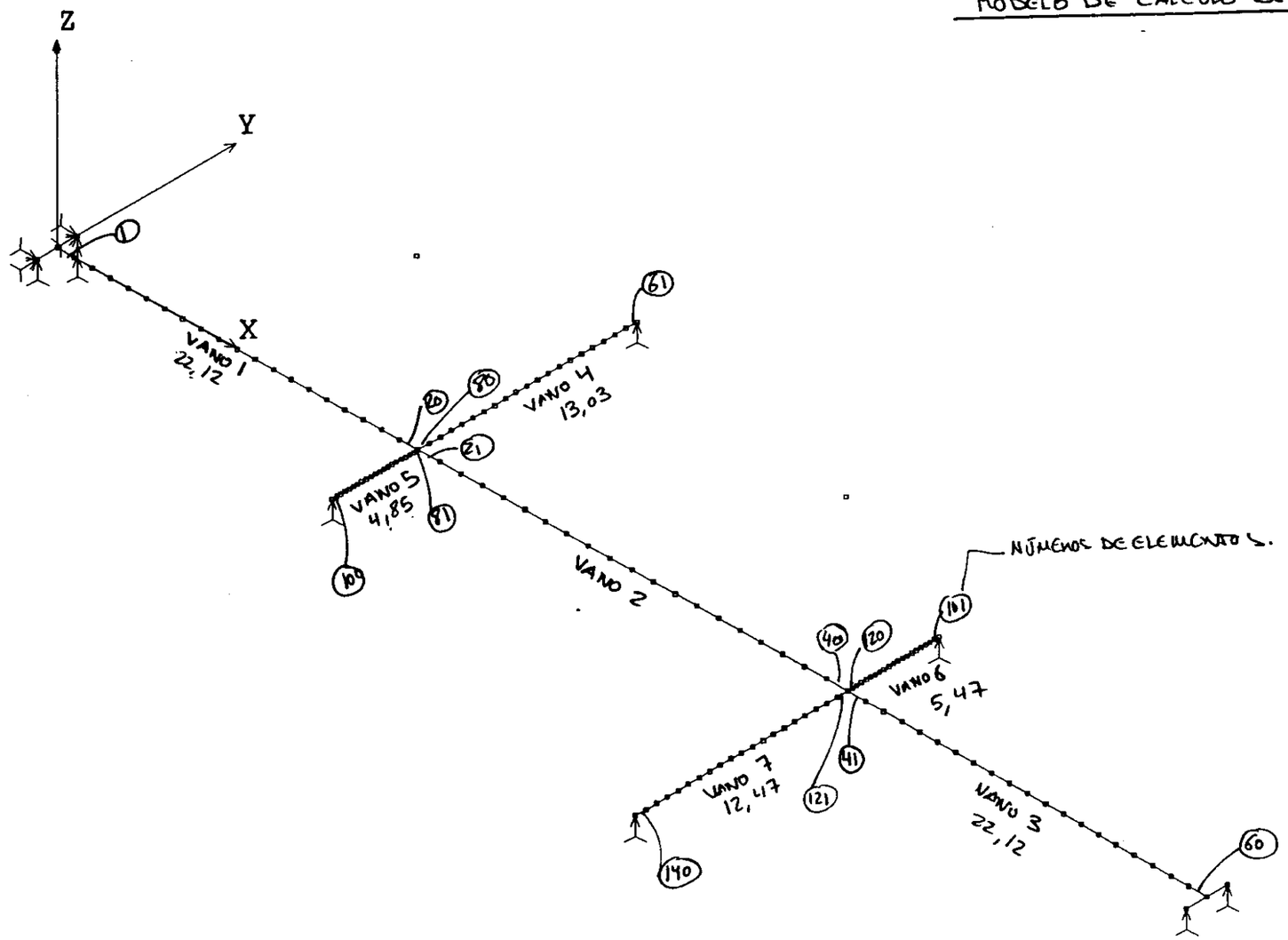
7) TREN SW/2

Sobrecarga 15,0 t/m.

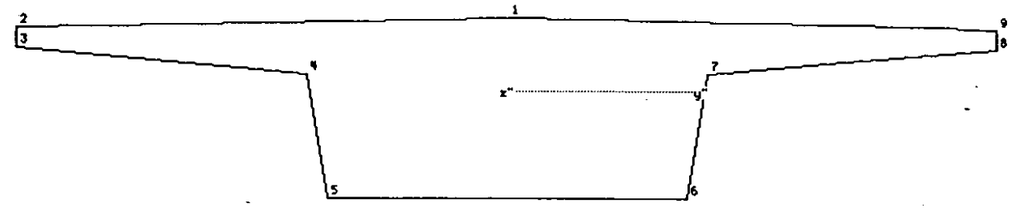
GeoStar 2.0 (64K Version):

RC CLR
1
2
3

E-1502.0
MODELO DE CALCULO DEL TABLERO



Mstb. 1 : 60.0



Sección :"APOYO" Armadura :""
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			

Características mecánicas de la sección:
Area : Ax= 8.485 [m2]
Momentos de inercia : Iy= 2.215 [m4] Iz= 28.448 [m4]
Inercia a torsión : Ix= 11.458 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.723786 [m]

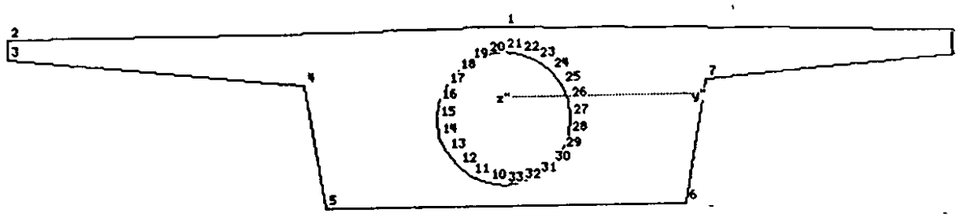
	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.989	0.706
dch.	Iz	4.750	5.989	-0.706
abajo	Iy	-1.026	-2.158	0.361
arriba	Iy	0.724	3.060	-0.254

Armadura: ningúna
Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H400"	380000.0	-226.600	-2.000	0.0	8.170	400.000

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Mstb. 1 : 60.0



Sección :"VANO" Armadura :""
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			
Puntos aligeramiento: 10			-16.82	-152.78	
11	-32.50	-146.29	12	-45.96	-135.96
13	-56.29	-122.50	14	-62.78	-106.82
15	-65.00	-90.00	16	-62.78	-73.18
17	-56.29	-57.50	18	-45.96	-44.04
19	-32.50	-33.71	20	-16.82	-27.21
21	0.00	-25.00	22	16.82	-27.21
23	32.50	-33.71	24	45.96	-44.04
25	56.29	-57.50	26	62.78	-73.18
27	65.00	-90.00	28	62.78	-106.82
29	56.29	-122.50	30	45.96	-135.96
31	32.50	-146.29	32	16.82	-152.78
33	0.00	-155.00			

Características mecánicas de la sección:
Area : Ax= 7.173 [m2]
Momentos de inercia : Iy= 2.029 [m4] Iz= 28.311 [m4]
Inercia a torsión : Ix= 8.188 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.691547 [m]

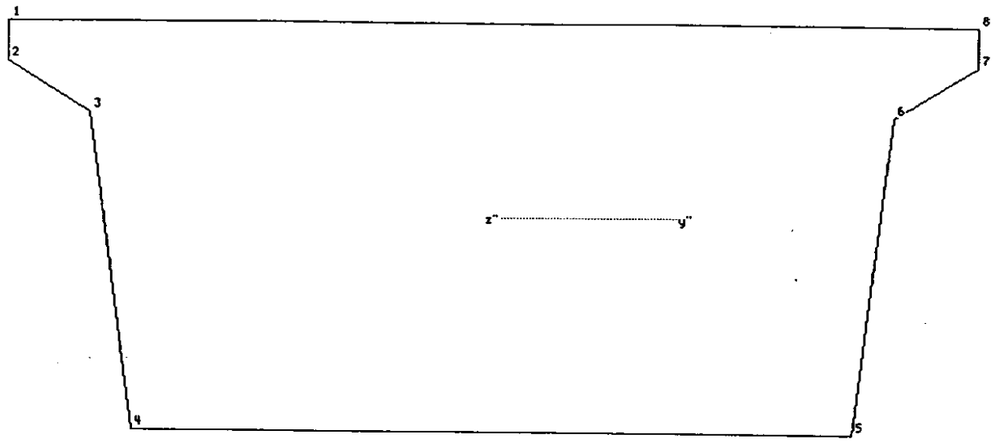
	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.960	0.831
dch.	Iz	4.750	5.960	-0.831
abajo	Iy	-1.058	-1.917	0.409
arriba	Iy	0.692	2.935	-0.267

Armadura: ninguna
Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H400"	380000.0	-226.600	-2.000	0.0	8.170	400.000

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)

Mstb. 1 : 30.0



Sección :"TRAV-1" Armadura :""
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	-235.00	0.00	2	-235.00	-20.00
3	-195.00	-45.00	4	-175.00	-200.00
5	175.00	-200.00	6	195.00	-45.00
7	235.00	-20.00	8	235.00	0.00

Características mecánicas de la sección:
Area : Ax= 7.750 [m2]
Momentos de inercia : Iy= 2.651 [m4] Iz= 9.963 [m4]
Inercia a torsión : Ix= 9.559 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.952839 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-2.350	-4.240	0.547
dch.	Iz	2.350	4.240	-0.547
abajo	Iy	-1.047	-2.531	0.359
arriba	Iy	0.953	2.782	-0.327

Armadura: ninguna
Características del material:

Nom.Mat.	Módulo E [N/mm2]	0.85*fcd,fyd [N/mm2]	eps-fc [o/oo]	fct [N/mm2]	fcv [N/mm2]	fcw,mín [N/mm2]
"H400"	38000.0	-22.660	-2.000	0.0	0.817000	40.000

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo tortante

GINPROSA

ASUNTO
E-1502.0
COEFICIENTE DE IMPACTO.

PAG. 1

MASA VIBRANTE

$\gamma = 2,5\ t/m^3$

Carga muerta = 8,8 t/m.

Se adopta un peso específico ficticio para la viga principal y para las traviesas

Viga $\gamma' = 2,5 + \frac{8,8}{a \cdot L_m} = 3,72\ t/m^3 \longrightarrow \gamma_{VM} = 0,372$ ton.

Traviesas $\gamma' = 2,5\ t/m^3 \longrightarrow \gamma_{TM} = 0,250$ ton.

De acuerdo con el cálculo de las masas de ubicación aforada el mayor periodo es:

$T = 0,228$ seg. $\longrightarrow n = 4,38$ Hz.

Esta frecuencia está comprendida en los límites marcados por el EC-2:

$n_{min} = 25,58 \times L^{-0,592} = 3,71$ Hz

$n_{max} = 94,76 \times L^{-0,748} = 8,21$ Hz.

El coeficiente de impacto según la IPF-75 es:

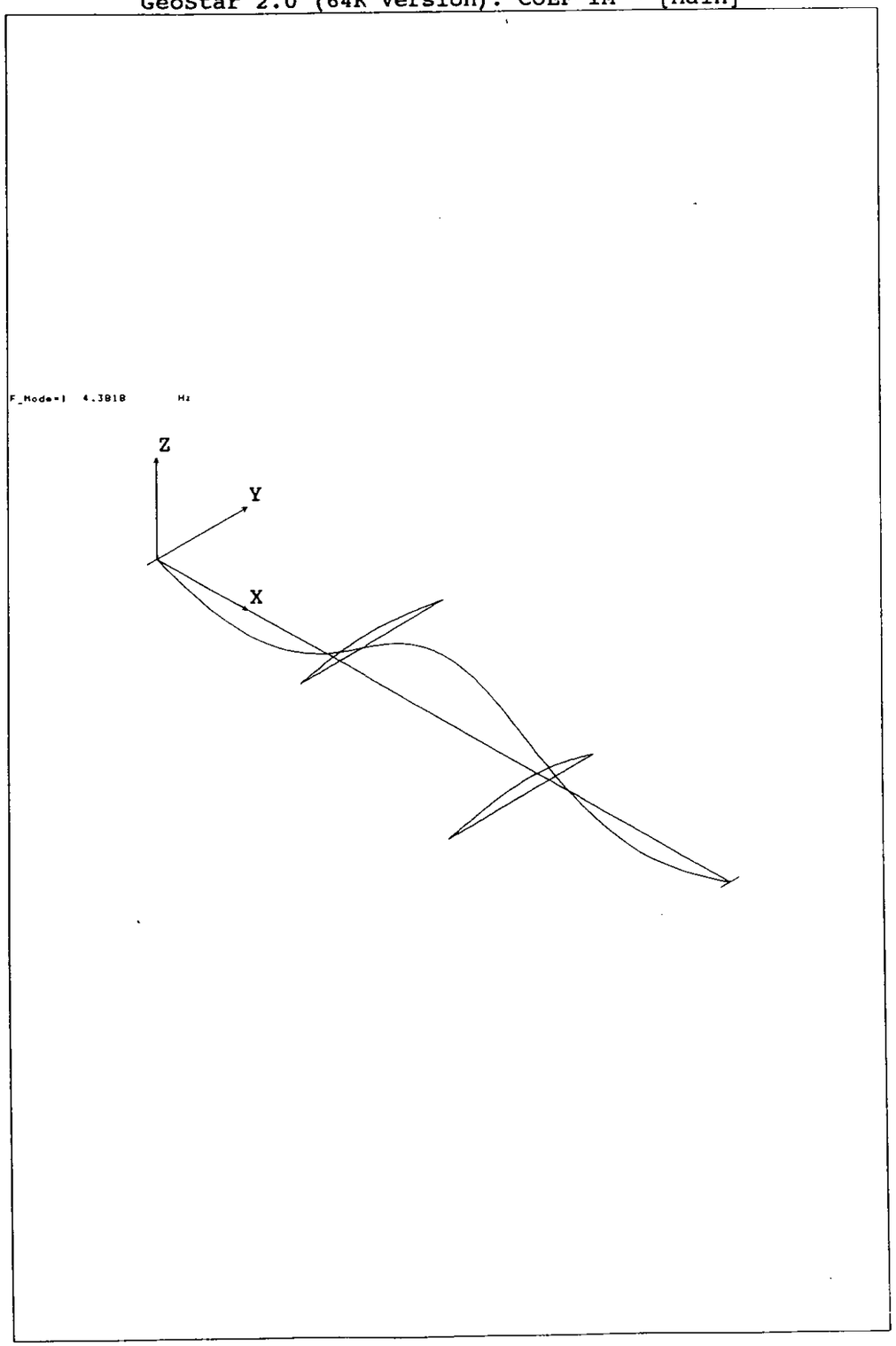
$\mu = \frac{V \cdot T}{2L} = \frac{55,5 \cdot 0,228}{2 \cdot L}$ $\begin{cases} L = 26,00 \rightarrow I = 1,17 \\ L = 22,12 \rightarrow \underline{I = 1,23} \end{cases}$

Coficiente según EC-2.

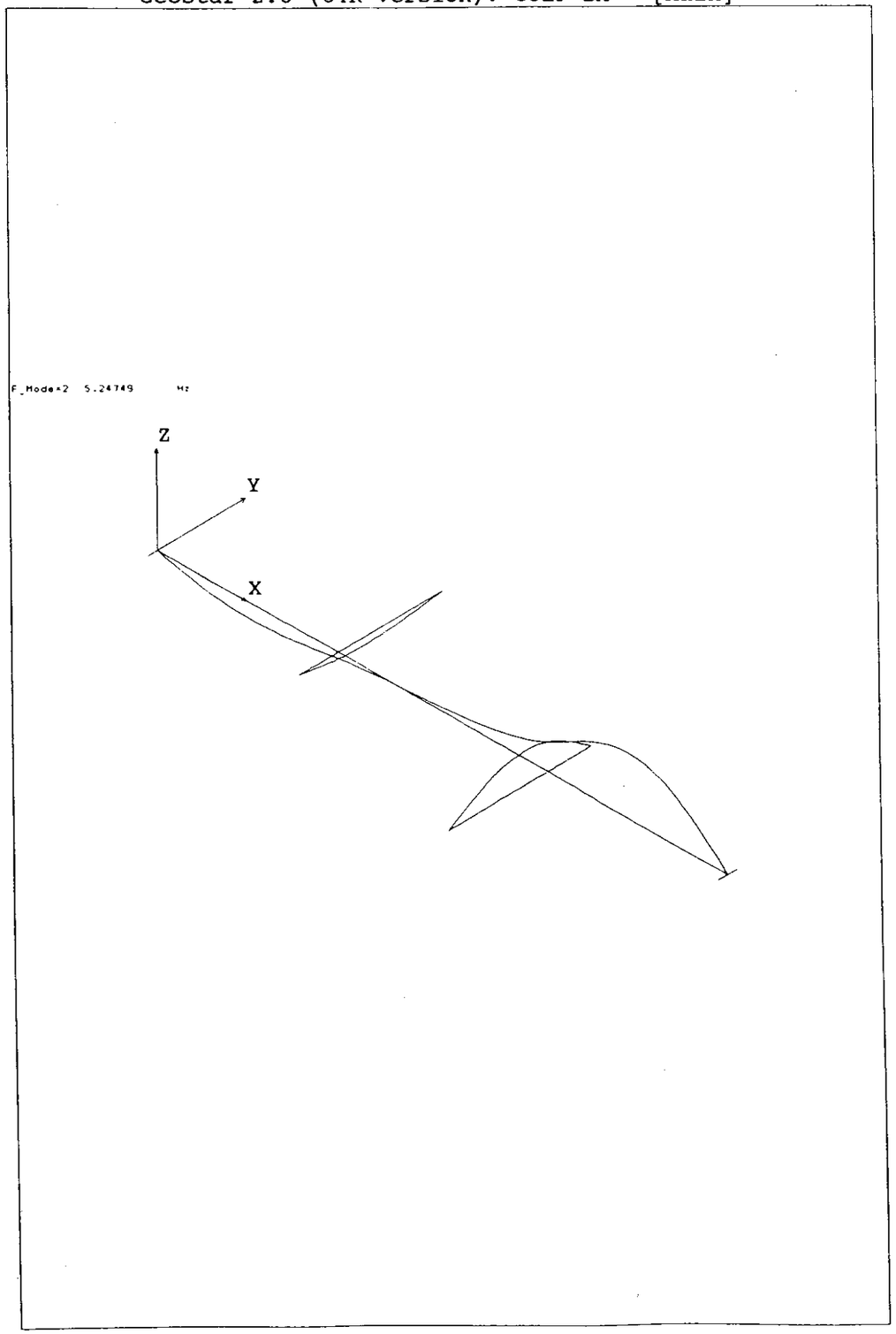
$\phi_2 = \frac{1,44}{12\rho - 0,2} + 0,82$ $\quad L_\rho = V \cdot L_m = 1,30 \times \frac{70,24}{3} = 30,43$

$\underline{\phi_2 = 1,09}$

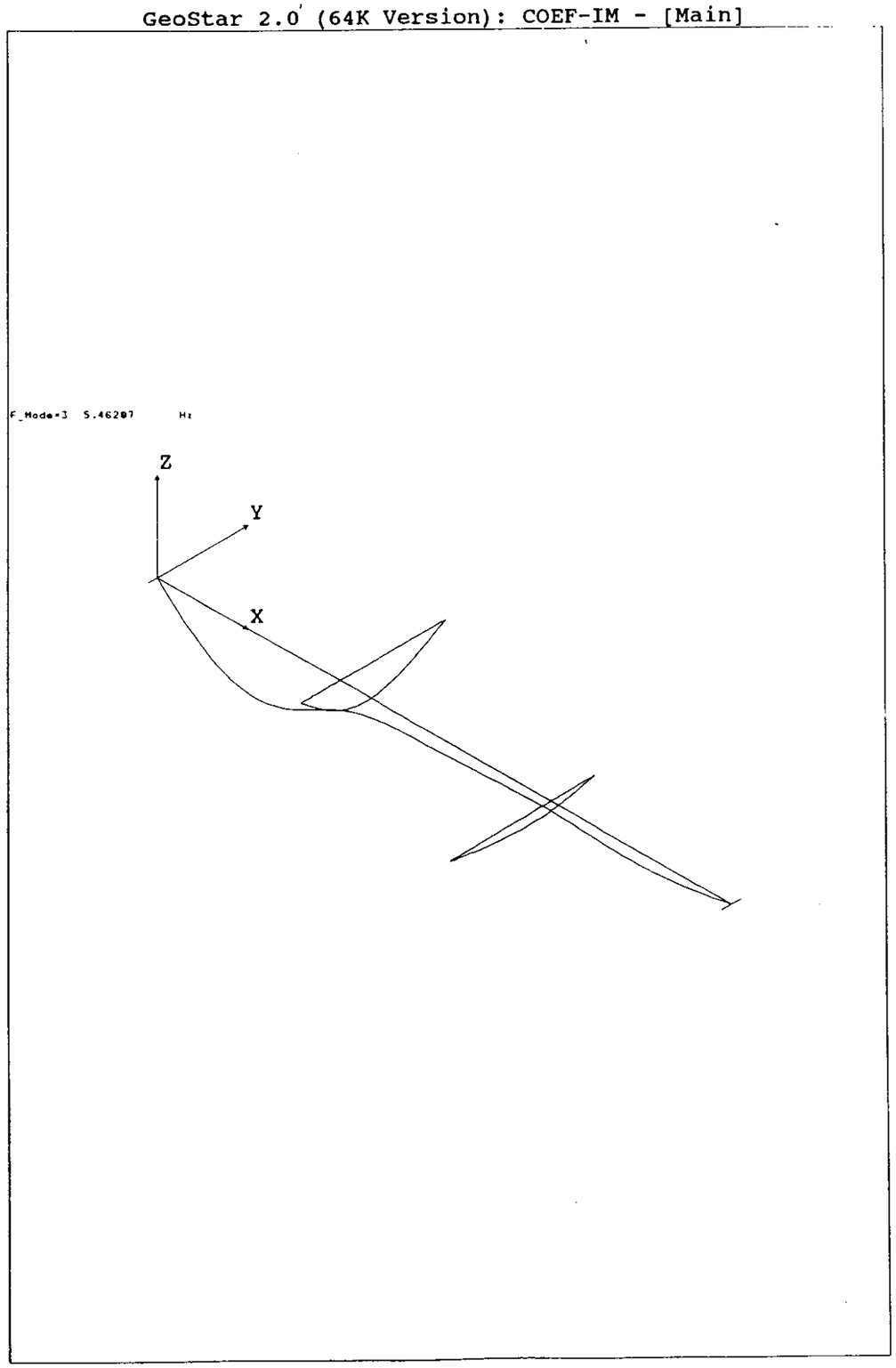
GeoStar 2.0 (64K Version): COEF-IM - [Main]



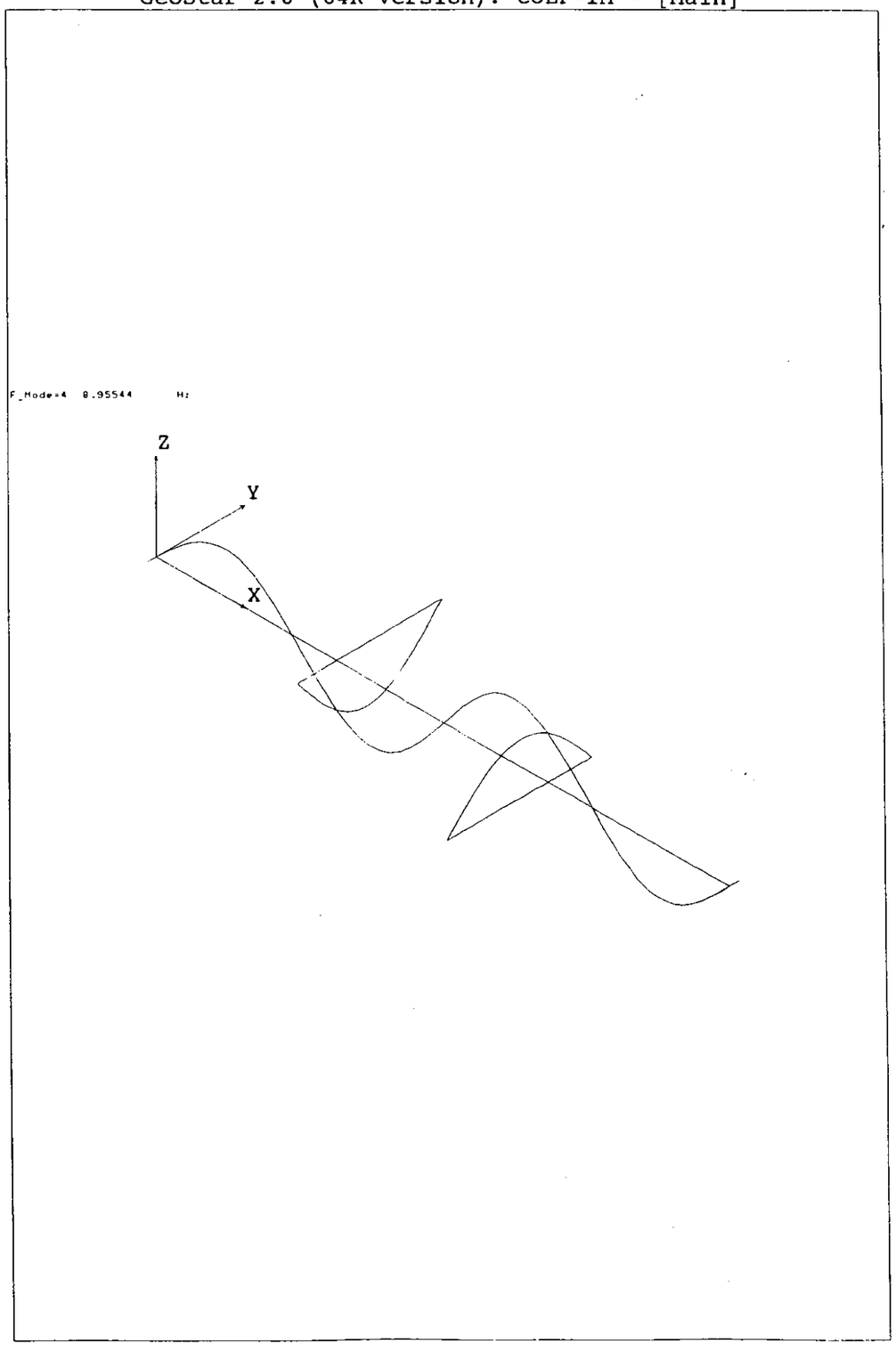
GeoStar 2.0 (64K Version): COEF-IM - [Main]



GeoStar 2.0 (64K Version): COEF-IM - [Main]



GeoStar 2.0 (64K Version): COEF-IM - [Main]



```
**********************************************************************
**********************************************************************
**                                                                  **
**                                                                  **
** CCCC  OOOO  SSSS  M   M  OOOO  SSSS   / M   M **
** C   O O S     MM MM O O S     / MM MM **
** C   O O SSSS  M M M M O O SSSS / M M M M **
** C   O O   S   M M M M O O   S / M M M M **
** CCCC  OOOO  SSSS  M   M  OOOO  SSSS/  M   M **
**                                                                  **
**                                                                  **
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**          COPYRIGHT 1988  S. R. A. C.            **
**                                                                  **
**********************************************************************
**********************************************************************
Problem name: COEF-IM
Date     : 10/20/1998    Time:  10:15:47
Title    :                                                          |
Subtitle :
```

Element group data

```
Element group number=   1
Element name:
BEAM3D  Three dimensional Elastic Beam elements
 Type of beam element = . . . . . .  0
   EQ. 0 ; Symmetric beam element
   EQ. 1 ; Unsymmetric beam element
   EQ. 2 ; Symmetric tapered beam element
```

Real constant data

```
 Real constant set   1
 Associated with :
 BEAM3D  Three dimensional Elastic Beam elements
  Area                          =   7.1730
  Moment of Inertia about element Y-axis =   28.311
  Moment of Inertia about element Z-axis =   2.0290
  Depth of beam (y-axis)        =   1.7500
  Width of beam (z-axis)        =   9.5000
  End release code (I-node)  [000000]  =      0
  End release code (J-node)  [000000]  =      0
  Moment of inertia about element x-axis =   2.3600
  Shear factor in the element y-axis   =   .00000
  Shear factor in the element z-axis   =   .00000
  Temp. difference in the element y-axis =   5.0000
  Temp. difference in the element z-axis =   .00000
  Orientation angle             =   .00000
  Torsion const for max shear stress    =   1.0000
 Real constant set   2
 Associated with :
 BEAM3D  Three dimensional Elastic Beam elements
  Area                          =   8.4850
  Moment of Inertia about element Y-axis =   28.448
  Moment of Inertia about element Z-axis =   2.2150
  Depth of beam (y-axis)        =   1.7500
  Width of beam (z-axis)        =   9.5000
  End release code (I-node)  [000000]  =      0
  End release code (J-node)  [000000]  =      0
  Moment of inertia about element x-axis =   2.3600
  Shear factor in the element y-axis   =   .00000
  Shear factor in the element z-axis   =   .00000
  Temp. difference in the element y-axis =   5.0000
  Temp. difference in the element z-axis =   .00000
  Orientation angle             =   .00000
  Torsion const for max shear stress    =   1.0000
 Real constant set   3
 Associated with :
 BEAM3D  Three dimensional Elastic Beam elements
  Area                          =   7.7500
  Moment of Inertia about element Y-axis =   9.9630
  Moment of Inertia about element Z-axis =   2.6510
  Depth of beam (y-axis)        =   2.0000
  Width of beam (z-axis)        =   4.7000
  End release code (I-node)  [000000]  =      0
  End release code (J-node)  [000000]  =      0
  Moment of inertia about element x-axis =   9.5550
  Shear factor in the element y-axis   =   .00000
  Shear factor in the element z-axis   =   .00000
  Temp. difference in the element y-axis =   5.0000
  Temp. difference in the element z-axis =   .00000
  Orientation angle             =   .00000
  Torsion const for max shear stress    =   1.0000
 Real constant set   4
 Associated with :
 BEAM3D  Three dimensional Elastic Beam elements
  Area                          =   100.00
  Moment of Inertia about element Y-axis =   100.00
  Moment of Inertia about element Z-axis =   100.00
  Depth of beam (y-axis)        =   .00000
  Width of beam (z-axis)        =   .00000
  End release code (I-node)  [000000]  =      0
  End release code (J-node)  [000000]  =      0
  Moment of inertia about element x-axis =   100.00
  Shear factor in the element y-axis   =   .00000
  Shear factor in the element z-axis   =   .00000
  Temp. difference in the element y-axis =   .00000
  Temp. difference in the element z-axis =   .00000
  Orientation angle             =   .00000
  Torsion const for max shear stress    =   .00000
```

Material propery data

```
 Material property set   1
                          Value     Temp curve no.
 EX   : X Elastic Modulus          .35000E+07     0
 NUXY : Poisson Ratio              .20000         0
 ALPX : X thermal expansion         .10000E-04    0
 DENS : Mass Density               .37200         0
 Material property set   2
                          Value     Temp curve no.
 EX   : X Elastic Modulus          .35000E+07     0
 NUXY : Poisson Ratio              .20000         0
 DENS : Mass Density               .25500         0
 Material property set   3
                          Value     Temp curve no.
 EX   : X Elastic Modulus          .35000E+07     0
 NUXY : Poisson Ratio              .20000         0
```

Nodal input data

NODE	BOUNDARY CONDITION CODES (0 = FREE ; 1 = FIXED)						NODAL POINT COORDINATES		
	X	Y	Z	XX	YY	ZZ	X	Y	Z
1	0	0	0	0	0	0	.00000	.00000	.00000
2	0	0	0	0	0	0	1.1060	.00000	.00000
3	0	0	0	0	0	0	2.2120	.00000	.00000
4	0	0	0	0	0	0	3.3180	.00000	.00000
5	0	0	0	0	0	0	4.4240	.00000	.00000
6	0	0	0	0	0	0	5.5300	.00000	.00000
7	0	0	0	0	0	0	6.6360	.00000	.00000
8	0	0	0	0	0	0	7.7420	.00000	.00000
9	0	0	0	0	0	0	8.8480	.00000	.00000
10	0	0	0	0	0	0	9.9540	.00000	.00000
11	0	0	0	0	0	0	11.060	.00000	.00000
12	0	0	0	0	0	0	12.166	.00000	.00000
13	0	0	0	0	0	0	13.272	.00000	.00000
14	0	0	0	0	0	0	14.378	.00000	.00000
15	0	0	0	0	0	0	15.484	.00000	.00000
16	0	0	0	0	0	0	16.590	.00000	.00000
17	0	0	0	0	0	0	17.696	.00000	.00000
18	0	0	0	0	0	0	18.802	.00000	.00000
19	0	0	0	0	0	0	19.908	.00000	.00000
20	0	0	0	0	0	0	21.014	.00000	.00000
21	0	0	0	0	0	0	22.120	.00000	.00000
22	1	1	1	1	1	1	.00000	.00000	10.000
24	0	0	0	0	0	0	23.420	.00000	.00000
25	0	0	0	0	0	0	24.720	.00000	.00000
26	0	0	0	0	0	0	26.020	.00000	.00000
27	0	0	0	0	0	0	27.320	.00000	.00000
28	0	0	0	0	0	0	28.620	.00000	.00000
29	0	0	0	0	0	0	29.920	.00000	.00000
30	0	0	0	0	0	0	31.220	.00000	.00000
31	0	0	0	0	0	0	32.520	.00000	.00000
32	0	0	0	0	0	0	33.820	.00000	.00000
33	0	0	0	0	0	0	35.120	.00000	.00000
34	0	0	0	0	0	0	36.420	.00000	.00000
35	0	0	0	0	0	0	37.720	.00000	.00000
36	0	0	0	0	0	0	39.020	.00000	.00000
37	0	0	0	0	0	0	40.320	.00000	.00000
38	0	0	0	0	0	0	41.620	.00000	.00000
39	0	0	0	0	0	0	42.920	.00000	.00000
40	0	0	0	0	0	0	44.220	.00000	.00000
41	0	0	0	0	0	0	45.520	.00000	.00000
42	0	0	0	0	0	0	46.820	.00000	.00000
43	0	0	0	0	0	0	48.120	.00000	.00000
46	0	0	0	0	0	0	49.226	.00000	.00000
47	0	0	0	0	0	0	50.332	.00000	.00000
48	0	0	0	0	0	0	51.438	.00000	.00000
49	0	0	0	0	0	0	52.544	.00000	.00000
50	0	0	0	0	0	0	53.650	.00000	.00000
51	0	0	0	0	0	0	54.756	.00000	.00000
52	0	0	0	0	0	0	55.862	.00000	.00000
53	0	0	0	0	0	0	56.968	.00000	.00000
54	0	0	0	0	0	0	58.074	.00000	.00000
55	0	0	0	0	0	0	59.180	.00000	.00000
56	0	0	0	0	0	0	60.286	.00000	.00000
57	0	0	0	0	0	0	61.392	.00000	.00000
58	0	0	0	0	0	0	62.498	.00000	.00000
59	0	0	0	0	0	0	63.604	.00000	.00000
60	0	0	0	0	0	0	64.710	.00000	.00000
61	0	0	0	0	0	0	65.816	.00000	.00000
62	0	0	0	0	0	0	66.922	.00000	.00000
63	0	0	0	0	0	0	68.028	.00000	.00000
64	0	0	0	0	0	0	69.134	.00000	.00000
65	0	0	0	0	0	0	70.240	.00000	.00000
67	0	1	1	0	0	0	22.120	13.035	.00000
68	0	0	0	0	0	0	22.120	12.383	.00000
69	0	0	0	0	0	0	22.120	11.732	.00000
70	0	0	0	0	0	0	22.120	11.080	.00000
71	0	0	0	0	0	0	22.120	10.428	.00000
72	0	0	0	0	0	0	22.120	9.7762	.00000
73	0	0	0	0	0	0	22.120	9.1245	.00000
74	0	0	0	0	0	0	22.120	8.4728	.00000
75	0	0	0	0	0	0	22.120	7.8210	.00000
76	0	0	0	0	0	0	22.120	7.1692	.00000
77	0	0	0	0	0	0	22.120	6.5175	.00000
78	0	0	0	0	0	0	22.120	5.8657	.00000
79	0	0	0	0	0	0	22.120	5.2140	.00000
80	0	0	0	0	0	0	22.120	4.5622	.00000
81	0	0	0	0	0	0	22.120	3.9105	.00000
82	0	0	0	0	0	0	22.120	3.2587	.00000
83	0	0	0	0	0	0	22.120	2.6070	.00000
84	0	0	0	0	0	0	22.120	1.9552	.00000
85	0	0	0	0	0	0	22.120	1.3035	.00000
86	0	0	0	0	0	0	22.120	.65175	.00000
88	1	1	1	1	1	1	22.120	.00000	10.000
90	0	0	0	0	0	0	22.120	-.24260	.00000
91	0	0	0	0	0	0	22.120	-.48520	.00000
92	0	0	0	0	0	0	22.120	-.72780	.00000
93	0	0	0	0	0	0	22.120	-.97040	.00000
94	0	0	0	0	0	0	22.120	-1.2130	.00000
95	0	0	0	0	0	0	22.120	-1.4556	.00000
96	0	0	0	0	0	0	22.120	-1.6982	.00000
97	0	0	0	0	0	0	22.120	-1.9408	.00000
98	0	0	0	0	0	0	22.120	-2.1834	.00000
99	0	0	0	0	0	0	22.120	-2.4260	.00000
100	0	0	0	0	0	0	22.120	-2.6686	.00000
101	0	0	0	0	0	0	22.120	-2.9112	.00000
102	0	0	0	0	0	0	22.120	-3.1538	.00000
103	0	0	0	0	0	0	22.120	-3.3964	.00000
104	0	0	0	0	0	0	22.120	-3.6390	.00000
105	0	0	0	0	0	0	22.120	-3.8816	.00000
106	0	0	0	0	0	0	22.120	-4.1242	.00000
107	0	0	0	0	0	0	22.120	-4.3668	.00000
108	0	0	0	0	0	0	22.120	-4.6094	.00000
109	0	0	1	0	0	0	22.120	-4.8520	.00000
111	0	0	1	0	0	0	48.120	5.4780	.00000
112	0	0	0	0	0	0	48.120	5.2041	.00000
113	0	0	0	0	0	0	48.120	4.9302	.00000
114	0	0	0	0	0	0	48.120	4.6563	.00000
115	0	0	0	0	0	0	48.120	4.3824	.00000
116	0	0	0	0	0	0	48.120	4.1085	.00000
117	0	0	0	0	0	0	48.120	3.8346	.00000
118	0	0	0	0	0	0	48.120	3.5607	.00000
119	0	0	0	0	0	0	48.120	3.2868	.00000
120	0	0	0	0	0	0	48.120	3.0129	.00000
121	0	0	0	0	0	0	48.120	2.7390	.00000
122	0	0	0	0	0	0	48.120	2.4651	.00000
123	0	0	0	0	0	0	48.120	2.1912	.00000
124	0	0	0	0	0	0	48.120	1.9173	.00000
125	0	0	0	0	0	0	48.120	1.6434	.00000
126	0	0	0	0	0	0	48.120	1.3695	.00000
127	0	0	0	0	0	0	48.120	1.0956	.00000
128	0	0	0	0	0	0	48.120	.82170	.00000
129	0	0	0	0	0	0	48.120	.54780	.00000
130	0	0	0	0	0	0	48.120	.27390	.00000
132	1	1	1	1	1	1	48.120	.00000	10.000
134	0	0	0	0	0	0	48.120	-.62395	.00000
135	0	0	0	0	0	0	48.120	-1.2479	.00000
136	0	0	0	0	0	0	48.120	-1.8719	.00000
137	0	0	0	0	0	0	48.120	-2.4958	.00000
138	0	0	0	0	0	0	48.120	-3.1198	.00000
139	0	0	0	0	0	0	48.120	-3.7437	.00000
140	0	0	0	0	0	0	48.120	-4.3677	.00000
141	0	0	0	0	0	0	48.120	-4.9916	.00000
142	0	0	0	0	0	0	48.120	-5.6156	.00000

143	0	0	0	0	0	0	48.120	-6.2395	.00000
144	0	0	0	0	0	0	48.120	-6.8635	.00000
145	0	0	0	0	0	0	48.120	-7.4874	.00000
146	0	0	0	0	0	0	48.120	-8.1114	.00000
147	0	0	0	0	0	0	48.120	-8.7353	.00000
148	0	0	0	0	0	0	48.120	-9.3593	.00000
149	0	0	0	0	0	0	48.120	-9.9832	.00000
150	0	0	0	0	0	0	48.120	-10.607	.00000
151	0	0	0	0	0	0	48.120	-11.231	.00000
152	0	0	0	0	0	0	48.120	-11.855	.00000
153	0	1	1	0	0	0	48.120	-12.479	.00000
154	1	1	1	0	0	1	.00000	1.2000	.00000
155	1	1	1	0	0	0	70.240	1.2000	.00000
156	1	1	1	0	0	0	.00000	-1.2000	.00000
157	0	0	1	0	0	0	70.240	-1.2000	.00000

Element input data

ELEM EGRP MP REAL ECS NODE 1 NODE 2 NODE 3 NODE 4 NODE 5 NODE 6
NODE 7 NODE 8 NODE 9 NODE10 NODE11 NODE12
NODE13 NODE14 NODE15 NODE16 NODE17 NODE18
NODE19 NODE20

1	1	1	2	-1	1	2	22
2	1	1	2	-1	2	3	22
3	1	1	1	-1	3	4	22
4	1	1	1	-1	4	5	22
5	1	1	1	-1	5	6	22
6	1	1	1	-1	6	7	22
7	1	1	1	-1	7	8	22
8	1	1	1	-1	8	9	22
9	1	1	1	-1	9	10	22
10	1	1	1	-1	10	11	22
11	1	1	1	-1	11	12	22
12	1	1	1	-1	12	13	22
13	1	1	1	-1	13	14	22
14	1	1	1	-1	14	15	22
15	1	1	1	-1	15	16	22
16	1	1	1	-1	16	17	22
17	1	1	1	-1	17	18	22
18	1	1	1	-1	18	19	22
19	1	1	2	-1	19	20	22
20	1	1	2	-1	20	21	22
21	1	1	2	-1	21	24	22
22	1	1	2	-1	24	25	22
23	1	1	1	-1	25	26	22
24	1	1	1	-1	26	27	22
25	1	1	1	-1	27	28	22
26	1	1	1	-1	28	29	22
27	1	1	1	-1	29	30	22
28	1	1	1	-1	30	31	22
29	1	1	1	-1	31	32	22
30	1	1	1	-1	32	33	22
31	1	1	1	-1	33	34	22
32	1	1	1	-1	34	35	22
33	1	1	1	-1	35	36	22
34	1	1	1	-1	36	37	22
35	1	1	1	-1	37	38	22
36	1	1	1	-1	38	39	22
37	1	1	1	-1	39	40	22
38	1	1	1	-1	40	41	22
39	1	1	2	-1	41	42	22
40	1	1	2	-1	42	43	22
41	1	1	2	-1	43	46	22
42	1	1	2	-1	46	47	22
43	1	1	1	-1	47	48	22
44	1	1	1	-1	48	49	22
45	1	1	1	-1	49	50	22
46	1	1	1	-1	50	51	22
47	1	1	1	-1	51	52	22
48	1	1	1	-1	52	53	22
49	1	1	1	-1	53	54	22
50	1	1	1	-1	54	55	22
51	1	1	1	-1	55	56	22
52	1	1	1	-1	56	57	22
53	1	1	1	-1	57	58	22
54	1	1	1	-1	58	59	22
55	1	1	1	-1	59	60	22
56	1	1	1	-1	60	61	22
57	1	1	1	-1	61	62	22
58	1	1	1	-1	62	63	22
59	1	1	2	-1	63	64	22
60	1	1	2	-1	64	65	22
61	1	2	3	-1	67	68	88
62	1	2	3	-1	68	69	88
63	1	2	3	-1	69	70	88
64	1	2	3	-1	70	71	88
65	1	2	3	-1	71	72	88
66	1	2	3	-1	72	73	88
67	1	2	3	-1	73	74	88
68	1	2	3	-1	74	75	88
69	1	2	3	-1	75	76	88
70	1	2	3	-1	76	77	88
71	1	2	3	-1	77	78	88
72	1	2	3	-1	78	79	88
73	1	2	3	-1	79	80	88
74	1	2	3	-1	80	81	88
75	1	2	3	-1	81	82	88
76	1	2	3	-1	82	83	88
77	1	2	3	-1	83	84	88
78	1	2	3	-1	84	85	88
79	1	2	3	-1	85	86	88
80	1	2	3	-1	86	21	88
81	1	2	3	-1	21	90	88
82	1	2	3	-1	90	91	88
83	1	2	3	-1	91	92	88
84	1	2	3	-1	92	93	88
85	1	2	3	-1	93	94	88
86	1	2	3	-1	94	95	88
87	1	2	3	-1	95	96	88
88	1	2	3	-1	96	97	88
89	1	2	3	-1	97	98	88
90	1	2	3	-1	98	99	88
91	1	2	3	-1	99	100	88
92	1	2	3	-1	100	101	88
93	1	2	3	-1	101	102	88
94	1	2	3	-1	102	103	88
95	1	2	3	-1	103	104	88
96	1	2	3	-1	104	105	88
97	1	2	3	-1	105	106	88
98	1	2	3	-1	106	107	88
99	1	2	3	-1	107	108	88
100	1	2	3	-1	108	109	88
101	1	2	3	-1	111	112	132
102	1	2	3	-1	112	113	132
103	1	2	3	-1	113	114	132
104	1	2	3	-1	114	115	132
105	1	2	3	-1	115	116	132
106	1	2	3	-1	116	117	132
107	1	2	3	-1	117	118	132
108	1	2	3	-1	118	119	132
109	1	2	3	-1	119	120	132
110	1	2	3	-1	120	121	132
111	1	2	3	-1	121	122	132
112	1	2	3	-1	122	123	132
113	1	2	3	-1	123	124	132
114	1	2	3	-1	124	125	132
115	1	2	3	-1	125	126	132
116	1	2	3	-1	126	127	132
117	1	2	3	-1	127	128	132
118	1	2	3	-1	128	129	132
119	1	2	3	-1	129	130	132
120	1	2	3	-1	130	43	132
121	1	2	3	-1	43	134	132
122	1	2	3	-1	134	135	132
123	1	2	3	-1	135	136	132
124	1	2	3	-1	136	137	132
125	1	2	3	-1	137	138	132
126	1	2	3	-1	138	139	132
127	1	2	3	-1	139	140	132
128	1	2	3	-1	140	141	132
129	1	2	3	-1	141	142	132
130	1	2	3	-1	142	143	132
131	1	2	3	-1	143	144	132
132	1	2	3	-1	144	145	132
133	1	2	3	-1	145	146	132
134	1	2	3	-1	146	147	132
135	1	2	3	-1	147	148	132
136	1	2	3	-1	148	149	132
137	1	2	3	-1	149	150	132
138	1	2	3	-1	150	151	132
139	1	2	3	-1	151	152	132
140	1	2	3	-1	152	153	132
141	1	3	4	-1	156	1	22
142	1	3	4	-1	1	154	22
143	1	3	4	-1	157	65	64
144	1	3	4	-1	65	155	64

CONTROL INFORMATION
NUMBER OF LOAD CASES . . . . . (NLCASE) = 1
SOLUTION MODE . . . . . (MODEX) = 2
EQ. 0, STATIC ANALYSIS
EQ. 1, BUCKLING ANALYSIS
EQ. 2, DYNAMIC ANALYSIS
THERMAL LOADING FLAG . . . . . (ITHERM) = 0
EQ. 0, NO THERMAL EFFECTS CONSIDERED
EQ. 1, ADD TEMPERATURE EFFECT
GRAVITY LOADING FLAG . . . . . (IGRAV) = 0
EQ. 0, NO GRAVITY LOADING CONSIDERED
EQ. 1, ADD GRAVITY LOADING EFFECT
CENTRIFUGAL LOADING FLAG . . . . . (ICNTRF) = 0
EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
IN-PLANE STIFFENING FLAG . . . . . (INPLN) = 0
EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
EQ. 1, IN-PLANE EFFECTS CONSIDERED
SOFT SPRING ADDITION FLAG . . . . . (ISOFT) = 0
EQ. 0, NO SOFT SPRING OPTION
EQ. 1, SOFT SPRING ADDED

SAVE DECOMPOSED STIFFNESS MATRIX FLAG . . . (ISAVK) = 0
EQ. 0, DO NOT SAVE DECOMPOSED K
EQ. 1, SAVE DECOMPOSED K
FORM STIFFNESS MATRIX FLAG . . . . . (IFORMK) = 0
EQ. 0, FORM STIFFNESS MATRIX
EQ. 1, USE EXISTING DECOMPOSED STIFFNESS MATRIX

SPIN SOFTENING FLAG . . . . . (ISPIN) = 0
EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
INERTIA RELIEF FLAG . . . . . (IFORMK) = 0
EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
RIGID CONNECTIONS FLAG . . . . . (IRIGID) = 0
EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS & SHELLS
EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS & SHELLS

TOTAL SYSTEM DATA
NUMBER OF EQUATIONS . . . . . (NEQ) = 853
NUMBER OF MATRIX ELEMENTS . . . . . (NWK) = 15977
MAXIMUM HALF BANDWIDTH . . . . . (MK) = 45
MEAN HALF BANDWIDTH . . . . . (MM) = 18
NUMBER OF ELEMENTS. . . . . (NUME) = -144
NUMBER OF NODAL POINTS. . . . . (NUMNP)= 148
ADJUSTED BLOCK SIZE . . . . . (MTBLK)= 15978
EXTRA MEMORY AVAILABLE (in 8-byte words) . . .(XMTBLK)= 4497390
NUMBER OF STIFFNESS BLOCKS. . . . . (NBLK) = 1

MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE = .586136E+11 (820)
MINIMUM DIAGONAL STIFFNESS MATRIX VALUE = .529486E+07 (246)
1

MASS MOMENT INFORMATION
|MASS .265118E+03 |VOLUME .128005E+04 |WEIGHT .000000E+00 |
| MASS MOMENT OF INERTIA W.R.T. C.G. |
|IX .291928E+04 |IY .922848E+05 |IZ .952040E+05 |
| MASS PRODUCT OF INERTIA W.R.T. C.G. |
|PXY -.349526E+04 |PXZ .000000E+00 |PYZ .000000E+00 |
| RADII OF GYRATION W.R.T. C.G. |
|RX .331832E+01 |RY .186571E+02 |RZ .189499E+02 |
| CENTER OF GRAVITY |
|CGx .351268E+02 |CGy .769733E-01 |CGz .000000E+00 |
| PRINCIPAL MASS MOMENT OF INERTIA |
|P1 .952040E+05 |P2 .924213E+05 |P3 .278278E+04 |
| PRINCIPAL RADII OF GYRATION |
|R1 .189499E+02 |R2 .186709E+02 |R3 .323981E+01 |
| PRINCIPAL AXES (DIRECTION COSINES IN ROWS W.R.T C.G) |
|N_11 .641032E+00 |N_12 .767514E+00 |N_13 .000000E+00 |
|N_21 .390269E-01 |N_22 .999238E+00 |N_23 .000000E+00 |

|----------|
|N_31 .000000E+00 |N_32 .000000E+00 |N_33 .610590E+00 |

Note: In the above table, WEIGHT is computed based on the user defined acceleration for the first active Load Case

3	.3431922E+02	.5462073E+01	.1830807E+00
4	.5626867E+02	.8955437E+01	.1116640E+00
5	.6739509E+02	.1072626E+02	.9322913E-01
6	.7694321E+02	.1224589E+02	.8166004E-01
7	.7787117E+02	.1239358E+02	.8068693E-01
8	.1063034E+03	.1691871E+02	.5910614E-01
9	.1149795E+03	.1829955E+02	.5464615E-01
10	.1305360E+03	.2077545E+02	.4813373E-01

SOLUTION PARAMETERS

NUMBER OF EIGENVALUES. . . . . (NFR)= 10
MASS TYPE: 1-LUMPED,2-CONSISTENT. . . . (MASS)= 1
MODE SHAPE PRINT FLAG. . . . . (MPRNT)= 1
INTERMEDIATE SOLUTION PRINT FLAG . . (IFPR)= 0
STURM SEQUENCE CHECK FLAG. . . . . (IFSS)= 0
MAXIMUM NUMBER OF ITERATIONS . . . . . (ITMAX)= 16
FREQUENCY SHIFT FLAG . . . . . (IFRSH)= 0
FREQUENCY SHIFT. . . . . (FRSH)= .0000000E+00
CONVERGENCE TOLERANCE. . . . . (RTOL)= .1000000E-04
COMPOSITE MODAL DAMPING CALC. FLAG . . .(IMDC)= 0
MODAL ACCELERATION FLAG. . . . . (IMAM)= 0

SOLUTION TIME LOG (sec)

INPUT PHASE 3
ASSEMBLAGE OF THE STIFFNESS MATRIX 0
ASSEMBLAGE OF THE MASS MATRIX 1
DECOMPOSITION OF THE STIFFNESS MATRIX 0
EIGENVALUE SOLUTION 6
OUTPUT PHASE 8
TOTAL SOLUTION TIME 18

SUBSPACE ITERATION

ITERATION NUMBER 1

ITERATION NUMBER 2

ITERATION NUMBER 3

ITERATION NUMBER 4

ITERATION NUMBER 5

ITERATION NUMBER 6

ITERATION NUMBER 7

ITERATION NUMBER 8

ITERATION NUMBER 9

ITERATION NUMBER 10

ITERATION NUMBER 11

CONVERGENCE REACHED FOR RTOL .1000E-04

FREQUENCY ANALYSIS
by
SUBSPACE ALGORITHM

FREQUENCY NUMBER	FREQUENCY (RAD/SEC)	FREQUENCY (CYCLES/SEC)	PERIOD (SECONDS)
1	.2753166E+02	.4381799E+01	.2282167E+00
2	.3297097E+02	.5247492E+01	.1905672E+00

GINPROSA

ASUNTO
E-1502.0
VERIFICACIÓN DEL PRETENSADO

Se realizarán las siguientes comprobaciones:

a) Durante las fases constructivas

Combinación: $PP + \begin{pmatrix} 0,9 \\ 1,1 \end{pmatrix} Pret + SC, construcción.$

Condiciones $\sigma_{max} = f_{ck}/1,60 = 2500\ t/m^2$

$\sigma_{min} = f_{ctk} = -244\ t/m^2$

b) En las fases finales:

Combinación frecuente:

$PP + CM + \begin{pmatrix} 0,9 \\ 1,1 \end{pmatrix} Pret + 0,60\ SC + 0,5\ Sob$

Condic: $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = 0$

Combinación rara:

$PP + CM + \begin{pmatrix} 0,9 \\ 1,1 \end{pmatrix} \times Pret + SC + 0,6\ Sob.$

Condiciones $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = f_{ctk}$

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-1.LIS

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 3

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=1
Parametros del tramo:
S0= 0.000 S1= 9.560 S2= 0.000 S3= 9.560 S4= 3.000 SR= 0.000
H1= 0.690 H2= 1.300 H3= 1.300 H4= 0.400

Tipo de cableado(1-2-3-4) para tramo nº2 TIPO=3
Parametros del tramo:
S1= 3.000 S2= 10.000 S3= 0.000 S4= 10.000 S5= 3.000
H1= 0.400 H2= 1.400 H3= 1.400 H5= 0.400

Tipo de cableado(1-2-3-4) para tramo nº3 TIPO=2
Parametros del tramo:
S0= 0.000 S1= 9.560 S2= 0.000 S3= 9.560 S4= 3.000 SR= 0.000
H1= 0.690 H2= 1.300 H3= 1.300 H4= 0.400

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...1
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1
Anclaje desde el que se tesa primero..(1=IZDO.)(2=DCHO.)...1
Fuerza de tesado inicial P0(ton)= 3232.0
Fuerza de tesado final P1(ton)= 3032.0
Area del cable (cm2)=212.800003
Coef.rozamiento cable-vaina NU=0.210000
Coef.rozamientos parasitos (K/NU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=10

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	9.560000	-0.006674	0.127615	0.690000
2	9.560000	19.120001	-0.007495	0.143312	0.614968
3	19.120001	22.120001	0.023885	-1.056688	12.086967
4	22.120001	25.120001	0.025641	-1.134359	12.946008
5	25.120001	35.120003	-0.007692	0.540308	-8.087801
6	35.120003	45.120003	-0.007692	0.540308	-8.087804
7	45.120003	48.120003	0.025641	-2.467692	59.772682
8	48.120003	51.120003	0.023885	-2.298726	55.707344
9	51.120003	60.680004	-0.007495	0.909642	-26.298536
10	60.680004	70.240005	-0.006674	0.810009	-23.275660

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	9.560000	0.000000	0.126929
2	9.560000	19.120001	0.126929	0.269272
3	19.120001	22.120001	0.269272	0.411615
4	22.120001	25.120001	0.411615	0.564264
5	25.120001	35.120003	0.564264	0.716913
6	35.120003	45.120003	0.716913	0.869563
7	45.120003	48.120003	0.869563	1.022212
8	48.120003	51.120003	1.022212	1.164555
9	51.120003	60.680004	1.164555	1.306898
10	60.680004	70.240005	1.306898	1.433827

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	9.560000	1.433827	1.306898
2	9.560000	19.120001	1.306898	1.164555
3	19.120001	22.120001	1.164555	1.022212
4	22.120001	25.120001	1.022212	0.869563
5	25.120001	35.120003	0.869563	0.716914
6	35.120003	45.120003	0.716914	0.564264
7	45.120003	48.120003	0.564264	0.411615
8	48.120003	51.120003	0.411615	0.269272
9	51.120003	60.680004	0.269272	0.126929
10	60.680004	70.240005	0.126929	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por izda. a_izda= 5.000(mm.)
Penetracion por retesado por izda. retesado _izda= 1.927(mm.)
Penetracion de cuñas ficticia por izda. a_ficticia_izda= 6.927(mm.)

Alcance de penetracion de cuñas+retesado por izda. x= 14.603(m.) perdidas= 5.881%

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 1.927(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 6.927(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 55.637(m.) perdidas= 5.881%

Punto de interseccion de curvas de perdidas x= 35.120(m.) perdidas= 17.700%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	9.560000	12.8	9.0	2818.2	2940.9
2	9.560000	14.603418	9.0	6.9	2940.9	3008.2
3	14.603418	19.120001	6.9	8.8	3008.2	2947.9
4	19.120001	22.120001	8.8	11.8	2947.9	2849.2
5	22.120001	25.120001	11.8	15.0	2849.2	2747.7
6	25.120001	35.120003	15.0	18.7	2747.7	2626.2
7	35.120003	45.120003	18.7	15.0	2626.2	2747.7
8	45.120003	48.120003	15.0	11.8	2747.7	2849.2
9	48.120003	51.120003	11.8	8.8	2849.2	2947.9
10	51.120003	55.636585	8.8	6.9	2947.9	3008.2
11	55.636585	60.680004	6.9	9.0	3008.2	2940.9
12	60.680004	70.240005	9.0	12.8	2940.9	2818.2

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 465.577
Alargamiento por la dcha.(mm.)= 48.500
ALARGAMIENTO TOTAL(mm.)= 514.077

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	9.560000	36.719	39.257
2	9.560000	14.603418	44.086	44.712
3	14.603418	19.120001	44.712	42.864
4	19.120001	22.120001	-136.594	-136.108
5	22.120001	25.120001	-146.112	-136.049
6	25.120001	35.120003	40.815	40.404
7	35.120003	45.120003	40.404	40.815
8	45.120003	48.120003	-136.049	-146.112
9	48.120003	51.120003	-136.108	-136.594
10	51.120003	55.636585	42.864	44.712
11	55.636585	60.680004	44.712	44.086
12	60.680004	70.240005	39.257	36.719

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	-356.750	2795.515
x= 70.240	-356.750	-2795.515

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-2.LIS

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...1
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1
Anclaje desde el que se tesa primero..(1=IZDO.)(2=DCHO.)...1

Fuerza de tesado inicial P0(ton)= 5740.0
Fuerza de tesado final P1(ton)= 5380.0
Area del cable (cm2)=378.000000
Coef.rozamiento cable-vaina NU=0.210000
Coef.rozamientos parasitos (K/NU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=2

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	13.035000	0.000000	0.061370	0.950000
2	13.035000	17.886999	0.000000	-0.164880	3.899220

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	13.035000	0.000000	0.000000
2	13.035000	17.886999	0.224703	0.224703

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	13.035000	0.224703	0.224703
2	13.035000	17.886999	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por izda. a_izda= 5.000(mm.)
Penetracion por retesado por izda. retesado _izda= 4.837(mm.)
Penetracion de cuñas ficticia por izda. a_ficticia_izda= 9.837(mm.)

Alcance de penetracion de cuñas+retesado por izda. x= 13.035(m.) perdidas= 5.536%

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 2.196(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 7.196(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 0.000(m.) perdidas= 6.945%

Punto de intersección de curvas de perdidas x= 13.035(m.) perdidas= 0.000%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	13.035000	12.1	10.5	5044.7	5138.2
2	13.035000	17.886999	14.3	14.9	4917.9	4882.9

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 139.607
Alargamiento por la dcha.(mm.)= 4.429
ALARGAMIENTO TOTAL(mm.)= 144.036

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	13.035000	0.000	0.000
2	13.035000	17.886999	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	-309.009	5035.187
x= 13.035	1114.795	-276.153
x= 17.887	-794.366	-4817.844

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-3.LIS

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...1
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1
Anclaje desde el que se tesa primero..(1=IZDO.)(2=DCHO.)...1

Fuerza de tesado inicial P0(ton)= 5740.0
Fuerza de tesado final P1(ton)= 5380.0
Area del cable (cm2)=378.000000
Coef.rozamiento cable-vaina NU=0.210000
Coef.rozamientos parasitos (K/NU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=2

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	5.478000	0.000000	0.146040	0.950000
2	5.478000	17.957001	0.000000	-0.064110	2.101180

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	5.478000	0.000000	0.000000
2	5.478000	17.957001	0.209037	0.209037

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	5.478000	0.209037	0.209037
2	5.478000	17.957001	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por izda. a_izda= 5.000(mm.)
Penetracion por retesado por izda. retesado _izda= 2.445(mm.)
Penetracion de cuñas ficticia por izda. a_ficticia_izda= 7.445(mm.)

Alcance de penetracion de cuñas+retesado por izda. x= 17.957(m.) perdidas= 6.656%

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 4.699(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 9.699(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 5.478(m.) perdidas= 5.643%

Punto de interseccion de curvas de perdidas x= 5.478(m.) perdidas= 0.000%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	5.478000	14.4	13.7	4916.0	4955.5
2	5.478000	17.957001	10.8	12.3	5121.9	5032.4

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 137.686
Alargamiento por la dcha.(mm.)= 6.819
ALARGAMIENTO TOTAL(mm.)= 144.505

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	5.478000	0.000	0.000
2	5.478000	17.957001	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	-710.404	4864.446
x= 5.478	1043.804	207.925
x= 17.957	-321.965	-5022.075

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

PUENTE EN VACIO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1502.0

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	1179	-39
2	Σ pp(i) + 1.1 x Σ pret(i)	1653	-169
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	1146	-21
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1617	-136

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	0.0	0.0	0.0	8.1	0.0	0.0	-5.6	0.0	0.0	160.4	2818.0	93.0	-325.5	326.3	260.1	398.8	317.9	326.3	260.1	398.8	317.9
1	2	0.0	0.0	0.0	0.0	8.3	7.0	0.0	-6.2	-5.6	0.0	164.4	136.9	2818.0	-244.0	-283.9	280.9	324.5	331.3	413.6	283.6	320.6	334.1	409.7
1	3	0.0	0.0	0.0	0.0	15.5	6.0	0.0	-12.4	-5.6	0.0	302.9	113.5	2818.0	-535.0	-242.3	292.7	446.8	334.9	581.2	298.0	438.7	340.2	573.1
1	4	0.0	0.0	0.0	0.0	21.6	4.9	0.0	-18.7	-5.6	0.0	417.4	93.6	2818.0	-870.3	-200.7	229.0	544.5	248.3	713.9	236.3	533.2	255.6	702.7
1	5	0.0	0.1	0.0	0.0	26.4	3.9	0.0	-24.9	-5.6	0.0	510.1	73.8	2818.0	-1068.9	-159.1	199.7	589.5	205.4	779.6	208.7	575.7	214.4	765.8
1	6	0.0	0.1	0.0	0.0	30.1	2.8	0.0	-31.1	-5.6	0.0	580.7	54.0	2818.0	-1222.1	-117.5	176.7	624.6	172.1	830.7	187.0	608.9	182.3	815.0
1	7	0.0	0.1	0.0	0.0	32.7	1.8	0.0	-37.3	-5.6	0.0	629.5	34.1	2818.0	-1329.3	-75.9	160.5	649.5	148.5	866.8	171.6	632.4	159.7	849.8
1	8	0.0	0.1	0.0	0.0	34.0	0.7	0.0	-43.6	-5.6	0.0	656.2	14.3	2819.0	-1390.6	-34.3	151.0	664.4	134.8	888.2	162.5	646.7	146.4	870.4
1	9	0.0	0.1	0.0	0.0	34.3	-0.3	0.0	-49.8	-5.6	0.0	661.1	-5.5	2819.0	-1405.8	7.3	148.0	669.0	130.8	894.4	159.6	651.1	142.5	876.5
1	10	0.0	0.1	0.0	0.0	33.3	-1.4	0.0	-56.0	-5.6	0.0	644.0	-25.4	2819.0	-1374.0	49.9	151.9	663.0	136.9	885.0	163.2	645.6	148.2	867.7
1	11	0.0	0.1	0.0	0.0	31.2	-2.4	0.0	-62.2	-5.6	0.0	605.0	-45.2	2941.0	-1364.2	100.2	156.9	694.1	146.0	918.5	167.5	677.8	156.6	902.2
1	12	0.0	0.1	0.0	0.0	27.9	-3.5	0.0	-68.5	-5.6	0.0	544.0	-65.0	2941.0	-1226.5	149.0	178.3	661.2	176.8	871.2	187.9	646.6	186.3	856.7
1	13	0.0	0.0	0.0	0.0	23.5	-4.5	0.0	-74.7	-5.6	0.0	461.0	-84.9	2941.0	-1035.0	197.7	208.8	614.5	220.3	804.6	216.8	602.3	228.3	792.3
1	14	0.0	0.0	0.0	0.0	17.9	-5.6	0.0	-80.9	-5.6	0.0	356.2	-104.7	2941.0	-789.3	246.5	248.4	553.8	276.6	718.2	254.5	544.5	282.7	708.9
1	15	0.0	0.0	0.0	0.0	11.1	-6.6	0.0	-87.1	-5.6	0.0	229.4	-124.5	3008.0	-513.0	301.2	298.3	498.7	347.2	636.1	302.1	492.8	351.0	630.3
1	16	0.0	0.0	0.0	0.0	3.2	-7.7	0.0	-93.3	-5.6	0.0	80.7	-144.4	3008.0	-152.3	351.1	358.2	406.8	431.7	506.6	359.3	405.1	432.8	504.9
1	17	0.0	0.0	0.0	0.0	-5.9	-8.7	0.0	-99.6	-5.6	0.0	-89.9	-164.2	3008.0	263.6	401.0	427.6	300.5	529.4	356.9	425.6	303.6	527.4	359.9
1	18	0.0	0.0	0.0	0.0	-16.1	-9.8	0.0	-105.8	-5.6	0.0	-282.5	-184.0	3008.0	734.6	450.8	506.4	179.8	640.3	187.0	500.9	188.2	634.8	195.4
1	19	0.0	0.0	0.0	0.0	-27.5	-10.8	0.0	-112.0	-5.6	0.0	-497.0	-203.9	2948.0	1193.0	353.4	566.3	68.9	729.7	26.6	556.9	83.3	720.4	40.9
1	20	0.0	-0.1	0.0	0.0	-40.1	-11.9	0.0	-118.2	-5.6	0.0	-735.6	-227.3	2948.0	1582.8	189.9	553.3	-21.3	731.2	-107.5	539.9	-1.4	717.8	-87.5
1	21	0.0	-0.1	0.0	0.0	-53.8	-12.9	0.0	-124.4	-5.6	0.0	-1000.0	-250.8	2948.0	1706.6	34.1	501.9	54.9	688.1	-43.6	483.8	81.7	670.1	-16.8
2	1	0.0	-0.1	0.0	0.0	-53.8	12.4	0.0	-124.4	-2.6	0.0	-1000.0	244.1	2849.0	1675.6	-3.2	468.2	66.6	644.8	-21.6	450.6	91.6	627.2	3.4
2	2	0.0	-0.1	0.0	0.0	-38.5	11.2	0.0	-127.8	-2.6	0.0	-700.6	216.5	2849.0	1548.2	-191.7	528.6	-19.0	696.9	-95.4	516.0	-1.2	684.3	-77.6
2	3	0.0	0.0	0.0	0.0	-24.7	10.0	0.0	-131.1	-2.6	0.0	-436.9	188.9	2849.0	1174.9	-382.0	568.8	33.6	728.2	-9.6	560.4	46.5	719.8	3.3
2	4	0.0	0.0	0.0	0.0	-12.5	8.7	0.0	-134.4	-2.6	0.0	-206.5	165.6	2748.0	547.7	-397.7	442.3	195.3	556.3	214.8	438.1	201.8	552.0	221.3
2	5	0.0	0.0	0.0	0.0	-2.0	7.5	0.0	-137.7	-2.6	0.0	-6.3	142.3	2748.0	80.6	-331.9	367.4	310.2	449.5	378.4	366.7	311.2	448.8	379.5
2	6	0.0	0.0	0.0	0.0	7.0	6.3	0.0	-141.0	-2.6	0.0	163.6	119.0	2748.0	-315.1	-277.0	303.9	407.4	359.1	516.9	306.3	403.8	361.5	513.3
2	7	0.0	0.0	0.0	0.0	14.3	5.0	0.0	-144.4	-2.6	0.0	303.1	95.7	2748.0	-639.4	-222.0	252.0	486.9	285.1	630.3	256.9	479.5	290.0	622.8
2	8	0.0	0.0	0.0	0.0	20.1	3.8	0.0	-147.7	-2.6	0.0	412.3	72.4	2747.0	-892.2	-167.1	211.6	548.6	227.5	718.3	218.5	538.1	234.3	707.8
2	9	0.0	0.0	0.0	0.0	24.2	2.6	0.0	-151.0	-2.6	0.0	491.3	49.1	2747.0	-1073.5	-112.1	183.0	592.5	186.4	781.1	191.2	579.8	194.7	768.5
2	10	0.0	0.1	0.0	0.0	26.7	1.3	0.0	-154.3	-2.6	0.0	540.0	25.8	2747.0	-1183.3	-57.1	165.9	618.7	161.9	818.8	175.0	604.7	171.0	804.8
2	11	0.0	0.1	0.0	0.0	27.7	0.1	0.0	-157.6	-2.6	0.0	558.3	2.4	2747.0	-1221.6	-2.2	160.4	627.1	153.7	831.2	169.8	612.7	163.2	816.8
2	12	0.0	0.1	0.0	0.0	27.0	-1.1	0.0	-161.0	-2.6	0.0	546.4	-20.9	2626.0	-1104.8	50.4	176.9	563.3	174.9	751.8	186.1	549.2	184.1	737.8
2	13	0.0	0.1	0.0	0.0	24.7	-2.4	0.0	-164.3	-2.6	0.0	504.1	-44.2	2626.0	-1005.2	102.8	193.0	538.6	197.8	716.7	201.5	525.7	206.2	703.8
2	14	0.0	0.0	0.0	0.0	20.8	-3.6	0.0	-167.6	-2.6	0.0	431.4	-67.5	2626.0	-837.3	155.4	219.8	497.6	236.0	658.2	226.9	486.8	243.1	647.4
2	15	0.0	0.0	0.0	0.0	15.3	-4.8	0.0	-170.9	-2.6	0.0	328.5	-90.8	2626.0	-601.2	207.9	257.1	440.4	289.4	576.4	262.3	432.4	294.6	568.4
2	16	0.0	0.0	0.0	0.0	8.2	-6.1	0.0	-174.2	-2.6	0.0	195.3	-114.1	2626.0	-296.7	260.4	305.1	366.9	358.1	471.1	307.9	362.6	360.9	466.8
2	17	0.0	0.0	0.0	0.0	-0.5	-7.3	0.0	-177.6	-2.6	0.0	31.8	-137.4	2627.0	76.0	313.0	363.7	277.3	442.1	342.7	363.5	277.6	442.0	342.9
2	18	0.0	0.0	0.0	0.0	-10.8	-8.6	0.0	-180.9	-2.6	0.0	-162.1	-160.7	2627.0	517.0	365.5	432.9	171.4	541.3	190.6	429.2	177.0	537.6	196.3
2	19	0.0	0.0	0.0	0.0	-22.7	-9.8	0.0	-184.2	-2.6	0.0	-386.2	-184.1	2627.0	1013.8	389.9	508.8	55.0	651.1	22.4	501.1	66.8	643.4	34.3
2	20	0.0	-0.1	0.0	0.0	-36.3	-11.0	0.0	-187.5	-2.6	0.0	-643.5	-211.6	2748.0	1470.5	181.0	528.5	-38.7	694.0	-118.5	516.3	-20.6	681.8	-100.5
2	21	0.0	-0.1	0.0	0.0	-51.4	-12.3	0.0	-190.8	-2.6	0.0	-936.5	-239.2	2748.0	1587.2	-2.1	465.3	54.9	638.7	-36.5	448.1	80.5	621.4	-10.9
3	1	0.0	-0.1	0.0	0.0	-51.4	12.8	0.0	-190.8	8.6	0.0	-936.5	247.9	2849.0	1620.2	-25.6	472.6	60.3	645.7	-22.8	455.8	84.1	628.9	1.1
3	2	0.0	-0.1	0.0	0.0	-37.8	11.8	0.0	-181.3	8.6	0.0	-675.3	224.5	2849.0	1503.7	-184.1	523.7	-12.2	689.1	-84.5	511.4	5.3	676.8	-67.0
3	3	0.0	0.0	0.0	0.0	-25.3	10.7	0.0	-171.8	8.6	0.0	-439.9	201.0	2849.0	1219.2	-332.6	581.3	14.4	743.8	-33.5	572.7	27.6	735.2	-20.2

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

PUENTE EN VACIO

PROYECTO: L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1502.0

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	1179	-39
2	Σ pp(i) + 1.1 x Σ pret(i)	1653	-169
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	1146	-21
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1617	-136

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		. Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	4	0.0	0.0	0.0	0.0	-14.1	9.7	0.0	-162.2	8.6	0.0	-228.6	181.2	2849.0	680.6	-474.1	488.2	157.1	614.0	165.5	483.4	164.4	609.2	172.8
3	5	0.0	0.0	0.0	0.0	-3.9	8.6	0.0	-152.7	8.6	0.0	-39.2	161.3	2948.0	223.7	-391.3	425.1	285.3	522.5	344.1	423.8	287.3	521.2	346.2
3	6	0.0	0.0	0.0	0.0	5.0	7.6	0.0	-143.1	8.6	0.0	128.3	141.5	2948.0	-182.0	-342.5	357.8	388.4	427.6	489.6	359.5	385.8	429.3	487.0
3	7	0.0	0.0	0.0	0.0	12.8	6.5	0.0	-133.6	8.6	0.0	273.8	121.7	2948.0	-533.7	-293.6	299.6	477.7	345.4	615.6	303.9	471.0	349.8	608.9
3	8	0.0	0.0	0.0	0.0	19.5	5.5	0.0	-124.0	8.6	0.0	397.4	101.8	2948.0	-831.3	-244.7	250.4	552.9	276.0	721.9	257.1	542.8	282.6	711.8
3	9	0.0	0.0	0.0	0.0	24.9	4.4	0.0	-114.5	8.6	0.0	499.1	82.0	3008.0	-1105.5	-199.2	208.6	636.2	217.1	835.5	217.1	623.2	225.6	822.4
3	10	0.0	0.1	0.0	0.0	29.3	3.4	0.0	-105.0	8.6	0.0	578.9	62.2	3008.0	-1298.0	-149.3	176.7	685.0	172.2	904.4	186.7	669.7	182.1	889.1
3	11	0.0	0.1	0.0	0.0	32.4	2.3	0.0	-95.4	8.6	0.0	636.7	42.3	3008.0	-1435.4	-99.4	154.3	719.4	140.4	953.1	165.3	702.5	151.4	936.2
3	12	0.0	0.1	0.0	0.0	34.4	1.3	0.0	-85.9	8.6	0.0	672.5	22.5	3008.0	-1517.9	-49.5	141.2	739.4	121.7	981.8	152.9	721.5	133.4	963.8
3	13	0.0	0.1	0.0	0.0	35.2	0.2	0.0	-76.3	8.6	0.0	686.5	2.7	2941.0	-1506.3	-3.2	141.1	718.3	120.5	957.5	153.1	699.9	132.5	939.2
3	14	0.0	0.1	0.0	0.0	34.9	-0.8	0.0	-66.8	8.6	0.0	678.4	-17.2	2941.0	-1485.8	39.6	144.6	712.9	125.4	950.0	156.5	694.7	137.3	931.8
3	15	0.0	0.1	0.0	0.0	33.4	-1.9	0.0	-57.3	8.6	0.0	648.5	-37.0	2941.0	-1418.3	83.0	155.1	696.8	140.6	926.8	166.5	679.3	151.9	909.4
3	16	0.0	0.1	0.0	0.0	30.7	-2.9	0.0	-47.7	8.6	0.0	596.6	-56.8	2941.0	-1302.7	126.4	172.9	669.6	166.2	887.6	183.4	653.5	176.6	871.5
3	17	0.0	0.1	0.0	0.0	26.9	-4.0	0.0	-38.2	8.6	0.0	522.8	-76.7	2941.0	-1139.2	169.8	197.9	631.3	202.3	832.2	207.0	617.2	211.5	818.2
3	18	0.0	0.0	0.0	0.0	21.9	-5.0	0.0	-28.6	8.6	0.0	426.9	-96.5	2941.0	-926.9	213.2	230.3	581.6	249.2	760.3	237.8	570.1	256.6	748.9
3	19	0.0	0.0	0.0	0.0	15.8	-6.1	0.0	-19.1	8.6	0.0	309.2	-116.3	2941.0	-667.1	256.6	269.9	521.0	306.4	672.6	275.2	512.7	311.8	664.4
3	20	0.0	0.0	0.0	0.0	8.5	-7.1	0.0	-9.5	8.6	0.0	167.6	-139.8	2941.0	-265.1	300.0	297.2	356.4	350.7	454.2	300.1	352.2	353.6	450.0
3	21	0.0	0.0	0.0	0.0	0.0	-8.2	0.0	0.0	8.6	0.0	0.0	-163.3	2940.0	90.7	343.4	348.4	280.3	425.8	342.6	348.4	280.3	425.8	342.6
4	1	0.0	0.0	0.0	0.0	0.0	6.3	5045.0	-232.1	-282.5	0.0	0.0	290.4	5045.0	-232.1	-292.3	510.9	668.4	624.4	817.0	510.9	668.4	624.4	817.0
4	2	0.0	0.0	0.0	0.0	4.1	6.3	5045.0	-416.2	-282.5	0.0	185.2	277.8	5045.0	-422.6	-292.3	515.8	663.0	615.6	826.6	517.3	661.4	617.1	825.0
4	3	0.0	0.0	0.0	0.0	8.3	6.3	5045.0	-600.3	-282.5	0.0	362.1	265.1	5045.0	-613.1	-292.3	517.8	660.8	603.9	839.5	520.7	657.6	606.9	836.2
4	4	0.0	0.1	0.0	0.0	12.4	6.3	5045.0	-784.4	-282.5	0.0	530.9	252.5	5045.0	-803.6	-292.3	516.8	661.9	589.3	855.6	521.2	657.0	593.7	850.7
4	5	0.0	0.1	0.0	0.0	16.5	6.3	5045.0	-968.5	-282.5	0.0	691.3	239.9	5045.0	-994.1	-292.3	512.8	666.3	571.6	875.1	518.8	659.7	577.6	868.5
4	6	0.0	0.1	0.0	0.0	20.7	6.3	5045.0	-1153.0	-282.5	0.0	843.6	227.3	5045.0	-1184.9	-292.3	505.8	674.0	550.9	897.9	513.3	665.8	558.3	889.7
4	7	0.0	0.1	0.0	0.0	24.8	6.3	5045.0	-1337.0	-282.5	0.0	987.6	214.6	5045.0	-1375.3	-292.3	496.0	684.8	527.4	923.7	504.9	675.0	536.3	913.9
4	8	0.0	0.1	0.0	0.0	28.9	6.3	5045.0	-1521.0	-282.5	0.0	1123.1	202.0	5045.0	-1565.7	-292.3	483.2	698.9	500.9	952.9	493.5	687.5	511.3	941.5
4	9	0.0	0.1	0.0	0.0	33.1	6.3	5045.0	-1705.0	-282.5	0.0	1251.1	189.4	5045.0	-1756.1	-292.3	467.6	716.1	471.7	985.1	479.5	703.0	483.5	972.0
4	10	0.0	0.1	0.0	0.0	37.2	6.3	5045.0	-1889.0	-282.5	0.0	1370.1	176.8	5045.0	-1946.5	-292.3	448.8	736.8	439.2	1020.9	462.2	722.1	452.5	1006.2
4	11	0.0	0.1	0.0	0.0	41.3	6.3	5045.0	-2073.0	-282.5	0.0	1481.1	164.1	5045.0	-2136.9	-292.3	427.1	760.6	403.9	1059.8	442.0	744.3	418.7	1043.4
4	12	0.0	0.2	0.0	0.0	45.5	6.3	5045.0	-2257.0	-282.5	0.0	1584.2	151.5	5045.0	-2327.3	-292.3	402.6	787.6	365.6	1101.8	418.9	769.7	382.0	1083.9
4	13	0.0	0.2	0.0	0.0	49.6	6.3	5045.0	-2441.0	-282.5	0.0	1679.2	138.9	5045.0	-2517.6	-292.3	375.2	817.8	324.6	1147.1	393.0	798.2	342.4	1127.5
4	14	0.0	0.2	0.0	0.0	53.7	6.3	5045.0	-2625.0	-282.5	0.0	1765.2	126.2	5045.0	-2708.0	-292.3	344.5	851.5	280.2	1195.9	363.8	830.3	299.5	1174.6
4	15	0.0	0.2	0.0	0.0	57.9	6.3	5045.0	-2810.0	-282.5	0.0	1843.2	113.6	5045.0	-2899.4	-292.3	310.7	888.8	232.6	1248.2	331.5	865.9	253.4	1225.4
4	16	0.0	0.2	0.0	0.0	62.0	6.3	5045.0	-2994.0	-282.5	0.0	1913.2	101.0	5045.0	-3089.8	-292.3	274.3	928.9	182.6	1303.4	296.6	904.4	204.8	1278.8
4	17	0.0	0.2	0.0	0.0	66.1	6.3	5045.0	-3178.0	-282.5	0.0	1975.2	88.4	5045.0	-3280.2	-292.3	235.0	972.1	129.6	1361.6	258.8	946.0	153.4	1335.5
4	18	0.0	0.2	0.0	0.0	70.3	6.3	5045.0	-3362.0	-282.5	0.0	2028.2	75.7	5045.0	-3470.6	-292.3	192.5	1018.9	73.5	1423.5	217.8	991.1	98.7	1395.7
4	19	0.0	0.2	0.0	0.0	74.4	6.3	5045.0	-3546.0	-282.5	0.0	2074.2	63.1	5045.0	-3661.0	-292.3	147.5	1068.4	14.8	1488.1	174.2	1039.0	41.5	1458.7
4	20	0.0	0.2	0.0	0.0	78.5	6.3	5045.0	-3730.0	-282.5	0.0	2111.2	50.5	5045.0	-3851.4	-292.3	99.3	1121.6	-47.2	1556.3	127.5	1090.5	-19.0	1525.2
4	21	0.0	0.2	0.0	0.0	82.7	6.3	5045.0	-3915.0	-283.7	0.0	2139.2	37.9	5045.0	-4042.7	-293.5	47.5	1178.5	-112.7	1628.4	77.2	1145.9	-83.0	1595.7
5	1	0.0	0.2	0.0	0.0	92.4	-19.0	4918.0	-4277.0	831.8	0.0	2446.2	-457.0	4918.0	-4420.0	861.3	21.1	1176.7	-169.5	1653.0	54.2	1140.1	-136.3	1616.5
5	2	0.0	0.2	0.0	0.0	87.8	-19.0	4918.0	-4075.0	835.9	0.0	2334.2	-461.7	4918.0	-4210.9	865.4	48.4	1146.5	-127.1	1606.4	79.9	1111.8	-95.6	1571.7
5	3	0.0	0.2	0.0	0.0	83.2	-19.0	4918.0	-3872.0	834.9	0.0	2222.2	-466.4	4918.0	-4000.7	864.4	76.1	1116.0	-84.3	1559.3	106.0	1083.2	-54.4	1526.4
5	4	0.0	0.2	0.0	0.0	78.5	-19.0	4918.0	-3670.0	834.9	0.0	2108.2	-471.1	4918.0	-3791.6	864.4	102.8	1086.7	-42.6	1513.4	131.0	1055.7	-14.4	1482.4
5	5	0.0	0.2	0.0	0.0	73.9	-19.0	4918.0	-3467.0	834.9	0.0	1993.2	-475.8	4918.0	-3581.4	864.4	129.4	1057.4	-0.9	1467.5	155.9	1028.2	25.6	1438.2
5	6	0.0	0.2	0.0	0.0	69.3	-19.0	4918.0	-3265.0	834.9	0.0	1877.2	-480.5	4918.0	-3372.3	864.4	155.3	1028.9	40.0	1422.4	180.2	1001.5	64.9	1395.0

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

PUENTE EN VACIO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1502.0

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	1179	-39
2	Σ pp(i) + 1.1 x Σ pret(i)	1653	-169
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	1146	-21
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1617	-136

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
5	7	0.0	0.2	0.0	0.0	64.7	-19.0	4918.0	-3062.0	834.9	0.0	1760.2	-485.2	4918.0	-3162.1	864.4	181.2	1000.3	81.0	1377.3	204.5	974.8	104.3	1351.7
5	8	0.0	0.2	0.0	0.0	60.1	-19.0	4918.0	-2859.0	834.9	0.0	1642.2	-489.9	4918.0	-2952.0	864.4	206.8	972.2	121.7	1332.5	228.3	948.5	143.2	1308.8
5	9	0.0	0.2	0.0	0.0	55.4	-19.0	4918.0	-2657.0	834.9	0.0	1522.2	-494.6	4918.0	-2742.8	864.4	231.3	945.3	161.2	1289.0	251.2	923.3	181.1	1267.1
5	10	0.0	0.1	0.0	0.0	50.8	-19.0	4918.0	-2454.0	834.9	0.0	1402.1	-499.3	4918.0	-2532.7	864.4	256.1	917.9	201.1	1245.1	274.3	897.8	219.4	1225.0
5	11	0.0	0.1	-0.1	0.0	46.2	-19.0	4918.0	-2252.0	834.9	0.0	1280.1	-504.1	4918.0	-2323.5	864.4	279.9	891.7	239.9	1202.4	296.5	873.5	256.5	1184.1
5	12	0.0	0.1	-0.1	0.0	41.6	-19.0	4918.0	-2049.0	834.9	0.0	1157.1	-508.8	4918.0	-2113.4	864.4	303.6	865.6	278.7	1159.6	318.5	849.2	293.7	1143.2
5	13	0.0	0.1	-0.1	0.0	37.0	-19.0	4918.0	-1847.0	834.9	0.0	1033.1	-513.5	4918.0	-1904.2	864.4	326.7	840.2	316.8	1117.7	340.0	825.6	330.1	1103.1
5	14	0.0	0.1	-0.1	0.0	32.3	-19.0	4918.0	-1644.0	834.9	0.0	907.9	-518.2	4918.0	-1694.1	864.4	349.6	814.9	354.9	1075.8	361.3	802.2	366.5	1063.0
5	15	0.0	0.1	-0.1	0.0	27.7	-19.0	4918.0	-1442.0	834.9	0.0	781.7	-522.9	4918.0	-1484.9	864.4	371.9	790.4	392.2	1034.7	381.9	779.5	402.1	1023.8
5	16	0.0	0.1	-0.1	0.0	23.1	-19.0	4918.0	-1239.0	834.9	0.0	654.3	-527.6	4918.0	-1274.8	864.4	394.1	766.0	429.4	993.7	402.4	756.9	437.7	984.6
5	17	0.0	0.1	-0.1	0.0	18.5	-19.0	4918.0	-1036.0	834.9	0.0	525.7	-532.3	4918.0	-1064.6	864.4	415.8	742.1	466.3	953.2	422.4	734.8	472.9	945.9
5	18	0.0	0.0	-0.1	0.0	13.9	-19.0	4918.0	-833.9	834.9	0.0	395.9	-537.0	4918.0	-855.4	864.4	436.9	718.9	502.3	913.5	441.8	713.4	507.3	908.0
5	19	0.0	0.0	-0.1	0.0	9.2	-19.0	4918.0	-631.4	834.9	0.0	265.1	-541.7	4918.0	-645.7	864.4	457.6	696.0	538.2	874.0	461.0	692.4	541.5	870.4
5	20	0.0	0.0	-0.1	0.0	4.6	-19.0	4918.0	-428.8	834.9	0.0	133.1	-546.4	4918.0	-436.0	864.4	478.0	673.6	573.6	835.0	479.7	671.8	575.3	833.2
5	21	0.0	0.0	-0.1	0.0	0.0	-19.0	4918.0	-226.3	834.9	0.0	0.0	-551.1	4918.0	-226.3	864.4	498.0	651.6	608.6	796.4	498.0	651.6	608.6	796.4
6	1	0.0	0.0	0.1	0.0	0.0	18.0	4916.0	-226.1	-735.2	0.0	0.0	529.0	4916.0	-226.1	-764.3	497.8	651.3	608.4	796.1	497.8	651.3	608.4	796.1
6	2	0.0	0.0	0.1	0.0	4.9	18.0	4916.0	-427.5	-735.2	0.0	144.1	523.7	4916.0	-435.5	-764.3	481.9	668.9	577.5	830.2	483.7	666.9	579.3	828.2
6	3	0.0	0.0	0.1	0.0	9.8	18.0	4916.0	-628.9	-735.2	0.0	286.8	518.4	4916.0	-644.9	-764.3	465.5	686.9	546.0	864.8	469.0	683.0	549.6	860.9
6	4	0.0	0.0	0.1	0.0	14.8	18.0	4916.0	-830.2	-735.2	0.0	428.0	513.1	4916.0	-854.1	-764.3	448.6	705.6	514.1	900.0	453.9	699.7	519.4	894.1
6	5	0.0	0.1	0.1	0.0	19.7	18.0	4916.0	-1032.0	-735.2	0.0	567.9	507.8	4916.0	-1063.9	-764.3	431.0	724.9	481.4	935.9	438.0	717.2	488.5	928.1
6	6	0.0	0.1	0.1	0.0	24.6	18.0	4916.0	-1233.0	-735.2	0.0	706.2	502.5	4916.0	-1272.9	-764.3	413.1	744.6	448.5	972.1	421.9	734.9	457.4	962.4
6	7	0.0	0.1	0.0	0.0	29.5	18.0	4916.0	-1434.0	-735.2	0.0	843.1	497.0	4916.0	-1481.9	-764.3	394.7	764.8	415.1	1008.9	405.3	753.2	425.7	997.2
6	8	0.0	0.1	0.0	0.0	34.4	18.0	4916.0	-1636.0	-735.2	0.0	978.5	491.7	4916.0	-1691.8	-764.3	375.5	786.0	380.8	1046.6	387.8	772.4	393.2	1033.0
6	9	0.0	0.1	0.0	0.0	39.4	18.0	4916.0	-1837.0	-735.2	0.0	1112.1	486.4	4916.0	-1900.8	-764.3	355.9	807.5	346.3	1084.7	370.0	792.0	360.4	1069.1
6	10	0.0	0.1	0.0	0.0	44.3	18.0	4916.0	-2038.0	-735.2	0.0	1245.1	481.1	4916.0	-2109.8	-764.3	336.1	829.3	311.5	1123.0	352.0	811.8	327.4	1105.5
6	11	0.0	0.1	0.0	0.0	49.2	18.0	4916.0	-2240.0	-735.2	0.0	1376.1	475.8	4916.0	-2319.8	-764.3	315.3	852.2	275.6	1162.5	333.0	832.8	293.2	1143.1
6	12	0.0	0.2	0.0	0.0	54.1	18.0	4916.0	-2441.0	-735.2	0.0	1506.2	470.5	4916.0	-2528.8	-764.3	294.5	875.2	239.7	1202.0	313.9	853.8	259.2	1180.6
6	13	0.0	0.2	0.0	0.0	59.0	18.0	4916.0	-2643.0	-735.2	0.0	1634.2	465.2	4916.0	-2738.7	-764.3	272.6	899.3	202.7	1242.7	293.8	875.9	223.9	1219.3
6	14	0.0	0.2	0.0	0.0	64.0	18.0	4916.0	-2844.0	-735.2	0.0	1760.2	459.9	4916.0	-2947.7	-764.3	250.3	923.8	165.4	1283.7	273.3	898.5	188.4	1258.5
6	15	0.0	0.2	0.0	0.0	68.9	18.0	4916.0	-3045.0	-735.2	0.0	1886.2	454.6	4916.0	-3156.7	-764.3	228.0	948.4	128.1	1324.8	252.7	921.1	152.9	1297.6
6	16	0.0	0.2	0.0	0.0	73.8	18.0	4916.0	-3247.0	-735.2	0.0	2009.2	449.3	4916.0	-3366.7	-764.3	204.3	974.4	89.4	1367.5	230.8	945.3	115.9	1338.3
6	17	0.0	0.2	0.0	0.0	78.7	18.0	4916.0	-3448.0	-735.2	0.0	2132.2	444.0	4916.0	-3575.6	-764.3	181.0	1000.1	51.0	1409.7	209.2	969.0	79.3	1378.6
6	18	0.0	0.2	0.0	0.0	83.6	18.0	4916.0	-3649.0	-735.2	0.0	2253.2	438.7	4916.0	-3784.6	-764.3	156.9	1026.7	11.9	1452.8	186.9	993.6	41.9	1419.7
6	19	0.0	0.2	0.0	0.0	88.5	18.0	4916.0	-3851.0	-735.2	0.0	2372.2	433.4	4916.0	-3994.6	-764.3	131.7	1054.3	-28.3	1497.0	163.5	1019.3	3.5	1462.0
6	20	0.0	0.2	0.0	0.0	93.5	18.0	4916.0	-4052.0	-735.2	0.0	2490.2	428.1	4916.0	-4203.6	-764.3	106.6	1082.0	-68.5	1541.3	140.1	1045.1	-34.9	1504.3
6	21	0.0	0.3	0.0	0.0	98.4	18.0	4916.0	-4244.0	-632.6	0.0	2607.3	422.8	4916.0	-4403.5	-661.7	84.0	1106.9	-105.4	1581.9	119.3	1068.0	-70.1	1543.0
7	1	0.0	0.2	0.0	0.0	89.0	-7.1	5122.0	-3972.0	299.7	0.0	2312.2	-64.4	5122.0	-4116.5	311.3	94.7	1145.3	-68.8	1603.0	126.7	1110.2	-36.8	1567.8
7	2	0.0	0.2	0.0	0.0	84.5	-7.1	5122.0	-3785.0	299.7	0.0	2268.2	-76.5	5122.0	-3922.2	311.3	141.7	1093.6	-7.8	1535.9	172.0	1060.2	22.5	1502.5
7	3	0.0	0.2	0.0	0.0	80.1	-7.1	5122.0	-3598.0	299.7	0.0	2217.2	-88.6	5122.0	-3728.0	311.3	186.2	1044.7	50.6	1471.6	214.9	1013.0	79.3	1440.0
7	4	0.0	0.2	0.0	0.0	75.6	-7.1	5122.0	-3411.0	299.7	0.0	2158.2	-100.7	5122.0	-3533.8	311.3	227.7	998.9	106.1	1410.5	254.9	969.0	133.3	1380.6
7	5	0.0	0.2	0.0	0.0	71.2	-7.1	5122.0	-3224.0	299.7	0.0	2091.2	-112.7	5122.0	-3339.6	311.3	266.4	956.3	158.8	1352.5	292.0	928.2	184.3	1324.4
7	6	0.0	0.2	0.0	0.0	66.7	-7.1	5122.0	-3037.0	299.7	0.0	2017.2	-124.8	5122.0	-3145.4	311.3	302.6	916.5	208.9	1297.3	326.6	890.1	232.8	1271.0
7	7	0.0	0.2	0.0	0.0	62.3	-7.1	5122.0	-2850.0	299.7	0.0	1935.2	-136.9	5122.0	-2951.1	311.3	336.0	879.8	256.2	1245.3	358.3	855.1	278.6	1220.7
7	8	0.0	0.2	0.0	0.0	57.8	-7.1	5122.0	-2663.0	299.7	0.0	1846.2	-149.0	5122.0	-2756.9	311.3	366.8	845.9	300.9	1196.0	387.5	823.0	321.7	1173.2
7	9	0.0	0.2	0.0	0.0	53.4	-7.1	5122.0	-2476.0	299.7	0.0	1749.2	-161.1	5122.0	-2562.7	311.3	394.7	815.1	342.8	1149.9	413.9	794.0	362.0	1128.8

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

PUENTE EN VACIO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1502.0

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	1179	-39
2	Σ pp(i) + 1.1 x Σ pret(i)	1653	-169
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	1146	-21
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1617	-136

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
7	10	0.0	0.2	0.0	0.0	48.9	-7.1	5122.0	-2289.0	299.7	0.0	1645.2	-173.2	5122.0	-2368.5	311.3	420.1	787.1	382.2	1106.6	437.7	767.8	399.8	1087.2
7	11	0.0	0.2	0.0	0.0	44.5	-7.1	5122.0	-2102.0	299.7	0.0	1533.2	-185.3	5122.0	-2174.2	311.3	442.7	762.3	418.7	1066.4	458.6	744.7	434.7	1048.8
7	12	0.0	0.1	0.0	0.0	40.0	-7.1	5122.0	-1915.0	299.7	0.0	1414.1	-197.4	5122.0	-1980.0	311.3	462.7	740.2	452.7	1029.0	477.1	724.4	467.1	1013.1
7	13	0.0	0.1	0.0	0.0	35.6	-7.1	5122.0	-1728.0	299.7	0.0	1287.1	-209.5	5122.0	-1785.8	311.3	479.9	721.3	483.8	994.7	492.6	707.3	496.6	980.7
7	14	0.0	0.1	0.0	0.0	31.1	-7.1	5122.0	-1541.0	299.7	0.0	1152.1	-221.5	5122.0	-1591.6	311.3	494.2	705.6	512.0	963.6	505.3	693.3	523.2	951.3
7	15	0.0	0.1	0.0	0.0	26.7	-7.1	5122.0	-1354.0	299.7	0.0	1010.1	-233.6	5122.0	-1397.3	311.3	505.9	692.7	537.8	935.3	515.5	682.1	547.3	924.8
7	16	0.0	0.1	0.0	0.0	22.2	-7.1	5122.0	-1167.0	299.7	0.0	861.0	-245.7	5122.0	-1203.1	311.3	515.2	682.5	560.9	909.8	523.1	673.7	568.9	901.0
7	17	0.0	0.1	0.0	0.0	17.8	-7.1	5122.0	-980.4	299.7	0.0	703.9	-257.8	5122.0	-1009.3	311.3	521.4	675.7	581.1	887.6	527.8	668.6	587.5	880.6
7	18	0.0	0.1	0.0	0.0	13.3	-7.1	5122.0	-793.4	299.7	0.0	539.3	-269.9	5122.0	-815.1	311.3	525.0	671.6	598.7	868.3	529.8	666.4	603.5	863.0
7	19	0.0	0.0	0.0	0.0	8.9	-7.1	5122.0	-606.4	299.7	0.0	367.0	-282.0	5122.0	-620.9	311.3	526.0	670.6	613.6	851.9	529.2	667.1	616.7	848.4
7	20	0.0	0.0	0.0	0.0	4.4	-7.1	5122.0	-419.4	299.7	0.0	187.3	-294.1	5122.0	-426.6	311.3	524.2	672.5	625.7	838.5	525.8	670.8	627.3	836.7
7	21	0.0	0.0	0.0	0.0	0.0	-7.1	5122.0	-232.4	299.7	0.0	0.0	-306.2	5122.0	-232.4	311.3	519.7	677.5	635.2	828.1	519.7	677.5	635.2	828.1

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INICIAL

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1502.0

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	PP,inicial + CM + 0.9 x Pret,inicial + 0.6 x SC(+) + 0.5 x GRAD	784	57
2	PP,inicial + CM + 1.1 x Pret,inicial + 0.6 x SC(+) + 0.5 x GRAD	971	-23
3	PP,inicial + CM + 0.9 x Pret,inicial + 0.6 x SC(-) + 0.5 x GRAD	895	127
4	PP,inicial + CM + 1.1 x Pret,inicial + 0.6 x SC(-) + 0.5 x GRAD	1345	124
5	PP,inicial + CM + 0.9 x Pret,inicial + 1.0* SC(+) + 0.6 x GRAD	999	-18
6	PP,inicial + CM + 1.1 x Pret,inicial + 1.0* SC(+) + 0.6 x GRAD	866	-44
7	PP,inicial + CM + 0.9 x Pret,inicial + 1.0* SC(-) + 0.6 x GRAD	908	7
8	PP,inicial + CM + 1.1 x Pret,inicial + 1.0* SC(-) + 0.6 x GRAD	1358	114

PP,inicial= Peso propio en tiempo inicial
Pret,inicial = Pretensado en tiempo inicial
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INICIAL																		TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	160.4	2818.0	93.0	-325.5	0.0	0.0	74.8	0.0	0.0	148.7	0.0	0.0	-23.8	0.0	0.0	10.54	326	260	399	316	326	260	399	318	326	260	399	318	326	260	399	318
1	2	0.0	164.4	136.9	2818.0	-244.0	-283.9	0.0	77.3	65.1	0.0	156.1	132.9	0.0	-26.4	-23.8	0.0	11.7	10.54	339	243	389	332	301	296	351	385	359	213	410	302	298	301	348	390
1	3	0.0	302.9	113.5	2818.0	-535.0	-242.3	0.0	143.9	55.3	0.0	294.0	116.6	0.0	-52.8	-23.8	0.0	23.3	10.54	406	274	448	408	331	388	373	523	447	211	489	345	324	399	366	534
1	4	0.0	417.4	93.6	2818.0	-870.3	-200.7	0.0	199.7	45.6	0.0	414.0	100.3	0.0	-79.1	-23.8	0.0	35.0	10.54	388	301	407	471	281	465	300	634	445	213	464	383	270	482	289	651
1	5	0.0	510.1	73.8	2818.0	-1068.9	-159.1	0.0	244.7	35.9	0.0	515.8	83.9	0.0	-105.5	-23.8	0.0	46.6	10.54	396	288	402	478	261	495	267	685	468	178	474	368	247	517	253	707
1	6	0.0	580.7	54.0	2818.0	-1222.1	-117.5	0.0	279.0	26.1	0.0	599.6	67.6	0.0	-131.9	-23.8	0.0	58.3	10.54	404	276	400	482	245	520	240	726	488	148	483	354	227	548	222	754
1	7	0.0	629.5	34.1	2818.0	-1329.3	-75.9	0.0	302.5	16.4	0.0	665.4	51.3	0.0	-158.3	-23.8	0.0	70.0	10.54	411	265	399	482	231	541	219	759	504	122	492	340	210	574	198	792
1	8	0.0	656.2	14.3	2819.0	-1390.6	-34.3	0.0	315.3	6.7	0.0	713.1	35.0	0.0	-184.6	-23.8	0.0	81.6	10.54	418	255	402	479	221	558	204	781	518	102	502	326	195	596	179	820
1	9	0.0	661.1	-5.5	2819.0	-1405.8	7.3	0.0	317.3	-3.1	0.0	742.7	18.6	0.0	-211.1	-23.8	0.0	93.3	10.54	424	246	407	472	213	570	196	795	528	87	511	312	184	614	167	839
1	10	0.0	644.0	-25.4	2819.0	-1374.0	49.9	0.0	308.5	-12.8	0.0	754.3	2.3	0.0	-237.4	-23.8	0.0	104.9	10.54	429	238	414	460	208	576	193	798	535	75	520	297	176	626	161	848
1	11	0.0	605.0	-45.2	2941.0	-1364.2	100.2	0.0	288.9	-22.5	0.0	747.9	-14.0	0.0	-263.8	-23.8	0.0	116.6	10.54	428	279	417	503	201	626	190	850	534	116	523	341	165	681	155	905
1	12	0.0	544.0	-65.0	2941.0	-1226.5	149.0	0.0	258.6	-32.3	0.0	723.4	-30.3	0.0	-290.2	-23.8	0.0	128.2	10.54	436	266	435	476	207	617	206	827	539	109	537	319	168	678	166	888
1	13	0.0	461.0	-84.9	2941.0	-1035.0	197.7	0.0	217.6	-42.0	0.0	680.8	-46.7	0.0	-316.6	-23.8	0.0	139.9	10.54	446	251	457	441	218	600	230	790	543	102	555	292	175	666	187	856
1	14	0.0	356.2	-104.7	2941.0	-789.3	246.5	0.0	165.7	-51.7	0.0	620.2	-63.0	0.0	-342.9	-23.8	0.0	151.6	10.54	457	234	486	398	235	575	263	739	547	96	575	261	188	646	216	811
1	15	0.0	229.4	-124.5	3008.0	-513.0	301.2	0.0	103.1	-61.5	0.0	541.4	-79.3	0.0	-369.4	-23.8	0.0	163.2	10.54	472	233	521	370	258	561	307	698	551	111	600	249	208	638	257	775
1	16	0.0	80.7	-144.4	3008.0	-152.3	351.1	0.0	29.7	-71.2	0.0	444.8	-95.6	0.0	-395.7	-23.8	0.0	174.9	10.54	489	206	563	306	288	515	361	615	556	104	629	204	234	598	307	698
1	17	0.0	-89.9	-164.2	3008.0	263.6	401.0	0.0	-54.4	-80.9	0.0	329.9	-111.9	0.0	-422.0	-23.8	0.0	186.5	10.54	508	177	610	233	323	461	425	517	560	98	661	155	265	549	367	606
1	18	0.0	-262.5	-184.0	3008.0	734.6	450.8	0.0	-149.3	-90.7	0.0	197.0	-128.2	0.0	-448.5	-23.8	0.0	198.2	10.54	530	144	663	151	364	398	498	405	563	93	697	100	303	492	437	499
1	19	0.0	-497.0	-203.9	2948.0	1193.0	353.4	0.0	-255.0	-100.4	0.0	59.6	3.0	0.0	-495.6	-171.8	0.0	209.9	10.54	527	129	691	86	378	357	542	315	543	105	706	63	311	461	474	418
1	20	0.0	-735.6	-227.3	2948.0	1582.8	189.9	0.0	-371.4	-110.1	0.0	62.9	3.0	0.0	-694.7	-188.2	0.0	221.5	10.54	478	90	656	4	288	371	466	285	494	66	672	-20	195	510	373	424
1	21	0.0	-1000.0	-250.8	2948.0	1706.6	34.1	0.0	-498.6	-119.9	0.0	66.2	3.0	0.0	-911.7	-204.4	0.0	233.2	10.54	387	225	573	127	151	576	337	477	404	201	590	102	28	757	214	659
2	1	0.0	-1000.0	244.1	2849.0	1675.6	-3.2	0.0	-498.6	115.3	0.0	66.2	-16.9	0.0	-911.7	210.8	0.0	233.2	-0.2259	356	225	533	137	127	551	303	463	373	202	549	114	7	721	184	632
2	2	0.0	-700.6	216.5	2849.0	1548.2	-191.7	0.0	-356.2	103.8	0.0	44.3	-16.9	0.0	-650.2	191.6	0.0	232.9	-0.2259	459	80	627	3	285	327	453	251	472	61	641	-16	200	448	368	371
2	3	0.0	-436.9	188.9	2849.0	1174.9	-382.0	0.0	-228.6	92.4	0.0	22.3	-16.9	0.0	-413.5	172.4	0.0	232.6	-0.2259	535	85	695	42	406	282	566	239	546	68	706	25	350	369	510	326
2	4	0.0	-206.5	165.6	2748.0	547.7	-397.7	0.0	-116.0	80.9	0.0	125.1	117.7	0.0	-318.3	1.1	0.0	232.3	-0.2259	468	156	582	176	338	356	452	375	493	118	607	137	294	422	408	441
2	5	0.0	-6.3	142.3	2748.0	80.6	-331.9	0.0	-18.2	69.5	0.0	287.1	115.3	0.0	-316.9	1.1	0.0	232.0	-0.2259	459	169	541	237	296	419	379	487	506	97	588	165	253	485	335	553
2	6	0.0	163.6	119.0	2748.0	-315.1	-277.0	0.0	64.7	58.1	0.0	424.5	96.1	0.0	-315.4	1.1	0.0	231.7	-0.2259	452	180	507	290	262	472	317	582	518	80	573	189	219	538	274	648
2	7	0.0	303.1	95.7	2748.0	-639.4	-222.0	0.0	132.8	46.6	0.0	537.0	77.0	0.0	-313.8	1.1	0.0	231.4	-0.2259	446	189	479	332	233	516	266	659	527	65	561	208	190	581	223	725
2	8	0.0	412.3	72.4	2747.0	-892.2	-167.1	0.0	186.0	35.2	0.0	624.6	57.8	0.0	-312.4	1.1	0.0	231.1	-0.2259	442	196	458	365	211	549	227	719	535	53	551	223	169	615	184	784
2	9	0.0	491.3	49.1	2747.0	-1073.5	-112.1	0.0	224.3	23.7	0.0	687.2	38.6	0.0	-310.9	0.7	0.0	230.8	-0.2259	439	200	443	389	196	573	199	761	541	44	544	233	153	638	157	826
2	10	0.0	540.0	25.8	2747.0	-1183.3	-57.1	0.0	247.7	12.3	0.0	725.0	19.4	0.0	-310.1	0.7	0.0	230.5	-0.2259	438	202	434	402	187	587	183	787	544	39	540	239	145	651	141	851
2	11	0.0	558.3	2.4	2747.0	-1221.6	-2.2	0.0	256.2	0.9	0.0	737.6	0.2	0.0	-309.2	0.7	0.0	230.2	-0.2259	438	202	431	406	184	590	178	794	546	36	539	240	142	655	136	859
2	12	0.0	546.4	-20.9	2626.0	-1104.8	50.4	0.0	249.9	-10.6	0.0	726.8	-17.8	0.0	-308.4	0.7	0.0	229.9	-0.2259	450	145	448	334	199	529	197	718	557	-18	555	170	157	594	155	782
2	13	0.0	504.1	-44.2	2626.0	-1005.2	102.8	0.0	228.7	-22.0	0.0	691.3	-37.0	0.0	-307.4	0.7	0.0	229.6	-0.2259	451	143	456	321	208	515	213	694	553	-13	558	165	166	580	171	758
2	14	0.0	431.4	-67.5	2626.0	-837.3	155.4	0.0	192.7	-33.5	0.0	630.6	-56.2	0.0	-307.2	0.1	0.0	229.4	-0.2259	453	140	470	300	223	493	239	654	547	-4	563	157	181	557	197	718
2	15	0.0	328.5	-90.8	2626.0	-601.2	207.9	0.0	141.8	-44.9	0.0	545.1	-75.4	0.0	-306.9	0.1	0.0	229.1	-0.2259	456	136	488	272	243	463	275	598	538	10	570	146	201	527	233	663
2	16	0.0	195.3	-114.1	2626.0	-296.7	260.4	0.0	76.0	-56.3	0.0	434.7	-94.6	0.0	-306.8	0.1	0.0	228.8	-0.2259	459	131	512	236	268	423	321	528	526	29	579	133	226	487	279	592
2	17	0.0	31.8	-137.4	2627.0	76.0	313.0	0.0	-4.7	-67.8	0.0	299.3	-113.8	0.0	-306.6	0.1	0.0	228.5	-0.2259	462	126	541	192	299	376	378	441	511	52	589	117	258	440	336	505
2	18	0.0	-162.1	-160.7	2627.0	517.0	365.5	0.0	-100.3	-79.2	0.0	143.0	-115.4	0.0	-307.1	-16.9	0.0	228.2	-0.2259	467	119	575	139	336	320	444	339	494	78	603	97	294	384	403	403
2	19	0.0	-386.2	-184.1	2627.0	1013.8	389.9	0.0	-210.7	-90.7	0.0	26.9	17.6	0.0	-387.5	-170.2	0.0	227.9	-0.2259	481	97	624	64	358	286	500	254	493	80	635	47	305	367	447	335
2	20	0.0	-643.5	-211.6	2748.0	1470.5	181.0	0.0	-336.0	-102.1	0.0	49.7	17.6	0.0	-621.2	-189.3	0.0	227.6	-0.2259	464	57	629	-23	290	314	456	234	478	36	644	-44	207	438	372	358
2	21	0.0	-936.5	-239.2	2748.0	1587.2	-2.1	0.0	-476.1	-113.5	0.0	72.6	17.6	0.0	-879.9	-208.5	0.0	227.3	-0.2259	358	214	531	122	128	555	301	464	376	188	549	97	10	730	183	639
3	1	0.0	-936.5	247.9	2849.0	1620.2	-25.6	0.0	-476.1	118.9	0.0	72.6	-3.3	0.0	-879.9	203.0	0.0	227.3	-10.28	368	208	541	125	145	526	318	443	385	184	558	101	30	689	203	606
3	2	0.0	-675.3	224.5	2849.0	1503.7	-184.1	0.0	-350.1	109.1	0.0	68.9	-3.3	0.0	-664.3	186.8	0.0	215.9	-10.28	458	81	624	9	279	335	445	263	474	58	640	-14	192	458	358	386
3	3	0.0	-439.9	201.0	2849.0	1219.2	-332.6	0.0	-234.8	99.4	0.0	65.3	-3.3	0.0	-466.8	170.4	0.0	204.6	-10.28	550	63	712	15	406	283	568	235	565	39	728	-9	342	381	505	333
3	4	0.0	-228.6	181.2	2849.0	680.6	-474.1	0.0	-130.2	89.7	0.0	211.4	127.5	0.0	-430.7	22.9	0.0	193.2	-10.28	520	108	646	117	356	360	482	368	555	54	681	63	297	450	423	458
3	5	0.0	-39.2	161.3	2948.0	223.7	-391.3	0.0	-36.5	79.9	0.0	343.4	111.2	0.0	-405.4	22.9	0.0	181.8	-10.28	514	149	611	208	330	431	427	490	567	68	664	127	275	516	372	575
3	6	0.0	128.3	141.5	2948.0	-182.0	-342.5	0.0	46.6	70.2	0.0	457.4	94.9	0.0	-380.1	22.9	0.0	170.5	-10.28	496	176	566	278	296	483	366	584	564	72	634	173	244	562	314	664
3	7	0.0	273.8	121.7	2948.0	-533.7	-293.6	0.0	118.8	60.5	0.0	553.3	78.5	0.0	-354.7	22.9	0.0	159.1	-10.28	480	201	526	339	268	527	313	665	561	77	607	215	219	601	265	739

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INICIAL

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1502.0

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	PP,inicial + CM + 0.9 x Pret,inicial + 0.6 x SC(+) + 0.5 x GRAD	784	57
2	PP,inicial + CM + 1.1 x Pret,inicial + 0.6 x SC(+) + 0.5 x GRAD	971	-23
3	PP,inicial + CM + 0.9 x Pret,inicial + 0.6 x SC(-) + 0.5 x GRAD	895	127
4	PP,inicial + CM + 1.1 x Pret,inicial + 0.6 x SC(-) + 0.5 x GRAD	1345	124
5	PP,inicial + CM + 0.9 x Pret,inicial + 1.0* SC(+) + 0.6 x GRAD	999	-18
6	PP,inicial + CM + 1.1 x Pret,inicial + 1.0* SC(+) + 0.6 x GRAD	866	-44
7	PP,inicial + CM + 0.9 x Pret,inicial + 1.0* SC(-) + 0.6 x GRAD	908	7
8	PP,inicial + CM + 1.1 x Pret,inicial + 1.0* SC(-) + 0.6 x GRAD	1358	114

PP,inicial= Peso propio en tiempo inicial
Pret,inicial = Pretensado en tiempo inicial
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INICIAL																		TENSIONES EN FIBRAS SUPERIOR E INFERIOR															
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	8	0.0	397.4	101.8	2948.0	-831.3	-244.7	0.0	180.3	50.7	0.0	631.1	62.2	0.0	-329.4	22.9	0.0	147.7	-10.28	466	223	492	392	245	562	270	731	557	83	583	252	200	631	225	800
3	9	0.0	499.1	82.0	3008.0	-1105.5	-199.2	0.0	231.0	41.0	0.0	690.9	45.9	0.0	-304.1	22.9	0.0	136.4	-10.28	452	264	460	463	225	611	234	810	550	112	559	312	184	674	192	874
3	10	0.0	578.9	62.2	3008.0	-1298.0	-149.3	0.0	271.0	31.3	0.0	732.6	29.6	0.0	-278.7	22.9	0.0	125.0	-10.28	440	282	435	501	212	631	208	850	544	122	540	341	174	689	170	908
3	11	0.0	636.7	42.3	3008.0	-1435.4	-99.4	0.0	300.2	21.5	0.0	756.3	13.2	0.0	-253.4	22.9	0.0	113.6	-10.28	430	296	417	530	205	642	191	876	537	132	523	366	170	695	156	929
3	12	0.0	672.5	22.5	3008.0	-1517.9	-49.5	0.0	318.6	11.8	0.0	761.9	-3.1	0.0	-228.0	22.9	0.0	102.3	-10.28	423	308	403	550	203	645	184	887	530	143	511	386	172	692	153	934
3	13	0.0	686.5	2.7	2941.0	-1506.3	-3.2	0.0	326.2	2.1	0.0	749.4	-19.4	0.0	-202.7	22.9	0.0	90.9	-10.28	421	290	400	529	211	612	190	851	526	128	505	368	183	654	163	893
3	14	0.0	678.4	-17.2	2941.0	-1485.8	39.6	0.0	323.1	-7.7	0.0	719.0	-35.7	0.0	-177.4	22.9	0.0	79.6	-10.28	415	298	396	535	218	600	199	837	516	144	497	381	194	637	175	874
3	15	0.0	648.5	-37.0	2941.0	-1418.3	83.0	0.0	309.3	-17.4	0.0	670.5	-52.0	0.0	-152.0	22.9	0.0	68.2	-10.28	409	308	395	538	229	583	215	813	503	164	488	394	209	615	194	845
3	16	0.0	596.6	-56.8	2941.0	-1302.7	126.4	0.0	284.6	-27.1	0.0	603.9	-68.4	0.0	-126.7	22.9	0.0	56.8	-10.28	403	317	396	535	244	561	237	779	487	188	480	406	227	587	220	805
3	17	0.0	522.8	-76.7	2941.0	-1139.2	169.8	0.0	249.2	-36.9	0.0	519.2	-84.7	0.0	-101.4	22.9	0.0	45.5	-10.28	397	327	401	528	262	533	266	734	469	216	473	417	248	554	253	755
3	18	0.0	426.9	-96.5	2941.0	-926.9	213.2	0.0	203.1	-46.6	0.0	416.4	-101.0	0.0	-76.0	22.9	0.0	34.1	-10.28	390	336	409	515	284	499	303	678	448	248	467	426	274	515	292	694
3	19	0.0	309.2	-116.3	2941.0	-667.1	256.6	0.0	146.1	-56.3	0.0	295.7	-117.4	0.0	-50.7	22.9	0.0	22.7	-10.28	384	346	420	498	309	461	346	612	425	283	462	435	302	471	339	623
3	20	0.0	167.6	-139.8	2941.0	-265.1	300.0	0.0	78.5	-66.1	0.0	156.9	-133.7	0.0	-25.3	22.9	0.0	11.4	-10.28	357	268	411	365	318	325	372	423	379	236	432	334	315	330	369	428
3	21	0.0	0.0	-163.3	2940.0	90.7	343.4	0.0	0.0	-75.8	0.0	0.0	22.9	0.0	0.0	-149.4	0.0	0.0	-10.28	348	280	426	343	348	280	426	343	348	280	426	343	348	280	426	343
4	1	0.0	0.0	290.4	5045.0	-232.1	-292.3	0.0	0.0	58.7	0.0	0.0	53.5	0.0	0.0	97.7	0.0	0.0	-0.6162	511	668	624	817	511	668	624	817	511	668	624	817	511	668	624	817
4	2	0.0	185.2	277.8	5045.0	-422.6	-292.3	0.0	38.3	58.7	0.0	75.2	115.3	0.0	-4.1	-6.3	0.0	-0.4	-0.6162	546	630	646	794	529	649	629	812	556	618	656	782	528	649	628	813
4	3	0.0	362.1	265.1	5045.0	-613.1	-292.3	0.0	76.6	58.7	0.0	150.3	115.3	0.0	-8.2	-6.3	0.0	-0.8	-0.6162	578	595	664	774	544	633	630	811	599	571	685	750	542	634	628	812
4	4	0.0	530.9	252.5	5045.0	-803.6	-292.3	0.0	114.8	58.7	0.0	225.5	115.3	0.0	-12.3	-6.3	0.0	-1.2	-0.6162	606	563	679	757	555	619	628	813	639	528	711	721	554	621	626	815
4	5	0.0	691.3	239.9	5045.0	-994.1	-292.3	0.0	153.1	58.7	0.0	300.6	115.3	0.0	-16.3	-6.3	0.0	-1.6	-0.6162	632	535	691	744	564	610	623	818	675	487	734	696	562	612	621	821
4	6	0.0	843.6	227.3	5045.0	-1184.9	-292.3	0.0	191.4	58.7	0.0	375.8	115.3	0.0	-20.4	-6.3	0.0	-2.0	-0.6162	655	510	700	733	570	603	615	827	709	450	754	674	567	606	612	830
4	7	0.0	987.6	214.6	5045.0	-1375.3	-292.3	0.0	229.7	58.7	0.0	451.0	115.3	0.0	-24.5	-6.3	0.0	-2.4	-0.6162	675	487	707	726	573	600	605	839	740	416	771	655	570	604	601	843
4	8	0.0	1123.1	202.0	5045.0	-1565.7	-292.3	0.0	267.9	58.7	0.0	526.1	115.3	0.0	-28.6	-6.3	0.0	-2.8	-0.6162	692	469	710	723	573	600	591	854	768	386	785	640	569	604	587	858
4	9	0.0	1251.1	189.4	5045.0	-1756.1	-292.3	0.0	306.2	58.7	0.0	601.2	115.3	0.0	-32.7	-6.3	0.0	-3.2	-0.6162	707	453	711	722	571	603	575	872	793	358	797	627	566	608	570	877
4	10	0.0	1370.1	176.8	5045.0	-1946.5	-292.3	0.0	344.5	58.7	0.0	676.4	115.3	0.0	-36.8	-6.3	0.0	-3.6	-0.6162	718	441	708	725	565	609	555	893	815	334	805	618	559	615	550	899
4	11	0.0	1481.1	164.1	5045.0	-2136.9	-292.3	0.0	382.8	58.7	0.0	751.5	115.3	0.0	-40.8	-6.3	0.0	-4.0	-0.6162	726	432	703	731	556	619	533	918	834	313	810	612	550	625	527	925
4	12	0.0	1584.2	151.5	5045.0	-2327.3	-292.3	0.0	421.1	58.7	0.0	826.8	115.3	0.0	-44.9	-6.3	0.0	-4.4	-0.6162	731	426	694	740	544	632	507	946	850	295	813	610	538	639	501	953
4	13	0.0	1679.2	138.9	5045.0	-2517.6	-292.3	0.0	459.3	58.7	0.0	901.8	115.3	0.0	-49.0	-6.3	0.0	-4.8	-0.6162	734	423	683	753	530	648	479	977	863	281	812	610	523	656	472	985
4	14	0.0	1765.2	126.2	5045.0	-2708.0	-292.3	0.0	497.6	58.7	0.0	977.1	115.3	0.0	-53.1	-6.3	0.0	-5.2	-0.6162	733	424	669	768	512	667	447	1012	873	270	809	614	504	676	440	1020
4	15	0.0	1843.2	113.6	5045.0	-2899.4	-292.3	0.0	535.9	58.7	0.0	1052.1	115.3	0.0	-57.2	-6.3	0.0	-5.6	-0.6162	729	429	651	788	491	691	413	1050	880	262	802	622	483	700	405	1059
4	16	0.0	1913.2	101.0	5045.0	-3089.8	-292.3	0.0	574.2	58.7	0.0	1127.4	115.3	0.0	-61.3	-6.3	0.0	-6.0	-0.6162	722	436	631	810	467	716	376	1091	884	258	792	632	458	726	367	1101
4	17	0.0	1975.2	88.4	5045.0	-3280.2	-292.3	0.0	612.5	58.7	0.0	1202.4	115.3	0.0	-65.3	-6.3	0.0	-6.4	-0.6162	713	446	608	836	441	745	336	1135	885	256	780	646	432	756	326	1145
4	18	0.0	2028.2	75.7	5045.0	-3470.6	-292.3	0.0	650.7	58.7	0.0	1277.6	115.3	0.0	-69.4	-6.3	0.0	-6.8	-0.6162	700	460	581	865	411	778	292	1183	884	258	764	663	401	789	282	1194
4	19	0.0	2074.2	63.1	5045.0	-3661.0	-292.3	0.0	689.0	58.7	0.0	1352.9	115.3	0.0	-73.5	-6.3	0.0	-7.2	-0.6162	685	477	552	896	379	813	246	1233	879	263	746	683	369	825	236	1245
4	20	0.0	2111.2	50.5	5045.0	-3851.4	-292.3	0.0	727.3	58.7	0.0	1427.9	115.3	0.0	-77.6	-6.3	0.0	-7.6	-0.6162	667	497	520	932	344	852	197	1287	872	271	725	706	333	865	186	1299
4	21	0.0	2139.2	37.9	5045.0	-4042.7	-293.5	0.0	765.6	58.7	0.0	1503.2	115.3	0.0	-81.7	-6.3	0.0	-8.0	-0.6162	645	521	485	971	305	895	145	1345	860	284	700	733	293	908	133	1358
5	1	0.0	2446.2	-457.0	4918.0	-4420.0	861.3	0.0	855.9	-176.4	0.0	1558.3	-321.2	0.0	-66.6	13.7	0.0	-49.3	10.15	655	478	465	955	314	854	124	1330	877	234	687	710	304	865	114	1341
5	2	0.0	2334.2	-461.7	4918.0	-4210.9	865.4	0.0	813.1	-176.4	0.0	1480.3	-321.2	0.0	-63.3	13.7	0.0	-46.8	10.15	651	483	475	943	327	840	151	1300	862	251	686	711	318	850	142	1310
5	3	0.0	2222.2	-466.4	4918.0	-4000.7	864.4	0.0	770.3	-176.4	0.0	1402.4	-321.2	0.0	-60.0	13.7	0.0	-44.3	10.15	647	488	487	931	340	826	179	1269	847	268	686	711	331	835	171	1278
5	4	0.0	2108.2	-471.1	4918.0	-3791.6	864.4	0.0	727.5	-176.4	0.0	1324.5	-321.2	0.0	-56.6	13.7	0.0	-41.9	10.15	642	493	496	920	352	813	206	1239	831	285	685	712	344	821	198	1248
5	5	0.0	1993.2	-475.8	4918.0	-3581.4	864.4	0.0	684.7	-176.4	0.0	1246.6	-321.2	0.0	-53.3	13.7	0.0	-39.4	10.15	637	499	506	909	364	799	233	1209	814	303	684	713	356	808	226	1218
5	6	0.0	1877.2	-480.5	4918.0	-3372.3	864.4	0.0	641.9	-176.4	0.0	1168.7	-321.2	0.0	-50.0	13.7	0.0	-36.9	10.15	631	505	516	899	375	787	260	1180	798	322	682	715	368	795	253	1188
5	7	0.0	1760.2	-485.2	4918.0	-3162.1	864.4	0.0	599.1	-176.4	0.0	1090.8	-321.2	0.0	-46.6	13.7	0.0	-34.5	10.15	625	512	525	889	386	775	286	1151	781	340	680	717	380	782	279	1159
5	8	0.0	1642.2	-489.9	4918.0	-2952.0	864.4	0.0	556.3	-176.4	0.0	1012.9	-321.2	0.0	-43.3	13.7	0.0	-32.0	10.15	619	518	534	879	397	763	312	1123	763	359	678	720	391	769	306	1130
5	9	0.0	1522.2	-494.6	4918.0	-2742.8	864.4	0.0	513.5	-176.4	0.0	935.0	-321.2	0.0	-40.0	13.7	0.0	-29.6	10.15	612	526	542	870	407	752	337	1096	745	380	675	723	401	758	331	1102
5	10	0.0	1402.1	-499.3	4918.0	-2532.7	864.4	0.0	470.7	-176.4	0.0	857.1	-321.2	0.0	-36.6	13.7	0.0	-27.1	10.15	605	534	550	861	417	741	362	1068	727	399	672	727	412	746	357	1073
5	11	0.0	1280.1	-504.1	4918.0	-2323.5	864.4	0.0	427.9	-176.4	0.0	779.2	-321.2	0.0	-33.3	13.7	0.0	-24.6	10.15	597	543	557	853	426	730	386	1041	708	420	668	731	422	736	382	1046
5	12	0.0	1157.1	-508.8	4918.0	-2113.4	864.4	0.0	385.1	-176.4	0.0	701.2	-321.2	0.0	-30.0	13.7	0.0	-22.2	10.15	589	551	564	845	435	720	411	1014	689	441	664	735	431	725	406	1019
5	13	0.0	1033.1	-513.5	4918.0	-1904.2	864.4	0.0	342.4	-176.4	0.0	623.2	-321.2	0.0	-26.6	13.7	0.0	-19.7	10.15	580	561	571	838	444	711	434	989	669	463	659	741	440	715	430	993
5	14	0.0	907.9	-518.2	4918.0	-1694.1	864.4	0.0	299.6	-176.4	0.0	545.4	-321.2	0.0	-23.3	13.7	0.0	-17.2	10.15	572	571	577	831	452	702	457	963	649	485	655	746	449	706	454	967

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INICIAL

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1502.0

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	PP,Inicial + CM + 0.9 x Pret,Inicial + 0.6 x SC(+) + 0.5 x GRAD	784	57
2	PP,Inicial + CM + 1.1 x Pret,Inicial + 0.6 x SC(+) + 0.5 x GRAD	971	-23
3	PP,Inicial + CM + 0.9 x Pret,Inicial + 0.6 x SC(-) + 0.5 x GRAD	895	127
4	PP,Inicial + CM + 1.1 x Pret,Inicial + 0.6 x SC(-) + 0.5 x GRAD	1345	124
5	PP,Inicial + CM + 0.9 x Pret,Inicial + 1.0* SC(+) + 0.6 x GRAD	999	-18
6	PP,Inicial + CM + 1.1 x Pret,Inicial + 1.0* SC(+) + 0.6 x GRAD	866	-44
7	PP,Inicial + CM + 0.9 x Pret,Inicial + 1.0* SC(-) + 0.6 x GRAD	908	7
8	PP,Inicial + CM + 1.1 x Pret,Inicial + 1.0* SC(-) + 0.6 x GRAD	1358	114

PP,inicial= Peso propio en tiempo inicial
Pret,inicial = Pretensado en tiempo inicial
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INICIAL																		TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
5	15	0.0	781.7	-522.9	4918.0	-1484.9	864.4	0.0	256.8	-176.4	0.0	467.4	-321.2	0.0	-20.0	13.7	0.0	-14.8	10.15	562	581	582	825	460	694	480	938	629	508	649	752	457	697	477	941
5	16	0.0	654.3	-527.6	4918.0	-1274.8	864.4	0.0	214.0	-176.4	0.0	389.5	-321.2	0.0	-16.7	13.7	0.0	-12.3	10.15	553	591	588	819	467	685	503	913	608	530	644	758	465	688	500	916
5	17	0.0	525.7	-532.3	4918.0	-1064.6	864.4	0.0	171.2	-176.4	0.0	311.7	-321.2	0.0	-13.3	13.7	0.0	-9.9	10.15	543	602	593	814	474	678	525	889	587	554	638	765	473	680	523	891
5	18	0.0	395.9	-537.0	4918.0	-855.4	864.4	0.0	128.4	-176.4	0.0	233.7	-321.2	0.0	-10.0	13.7	0.0	-7.4	10.15	532	614	597	809	481	671	546	865	565	578	631	772	479	672	545	867
5	19	0.0	265.1	-541.7	4918.0	-645.7	864.4	0.0	85.6	-176.4	0.0	155.8	-321.2	0.0	-6.7	13.7	0.0	-4.9	10.15	521	626	602	804	487	664	567	842	543	602	624	780	486	665	567	843
5	20	0.0	133.1	-546.4	4918.0	-436.0	864.4	0.0	42.8	-176.4	0.0	77.9	-321.2	0.0	-3.3	13.7	0.0	-2.5	10.15	510	639	605	800	493	657	588	819	521	626	616	788	492	658	588	819
5	21	0.0	0.0	-551.1	4918.0	-226.3	864.4	0.0	0.0	-176.4	0.0	0.0	0.0	0.0	0.0	-283.4	0.0	0.0	10.15	498	652	609	796	498	652	609	796	498	652	609	796	498	652	609	796
6	1	0.0	0.0	529.0	4916.0	-226.1	-764.3	0.0	0.0	166.4	0.0	0.0	280.3	0.0	0.0	0.0	0.0	0.0	-9.152	498	651	608	796	498	651	608	796	498	651	608	796	498	651	608	796
6	2	0.0	144.1	523.7	4916.0	-435.5	-764.3	0.0	45.6	166.4	0.0	83.3	304.2	0.0	-3.7	-13.6	0.0	-2.5	-9.152	516	632	611	793	497	652	593	813	528	618	623	780	497	652	593	814
6	3	0.0	286.8	518.4	4916.0	-644.9	-764.3	0.0	91.1	166.4	0.0	166.6	304.2	0.0	-7.5	-13.6	0.0	-5.0	-9.152	533	612	614	790	497	653	577	831	557	586	638	764	496	654	576	832
6	4	0.0	428.0	513.1	4916.0	-854.1	-764.3	0.0	136.7	166.4	0.0	249.9	304.2	0.0	-11.2	-13.6	0.0	-7.5	-9.152	550	594	616	788	495	654	561	849	586	555	651	749	494	656	559	850
6	5	0.0	567.9	507.8	4916.0	-1063.9	-764.3	0.0	182.3	166.4	0.0	333.2	304.2	0.0	-14.9	-13.6	0.0	-10.0	-9.152	566	576	617	787	493	656	544	867	614	524	664	735	491	659	542	870
6	6	0.0	706.2	502.5	4916.0	-1272.9	-764.3	0.0	227.8	166.4	0.0	416.5	304.2	0.0	-18.6	-13.6	0.0	-12.5	-9.152	582	558	618	786	491	659	526	886	642	493	677	720	488	662	524	889
6	7	0.0	843.1	497.0	4916.0	-1481.9	-764.3	0.0	273.4	166.4	0.0	499.9	304.2	0.0	-22.4	-13.6	0.0	-15.0	-9.152	598	541	618	785	488	662	509	906	669	463	690	707	485	666	505	910
6	8	0.0	978.5	491.7	4916.0	-1691.8	-764.3	0.0	319.0	166.4	0.0	583.1	304.2	0.0	-26.1	-13.6	0.0	-17.6	-9.152	613	525	618	786	484	666	490	927	696	434	701	694	481	670	486	931
6	9	0.0	1112.1	486.4	4916.0	-1900.8	-764.3	0.0	364.5	166.4	0.0	666.5	304.2	0.0	-29.8	-13.6	0.0	-20.1	-9.152	627	509	617	786	480	671	471	948	722	405	712	682	476	675	466	952
6	10	0.0	1245.1	481.1	4916.0	-2109.8	-764.3	0.0	410.1	166.4	0.0	749.8	304.2	0.0	-33.6	-13.6	0.0	-22.6	-9.152	641	494	616	787	476	675	452	969	748	376	723	670	471	680	447	974
6	11	0.0	1376.1	475.8	4916.0	-2319.8	-764.3	0.0	455.7	166.4	0.0	833.2	304.2	0.0	-37.3	-13.6	0.0	-25.1	-9.152	654	479	614	790	471	681	431	991	773	349	733	659	466	687	426	997
6	12	0.0	1506.2	470.5	4916.0	-2528.8	-764.3	0.0	501.2	166.4	0.0	916.5	304.2	0.0	-41.0	-13.6	0.0	-27.6	-9.152	667	465	612	792	466	687	411	1014	798	321	743	648	460	693	405	1020
6	13	0.0	1634.2	465.2	4916.0	-2738.7	-764.3	0.0	546.8	166.4	0.0	999.7	304.2	0.0	-44.8	-13.6	0.0	-30.1	-9.152	679	452	609	795	459	694	389	1037	821	295	752	638	453	701	383	1044
6	14	0.0	1760.2	459.9	4916.0	-2947.7	-764.3	0.0	592.4	166.4	0.0	1083.0	304.2	0.0	-48.5	-13.6	0.0	-32.6	-9.152	691	439	606	799	453	701	368	1061	845	269	760	629	446	709	361	1069
6	15	0.0	1886.2	454.6	4916.0	-3156.7	-764.3	0.0	637.9	166.4	0.0	1166.4	304.2	0.0	-52.2	-13.6	0.0	-35.1	-9.152	702	426	602	803	446	709	346	1085	868	243	769	620	438	717	338	1093
6	16	0.0	2009.2	449.3	4916.0	-3366.7	-764.3	0.0	683.5	166.4	0.0	1249.7	304.2	0.0	-56.0	-13.6	0.0	-37.6	-9.152	712	415	597	808	438	718	323	1111	890	219	775	612	430	726	315	1119
6	17	0.0	2132.2	444.0	4916.0	-3575.6	-764.3	0.0	729.1	166.4	0.0	1333.1	304.2	0.0	-59.7	-13.6	0.0	-40.1	-9.152	723	404	593	813	430	726	300	1136	913	194	783	604	421	736	291	1145
6	18	0.0	2253.2	438.7	4916.0	-3784.6	-764.3	0.0	774.6	166.4	0.0	1416.3	304.2	0.0	-63.4	-13.6	0.0	-42.6	-9.152	733	393	588	819	421	735	276	1162	934	171	790	597	412	746	267	1172
6	19	0.0	2372.2	433.4	4916.0	-3994.6	-764.3	0.0	820.2	166.4	0.0	1499.7	304.2	0.0	-67.1	-13.6	0.0	-45.1	-9.152	741	383	581	826	412	746	252	1189	955	148	795	591	402	757	242	1199
6	20	0.0	2490.2	428.1	4916.0	-4203.6	-764.3	0.0	865.8	166.4	0.0	1582.9	304.2	0.0	-70.9	-13.6	0.0	-47.6	-9.152	750	374	575	833	402	757	227	1216	976	125	801	585	392	768	217	1227
6	21	0.0	2607.3	422.8	4916.0	-4403.5	-661.7	0.0	911.3	166.4	0.0	1666.3	304.2	0.0	-74.6	-13.6	0.0	-50.1	-9.152	761	361	572	836	395	764	206	1239	999	100	809	575	384	776	195	1251
7	1	0.0	2312.2	-64.4	5122.0	-4116.5	311.3	0.0	824.0	-66.0	0.0	1605.2	-128.6	0.0	-91.4	7.3	0.0	-11.2	0.8977	734	441	571	899	371	841	207	1299	965	188	801	645	358	856	194	1313
7	2	0.0	2268.2	-76.5	5122.0	-3922.2	311.3	0.0	782.8	-66.0	0.0	1525.0	-128.6	0.0	-86.8	7.3	0.0	-10.6	0.8977	749	425	600	867	404	805	255	1247	968	184	819	626	392	818	242	1261
7	3	0.0	2217.2	-88.6	5122.0	-3728.0	311.3	0.0	741.6	-66.0	0.0	1444.6	-128.6	0.0	-82.2	7.3	0.0	-10.1	0.8977	762	411	626	838	435	771	299	1198	969	183	834	610	423	784	287	1211
7	4	0.0	2158.2	-100.7	5122.0	-3533.8	311.3	0.0	700.4	-66.0	0.0	1364.3	-128.6	0.0	-77.7	7.3	0.0	-9.5	0.8977	772	400	650	812	463	740	341	1152	967	185	846	597	451	753	330	1164
7	5	0.0	2091.2	-112.7	5122.0	-3339.6	311.3	0.0	659.2	-66.0	0.0	1284.1	-128.6	0.0	-73.1	7.3	0.0	-9.0	0.8977	778	393	671	789	487	713	380	1109	962	190	855	586	477	725	369	1121
7	6	0.0	2017.2	-124.8	5122.0	-3145.4	311.3	0.0	618.0	-66.0	0.0	1203.8	-128.6	0.0	-68.5	7.3	0.0	-8.4	0.8977	782	388	689	769	510	688	416	1069	955	198	861	579	500	699	406	1080
7	7	0.0	1935.2	-136.9	5122.0	-2951.1	311.3	0.0	576.8	-66.0	0.0	1123.6	-128.6	0.0	-64.0	7.3	0.0	-7.8	0.8977	784	387	704	752	529	667	450	1032	945	209	865	575	520	677	440	1043
7	8	0.0	1846.2	-149.0	5122.0	-2756.9	311.3	0.0	535.6	-66.0	0.0	1043.4	-128.6	0.0	-59.4	7.3	0.0	-7.3	0.8977	783	388	717	736	546	648	480	998	932	223	866	574	538	658	472	1008
7	9	0.0	1749.2	-161.1	5122.0	-2562.7	311.3	0.0	494.4	-66.0	0.0	963.1	-128.6	0.0	-54.8	7.3	0.0	-6.7	0.8977	779	393	727	727	560	633	509	967	917	241	865	575	553	641	501	976
7	10	0.0	1645.2	-173.2	5122.0	-2368.5	311.3	0.0	453.2	-66.0	0.0	882.9	-128.6	0.0	-50.3	7.3	0.0	-6.2	0.8977	772	400	734	719	572	620	534	939	899	260	861	580	565	628	527	947
7	11	0.0	1533.2	-185.3	5122.0	-2174.2	311.3	0.0	412.0	-66.0	0.0	802.6	-128.6	0.0	-45.7	7.3	0.0	-5.6	0.8977	763	410	739	714	581	610	557	914	878	283	854	588	574	617	550	922
7	12	0.0	1414.1	-197.4	5122.0	-1980.0	311.3	0.0	370.8	-66.0	0.0	722.3	-128.6	0.0	-41.1	7.3	0.0	-5.0	0.8977	751	423	741	712	587	603	577	892	854	309	844	598	581	610	571	899
7	13	0.0	1287.1	-209.5	5122.0	-1785.8	311.3	0.0	329.6	-66.0	0.0	642.1	-128.6	0.0	-36.6	7.3	0.0	-4.5	0.8977	736	440	740	713	590	600	594	873	828	338	832	612	585	606	589	879
7	14	0.0	1152.1	-221.5	5122.0	-1591.6	311.3	0.0	288.4	-66.0	0.0	561.7	-128.6	0.0	-32.0	7.3	0.0	-3.9	0.8977	718	459	736	717	591	599	609	857	799	370	816	628	586	604	604	862
7	15	0.0	1010.1	-233.6	5122.0	-1397.3	311.3	0.0	247.2	-66.0	0.0	481.5	-128.6	0.0	-27.4	7.3	0.0	-3.4	0.8977	698	481	730	724	589	601	621	844	767	405	799	648	585	606	617	848
7	16	0.0	861.0	-245.7	5122.0	-1203.1	311.3	0.0	206.0	-66.0	0.0	401.3	-128.6	0.0	-22.8	7.3	0.0	-2.8	0.8977	675	506	721	734	584	606	630	834	733	443	778	670	581	610	627	837
7	17	0.0	703.9	-257.8	5122.0	-1009.3	311.3	0.0	164.8	-66.0	0.0	321.0	-128.6	0.0	-18.3	7.3	0.0	-2.2	0.8977	649	535	709	747	577	615	636	827	695	484	755	696	574	618	634	830
7	18	0.0	539.3	-269.9	5122.0	-815.1	311.3	0.0	123.6	-66.0	0.0	240.7	-128.6	0.0	-13.7	7.3	0.0	-1.7	0.8977	621	566	695	763	566	626	640	823	656	528	729	725	564	628	638	825
7	19	0.0	367.0	-282.0	5122.0	-620.9	311.3	0.0	82.4	-66.0	0.0	160.5	-128.6	0.0	-9.1	7.3	0.0	-1.1	0.8977	590	600	678	781	554	640	641	821	613	575	701	756	552	642	640	823
7	20	0.0	187.3	-294.1	5122.0	-426.6	311.3	0.0	41.2	-66.0	0.0	80.3	-128.6	0.0	-4.6	7.3	0.0	-0.6	0.8977	556	637	658	803	538	657	640	823	568	625	669	791	537	658	639	824
7	21	0.0	0.0	-306.2	5122.0	-232.4	311.3	0.0	0.0	-66.0	0.0	0.0	-111.6	0.0	0.0	-109.9	0.0	0.0	0.8977	520	677	635	828	520	677	635	828	520	677	635	828	520	677	635	828

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INFINITO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1502.0

Resumen de combinaciones:

		Tension máxima (t/m2)	Tension mínima (t/m2)
1	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	872	35
2	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	764	34
3	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	633	23
4	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	1023	177
5	PP,final + CM + 0.9 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	1110	-178
6	PP,final + CM + 1.1 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	945	13
7	PP,final + CM + 0.9 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	815	-96
8	PP,final + CM + 1.1 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	1036	58

PP,final= Peso propio en tiempo final
Pret,final = Pretensado en tiempo final
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR															
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	160.4	2452.0	80.9	-283.2	0.0	0.0	74.8	0.0	0.0	148.7	0.0	0.0	-23.8	0.0	0.0	10.54	284	226	347	277	284	226	347	277	284	226	347	277	284	226	347	277
1	2	0.0	164.4	136.9	2452.0	-212.3	-247.0	0.0	77.3	65.1	0.0	156.1	132.9	0.0	-26.4	-23.8	0.0	11.7	10.54	309	190	353	268	271	244	315	321	330	161	374	238	268	249	312	326
1	3	0.0	302.9	113.5	2452.0	-465.5	-210.8	0.0	143.9	55.3	0.0	294.0	116.6	0.0	-52.8	-23.8	0.0	23.3	10.54	381	195	418	312	306	310	343	427	422	132	459	249	299	321	336	438
1	4	0.0	417.4	93.6	2452.0	-757.2	-174.6	0.0	199.7	45.6	0.0	414.0	100.3	0.0	-79.1	-23.8	0.0	35.0	10.54	376	202	393	350	270	366	286	513	434	114	451	262	259	383	276	530
1	5	0.0	510.0	73.8	2452.0	-930.3	-138.4	0.0	244.7	35.9	0.0	515.8	83.9	0.0	-105.5	-23.8	0.0	46.6	10.54	393	177	398	343	258	384	263	549	465	67	470	232	244	406	249	571
1	6	0.0	580.6	54.0	2452.0	-1063.0	-102.3	0.0	279.0	26.1	0.0	599.6	67.6	0.0	-131.9	-23.8	0.0	58.3	10.54	407	155	403	335	248	400	244	579	491	27	487	206	230	427	226	606
1	7	0.0	629.4	34.1	2452.0	-1157.0	-66.1	0.0	302.5	16.4	0.0	665.4	51.3	0.0	-158.3	-23.8	0.0	70.0	10.54	418	138	408	327	238	414	228	603	511	-4	501	185	216	447	206	637
1	8	0.0	656.1	14.3	2452.0	-1210.0	-29.9	0.0	315.3	6.7	0.0	713.1	35.0	0.0	-184.6	-23.8	0.0	81.6	10.54	427	124	413	319	230	427	216	622	527	-29	513	166	205	465	191	660
1	9	0.0	661.0	-5.5	2452.0	-1223.0	6.3	0.0	317.3	-3.1	0.0	742.7	18.6	0.0	-211.1	-23.8	0.0	93.3	10.54	434	115	419	311	223	438	208	634	538	-45	523	151	194	482	179	678
1	10	0.0	643.9	-25.4	2452.0	-1195.0	43.4	0.0	308.5	-12.8	0.0	754.3	2.3	0.0	-237.4	-23.8	0.0	104.9	10.54	438	108	425	301	217	446	204	639	544	-55	531	138	185	496	172	689
1	11	0.0	604.9	-45.2	2559.0	-1187.0	87.2	0.0	288.9	-22.5	0.0	747.9	-14.0	0.0	-263.8	-23.8	0.0	116.6	10.54	434	148	425	343	208	495	198	690	540	-15	531	181	172	550	162	745
1	12	0.0	543.9	-65.0	2559.0	-1067.0	129.6	0.0	258.6	-32.3	0.0	723.4	-30.3	0.0	-290.2	-23.8	0.0	128.2	10.54	437	143	436	326	208	494	207	677	540	-14	539	168	169	555	167	738
1	13	0.0	461.0	-84.9	2559.0	-900.4	172.0	0.0	217.6	-42.0	0.0	680.8	-46.7	0.0	-316.6	-23.8	0.0	139.9	10.54	439	140	449	305	212	489	222	654	537	-9	547	156	168	555	178	720
1	14	0.0	356.2	-104.7	2559.0	-686.7	214.4	0.0	165.7	-51.7	0.0	620.2	-63.0	0.0	-342.9	-23.8	0.0	151.6	10.54	441	137	465	281	218	479	243	622	531	0	555	143	172	550	196	693
1	15	0.0	229.4	-124.5	2617.0	-446.3	262.1	0.0	103.1	-61.5	0.0	541.4	-79.3	0.0	-369.4	-23.8	0.0	163.2	10.54	443	152	486	272	229	480	272	600	523	31	565	150	179	557	222	677
1	16	0.0	80.7	-144.4	2617.0	-132.5	305.4	0.0	29.7	-71.2	0.0	444.8	-95.6	0.0	-395.7	-23.8	0.0	174.9	10.54	446	148	510	235	245	457	308	544	513	46	577	133	191	539	255	626
1	17	0.0	-89.9	-164.2	2617.0	229.4	348.8	0.0	-54.4	-80.9	0.0	329.9	-111.9	0.0	-422.0	-23.8	0.0	186.5	10.54	449	144	537	193	263	428	352	477	500	65	589	114	206	516	294	565
1	18	0.0	-282.5	-184.0	2617.0	639.1	392.2	0.0	-149.3	-90.7	0.0	197.0	-128.2	0.0	-448.5	-23.8	0.0	198.2	10.54	451	140	568	146	286	394	402	400	485	89	601	95	224	488	341	494
1	19	0.0	-497.0	-203.9	2565.0	1038.0	307.4	0.0	-255.0	-100.4	0.0	59.6	3.0	0.0	-495.6	-171.8	0.0	209.9	10.54	432	153	574	116	283	382	425	345	447	130	589	93	215	485	357	449
1	20	0.0	-735.5	-227.3	2565.0	1377.0	165.2	0.0	-371.4	-110.1	0.0	62.9	3.0	0.0	-694.7	-188.2	0.0	221.5	10.54	374	140	529	65	184	422	339	347	390	117	545	42	91	560	246	485
1	21	0.0	-999.9	-250.8	2565.0	1485.0	29.7	0.0	-498.6	-119.9	0.0	66.2	3.0	0.0	-911.7	-204.4	0.0	233.2	10.54	278	283	440	197	42	633	204	547	295	258	457	172	-81	815	81	729
2	1	0.0	-999.9	244.1	2479.0	1457.0	-2.7	0.0	-498.6	115.3	0.0	66.2	-16.9	0.0	-911.7	210.8	0.0	233.2	-0.226	253	277	407	201	23	603	177	527	269	254	423	177	-96	772	58	696
2	2	0.0	-700.5	216.5	2479.0	1347.0	-166.8	0.0	-356.2	103.8	0.0	44.3	-16.9	0.0	-650.2	191.6	0.0	232.9	-0.226	361	124	507	58	186	372	333	305	374	105	520	39	101	492	248	426
2	3	0.0	-436.9	188.9	2479.0	1023.0	-332.3	0.0	-228.6	92.4	0.0	22.3	-16.9	0.0	-413.5	172.4	0.0	232.6	-0.226	442	110	581	72	313	307	452	270	453	93	592	56	257	394	396	356
2	4	0.0	-206.5	165.6	2390.0	476.5	-345.9	0.0	-116.0	80.9	0.0	125.1	117.7	0.0	-316.3	1.1	0.0	232.3	-0.226	401	145	500	161	271	344	370	361	426	106	525	123	228	411	327	427
2	5	0.0	-6.3	142.3	2390.0	70.1	-288.7	0.0	-18.2	69.5	0.0	287.1	115.3	0.0	-316.9	1.1	0.0	232.0	-0.226	411	129	483	189	248	379	320	438	458	57	530	117	205	445	277	504
2	6	0.0	163.6	119.0	2390.0	-274.2	-240.9	0.0	84.7	58.1	0.0	424.5	96.1	0.0	-315.4	1.1	0.0	231.7	-0.226	420	116	468	211	229	408	277	504	485	15	533	111	186	474	234	569
2	7	0.0	303.1	95.7	2390.0	-556.3	-193.1	0.0	132.8	46.6	0.0	537.0	77.0	0.0	-313.8	1.1	0.0	231.4	-0.226	427	105	456	230	214	432	242	557	508	-19	537	106	171	497	200	622
2	8	0.0	412.3	72.4	2390.0	-776.2	-145.3	0.0	186.0	35.2	0.0	624.6	57.8	0.0	-312.4	1.1	0.0	231.1	-0.226	433	96	446	244	202	450	216	598	526	-46	539	102	159	515	173	663
2	9	0.0	491.3	49.1	2390.0	-934.0	-97.5	0.0	224.3	23.7	0.0	687.2	38.6	0.0	-310.9	0.7	0.0	230.8	-0.226	437	90	440	254	194	462	197	627	538	-66	542	98	151	527	154	692
2	10	0.0	539.9	25.8	2390.0	-1030.0	-49.7	0.0	247.7	12.3	0.0	725.0	19.4	0.0	-310.1	0.7	0.0	230.5	-0.226	440	85	436	260	189	470	186	644	546	-78	543	96	147	534	143	709
2	11	0.0	558.2	2.4	2390.0	-1063.0	-1.9	0.0	256.2	0.9	0.0	737.6	0.2	0.0	-309.2	0.7	0.0	230.2	-0.226	441	83	436	261	188	471	182	649	550	-83	544	95	146	536	140	713
2	12	0.0	546.3	-20.9	2285.0	-961.1	43.8	0.0	249.9	-10.6	0.0	726.8	-17.8	0.0	-308.4	0.7	0.0	229.9	-0.226	451	35	449	199	200	419	199	583	558	-129	556	35	158	484	157	648
2	13	0.0	504.0	-44.2	2285.0	-874.5	89.5	0.0	228.7	-22.0	0.0	691.3	-37.0	0.0	-307.4	0.7	0.0	229.6	-0.226	449	39	453	194	205	411	210	566	551	-118	555	37	163	476	168	631
2	14	0.0	431.4	-67.5	2285.0	-728.5	135.2	0.0	192.7	-33.5	0.0	630.6	-56.2	0.0	-307.2	0.1	0.0	229.4	-0.226	444	46	458	186	213	399	227	539	538	-98	552	42	171	463	185	603
2	15	0.0	328.5	-90.8	2285.0	-523.0	180.9	0.0	141.8	-44.9	0.0	545.1	-75.4	0.0	-306.9	0.1	0.0	229.1	-0.226	437	56	465	175	224	383	252	501	519	-69	547	49	182	447	210	585
2	16	0.0	195.3	-114.1	2285.0	-258.2	226.6	0.0	76.0	-56.3	0.0	434.7	-94.6	0.0	-306.8	0.1	0.0	228.8	-0.226	428	71	474	161	237	362	283	453	495	-32	541	59	195	427	242	517
2	17	0.0	31.8	-137.4	2285.0	66.1	272.3	0.0	-4.7	-67.8	0.0	299.3	-113.8	0.0	-306.6	0.1	0.0	228.5	-0.226	416	88	484	145	254	338	322	394	465	14	533	71	212	402	280	458
2	18	0.0	-162.1	-160.7	2285.0	449.8	318.0	0.0	-100.3	-79.2	0.0	143.0	-115.4	0.0	-307.1	-16.9	0.0	228.2	-0.226	403	108	498	125	272	309	367	325	431	66	525	83	231	373	325	389
2	19	0.0	-386.2	-184.1	2285.0	882.4	339.2	0.0	-210.7	-90.7	0.0	26.9	17.6	0.0	-387.5	-170.2	0.0	227.9	-0.226	398	116	522	87	275	305	399	277	410	98	533	70	222	386	346	358
2	20	0.0	-643.4	-211.6	2391.0	1280.0	157.5	0.0	-336.0	-102.1	0.0	49.7	17.6	0.0	-621.2	-189.3	0.0	227.6	-0.226	367	104	511	34	194	361	338	291	382	82	526	13	110	484	254	415
2	21	0.0	-936.4	-239.2	2391.0	1381.0	-1.8	0.0	-476.1	-113.5	0.0	72.6	17.6	0.0	-879.9	-208.5	0.0	227.3	-0.226	257	267	408	188	27	608	177	529	274	241	425	162	-92	784	59	704
3	1	0.0	-936.4	247.9	2479.0	1409.0	-22.2	0.0	-476.1	118.9	0.0	72.6	-3.3	0.0	-879.9	203.0	0.0	227.3	-10.28	267	257	418	185	43	575	194	502	284	233	435	161	-72	738	79	686
3	2	0.0	-675.2	224.5	2479.0	1309.0	-160.1	0.0	-350.1	109.1	0.0	68.9	-3.3	0.0	-664.3	186.8	0.0	215.9	-10.28	362	123	506	60	183	377	327	314	378	100	522	37	96	500	240	437
3	3	0.0	-439.9	201.0	2479.0	1061.0	-289.4	0.0	-234.8	99.4	0.0	65.3	-3.3	0.0	-466.8	170.4	0.0	204.6	-10.28	455	91	596	49	311	311	452	289	471	67	612	25	247	408	389	367
3	4	0.0	-228.6	181.2	2479.0	592.1	-412.4	0.0	-130.2	89.7	0.0	211.4	127.5	0.0	-430.7	22.9	0.0	193.2	-10.28	446	104	556	111	282	355	392	362	482	49	591	57	224	445	333	452
3	5	0.0	-39.2	161.3	2565.0	194.6	-340.4	0.0	-36.5	79.9	0.0	343.4	111.2	0.0	-405.4	22.9	0.0	181.8	-10.28	457	115	542	166	273	397	358	448	510	34	595	85	218	481	302	533
3	6	0.0	128.3	141.5	2565.0	-158.4	-297.9	0.0	46.6	70.2	0.0	457.4	94.9	0.0	-380.1	22.9	0.0	170.5	-10.28	455	117	516	205	255	424	316	512	523	13	584	101	203	503	264	591
3	7	0.0	273.8	121.7	2565.0	-464.3	-255.4	0.0	118.8	60.5	0.0	553.3	78.5	0.0	-354.7	22.9	0.0	159.1	-10.28	453	120	493	240	241	446	281	566	534	-4	574	116	192	520	232	640
3	8	0.0	397.4	101.8	2565.0	-723.3	-212.9	0.0	180.3	50.7	0.0	631.1	62.2	0.0	-329.4	22.9	0.0	147.7	-10.28	451	124	473	271	230	463	252	610	542	-16	564	131	185	532	207	679
3	9	0.0	499.1	82.0	2617.0	-961.8	-173.3	0.0	231.0	41.0	0.0	690.9	45.9	0.0	-304.1	22.9	0.0	136.4	-10.28	447	147	454	321	220	494	228	668	545	-4	553	169	179	558	186	731

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INFINITO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1502.0

Resumen de combinaciones:

		Tension máxima (t/m2)	Tension mínima (t/m2)
1	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	872	35
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3	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	633	23
4	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	1023	177
5	PP,final + CM + 0.9 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	1110	-178
6	PP,final + CM + 1.1 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	945	13
7	PP,final + CM + 0.9 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	815	-96
8	PP,final + CM + 1.1 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	1036	58

PP,final= Peso propio en tiempo final
Pret,final = Pretensado en tiempo final
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INFINITO																		TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	10	0.0	578.8	62.2	2617.0	-1129.0	-129.9	0.0	271.0	31.3	0.0	732.6	29.6	0.0	-278.7	22.9	0.0	125.0	-10.28	443	153	439	344	215	502	211	693	547	-6	543	184	177	561	173	751
3	11	0.0	636.6	42.3	2617.0	-1249.0	-86.5	0.0	300.2	21.5	0.0	756.3	13.2	0.0	-253.4	22.9	0.0	113.6	-10.28	438	160	426	363	213	505	201	709	545	-4	533	199	178	558	166	762
3	12	0.0	672.4	22.5	2617.0	-1321.0	-43.1	0.0	318.6	11.8	0.0	761.9	-3.1	0.0	-228.0	22.9	0.0	102.3	-10.28	434	166	417	377	214	503	197	714	541	2	524	213	183	551	166	762
3	13	0.0	686.4	2.7	2559.0	-1310.0	-2.8	0.0	326.2	2.1	0.0	749.4	-19.4	0.0	-202.7	22.9	0.0	90.9	-10.28	433	150	415	358	223	471	205	680	538	-12	520	196	195	514	177	722
3	14	0.0	678.3	-17.2	2559.0	-1293.0	34.4	0.0	323.1	-7.7	0.0	719.0	-35.7	0.0	-177.4	22.9	0.0	79.6	-10.28	426	160	410	366	230	461	213	668	527	6	510	212	205	498	189	705
3	15	0.0	648.4	-37.0	2558.0	-1234.0	72.2	0.0	309.3	-17.4	0.0	670.5	-52.0	0.0	-152.0	22.9	0.0	68.2	-10.28	417	173	405	373	238	448	225	649	511	29	498	230	217	480	204	680
3	16	0.0	596.5	-56.8	2558.0	-1133.0	110.0	0.0	284.6	-27.1	0.0	603.9	-68.4	0.0	-126.7	22.9	0.0	56.8	-10.28	407	189	401	379	248	433	242	623	491	60	485	250	231	459	225	649
3	17	0.0	522.7	-76.7	2558.0	-990.7	147.7	0.0	249.2	-36.9	0.0	519.2	-84.7	0.0	-101.4	22.9	0.0	45.5	-10.28	394	209	398	384	259	415	263	590	466	98	470	273	246	436	250	611
3	18	0.0	426.9	-96.5	2558.0	-806.4	185.5	0.0	203.1	-46.6	0.0	416.4	-101.0	0.0	-76.0	22.9	0.0	34.1	-10.28	379	232	396	387	273	395	289	550	437	143	454	298	262	411	279	566
3	19	0.0	309.2	-116.3	2558.0	-580.3	223.3	0.0	146.1	-56.3	0.0	295.7	-117.4	0.0	-50.7	22.9	0.0	22.7	-10.28	362	257	394	389	288	372	320	504	403	194	435	326	281	382	313	514
3	20	0.0	167.6	-139.8	2558.0	-230.6	261.0	0.0	78.5	-66.1	0.0	156.9	-133.7	0.0	-25.3	22.9	0.0	11.4	-10.28	326	210	372	295	287	268	334	353	347	179	394	264	284	273	330	358
3	21	0.0	0.0	-163.3	2558.0	78.9	298.8	0.0	0.0	-75.8	0.0	0.0	22.9	0.0	0.0	-149.4	0.0	0.0	-10.28	303	244	370	298	303	244	370	298	303	244	370	298	303	244	370	298
4	1	0.0	0.0	290.4	4389.0	-201.9	-254.3	0.0	0.0	58.7	0.0	0.0	53.5	0.0	0.0	97.7	0.0	0.0	-0.616	444	582	543	711	444	582	543	711	444	582	543	711	444	582	543	711
4	2	0.0	185.2	277.8	4389.0	-367.6	-254.3	0.0	38.3	58.7	0.0	75.2	115.3	0.0	-4.1	-6.3	0.0	-0.4	-0.616	487	534	574	677	470	553	557	695	498	523	585	665	470	554	557	696
4	3	0.0	362.1	265.1	4389.0	-533.3	-254.3	0.0	76.6	58.7	0.0	150.3	115.3	0.0	-8.2	-6.3	0.0	-0.8	-0.616	527	491	602	646	493	526	568	683	549	467	624	622	492	529	567	685
4	4	0.0	530.8	252.5	4389.0	-699.1	-254.3	0.0	114.8	58.7	0.0	225.5	115.3	0.0	-12.3	-6.3	0.0	-1.2	-0.616	564	450	627	618	513	506	576	675	596	414	659	583	511	508	574	677
4	5	0.0	691.2	239.9	4389.0	-864.8	-254.3	0.0	153.1	58.7	0.0	300.6	115.3	0.0	-16.3	-6.3	0.0	-1.6	-0.616	598	413	649	594	530	487	581	669	641	365	692	547	528	490	579	672
4	6	0.0	843.5	227.3	4389.0	-1031.0	-254.3	0.0	191.4	58.7	0.0	375.8	115.3	0.0	-20.4	-6.3	0.0	-2.0	-0.616	629	379	668	573	544	472	583	667	683	319	722	514	541	475	580	670
4	7	0.0	987.5	214.6	4389.0	-1196.0	-254.3	0.0	229.7	58.7	0.0	451.0	115.3	0.0	-24.5	-6.3	0.0	-2.4	-0.616	657	348	684	555	555	460	582	668	722	276	749	484	551	464	579	672
4	8	0.0	1123.0	202.0	4389.0	-1362.0	-254.3	0.0	267.9	58.7	0.0	526.1	115.3	0.0	-28.6	-6.3	0.0	-2.8	-0.616	682	320	697	541	563	451	578	672	757	237	773	458	559	456	574	677
4	9	0.0	1251.0	189.4	4389.0	-1528.0	-254.3	0.0	306.2	58.7	0.0	601.2	115.3	0.0	-32.7	-6.3	0.0	-3.2	-0.616	704	296	708	530	568	445	572	680	790	201	794	435	563	451	567	685
4	10	0.0	1370.0	176.8	4389.0	-1693.0	-254.3	0.0	344.5	58.7	0.0	676.4	115.3	0.0	-36.8	-6.3	0.0	-3.6	-0.616	723	275	715	522	570	443	562	690	820	168	812	415	565	449	557	696
4	11	0.0	1481.0	164.1	4389.0	-1859.0	-254.3	0.0	382.8	58.7	0.0	751.5	115.3	0.0	-40.8	-6.3	0.0	-4.0	-0.616	739	257	719	517	569	444	549	704	847	138	827	398	564	450	543	711
4	12	0.0	1584.0	151.5	4389.0	-2025.0	-254.3	0.0	421.1	58.7	0.0	826.8	115.3	0.0	-44.9	-6.3	0.0	-4.4	-0.616	753	242	720	516	566	448	533	722	871	112	839	385	559	455	527	729
4	13	0.0	1679.0	138.9	4389.0	-2191.0	-254.3	0.0	459.3	58.7	0.0	901.8	115.3	0.0	-49.0	-6.3	0.0	-4.8	-0.616	763	231	719	517	559	456	515	742	892	89	848	375	552	463	508	750
4	14	0.0	1765.0	126.2	4389.0	-2356.0	-254.3	0.0	497.6	58.7	0.0	977.1	115.3	0.0	-53.1	-6.3	0.0	-5.2	-0.616	770	223	714	522	549	466	493	766	911	68	855	368	542	474	486	774
4	15	0.0	1843.0	113.6	4389.0	-2522.0	-254.3	0.0	535.9	58.7	0.0	1052.1	115.3	0.0	-57.2	-6.3	0.0	-5.6	-0.616	775	218	707	531	537	480	469	793	925	52	858	365	528	489	460	802
4	16	0.0	1913.0	101.0	4389.0	-2688.0	-254.3	0.0	574.2	58.7	0.0	1127.4	115.3	0.0	-61.3	-6.3	0.0	-6.0	-0.616	776	217	696	542	521	497	441	823	938	39	858	364	512	507	432	833
4	17	0.0	1975.0	88.4	4389.0	-2854.0	-254.3	0.0	612.5	58.7	0.0	1202.4	115.3	0.0	-65.3	-6.3	0.0	-6.4	-0.616	774	218	683	557	502	518	411	857	947	28	855	367	493	528	401	867
4	18	0.0	2028.0	75.7	4389.0	-3019.0	-254.3	0.0	650.7	58.7	0.0	1277.6	115.3	0.0	-69.4	-6.3	0.0	-6.8	-0.616	770	223	666	575	481	541	377	893	953	21	850	373	471	552	367	904
4	19	0.0	2074.0	63.1	4389.0	-3185.0	-254.3	0.0	689.0	58.7	0.0	1352.9	115.3	0.0	-73.5	-6.3	0.0	-7.2	-0.616	763	231	647	596	457	568	341	933	957	17	841	383	446	580	331	945
4	20	0.0	2111.0	50.5	4389.0	-3351.0	-254.3	0.0	727.3	58.7	0.0	1427.9	115.3	0.0	-77.6	-6.3	0.0	-7.6	-0.616	752	243	625	621	429	598	302	977	957	17	830	395	418	611	291	989
4	21	0.0	2139.0	37.9	4389.0	-3517.0	-255.3	0.0	765.6	58.7	0.0	1503.2	115.3	0.0	-81.7	-6.3	0.0	-8.0	-0.616	739	258	599	649	398	632	259	1023	954	20	815	412	387	645	247	1036
5	1	0.0	2446.0	-457.0	4279.0	-3845.0	749.3	0.0	855.9	-176.4	0.0	1558.3	-321.2	0.0	-66.6	13.7	0.0	-49.3	10.15	767	200	601	614	426	575	260	990	989	-45	823	370	416	586	250	1000
5	2	0.0	2334.0	-461.7	4279.0	-3663.0	752.9	0.0	813.1	-176.4	0.0	1480.3	-321.2	0.0	-63.3	13.7	0.0	-46.8	10.15	754	214	601	614	430	571	277	971	965	-18	812	382	420	581	268	981
5	3	0.0	2222.0	-466.4	4279.0	-3481.0	752.0	0.0	770.3	-176.4	0.0	1402.4	-321.2	0.0	-60.0	13.7	0.0	-44.3	10.15	741	229	601	614	434	567	294	952	941	9	801	394	425	576	285	962
5	4	0.0	2108.0	-471.1	4279.0	-3298.0	752.0	0.0	727.5	-176.4	0.0	1324.5	-321.2	0.0	-56.6	13.7	0.0	-41.9	10.15	727	243	601	615	437	563	311	934	916	36	789	407	429	572	302	943
5	5	0.0	1993.0	-475.8	4279.0	-3116.0	752.0	0.0	684.7	-176.4	0.0	1246.6	-321.2	0.0	-53.3	13.7	0.0	-39.4	10.15	713	259	600	616	440	560	327	916	891	64	777	420	432	568	319	925
5	6	0.0	1877.0	-480.5	4279.0	-2933.0	752.0	0.0	641.9	-176.4	0.0	1168.7	-321.2	0.0	-50.0	13.7	0.0	-36.9	10.15	699	275	598	617	443	557	343	899	865	91	765	434	436	564	335	907
5	7	0.0	1760.0	-485.2	4279.0	-2751.0	752.0	0.0	599.1	-176.4	0.0	1090.8	-321.2	0.0	-46.6	13.7	0.0	-34.5	10.15	684	291	597	619	445	554	358	882	839	120	752	448	438	562	351	889
5	8	0.0	1642.0	-489.9	4279.0	-2569.0	752.0	0.0	556.3	-176.4	0.0	1012.9	-321.2	0.0	-43.3	13.7	0.0	-32.0	10.15	669	308	594	622	447	552	373	866	813	149	739	463	441	559	366	873
5	9	0.0	1522.0	-494.6	4279.0	-2386.0	752.0	0.0	513.5	-176.4	0.0	935.0	-321.2	0.0	-40.0	13.7	0.0	-29.6	10.15	653	325	592	624	448	551	387	850	786	179	725	478	442	557	381	856
5	10	0.0	1402.0	-499.3	4279.0	-2204.0	752.0	0.0	470.7	-176.4	0.0	857.1	-321.2	0.0	-36.6	13.7	0.0	-27.1	10.15	637	343	589	628	449	549	401	834	759	208	711	493	444	555	396	840
5	11	0.0	1280.0	-504.0	4279.0	-2021.0	752.0	0.0	427.9	-176.4	0.0	779.2	-321.2	0.0	-33.3	13.7	0.0	-24.6	10.15	621	361	586	631	450	549	415	819	732	239	697	509	445	554	410	824
5	12	0.0	1157.0	-508.7	4279.0	-1839.0	752.0	0.0	385.1	-176.4	0.0	701.2	-321.2	0.0	-30.0	13.7	0.0	-22.2	10.15	603	380	582	635	450	549	428	805	703	270	682	525	446	553	424	809
5	13	0.0	1033.0	-513.4	4279.0	-1656.0	752.0	0.0	342.4	-176.4	0.0	623.2	-321.2	0.0	-26.6	13.7	0.0	-19.7	10.15	586	398	578	640	450	549	441	790	675	301	667	542	446	553	438	794
5	14	0.0	907.8	-518.1	4279.0	-1474.0	752.0	0.0	299.6	-176.4	0.0	545.4	-321.2	0.0	-23.3	13.7	0.0	-17.2	10.15	569	418	573	645	449	550	454	777	646	333	651	559	446	553	450	780
5	15	0.0	781.6	-522.8	4279.0	-1291.0	752.0	0.0	256.8	-176.4	0.0	467.4	-321.2	0.0	-20.0	13.7	0.0	-14.8	10.15	551	438	568	650	448	550	466	763	617	364	635	577	445	554	463	766
5	16	0.0	654.2	-527.5	4279.0	-1109.0	752.0	0.0	214.0	-176.4	0.0	389.5	-321.2	0.0	-16.7	13.7	0.0	-12.3	10.15	532	458	563	656	447	552	477	750	588	397	618	595	444	555	475	753
5	17	0.0	525.6	-532.2	4279.0	-926.6	752.0	0.0	171.2	-176.4	0.0	311.7	-321.2	0.0	-13.3	13.7	0.0	-9.9	10.15	513	479	557	663	445	554	489	738	557	430	601	614	443	556	487	740
5	18	0.0	395.9	-536.9	4279.0	-744.2	752.0	0.0	128.4	-176.4	0.0	233.7	-321.2	0.0	-10.0	13.7	0.0	-7.4	10.15	494	500	551	670	443	557	499	726	527	464	584	633	441	558	498	728

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INFINITO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1502.0

Resumen de combinaciones:

		Tension máxima (t/m2)	Tension mínima (t/m2)
1	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	872	35
2	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	764	34
3	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	633	23
4	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	1023	177
5	PP,final + CM + 0.9 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	1110	-178
6	PP,final + CM + 1.1 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	945	13
7	PP,final + CM + 0.9 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	815	-96
8	PP,final + CM + 1.1 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	1036	58

PP,final= Peso propio en tiempo final
Pret,final = Pretensado en tiempo final
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
5	19	0.0	265.1	-541.6	4279.0	-561.7	752.0	0.0	85.6	-176.4	0.0	155.8	-321.2	0.0	-6.7	13.7	0.0	-4.9	10.15	474	522	544	677	440	560	510	715	496	498	566	653	439	561	509	716
5	20	0.0	133.1	-548.3	4279.0	-379.3	752.0	0.0	42.8	-176.4	0.0	77.9	-321.2	0.0	-3.3	13.7	0.0	-2.5	10.15	454	544	537	685	437	563	520	704	465	532	548	673	436	564	519	704
5	21	0.0	0.0	-551.0	4279.0	-196.9	752.0	0.0	0.0	-176.4	0.0	0.0	0.0	0.0	0.0	-283.4	0.0	0.0	10.15	433	567	530	693	433	567	530	693	433	567	530	693	433	567	530	693
6	1	0.0	0.0	528.9	4277.0	-196.7	-665.0	0.0	0.0	166.4	0.0	0.0	280.3	0.0	0.0	0.0	0.0	-2.5	-9.152	433	567	529	693	433	567	529	693	433	567	529	693	433	567	529	693
6	2	0.0	144.1	523.6	4277.0	-378.9	-665.0	0.0	45.6	166.4	0.0	83.3	304.2	0.0	-3.7	-13.6	0.0	-2.5	-9.152	460	537	543	678	442	557	525	698	472	524	555	665	441	558	524	698
6	3	0.0	286.8	518.3	4277.0	-561.0	-665.0	0.0	91.1	166.4	0.0	166.6	304.2	0.0	-7.5	-13.6	0.0	-5.0	-9.152	486	508	556	663	449	549	520	703	510	482	580	637	448	550	518	705
6	4	0.0	428.0	513.0	4277.0	-743.1	-665.0	0.0	136.7	166.4	0.0	249.9	304.2	0.0	-11.2	-13.6	0.0	-7.5	-9.152	512	480	569	649	457	540	514	710	547	441	604	610	455	542	512	711
6	5	0.0	567.8	507.7	4277.0	-925.3	-665.0	0.0	182.3	166.4	0.0	333.2	304.2	0.0	-14.9	-13.6	0.0	-10.0	-9.152	537	452	581	636	464	533	508	716	584	400	628	584	462	535	506	719
6	6	0.0	706.1	502.4	4277.0	-1107.0	-665.0	0.0	227.8	166.4	0.0	416.5	304.2	0.0	-18.6	-13.6	0.0	-12.5	-9.152	562	425	593	623	470	526	501	724	621	360	652	558	468	529	498	727
6	7	0.0	843.0	497.0	4277.0	-1290.0	-665.0	0.0	273.4	166.4	0.0	499.9	304.2	0.0	-22.4	-13.6	0.0	-15.0	-9.152	586	399	603	611	476	520	494	732	657	320	675	533	473	523	490	736
6	8	0.0	978.4	491.7	4277.0	-1472.0	-665.0	0.0	319.0	166.4	0.0	583.1	304.2	0.0	-26.1	-13.6	0.0	-17.6	-9.152	609	373	614	599	481	514	486	740	692	281	697	508	477	518	482	745
6	9	0.0	1112.0	486.4	4277.0	-1654.0	-665.0	0.0	364.5	166.4	0.0	666.5	304.2	0.0	-29.8	-13.6	0.0	-20.1	-9.152	632	347	624	588	486	509	477	750	727	243	719	484	482	513	473	754
6	10	0.0	1245.0	481.1	4277.0	-1836.0	-665.0	0.0	410.1	166.4	0.0	749.8	304.2	0.0	-33.6	-13.6	0.0	-22.6	-9.152	655	322	634	578	490	504	469	759	762	205	741	460	486	509	464	764
6	11	0.0	1376.0	475.8	4277.0	-2018.0	-665.0	0.0	455.7	166.4	0.0	833.2	304.2	0.0	-37.3	-13.6	0.0	-25.1	-9.152	677	298	643	568	494	499	460	769	796	167	761	437	489	505	454	775
6	12	0.0	1506.0	470.5	4277.0	-2200.0	-665.0	0.0	501.2	166.4	0.0	916.5	304.2	0.0	-41.0	-13.6	0.0	-27.6	-9.152	699	274	651	558	498	496	450	780	830	130	782	414	492	502	444	786
6	13	0.0	1634.0	465.2	4277.0	-2382.0	-665.0	0.0	546.8	166.4	0.0	999.7	304.2	0.0	-44.8	-13.6	0.0	-30.1	-9.152	720	251	659	550	500	493	440	791	863	94	802	393	494	500	433	798
6	14	0.0	1760.0	459.9	4277.0	-2564.0	-665.0	0.0	592.4	166.4	0.0	1083.0	304.2	0.0	-48.5	-13.6	0.0	-32.6	-9.152	740	229	666	542	502	490	429	804	895	59	821	372	495	498	422	811
6	15	0.0	1886.0	454.6	4277.0	-2747.0	-665.0	0.0	637.9	166.4	0.0	1166.4	304.2	0.0	-52.2	-13.6	0.0	-35.1	-9.152	760	207	673	534	504	489	417	816	927	24	840	351	496	497	410	824
6	16	0.0	2009.0	449.3	4277.0	-2929.0	-665.0	0.0	683.5	166.4	0.0	1249.7	304.2	0.0	-56.0	-13.6	0.0	-37.6	-9.152	779	185	679	527	505	488	405	830	958	-11	858	331	497	497	397	838
6	17	0.0	2132.0	444.0	4277.0	-3111.0	-665.0	0.0	729.1	166.4	0.0	1333.1	304.2	0.0	-59.7	-13.6	0.0	-40.1	-9.152	799	164	686	521	506	487	393	843	989	-45	876	311	497	496	384	852
6	18	0.0	2253.0	438.7	4277.0	-3293.0	-665.0	0.0	774.6	166.4	0.0	1416.3	304.2	0.0	-63.4	-13.6	0.0	-42.6	-9.152	817	144	691	515	506	486	380	857	1019	-78	893	292	497	496	371	867
6	19	0.0	2372.0	433.4	4277.0	-3475.0	-665.0	0.0	820.2	166.4	0.0	1499.7	304.2	0.0	-67.1	-13.6	0.0	-45.1	-9.152	835	124	696	509	505	487	366	872	1049	-111	910	274	496	498	357	883
6	20	0.0	2490.0	428.1	4277.0	-3657.0	-665.0	0.0	865.8	166.4	0.0	1582.9	304.2	0.0	-70.9	-13.6	0.0	-47.6	-9.152	852	105	700	505	505	488	352	888	1078	-143	926	256	494	499	342	899
6	21	0.0	2607.0	422.8	4277.0	-3831.0	-575.7	0.0	911.3	166.4	0.0	1666.3	304.2	0.0	-74.6	-13.6	0.0	-50.1	-9.152	872	84	707	497	506	487	341	900	1110	-178	945	235	495	498	330	912
7	1	0.0	2312.0	-64.4	4456.0	-3582.0	270.8	0.0	824.0	-66.0	0.0	1605.2	-128.6	0.0	-91.4	7.3	0.0	-11.2	0.8977	830	174	688	572	466	574	324	972	1060	-80	918	318	453	588	311	987
7	2	0.0	2268.0	-76.5	4456.0	-3413.0	270.8	0.0	782.8	-66.0	0.0	1525.0	-128.6	0.0	-86.8	7.3	0.0	-10.6	0.8977	837	166	706	551	491	546	361	931	1055	-75	925	310	479	560	349	945
7	3	0.0	2217.0	-88.6	4456.0	-3244.0	270.8	0.0	741.6	-66.0	0.0	1444.6	-128.6	0.0	-82.2	7.3	0.0	-10.1	0.8977	841	161	723	533	514	522	396	893	1048	-67	930	305	502	535	384	906
7	4	0.0	2158.0	-100.7	4456.0	-3075.0	270.8	0.0	700.4	-66.0	0.0	1364.3	-128.6	0.0	-77.7	7.3	0.0	-9.5	0.8977	842	160	737	518	533	500	428	858	1038	-56	932	303	522	512	416	870
7	5	0.0	2091.0	-112.7	4456.0	-2906.0	270.8	0.0	659.2	-66.0	0.0	1284.1	-128.6	0.0	-73.1	7.3	0.0	-9.0	0.8977	841	161	747	506	550	482	456	826	1025	-41	931	303	540	493	446	838
7	6	0.0	2017.0	-124.8	4456.0	-2737.0	270.8	0.0	618.0	-66.0	0.0	1203.8	-128.6	0.0	-68.5	7.3	0.0	-8.4	0.8977	837	166	755	497	564	466	483	797	1010	-24	928	307	555	477	473	808
7	7	0.0	1935.0	-136.9	4456.0	-2568.0	270.8	0.0	576.8	-66.0	0.0	1123.6	-128.6	0.0	-64.0	7.3	0.0	-7.8	0.8977	830	173	761	491	576	453	506	771	991	-4	922	314	567	463	497	781
7	8	0.0	1846.0	-149.0	4456.0	-2399.0	270.8	0.0	535.6	-66.0	0.0	1043.4	-128.6	0.0	-59.4	7.3	0.0	-7.3	0.8977	821	183	764	488	585	444	527	748	971	19	913	323	576	453	519	758
7	9	0.0	1749.0	-161.1	4456.0	-2230.0	270.8	0.0	494.4	-66.0	0.0	963.1	-128.6	0.0	-54.8	7.3	0.0	-6.7	0.8977	809	197	764	488	591	437	545	728	947	45	902	336	583	446	538	737
7	10	0.0	1645.0	-173.2	4456.0	-2061.0	270.8	0.0	453.2	-66.0	0.0	882.9	-128.6	0.0	-50.3	7.3	0.0	-6.2	0.8977	794	213	761	491	594	433	561	711	921	74	888	352	587	441	554	719
7	11	0.0	1533.0	-185.3	4456.0	-1892.0	270.8	0.0	412.0	-66.0	0.0	802.6	-128.6	0.0	-45.7	7.3	0.0	-5.6	0.8977	776	232	755	497	595	433	574	697	891	106	871	370	588	440	567	704
7	12	0.0	1414.0	-197.4	4456.0	-1723.0	270.8	0.0	370.8	-66.0	0.0	722.3	-128.6	0.0	-41.1	7.3	0.0	-5.0	0.8977	756	255	747	506	593	435	584	686	860	141	851	392	587	441	578	692
7	13	0.0	1287.0	-209.5	4456.0	-1554.0	270.8	0.0	329.6	-66.0	0.0	642.1	-128.6	0.0	-36.6	7.3	0.0	-4.5	0.8977	733	280	737	518	588	440	591	678	825	179	829	416	583	446	586	684
7	14	0.0	1152.0	-221.5	4456.0	-1385.0	270.8	0.0	288.4	-66.0	0.0	561.7	-128.6	0.0	-32.0	7.3	0.0	-3.9	0.8977	707	308	723	533	580	448	596	673	788	220	804	444	576	453	591	678
7	15	0.0	1010.0	-233.6	4456.0	-1216.0	270.8	0.0	247.2	-66.0	0.0	481.5	-128.6	0.0	-27.4	7.3	0.0	-3.4	0.8977	679	340	707	551	570	460	598	671	748	264	776	475	566	464	594	675
7	16	0.0	860 9	-245.7	4456.0	-1047.0	270.8	0.0	206.0	-66.0	0.0	401.3	-128.6	0.0	-22.8	7.3	0.0	-2.8	0.8977	648	374	688	571	557	474	597	671	706	310	746	508	554	477	594	675
7	17	0.0	703.8	-257.8	4456.0	-878.1	270.8	0.0	164.8	-66.0	0.0	321.0	-128.6	0.0	-18.3	7.3	0.0	-2.2	0.8977	614	411	666	595	542	491	594	675	660	360	712	545	539	494	591	678
7	18	0.0	539 2	-269.9	4456.0	-709.1	270.8	0.0	123.6	-66.0	0.0	240.7	-128.6	0.0	-13.7	7.3	0.0	-1.7	0.8977	578	451	642	622	523	511	587	682	612	413	676	584	521	513	585	684
7	19	0.0	367.0	-282.0	4456.0	-540.1	270.8	0.0	82.4	-66.0	0.0	160.5	-128.6	0.0	-9.1	7.3	0.0	-1.1	0.8977	539	494	615	652	502	534	579	692	562	469	638	626	501	536	577	693
7	20	0.0	187.3	-294.1	4456.0	-371.2	270.8	0.0	41.2	-66.0	0.0	80.3	-128.6	0.0	-4.6	7.3	0.0	-0.6	0.8977	497	540	585	685	479	560	567	705	508	528	597	672	478	561	566	705
7	21	0.0	0.0	-306.2	4456.0	-202.2	270.8	0.0	0.0	-66.0	0.0	0.0	-111.6	0.0	0.0	-109.9	0.0	0.0	0.8977	452	589	553	720	452	589	553	720	452	589	553	720	452	589	553	720

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
1	1	0.0	0.0	8.485	1.750	9.500	3.500	212.800	0.690	1.060	26.69	0.00	21.470	5.93
1	2	614.2	178.0	8.485	1.750	9.500	3.500	212.800	0.823	0.927	20.60	0.00	21.470	5.93
1	3	1146.1	323.0	7.173	1.750	9.500	3.500	212.800	0.940	0.810	6.22	0.00	21.470	5.01
1	4	1599.1	436.7	7.173	1.750	9.500	3.500	212.800	1.040	0.710	1.64	0.00	21.470	5.01
1	5	1975.7	520.9	7.173	1.750	9.500	3.500	212.800	1.124	0.626	0.00	0.00	21.470	5.01
1	6	2276.2	575.9	7.173	1.750	9.500	3.500	212.800	1.192	0.558	0.00	0.00	21.470	5.01
1	7	2500.8	601.3	7.173	1.750	9.500	3.500	212.800	1.243	0.507	0.00	0.00	21.470	5.01
1	8	2649.2	597.3	7.173	1.750	9.500	3.500	212.800	1.278	0.472	0.00	0.00	21.470	5.01
1	9	2721.4	563.9	7.173	1.750	9.500	3.500	212.800	1.297	0.453	0.00	0.00	21.470	5.01
1	10	2717.4	501.1	7.173	1.750	9.500	3.500	212.800	1.299	0.451	0.00	0.00	21.470	5.01
1	11	2637.4	408.7	7.173	1.750	9.500	3.500	212.800	1.283	0.467	0.00	0.00	21.470	5.01
1	12	2481.1	287.0	7.173	1.750	9.500	3.500	212.800	1.249	0.501	0.00	0.00	21.470	5.01
1	13	2249.0	135.8	7.173	1.750	9.500	3.500	212.800	1.197	0.553	0.00	0.00	21.470	5.01
1	14	1940.5	-44.7	7.173	1.750	9.500	3.500	212.800	1.126	0.624	0.00	7.63	21.470	5.01
1	15	1555.7	-254.8	7.173	1.750	9.500	3.500	212.800	1.037	0.713	1.78	6.12	21.470	5.01
1	16	1095.2	-494.1	7.173	1.750	9.500	3.500	212.800	0.930	0.820	6.68	4.32	21.470	5.01
1	17	644.7	-849.5	7.173	1.750	9.500	3.500	212.800	0.804	0.946	12.45	2.19	21.470	5.01
1	18	204.2	-1320.4	7.173	1.750	9.500	3.500	212.800	0.660	1.090	19.05	0.00	21.470	5.01
1	19	-272.5	-1871.3	7.173	1.750	9.500	3.500	212.800	0.517	1.233	0.00	0.00	21.470	5.01
1	20	-569.6	-2702.4	8.485	1.750	9.500	3.500	212.800	0.429	1.321	0.00	0.00	21.470	5.93
1	21	-899.5	-3615.3	8.485	1.750	9.500	3.500	212.800	0.400	1.350	0.00	0.00	21.470	5.93

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
2	1	-899.5	-3615.3	8.485	1.750	9.500	3.500	212.800	0.400	1.350	0.00	0.00	21.470	5.93
2	2	-535.3	-2560.3	8.485	1.750	9.500	3.500	212.800	0.443	1.307	0.00	0.00	21.470	5.93
2	3	-216.6	-1618.5	7.173	1.750	9.500	3.500	212.800	0.573	1.177	0.00	0.00	21.470	5.01
2	4	245.8	-961.2	7.173	1.750	9.500	3.500	212.800	0.763	0.987	14.33	1.50	21.470	5.01
2	5	756.6	-512.1	7.173	1.750	9.500	3.500	212.800	0.932	0.818	6.59	4.35	21.470	5.01
2	6	1326.8	-267.5	7.173	1.750	9.500	3.500	212.800	1.075	0.675	0.04	6.77	21.470	5.01
2	7	1806.5	-78.4	7.173	1.750	9.500	3.500	212.800	1.192	0.558	0.00	8.74	21.470	5.01
2	8	2181.0	69.9	7.173	1.750	9.500	3.500	212.800	1.283	0.467	0.00	0.00	21.470	5.01
2	9	2450.4	177.6	7.173	1.750	9.500	3.500	212.800	1.348	0.402	0.00	0.00	21.470	5.01
2	10	2614.6	243.7	7.173	1.750	9.500	3.500	212.800	1.387	0.363	0.00	0.00	21.470	5.01
2	11	2673.3	269.1	7.173	1.750	9.500	3.500	212.800	1.400	0.350	0.00	0.00	21.470	5.01
2	12	2629.4	254.0	7.173	1.750	9.500	3.500	212.800	1.387	0.363	0.00	0.00	21.470	5.01
2	13	2480.3	198.3	7.173	1.750	9.500	3.500	212.800	1.348	0.402	0.00	0.00	21.470	5.01
2	14	2226.2	100.9	7.173	1.750	9.500	3.500	212.800	1.283	0.467	0.00	0.00	21.470	5.01
2	15	1866.8	-37.1	7.173	1.750	9.500	3.500	212.800	1.193	0.557	0.00	8.76	21.470	5.01
2	16	1402.1	-216.0	7.173	1.750	9.500	3.500	212.800	1.076	0.674	0.00	6.78	21.470	5.01
2	17	835.0	-438.4	7.173	1.750	9.500	3.500	212.800	0.933	0.817	6.54	4.37	21.470	5.01
2	18	320.7	-854.3	7.173	1.750	9.500	3.500	212.800	0.764	0.986	14.29	1.52	21.470	5.01
2	19	-155.0	-1476.6	7.173	1.750	9.500	3.500	212.800	0.573	1.177	0.00	0.00	21.470	5.01
2	20	-465.5	-2400.8	8.485	1.750	9.500	3.500	212.800	0.443	1.307	0.00	0.00	21.470	5.93
2	21	-821.4	-3438.7	8.485	1.750	9.500	3.500	212.800	0.400	1.350	0.00	0.00	21.470	5.93

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
3	1	-821.4	-3438.7	8.485	1.750	9.500	3.500	212.800	0.400	1.350	0.00	0.00	21.470	5.93
3	2	-495.5	-2534.4	8.485	1.750	9.500	3.500	212.800	0.428	1.322	0.00	0.00	21.470	5.93
3	3	-202.4	-1712.3	7.173	1.750	9.500	3.500	212.800	0.516	1.234	0.00	0.00	21.470	5.01
3	4	283.9	-1184.3	7.173	1.750	9.500	3.500	212.800	0.661	1.089	19.01	0.00	21.470	5.01
3	5	719.7	-721.6	7.173	1.750	9.500	3.500	212.800	0.805	0.945	12.41	2.21	21.470	5.01
3	6	1204.1	-412.7	7.173	1.750	9.500	3.500	212.800	0.931	0.819	6.63	4.33	21.470	5.01
3	7	1657.4	-178.8	7.173	1.750	9.500	3.500	212.800	1.038	0.712	1.73	6.14	21.470	5.01
3	8	2034.7	25.8	7.173	1.750	9.500	3.500	212.800	1.127	0.623	0.00	0.00	21.470	5.01

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

3	9	2336.1	201.0	7.173	1.750	9.500	3.500	212.800	1.198	0.552	0.00	0.00	21.470	5.01
3	10	2561.2	346.7	7.173	1.750	9.500	3.500	212.800	1.250	0.500	0.00	0.00	21.470	5.01
3	11	2710.1	463.1	7.173	1.750	9.500	3.500	212.800	1.285	0.465	0.00	0.00	21.470	5.01
3	12	2782.8	549.8	7.173	1.750	9.500	3.500	212.800	1.300	0.450	0.00	0.00	21.470	5.01
3	13	2779.4	607.3	7.173	1.750	9.500	3.500	212.800	1.298	0.452	0.00	0.00	21.470	5.01
3	14	2699.9	635.2	7.173	1.750	9.500	3.500	212.800	1.280	0.470	0.00	0.00	21.470	5.01
3	15	2544.5	633.9	7.173	1.750	9.500	3.500	212.800	1.245	0.505	0.00	0.00	21.470	5.01
3	16	2312.7	603.0	7.173	1.750	9.500	3.500	212.800	1.193	0.557	0.00	0.00	21.470	5.01
3	17	2004.8	542.7	7.173	1.750	9.500	3.500	212.800	1.126	0.624	0.00	0.00	21.470	5.01
3	18	1620.8	453.0	7.173	1.750	9.500	3.500	212.800	1.042	0.708	1.55	0.00	21.470	5.01
3	19	1160.6	333.7	7.173	1.750	9.500	3.500	212.800	0.942	0.808	6.13	0.00	21.470	5.01
3	20	621.5	183.4	8.485	1.750	9.500	3.500	212.800	0.825	0.925	20.51	0.00	21.470	5.93
3	21	0.0	0.0	8.485	1.750	9.500	3.500	212.800	0.692	1.058	0.00	3.62	21.470	5.93

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
4	1	0.0	0.0	7.750	2.000	4.700	3.500	378.000	0.950	1.050	0.00	0.00	13.400	8.68
4	2	447.9	194.4	7.750	2.000	4.700	3.500	378.000	0.990	1.010	0.00	0.00	13.400	8.68
4	3	883.5	381.3	7.750	2.000	4.700	3.500	378.000	1.030	0.970	0.00	0.00	13.400	8.68
4	4	1306.6	560.9	7.750	2.000	4.700	3.500	378.000	1.070	0.930	0.00	0.00	13.400	8.68
4	5	1717.4	733.0	7.750	2.000	4.700	3.500	378.000	1.110	0.890	0.00	0.00	13.400	8.68
4	6	2116.0	897.8	7.750	2.000	4.700	3.500	378.000	1.150	0.850	0.00	0.00	13.400	8.68
4	7	2502.4	1055.1	7.750	2.000	4.700	3.500	378.000	1.190	0.810	0.00	0.00	13.400	8.68
4	8	2875.5	1204.7	7.750	2.000	4.700	3.500	378.000	1.230	0.770	0.00	0.00	13.400	8.68
4	9	3237.6	1347.7	7.750	2.000	4.700	3.500	378.000	1.270	0.730	0.00	0.00	13.400	8.68
4	10	3586.3	1482.5	7.750	2.000	4.700	3.500	378.000	1.310	0.690	0.00	0.00	13.400	8.68
4	11	3923.0	1610.1	7.750	2.000	4.700	3.500	378.000	1.350	0.650	0.00	0.00	13.400	8.68
4	12	4247.9	1730.6	7.750	2.000	4.700	3.500	378.000	1.390	0.610	0.00	0.00	13.400	8.68
4	13	4560.2	1843.7	7.750	2.000	4.700	3.500	378.000	1.430	0.570	0.00	0.00	13.400	8.68
4	14	4859.6	1948.9	7.750	2.000	4.700	3.500	378.000	1.470	0.530	0.00	0.00	13.400	8.68
4	15	5146.6	2046.8	7.750	2.000	4.700	3.500	378.000	1.510	0.490	0.00	0.00	13.400	8.68
4	16	5421.9	2137.5	7.750	2.000	4.700	3.500	378.000	1.550	0.450	0.00	0.00	13.400	8.68
4	17	5684.9	2221.1	7.750	2.000	4.700	3.500	378.000	1.590	0.410	0.00	0.00	13.400	8.68
4	18	5934.5	2296.4	7.750	2.000	4.700	3.500	378.000	1.630	0.370	0.00	0.00	13.400	8.68
4	19	6173.8	2365.6	7.750	2.000	4.700	3.500	378.000	1.670	0.330	0.00	0.00	13.400	8.68
4	20	6399.3	2426.6	7.750	2.000	4.700	3.500	378.000	1.710	0.290	0.00	0.00	13.400	8.68
4	21	6611.7	2479.6	7.750	2.000	4.700	3.500	378.000	1.750	0.250	0.00	0.00	13.400	8.68

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)					Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)		ART.51.3 As min. (cm2/m.)
5	1	7290.3	2797.9	7.750	2.000	4.700	3.500	378.000	1.750	0.250	0.00	0.00	13.400	8.68
5	2	6941.1	2667.3	7.750	2.000	4.700	3.500	378.000	1.710	0.290	0.00	0.00	13.400	8.68
5	3	6592.1	2536.6	7.750	2.000	4.700	3.500	378.000	1.670	0.330	0.00	0.00	13.400	8.68
5	4	6239.9	2404.2	7.750	2.000	4.700	3.500	378.000	1.630	0.370	0.00	0.00	13.400	8.68
5	5	5886.5	2270.9	7.750	2.000	4.700	3.500	378.000	1.590	0.410	0.00	0.00	13.400	8.68
5	6	5531.5	2136.7	7.750	2.000	4.700	3.500	378.000	1.550	0.450	0.00	0.00	13.400	8.68
5	7	5174.8	2001.5	7.750	2.000	4.700	3.500	378.000	1.510	0.490	0.00	0.00	13.400	8.68
5	8	4816.8	1865.5	7.750	2.000	4.700	3.500	378.000	1.470	0.530	0.00	0.00	13.400	8.68
5	9	4455.8	1727.7	7.750	2.000	4.700	3.500	378.000	1.430	0.570	0.00	0.00	13.400	8.68
5	10	4094.6	1589.9	7.750	2.000	4.700	3.500	378.000	1.390	0.610	0.00	0.00	13.400	8.68
5	11	3730.7	1450.2	7.750	2.000	4.700	3.500	378.000	1.350	0.650	0.00	0.00	13.400	8.68
5	12	3365.0	1309.7	7.750	2.000	4.700	3.500	378.000	1.310	0.690	0.00	0.00	13.400	8.68
5	13	2998.0	1168.3	7.750	2.000	4.700	3.500	378.000	1.270	0.730	0.00	0.00	13.400	8.68
5	14	2629.2	1025.8	7.750	2.000	4.700	3.500	378.000	1.230	0.770	0.00	0.00	13.400	8.68
5	15	2258.7	882.4	7.750	2.000	4.700	3.500	378.000	1.190	0.810	0.00	0.00	13.400	8.68
5	16	1886.6	737.9	7.750	2.000	4.700	3.500	378.000	1.150	0.850	0.00	0.00	13.400	8.68
5	17	1512.7	592.4	7.750	2.000	4.700	3.500	378.000	1.110	0.890	0.00	0.00	13.400	8.68
5	18	1137.1	445.8	7.750	2.000	4.700	3.500	378.000	1.070	0.930	0.00	0.00	13.400	8.68
5	19	759.8	298.2	7.750	2.000	4.700	3.500	378.000	1.030	0.970	0.00	0.00	13.400	8.68
5	20	380.7	149.6	7.750	2.000	4.700	3.500	378.000	0.990	1.010	0.00	0.00	13.400	8.68

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

5	21	0.0	0.0	7.750	2.000	4.700	3.500	378.000	0.950	1.050	0.00	0.00	13.400	8.68

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)					Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)		ART.51.3 As min. (cm2/m.)
6	1	125.0	-5.6	7.750	2.000	4.700	3.500	378.000	0.950	1.050	0.00	0.00	13.400	8.68
6	2	534.4	155.8	7.750	2.000	4.700	3.500	378.000	0.990	1.010	0.00	0.00	13.400	8.68
6	3	941.7	315.8	7.750	2.000	4.700	3.500	378.000	1.030	0.970	0.00	0.00	13.400	8.68
6	4	1346.9	474.6	7.750	2.000	4.700	3.500	378.000	1.070	0.930	0.00	0.00	13.400	8.68
6	5	1749.9	632.1	7.750	2.000	4.700	3.500	378.000	1.110	0.890	0.00	0.00	13.400	8.68
6	6	2150.7	788.1	7.750	2.000	4.700	3.500	378.000	1.150	0.850	0.00	0.00	13.400	8.68
6	7	2549.3	943.0	7.750	2.000	4.700	3.500	378.000	1.190	0.810	0.00	0.00	13.400	8.68
6	8	2945.9	1096.6	7.750	2.000	4.700	3.500	378.000	1.230	0.770	0.00	0.00	13.400	8.68
6	9	3339.5	1248.4	7.750	2.000	4.700	3.500	378.000	1.270	0.730	0.00	0.00	13.400	8.68
6	10	3732.5	1399.8	7.750	2.000	4.700	3.500	378.000	1.310	0.690	0.00	0.00	13.400	8.68
6	11	4122.3	1549.4	7.750	2.000	4.700	3.500	378.000	1.350	0.650	0.00	0.00	13.400	8.68
6	12	4510.4	1698.0	7.750	2.000	4.700	3.500	378.000	1.390	0.610	0.00	0.00	13.400	8.68
6	13	4895.7	1844.9	7.750	2.000	4.700	3.500	378.000	1.430	0.570	0.00	0.00	13.400	8.68
6	14	5278.2	1989.9	7.750	2.000	4.700	3.500	378.000	1.470	0.530	0.00	0.00	13.400	8.68
6	15	5660.4	2134.9	7.750	2.000	4.700	3.500	378.000	1.510	0.490	0.00	0.00	13.400	8.68
6	16	6038.4	2277.3	7.750	2.000	4.700	3.500	378.000	1.550	0.450	0.00	0.00	13.400	8.68
6	17	6416.2	2419.7	7.750	2.000	4.700	3.500	378.000	1.590	0.410	0.00	0.00	13.400	8.68
6	18	6791.0	2560.2	7.750	2.000	4.700	3.500	378.000	1.630	0.370	0.00	0.00	13.400	8.68
6	19	7162.6	2699.0	7.750	2.000	4.700	3.500	378.000	1.670	0.330	0.00	0.00	13.400	8.68
6	20	7533.1	2836.9	7.750	2.000	4.700	3.500	378.000	1.710	0.290	0.00	0.00	13.400	8.68
6	21	5277.5	3091.3	7.750	2.000	4.700	3.500	378.000	1.750	0.250	0.00	0.00	13.400	8.68

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)					Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)		ART.51.3 As min. (cm2/m.)
7	1	6991.4	2675.4	7.750	2.000	4.700	3.500	378.000	1.750	0.250	0.00	0.00	13.400	8.68
7	2	6743.2	2606.4	7.750	2.000	4.700	3.500	378.000	1.710	0.290	0.00	0.00	13.400	8.68
7	3	6484.4	2531.1	7.750	2.000	4.700	3.500	378.000	1.670	0.330	0.00	0.00	13.400	8.68
7	4	6213.8	2448.6	7.750	2.000	4.700	3.500	378.000	1.630	0.370	0.00	0.00	13.400	8.68
7	5	5931.0	2358.9	7.750	2.000	4.700	3.500	378.000	1.590	0.410	0.00	0.00	13.400	8.68
7	6	5637.9	2262.9	7.750	2.000	4.700	3.500	378.000	1.550	0.450	0.00	0.00	13.400	8.68
7	7	5332.8	2159.8	7.750	2.000	4.700	3.500	378.000	1.510	0.490	0.00	0.00	13.400	8.68
7	8	5017.0	2050.3	7.750	2.000	4.700	3.500	378.000	1.470	0.530	0.00	0.00	13.400	8.68
7	9	4689.4	1933.6	7.750	2.000	4.700	3.500	378.000	1.430	0.570	0.00	0.00	13.400	8.68
7	10	4351.2	1810.6	7.750	2.000	4.700	3.500	378.000	1.390	0.610	0.00	0.00	13.400	8.68
7	11	4000.9	1680.4	7.750	2.000	4.700	3.500	378.000	1.350	0.650	0.00	0.00	13.400	8.68
7	12	3640.3	1543.9	7.750	2.000	4.700	3.500	378.000	1.310	0.690	0.00	0.00	13.400	8.68
7	13	3267.5	1400.2	7.750	2.000	4.700	3.500	378.000	1.270	0.730	0.00	0.00	13.400	8.68
7	14	2882.9	1249.4	7.750	2.000	4.700	3.500	378.000	1.230	0.770	0.00	0.00	13.400	8.68
7	15	2487.8	1092.2	7.750	2.000	4.700	3.500	378.000	1.190	0.810	0.00	0.00	13.400	8.68
7	16	2081.9	928.6	7.750	2.000	4.700	3.500	378.000	1.150	0.850	0.00	0.00	13.400	8.68
7	17	1664.0	757.8	7.750	2.000	4.700	3.500	378.000	1.110	0.890	0.00	0.00	13.400	8.68
7	18	1235.0	580.3	7.750	2.000	4.700	3.500	378.000	1.070	0.930	0.00	0.00	13.400	8.68
7	19	794.5	395.9	7.750	2.000	4.700	3.500	378.000	1.030	0.970	0.00	0.00	13.400	8.68
7	20	342.8	204.8	7.750	2.000	4.700	3.500	378.000	0.990	1.010	0.00	0.00	13.400	8.68
7	21	0.0	0.0	7.750	2.000	4.700	3.500	378.000	0.950	1.050	0.00	0.00	13.400	8.68

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

Pretensado preteso Inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	284	226	0.000	0.00	0.00	0.00	0.00	0.000	7	284	226	0.000	0.00	0.000	0.00	5.93	5.93	26.89	5.93	5.93
0.00	0.000	5	330	161	0.000	0.00	0.00	0.00	0.00	0.000	7	268	249	0.000	0.00	0.000	0.00	5.93	5.93	20.60	5.93	5.93
0.00	0.000	5	422	132	0.000	0.00	0.00	0.00	0.00	0.000	7	299	321	0.000	0.00	0.000	0.00	5.01	5.01	6.22	5.01	5.01
0.00	0.000	5	434	114	0.000	0.00	0.00	0.00	0.00	0.000	7	259	383	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	465	67	0.000	0.00	0.00	0.00	0.00	0.000	7	244	406	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	491	27	0.000	0.00	0.00	0.00	0.00	0.000	7	230	427	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	511	-4	1.735	0.00	0.05	0.75	0.00	0.000	7	216	447	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	527	-29	1.660	0.00	0.32	4.52	0.00	0.000	7	205	465	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	538	-45	1.614	0.00	0.48	6.80	0.00	0.000	7	194	482	0.000	0.00	0.000	0.00	5.01	5.01	6.80	5.01	5.01
0.00	0.000	5	544	-55	1.590	0.00	0.56	7.98	0.00	0.000	7	185	496	0.000	0.00	0.000	0.00	5.01	5.01	7.98	5.01	5.01
0.00	0.000	5	540	-15	1.704	0.00	0.16	2.32	0.00	0.000	7	172	550	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	540	-14	1.705	0.00	0.16	2.25	0.00	0.000	7	169	555	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	537	-9	1.720	0.00	0.10	1.49	0.00	0.000	7	168	555	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	531	0	0.000	0.00	0.00	0.00	0.00	0.000	7	172	550	0.000	0.00	0.000	0.00	7.63	7.63	5.01	5.01	5.01
0.00	0.000	5	523	31	0.000	0.00	0.00	0.00	0.00	0.000	7	179	557	0.000	0.00	0.000	0.00	6.12	6.12	5.01	5.01	5.01
0.00	0.000	5	513	46	0.000	0.00	0.00	0.00	0.00	0.000	7	191	539	0.000	0.00	0.000	0.00	5.01	5.01	6.68	5.01	5.01
0.00	0.000	5	500	65	0.000	0.00	0.00	0.00	0.00	0.000	7	206	516	0.000	0.00	0.000	0.00	5.01	5.01	12.45	5.01	5.01
0.00	0.000	5	485	89	0.000	0.00	0.00	0.00	0.00	0.000	7	224	488	0.000	0.00	0.000	0.00	5.01	5.01	19.05	5.01	5.01
0.00	0.000	5	447	130	0.000	0.00	0.00	0.00	0.00	0.000	7	215	485	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	390	117	0.000	0.00	0.00	0.00	0.00	0.000	7	91	560	0.000	0.00	0.000	0.00	5.93	5.93	5.93	5.93	5.93
0.00	0.000	5	295	258	0.000	0.00	0.00	0.00	0.00	0.000	7	-81	815	0.158	0.00	1.499	7.89	7.89	7.89	5.93	5.93	5.93

Pretensado preteso Inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	269	254	0.000	0.00	0.00	0.00	0.00	0.000	7	-96	772	0.194	0.00	1.839	9.68	9.68	9.68	5.93	5.93	5.93
0.00	0.000	5	374	105	0.000	0.00	0.00	0.00	0.00	0.000	7	101	492	0.000	0.00	0.000	0.00	5.93	5.93	5.93	5.93	5.93
0.00	0.000	5	453	93	0.000	0.00	0.00	0.00	0.00	0.000	7	257	394	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	426	106	0.000	0.00	0.00	0.00	0.00	0.000	7	228	411	0.000	0.00	0.000	0.00	5.01	5.01	14.33	5.01	5.01
0.00	0.000	5	458	57	0.000	0.00	0.00	0.00	0.00	0.000	7	205	445	0.000	0.00	0.000	0.00	5.01	5.01	6.59	5.01	5.01
0.00	0.000	5	485	15	0.000	0.00	0.00	0.00	0.00	0.000	7	186	474	0.000	0.00	0.000	0.00	6.77	6.77	5.01	5.01	5.01
0.00	0.000	5	508	-19	1.687	0.00	0.22	3.17	0.00	0.000	7	171	497	0.000	0.00	0.000	0.00	8.74	8.74	5.01	5.01	5.01
0.00	0.000	5	526	-46	1.609	0.00	0.49	7.06	0.00	0.000	7	159	515	0.000	0.00	0.000	0.00	5.01	5.01	7.06	5.01	5.01
0.00	0.000	5	538	-66	1.559	0.00	0.67	9.53	0.00	0.000	7	151	527	0.000	0.00	0.000	0.00	5.01	5.01	9.53	5.01	5.01
0.00	0.000	5	546	-78	1.532	0.00	0.76	10.92	0.00	0.000	7	147	534	0.000	0.00	0.000	0.00	5.01	5.01	10.92	5.01	5.01
0.00	0.000	5	550	-83	1.521	0.00	0.80	11.47	0.00	0.000	7	146	536	0.000	0.00	0.000	0.00	5.01	5.01	11.47	5.01	5.01
0.00	0.000	5	558	-129	1.422	0.00	1.15	16.41	0.00	0.000	7	158	484	0.000	0.00	0.000	0.00	5.01	5.01	16.41	5.01	5.01
0.00	0.000	5	551	-118	1.442	0.00	1.08	15.40	0.00	0.000	7	163	476	0.000	0.00	0.000	0.00	5.01	5.01	15.40	5.01	5.01
0.00	0.000	5	538	-98	1.481	0.00	0.94	13.47	0.00	0.000	7	171	463	0.000	0.00	0.000	0.00	5.01	5.01	13.47	5.01	5.01
0.00	0.000	5	519	-69	1.544	0.00	0.72	10.31	0.00	0.000	7	182	447	0.000	0.00	0.000	0.00	8.76	8.76	10.31	5.01	5.01
0.00	0.000	5	495	-32	1.643	0.00	0.37	5.33	0.00	0.000	7	195	427	0.000	0.00	0.000	0.00	6.78	6.78	5.33	5.01	5.01
0.00	0.000	5	465	14	0.000	0.00	0.00	0.00	0.00	0.000	7	212	402	0.000	0.00	0.000	0.00	5.01	5.01	6.54	5.01	5.01
0.00	0.000	5	431	66	0.000	0.00	0.00	0.00	0.00	0.000	7	231	373	0.000	0.00	0.000	0.00	5.01	5.01	14.29	5.01	5.01
0.00	0.000	5	410	98	0.000	0.00	0.00	0.00	0.00	0.000	7	222	386	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	382	82	0.000	0.00	0.00	0.00	0.00	0.000	7	110	484	0.000	0.00	0.000	0.00	5.93	5.93	5.93	5.93	5.93
0.00	0.000	5	274	241	0.000	0.00	0.00	0.00	0.00	0.000	7	-92	784	0.183	0.00	1.741	9.16	9.16	9.16	5.93	5.93	5.93

Pretensado preteso Inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	284	233	0.000	0.00	0.00	0.00	0.00	0.000	7	-72	738	0.155	0.00	1.473	7.75	7.75	7.75	5.93	5.93	5.93
0.00	0.000	5	378	100	0.000	0.00	0.00	0.00	0.00	0.000	7	96	500	0.000	0.00	0.000	0.00	5.93	5.93	5.93	5.93	5.93
0.00	0.000	5	471	67	0.000	0.00	0.00	0.00	0.00	0.000	7	247	408	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	482	49	0.000	0.00	0.00	0.00	0.00	0.000	7	224	445	0.000	0.00	0.000	0.00	5.01	5.01	19.01	5.01	5.01
0.00	0.000	5	510	34	0.000	0.00	0.00	0.00	0.00	0.000	7	218	481	0.000	0.00	0.000	0.00	5.01	5.01	12.41	5.01	5.01
0.00	0.000	5	523	13	0.000	0.00	0.00	0.00	0.00	0.000	7	203	503	0.000	0.00	0.000	0.00	5.01	5.01	6.63	5.01	5.01
0.00	0.000	5	534	-4	1.738	0.00	0.04	0.58	0.00	0.000	7	192	520	0.000	0.00	0.000	0.00	6.14	6.14	5.01	5.01	5.01
0.00	0.000	5	542	-16	1.701	0.00	0.17	2.44	0.00	0.000	7	185	532	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	545	-4	1.737	0.00	0.05	0.67	0.00	0.000	7	179	558	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	547	-6	1.730	0.00	0.07	1.01	0.00	0.000	7	177	561	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	545	-4	1.737	0.00	0.05	0.67	0.00	0.000	7	178	558	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	541	2	0.000	0.00	0.00	0.00	0.00	0.000	7	183	551	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	538	-12	1.713	0.00	0.13	1.86	0.00	0.000	7	195	514	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	527	6	0.000	0.00	0.00	0.00	0.00	0.000	7	205	498	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	511	29	0.000	0.00	0.00	0.00	0.00	0.000	7	217	480	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	491	60	0.000	0.00	0.00	0.00	0.00	0.000	7	231	459	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

0.00	0.000	5	466	98	0.000	0.00	0.00	0.00	0.00	0.000	7	246	436	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	437	143	0.000	0.00	0.00	0.00	0.00	0.000	7	262	411	0.000	0.00	0.000	0.00	5.01	5.01	5.01	5.01	5.01
0.00	0.000	5	403	194	0.000	0.00	0.00	0.00	0.00	0.000	7	281	382	0.000	0.00	0.000	0.00	5.01	5.01	6.13	5.01	5.01
0.00	0.000	5	347	179	0.000	0.00	0.00	0.00	0.00	0.000	7	284	273	0.000	0.00	0.000	0.00	5.93	5.93	20.51	5.93	5.93
0.00	0.000	5	303	244	0.000	0.00	0.00	0.00	0.00	0.000	7	303	244	0.000	0.00	0.000	0.00	5.93	5.93	5.93	5.93	5.93

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	444	582	0.000	0.00	0.00	0.00	0.00	0.000	7	444	582	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	498	523	0.000	0.00	0.00	0.00	0.00	0.000	7	470	554	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	549	467	0.000	0.00	0.00	0.00	0.00	0.000	7	492	529	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	596	414	0.000	0.00	0.00	0.00	0.00	0.000	7	511	508	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	641	365	0.000	0.00	0.00	0.00	0.00	0.000	7	528	490	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	683	319	0.000	0.00	0.00	0.00	0.00	0.000	7	541	475	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	722	276	0.000	0.00	0.00	0.00	0.00	0.000	7	551	464	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	757	237	0.000	0.00	0.00	0.00	0.00	0.000	7	559	456	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	790	201	0.000	0.00	0.00	0.00	0.00	0.000	7	563	451	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	820	168	0.000	0.00	0.00	0.00	0.00	0.000	7	565	449	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	847	138	0.000	0.00	0.00	0.00	0.00	0.000	7	564	450	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	871	112	0.000	0.00	0.00	0.00	0.00	0.000	7	559	455	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	892	89	0.000	0.00	0.00	0.00	0.00	0.000	7	552	463	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	911	68	0.000	0.00	0.00	0.00	0.00	0.000	7	542	474	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	925	52	0.000	0.00	0.00	0.00	0.00	0.000	7	528	489	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	938	39	0.000	0.00	0.00	0.00	0.00	0.000	7	512	507	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	947	28	0.000	0.00	0.00	0.00	0.00	0.000	7	493	528	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	953	21	0.000	0.00	0.00	0.00	0.00	0.000	7	471	552	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	957	17	0.000	0.00	0.00	0.00	0.00	0.000	7	446	580	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	957	17	0.000	0.00	0.00	0.00	0.00	0.000	7	418	611	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	954	20	0.000	0.00	0.00	0.00	0.00	0.000	7	387	645	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	989	-45	1.913	0.00	0.30	4.33	0.00	0.000	7	416	586	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	965	-18	1.963	0.00	0.13	1.84	0.00	0.000	7	420	581	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	941	9	0.000	0.00	0.00	0.00	0.00	0.000	7	425	576	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	916	36	0.000	0.00	0.00	0.00	0.00	0.000	7	429	572	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	891	64	0.000	0.00	0.00	0.00	0.00	0.000	7	432	568	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	865	91	0.000	0.00	0.00	0.00	0.00	0.000	7	436	564	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	839	120	0.000	0.00	0.00	0.00	0.00	0.000	7	438	562	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	813	149	0.000	0.00	0.00	0.00	0.00	0.000	7	441	559	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	786	179	0.000	0.00	0.00	0.00	0.00	0.000	7	442	557	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	759	208	0.000	0.00	0.00	0.00	0.00	0.000	7	444	555	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	732	239	0.000	0.00	0.00	0.00	0.00	0.000	7	445	554	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	703	270	0.000	0.00	0.00	0.00	0.00	0.000	7	446	553	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	675	301	0.000	0.00	0.00	0.00	0.00	0.000	7	446	553	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	646	333	0.000	0.00	0.00	0.00	0.00	0.000	7	446	553	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	617	364	0.000	0.00	0.00	0.00	0.00	0.000	7	445	554	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	588	397	0.000	0.00	0.00	0.00	0.00	0.000	7	444	555	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	557	430	0.000	0.00	0.00	0.00	0.00	0.000	7	443	556	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	527	464	0.000	0.00	0.00	0.00	0.00	0.000	7	441	558	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	496	498	0.000	0.00	0.00	0.00	0.00	0.000	7	439	561	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	465	532	0.000	0.00	0.00	0.00	0.00	0.000	7	436	564	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	433	567	0.000	0.00	0.00	0.00	0.00	0.000	7	433	567	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	433	567	0.000	0.00	0.00	0.00	0.00	0.000	7	433	567	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	472	524	0.000	0.00	0.00	0.00	0.00	0.000	7	441	558	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	510	482	0.000	0.00	0.00	0.00	0.00	0.000	7	448	550	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	547	441	0.000	0.00	0.00	0.00	0.00	0.000	7	455	542	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	584	400	0.000	0.00	0.00	0.00	0.00	0.000	7	462	535	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	621	360	0.000	0.00	0.00	0.00	0.00	0.000	7	468	529	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	657	320	0.000	0.00	0.00	0.00	0.00	0.000	7	473	523	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	692	281	0.000	0.00	0.00	0.00	0.00	0.000	7	477	518	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	727	243	0.000	0.00	0.00	0.00	0.00	0.000	7	482	513	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	762	205	0.000	0.00	0.00	0.00	0.00	0.000	7	486	509	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	796	167	0.000	0.00	0.00	0.00	0.00	0.000	7	489	505	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	830	130	0.000	0.00	0.00	0.00	0.00	0.000	7	492	502	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	863	94	0.000	0.00	0.00	0.00	0.00	0.000	7	494	500	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	895	59	0.000	0.00	0.00	0.00	0.00	0.000	7	495	498	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	927	24	0.000	0.00	0.00	0.00	0.00	0.000	7	496	497	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	958	-11	1.978	0.00	0.08	1.11	0.00	0.000	7	497	497	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	989	-45	1.913	0.00	0.30	4.35	0.00	0.000	7	497	496	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	1019	-78	1.857	0.00	0.50	7.14	0.00	0.000	7	497	496	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	1049	-111	1.808	0.00	0.67	9.58	0.00	0.000	7	496	498	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	1078	-143	1.765	0.00	0.82	11.73	0.00	0.000	7	494	499	0.000	0.00	0.000	0.00	8.68	8.68	11.73	8.68	8.68
0.00	0.000	5	1110	-178	1.724	0.00	0.97	13.82	0.00	0.000	7	495	498	0.000	0.00	0.000	0.00	8.68	8.68	13.82	8.68	8.68
0.00	0.000	5	1060	-80	1.860	0.00	0.49	6.99	0.00	0.000	7	453	588	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	1055	-75	1.868	0.00	0.46	6.60	0.00	0.000	7	479	560	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	1048	-67	1.880	0.00	0.42	5.98	0.00	0.000	7	502	535	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	1038	-56	1.898	0.00	0.36	5.08	0.00	0.000	7	522	512	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	1025	-41	1.922	0.00	0.27	3.88	0.00	0.000	7	540	493	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	1010	-24	1.953	0.00	0.16	2.35	0.00	0.000	7	555	477	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	991	-4	1.992	0.00	0.03	0.42	0.00	0.000	7	567	463	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	971	19	0.000	0.00	0.00	0.00	0.00	0.000	7	576	453	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	947	45	0.000	0.00	0.00	0.00	0.00	0.000	7	583	446	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	921	74	0.000	0.00	0.00	0.00	0.00	0.000	7	587	441	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	891	106	0.000	0.00	0.00	0.00	0.00	0.000	7	588	440	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	860	141	0.000	0.00	0.00	0.00	0.00	0.000	7	587	441	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	825	179	0.000	0.00	0.00	0.00	0.00	0.000	7	583	446	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	788	220	0.000	0.00	0.00	0.00	0.00	0.000	7	576	453	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	748	264	0.000	0.00	0.00	0.00	0.00	0.000	7	566	464	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	706	310	0.000	0.00	0.00	0.00	0.00	0.000	7	554	477	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	660	360	0.000	0.00	0.00	0.00	0.00	0.000	7	539	494	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	612	413	0.000	0.00	0.00	0.00	0.00	0.000	7	521	513	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	562	469	0.000	0.00	0.00	0.00	0.00	0.000	7	501	536	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	508	528	0.000	0.00	0.00	0.00	0.00	0.000	7	478	561	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68
0.00	0.000	5	452	589	0.000	0.00	0.00	0.00	0.00	0.000	7	452	589	0.000	0.00	0.000	0.00	8.68	8.68	8.68	8.68	8.68

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 22.12 tg(β)	z=d*0.9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
1	1	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
1	2	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
1	3	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	4	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	5	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	6	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	7	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	8	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	9	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	10	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	11	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	12	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	13	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	14	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	15	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	16	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	17	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	18	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	19	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	20	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
1	21	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
1	1	0.0	160.4	0.0	74.8	149	0	-24	0	0.0	10.54			80.91	-263.2	2452
1	2	164.4	136.9	77.3	65.1	133	156	-24	-26	11.7	10.54			-212.3	-247	2452
1	3	302.9	113.5	143.9	55.3	117	294	-24	-53	23.3	10.54			-465.5	-210.8	2452
1	4	417.4	93.6	199.7	45.6	100	414	-24	-79	35.0	10.54			-757.2	-174.6	2452
1	5	510.0	73.8	244.7	35.9	84	516	-24	-106	46.6	10.54			-930.3	-138.4	2452
1	6	580.6	54.0	279.0	26.1	68	600	-24	-132	58.3	10.54			-1063	-102.3	2452
1	7	629.4	34.1	302.5	16.4	51	665	-24	-158	70.0	10.54			-1157	-66.05	2452
1	8	656.1	14.3	315.3	6.7	35	713	-24	-185	81.6	10.54			-1210	-29.86	2452
1	9	661.0	-5.5	317.3	-3.1	19	743	-24	-211	93.3	10.54			-1223	6.343	2452
1	10	643.9	-25.4	308.5	-12.8	3	30	-25	483	104.9	10.54			-1195	43.41	2452
1	11	604.9	-45.2	288.9	-22.5	3	33	-41	447	116.6	10.54			-1187	87.18	2559
1	12	543.9	-65.0	258.6	-32.3	3	36	-58	392	128.2	10.54			-1067	129.6	2559
1	13	461.0	-84.9	217.6	-42.0	3	40	-74	320	139.9	10.54			-900.4	172	2559
1	14	356.2	-104.7	165.7	-51.7	3	43	-90	229	151.6	10.54			-686.7	214.4	2559
1	15	229.4	-124.5	103.1	-61.5	3	46	-107	120	163.2	10.54			-446.3	262.1	2617
1	16	80.7	-144.4	29.7	-71.2	3	50	-123	-7	174.9	10.54			-132.5	305.4	2617
1	17	-89.9	-164.2	-54.4	-80.9	3	53	-139	-152	186.5	10.54			229.4	348.8	2617
1	18	-282.5	-184.0	-149.3	-90.7	3	56	-155	-315	198.2	10.54			639.1	392.2	2617
1	19	-497.0	-203.9	-255.0	-100.4	3	60	-172	-496	209.9	10.54			1038	307.4	2565
1	20	-735.5	-227.3	-371.4	-110.1	3	63	-188	-695	221.5	10.54			1377	165.2	2565
1	21	-999.9	-250.8	-498.6	-119.9	3	66	-204	-912	233.2	10.54			1485	29.71	2565

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 26.00 tg(β)	z=d*0.9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
2	1	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
2	2	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
2	3	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	4	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	5	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	6	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	7	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	8	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	9	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	10	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	11	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	12	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	13	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	14	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	15	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	16	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	17	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	18	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	19	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	20	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
2	21	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
2	1	-999.9	244.1	-498.6	115.3	211	-912	-17	66	233.2	-0.2259			1457	-2.741	2479
2	2	-700.5	216.5	-356.2	103.8	192	-650	-17	44	232.9	-0.2259			1347	-166.8	2479
2	3	-436.9	188.9	-228.6	92.4	172	-414	-17	22	232.6	-0.2259			1023	-332.3	2479
2	4	-206.5	165.6	-116.0	80.9	153	-202	-17	0	232.3	-0.2259			476.5	-345.9	2390
2	5	-6.3	142.3	-18.2	69.5	134	-15	-17	-22	232.0	-0.2259			70.06	-288.7	2390
2	6	163.6	119.0	64.7	58.1	115	147	-17	-44	231.7	-0.2259			-274.2	-240.9	2390
2	7	303.1	95.7	132.8	46.6	96	284	-17	-66	231.4	-0.2259			-556.3	-193.1	2390
2	8	412.3	72.4	186.0	35.2	77	396	-17	-88	231.1	-0.2259			-776.2	-145.3	2390
2	9	491.3	49.1	224.3	23.7	57	483	-17	-109	230.8	-0.2259			-934	-97.49	2390
2	10	539.9	25.8	247.7	12.3	38	545	-17	-131	230.5	-0.2259			-1030	-49.69	2390
2	11	558.2	2.4	256.2	0.9	19	582	-17	-153	230.2	-0.2259			-1063	-1.884	2390
2	12	546.3	-20.9	249.9	-10.6	18	-133	-36	550	229.9	-0.2259			-961.1	43.81	2285
2	13	504.0	-44.2	228.7	-22.0	18	-110	-55	491	229.6	-0.2259			-874.5	89.51	2285
2	14	431.4	-67.5	192.7	-33.5	18	-87	-74	407	229.4	-0.2259			-728.5	135.2	2285
2	15	328.5	-90.8	141.8	-44.9	18	-64	-93	298	229.1	-0.2259			-523	180.9	2285
2	16	195.3	-114.1	76.0	-56.3	18	-42	-113	164	228.8	-0.2259			-258.2	226.6	2285
2	17	31.8	-137.4	-4.7	-67.8	18	-19	-132	5	228.5	-0.2259			66.13	272.3	2285
2	18	-162.1	-160.7	-100.3	-79.2	18	4	-151	-179	228.2	-0.2259			449.8	318	2285
2	19	-386.2	-184.1	-210.7	-90.7	18	27	-170	-388	227.9	-0.2259			882.4	339.2	2285
2	20	-643.4	-211.6	-336.0	-102.1	18	50	-189	-621	227.6	-0.2259			1280	157.5	2391
2	21	-936.4	-239.2	-476.1	-113.5	18	73	-209	-880	227.3	-0.2259			1381	-1.827	2391

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 22.12 tg(β)	z=d*0.9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
3	1	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
3	2	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
3	3	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	4	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	5	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	6	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	7	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	8	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	9	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	10	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	11	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	12	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	13	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	14	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
3	1	-936.4	247.9	-476.1	118.9	203	-880	-3	73	227.3	-10.28			1409	-22.24	2479
3	2	-675.2	224.5	-350.1	109.1	187	-664	-3	69	215.9	-10.28			1309	-160.1	2479
3	3	-439.9	201.0	-234.8	99.4	170	-467	-3	65	204.6	-10.28			1061	-289.4	2479
3	4	-228.6	181.2	-130.2	89.7	154	-287	-3	62	193.2	-10.28			592.1	-412.4	2479
3	5	-39.2	161.3	-36.5	79.9	138	-126	-3	58	181.8	-10.28			194.6	-340.4	2565
3	6	128.3	141.5	46.6	70.2	121	17	-3	54	170.5	-10.28			-158.4	-297.9	2565
3	7	273.8	121.7	116.8	60.5	105	142	-3	51	159.1	-10.28			-464.3	-255.4	2565
3	8	397.4	101.8	180.3	50.7	89	250	-3	47	147.7	-10.28			-723.3	-212.9	2565
3	9	499.1	82.0	231.0	41.0	72	339	-3	44	136.4	-10.28			-961.8	-173.3	2617
3	10	578.8	62.2	271.0	31.3	56	410	-3	40	125.0	-10.28			-1129	-129.9	2617
3	11	636.6	42.3	300.2	21.5	40	463	-3	36	113.6	-10.28			-1249	-86.49	2617
3	12	672.4	22.5	318.6	11.8	23	498	-3	33	102.3	-10.28			-1321	-43.1	2617
3	13	686.4	2.7	326.2	2.1	23	-203	-19	749	90.9	-10.28			-1310	-2.766	2559
3	14	678.3	-17.2	323.1	-7.7	23	-177	-36	719	79.6	-10.28			-1293	34.44	2559

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 22.12 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho Inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
3	15	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	16	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	17	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	18	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	19	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	20	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
3	21	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
3	15	648.4	-37.0	309.3	-17.4	23	-152	-52	670	68.2	-10.28			-1234	72.21	2558
3	16	596.5	-56.8	284.6	-27.1	23	-127	-68	604	56.8	-10.28			-1133	110	2558
3	17	522.7	-76.7	249.2	-36.9	23	-101	-85	519	45.5	-10.28			-990.7	147.7	2558
3	18	426.9	-96.5	203.1	-46.6	23	-76	-101	416	34.1	-10.28			-806.4	185.5	2558
3	19	309.2	-116.3	146.1	-56.3	23	-51	-117	296	22.7	-10.28			-580.3	223.3	2558
3	20	167.6	-139.8	78.5	-66.1	23	-25	-134	157	11.4	-10.28			-230.6	261	2558
3	21	0.0	-163.3	0.0	-75.8	23	0	-150	0	0.0	-10.28			78.94	298.8	2558

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 13.04 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho Inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
4	1	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	2	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	3	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	4	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	5	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	6	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	7	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	8	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	9	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	10	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	11	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	12	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	13	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	14	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	15	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	16	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	17	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	18	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	19	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	20	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
4	21	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
4	1	0.0	290.4	0.0	58.7	115	0	-6	0	0.0	-0.6162			-201.9	-254.3	4389
4	2	185.2	277.8	38.3	58.7	115	75	-6	-4	-0.4	-0.6162			-367.6	-254.3	4389
4	3	362.1	265.1	76.6	58.7	115	150	-6	-8	-0.8	-0.6162			-533.3	-254.3	4389
4	4	530.8	252.5	114.8	58.7	115	225	-6	-12	-1.2	-0.6162			-699.1	-254.3	4389
4	5	691.2	239.9	153.1	58.7	115	301	-6	-16	-1.6	-0.6162			-864.8	-254.3	4389
4	6	843.5	227.3	191.4	58.7	115	376	-6	-20	-2.0	-0.6162			-1031	-254.3	4389
4	7	987.5	214.6	229.7	58.7	115	451	-6	-25	-2.4	-0.6162			-1196	-254.3	4389
4	8	1123.0	202.0	267.9	58.7	115	526	-6	-29	-2.8	-0.6162			-1362	-254.3	4389
4	9	1251.0	189.4	306.2	58.7	115	601	-6	-33	-3.2	-0.6162			-1528	-254.3	4389
4	10	1370.0	176.8	344.5	58.7	115	676	-6	-37	-3.6	-0.6162			-1693	-254.3	4389
4	11	1481.0	164.1	382.8	58.7	115	752	-6	-41	-4.0	-0.6162			-1859	-254.3	4389
4	12	1584.0	151.5	421.1	58.7	115	827	-6	-45	-4.4	-0.6162			-2025	-254.3	4389
4	13	1679.0	138.9	459.3	58.7	115	902	-6	-49	-4.8	-0.6162			-2191	-254.3	4389
4	14	1765.0	126.2	497.6	58.7	115	977	-6	-53	-5.2	-0.6162			-2356	-254.3	4389
4	15	1843.0	113.6	535.9	58.7	115	1052	-6	-57	-5.6	-0.6162			-2522	-254.3	4389
4	16	1913.0	101.0	574.2	58.7	115	1127	-6	-61	-6.0	-0.6162			-2688	-254.3	4389
4	17	1975.0	88.4	612.5	58.7	115	1202	-6	-65	-6.4	-0.6162			-2854	-254.3	4389
4	18	2028.0	75.7	650.7	58.7	115	1278	-6	-69	-6.8	-0.6162			-3019	-254.3	4389
4	19	2074.0	63.1	689.0	58.7	115	1353	-6	-74	-7.2	-0.6162			-3185	-254.3	4389
4	20	2111.0	50.5	727.3	58.7	115	1428	-6	-78	-7.6	-0.6162			-3351	-254.3	4389
4	21	2139.0	37.9	765.6	58.7	115	1503	-6	-82	-8.0	-0.6162			-3517	-255.3	4389

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 4.85 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho Inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
5	1	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	2	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	3	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	4	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	5	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	6	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	7	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	8	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	9	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	10	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	11	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	12	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	13	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	14	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	15	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	16	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	17	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	18	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	19	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	20	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
5	21	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
5	1	2446.0	-457.0	855.9	-176.4	14	-67	-321	1558	-49.3	10.15			-3845	749.3	4279
5	2	2334.0	-461.7	813.1	-176.4	14	-63	-321	1480	-46.8	10.15			-3663	752.9	4279
5	3	2222.0	-466.4	770.3	-176.4	14	-60	-321	1402	-44.3	10.15			-3481	752	4279
5	4	2108.0	-471.1	727.5	-176.4	14	-57	-321	1324	-41.9	10.15			-3298	752	4279
5	5	1993.0	-475.8	684.7	-176.4	14	-53	-321	1247	-39.4	10.15			-3116	752	4279
5	6	1877.0	-480.5	641.9	-176.4	14	-50	-321	1169	-36.9	10.15			-2933	752	4279
5	7	1760.0	-485.2	599.1	-176.4	14	-47	-321	1091	-34.5	10.15			-2751	752	4279
5	8	1642.0	-489.9	556.3	-176.4	14	-43	-321	1013	-32.0	10.15			-2569	752	4279
5	9	1522.0	-494.6	513.5	-176.4	14	-40	-321	935	-29.6	10.15			-2386	752	4279
5	10	1402.0	-499.3	470.7	-176.4	14	-37	-321	857	-27.1	10.15			-2204	752	4279
5	11	1280.0	-504.0	427.9	-176.4	14	-33	-321	779	-24.6	10.15			-2021	752	4279
5	12	1157.0	-508.7	385.1	-176.4	14	-30	-321	701	-22.2	10.15			-1839	752	4279
5	13	1033.0	-513.4	342.4	-176.4	14	-27	-321	623	-19.7	10.15			-1656	752	4279
5	14	907.8	-518.1	299.6	-176.4	14	-23	-321	545	-17.2	10.15			-1474	752	4279
5	15	781.6	-522.8	256.8	-176.4	14	-20	-321	467	-14.8	10.15			-1291	752	4279
5	16	654.2	-527.5	214.0	-176.4	14	-17	-321	390	-12.3	10.15			-1109	752	4279
5	17	525.6	-532.2	171.2	-176.4	14	-13	-321	312	-9.9	10.15			-926.6	752	4279
5	18	395.9	-536.9	128.4	-176.4	14	-10	-321	234	-7.4	10.15			-744.2	752	4279
5	19	265.1	-541.6	85.6	-176.4	14	-7	-321	156	-4.9	10.15			-561.7	752	4279
5	20	133.1	-546.3	42.8	-176.4	14	-3	-321	78	-2.5	10.15			-379.3	752	4279
5	21	0.0	-551.0	0.0	-176.4	14	0	-321	0	0.0	10.15			-196.9	752	4279

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 5.48 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho Inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
6	1	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	2	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
						304.179	0	-13.616	0							
6	1	0.00	528.90	0.00	166.40	304.18	83.32	-13.62	-3.73	0.00	-9.15			-196.70	-665.00	4277.00
6	2	144.10	523.60	45.57	166.40	304.18	166.63	-13.62	-7.46	-2.51	-9.15			-378.90	-665.00	4277.00

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 22.12 tg(β)	z=d*0.9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto util d (cm.)	α (°)
6	3	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	4	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	5	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	6	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	7	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	8	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	9	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	10	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	11	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	12	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	13	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	14	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	15	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	16	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	17	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	18	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	19	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	20	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
6	21	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 12.48 tg(β)	z=d*0.9 (cm.)				Canto util d (cm.)	α (°)
7	1	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	2	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	3	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	4	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	5	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	6	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	7	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	8	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	9	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	10	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	11	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	12	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	13	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	14	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	15	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	16	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	17	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	18	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	19	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	20	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90
7	21	7.750	2.651	0.925	-1.075	0.000	175.5	3.500	3.500	2.000	195.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
6	3	286.80	518.30	91.13	166.40	304.18	249.89	-13.62	-11.19	-5.01	-9.15			-561.00	-665.00	4277.00
6	4	428.00	513.00	136.70	166.40	304.18	333.21	-13.62	-14.92	-7.52	-9.15			-743.10	-665.00	-4277.00
6	5	567.80	507.70	182.30	166.40	304.18	416.48	-13.62	-18.65	-10.03	-9.15			-925.30	-665.00	4277.00
6	6	706.10	502.40	227.80	166.40	304.18	499.87	-13.62	-22.39	-12.53	-9.15			-1107.00	-665.00	4277.00
6	7	843.00	497.00	273.40	166.40	304.18	583.14	-13.62	-26.11	-15.04	-9.15			-1290.00	-665.00	4277.00
6	8	978.40	491.70	319.00	166.40	304.18	666.54	-13.62	-29.84	-17.55	-9.15			-1472.00	-665.00	4277.00
6	9	1112.00	486.40	364.50	166.40	304.18	749.81	-13.62	-33.58	-20.05	-9.15			-1654.00	-665.00	4277.00
6	10	1245.00	481.10	410.10	166.40	304.18	833.20	-13.62	-37.31	-22.56	-9.15			-1836.00	-665.00	4277.00
6	11	1376.00	475.80	455.70	166.40	304.18	916.47	-13.62	-41.03	-25.07	-9.15			-2018.00	-665.00	4277.00
6	12	1506.00	470.50	501.20	166.40	304.18	999.74	-13.62	-44.76	-27.57	-9.15			-2200.00	-665.00	4277.00
6	13	1634.00	465.20	546.80	166.40	304.18	1083.02	-13.62	-48.50	-30.08	-9.15			-2382.00	-665.00	4277.00
6	14	1760.00	459.90	592.40	166.40	304.18	1166.41	-13.62	-52.23	-32.59	-9.15			-2564.00	-665.00	4277.00
6	15	1886.00	454.60	637.90	166.40	304.18	1249.68	-13.62	-55.95	-35.09	-9.15			-2747.00	-665.00	4277.00
6	16	2009.00	449.30	683.50	166.40	304.18	1333.07	-13.62	-59.69	-37.60	-9.15			-2929.00	-665.00	4277.00
6	17	2132.00	444.00	729.10	166.40	304.18	1416.35	-13.62	-63.42	-40.11	-9.15			-3111.00	-665.00	4277.00
6	18	2253.00	438.70	774.60	166.40	304.18	1499.74	-13.62	-67.15	-42.61	-9.15			-3293.00	-665.00	4277.00
6	19	2372.00	433.40	820.20	166.40	304.18	1582.89	-13.62	-70.88	-45.12	-9.15			-3475.00	-665.00	4277.00
6	20	2490.00	428.10	865.80	166.40	304.18	1666.28	-13.62	-74.61	-47.63	-9.15			-3657.00	-665.00	4277.00
6	21	2607.00	422.80	911.30	166.40					-50.13	-9.15			-3831.00	-575.70	4277.00

VANO	SECCIÓN															
						7.32	-91.38	-128.62	1605.15							
7	1	2312.00	-64.38	824.00	-66.03	7.32	-86.81	-128.62	1524.95	-11.20	0.90			-3582.00	270.80	4456.00
7	2	2268.00	-76.47	782.80	-66.03	7.32	-82.24	-128.62	1444.64	-10.64	0.90			-3413.00	270.80	4456.00
7	3	2217.00	-88.56	741.60	-66.03	7.32	-77.67	-128.62	1364.32	-10.08	0.90			-3244.00	270.80	4456.00
7	4	2158.00	-100.70	700.40	-66.03	7.32	-73.11	-128.62	1284.12	-9.52	0.90			-3075.00	270.80	4456.00
7	5	2091.00	-112.70	659.20	-66.03	7.32	-68.54	-128.62	1203.80	-8.96	0.90			-2906.00	270.80	4456.00
7	6	2017.00	-124.80	618.00	-66.03	7.32	-63.97	-128.62	1123.61	-8.40	0.90			-2737.00	270.80	4456.00
7	7	1935.00	-136.90	576.80	-66.03	7.32	-59.40	-128.62	1043.41	-7.84	0.90			-2568.00	270.80	4456.00
7	8	1846.00	-149.00	535.60	-66.03	7.32	-54.83	-128.62	963.09	-7.28	0.90			-2399.00	270.80	4456.00
7	9	1749.00	-161.10	494.40	-66.03	7.32	-50.26	-128.62	882.89	-6.72	0.90			-2230.00	270.80	4456.00
7	10	1645.00	-173.20	453.20	-66.03	7.32	-45.69	-128.62	802.58	-6.16	0.90			-2061.00	270.80	4456.00
7	11	1533.00	-185.30	412.00	-66.03	7.32	-41.12	-128.62	722.26	-5.60	0.90			-1892.00	270.80	4456.00
7	12	1414.00	-197.40	370.80	-66.03	7.32	-36.56	-128.62	642.06	-5.04	0.90			-1723.00	270.80	4456.00
7	13	1287.00	-209.50	329.60	-66.03	7.32	-31.98	-128.62	561.74	-4.48	0.90			-1554.00	270.80	4456.00
7	14	1152.00	-221.50	288.40	-66.03	7.32	-27.42	-128.62	481.55	-3.92	0.90			-1385.00	270.80	4456.00
7	15	1010.00	-233.60	247.20	-66.03	7.32	-22.84	-128.62	401.35	-3.36	0.90			-1216.00	270.80	4456.00
7	16	860.90	-245.70	206.00	-66.03	7.32	-18.28	-128.62	321.03	-2.80	0.90			-1047.00	270.80	4456.00
7	17	703.80	-257.80	164.80	-66.03	7.32	-13.70	-128.62	240.72	-2.24	0.90			-878.10	270.80	4456.00
7	18	539.20	-269.90	123.60	-66.03	7.32	-9.14	-128.62	160.52	-1.68	0.90			-709.10	270.80	4456.00
7	19	367.00	-282.00	82.40	-66.03	7.32	-4.57	-128.62	80.26	-1.12	0.90			-540.10	270.80	4456.00
7	20	187.30	-294.10	41.20	-66.03	7.32	0.00	-128.62	0.00	-0.56	0.90			-371.20	270.80	4456.00
7	21	0.00	-306.20	0.00	-66.03	6.36	0.00	-120.70	0.00	0.00	0.90			-202.20	270.80	4456.00

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO: L.A.V. MADRID - ZARAGOZA
ESTRUCTURA: E-1502.0

VANO	SECCIÓ	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
1	1	0.0	0.0	309.3	-107.3	80.9	80.9	309.3	80.9	315.4	251.5	-244.3	A-B
1	2	0.0	0.0	271.1	-101.0	401.9	-34.3	271.1	401.9	420.3	102.8	-244.3	A-B
1	3	0.0	0.0	233.1	-94.6	680.6	-142.5	233.1	680.6	573.6	-13.4	-244.3	A-B
1	4	0.0	0.0	200.4	-85.1	841.9	-320.5	200.4	841.9	628.6	-97.6	-244.3	A-B
1	5	0.0	0.0	167.8	-75.5	1045.4	-409.4	167.8	1045.4	697.9	-203.8	-244.3	A-B
1	6	0.0	0.0	135.1	-66.0	1213.2	-487.1	135.1	1213.2	755.0	-291.4	-244.3	C
1	7	0.0	0.0	102.5	-56.4	1343.8	-555.7	102.5	1343.8	799.5	-359.6	-244.3	C
1	8	0.0	0.0	69.8	-46.8	1439.2	-612.7	69.8	1439.2	832.0	-409.3	-244.3	C
1	9	0.0	0.0	42.4	-42.3	911.5	-72.2	42.4	911.5	652.2	-133.9	-244.3	A-B
1	10	0.0	0.0	29.4	-51.2	-135.8	958.7	51.2	958.7	668.3	-158.5	-244.3	A-B
1	11	0.0	0.0	46.5	-76.3	-158.0	824.0	76.3	824.0	637.4	-73.3	-244.3	A-B
1	12	0.0	0.0	62.3	-102.7	-97.8	725.1	102.7	725.1	603.7	-21.7	-244.3	A-B
1	13	0.0	0.0	78.1	-129.1	-20.2	596.8	129.1	596.8	560.0	45.2	-244.3	A-B
1	14	0.0	0.0	93.9	-155.6	75.0	439.5	155.6	439.5	506.4	127.4	-244.3	A-B
1	15	0.0	0.0	115.0	-176.6	167.3	232.5	176.6	232.5	444.0	243.5	-244.3	A-B
1	16	0.0	0.0	131.7	-202.3	303.8	23.0	202.3	23.0	372.7	352.8	-244.3	A-B
1	17	0.0	0.0	148.5	-227.7	458.7	-214.6	227.7	-214.6	291.8	476.8	-244.3	A-B
1	18	0.0	0.0	165.3	-253.0	632.2	-480.6	253.0	-480.6	201.2	615.7	-244.3	A-B
1	19	0.0	0.0	53.8	-406.8	765.5	-833.3	406.8	-833.3	73.8	792.5	-244.3	A-B
1	20	0.0	0.0	-118.2	-623.2	807.4	-1325.4	623.2	-1325.4	-130.7	916.4	-244.3	A-B
1	21	0.0	0.0	-283.6	-833.0	585.5	-2130.3	833.0	-2130.3	-393.7	1289.3	-244.3	C

VANO	SECCIÓN	Pdf. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
1	1	2452.0	289.0	1.48	34.09	90	VERIFICA	350.0	170.0	0.267	4419.1	309.3	VERIFICA
1	2	2452.0	289.0	1.48	34.09	90	VERIFICA	350.0	170.0	0.267	4419.1	271.1	VERIFICA
1	3	2452.0	341.8	1.55	32.85	90	VERIFICA	220.0	170.0	0.267	2726.8	233.1	VERIFICA
1	4	2452.0	341.8	1.55	32.85	90	VERIFICA	220.0	170.0	0.267	2726.8	200.4	VERIFICA
1	5	2452.0	341.8	1.55	32.85	90	VERIFICA	220.0	170.0	0.267	2726.8	167.8	VERIFICA
1	6	2452.0	341.8	1.55	32.85	90	VERIFICA	220.0	170.0	0.267	2726.8	135.1	VERIFICA
1	7	2452.0	341.8	1.55	32.85	90	VERIFICA	220.0	170.0	0.267	2726.8	102.5	VERIFICA
1	8	2452.0	341.8	1.55	32.85	90	VERIFICA	220.0	170.0	0.267	2726.8	69.8	VERIFICA
1	9	2452.0	341.8	1.55	32.85	90	VERIFICA	220.0	170.0	0.267	2726.8	42.4	VERIFICA
1	10	2452.0	341.8	1.55	32.85	90	VERIFICA	220.0	170.0	0.267	2726.8	51.2	VERIFICA
1	11	2559.0	356.8	1.57	32.52	90	VERIFICA	220.0	170.0	0.267	2712.5	76.3	VERIFICA
1	12	2559.0	356.8	1.57	32.52	90	VERIFICA	220.0	170.0	0.267	2712.5	102.7	VERIFICA
1	13	2559.0	356.8	1.57	32.52	90	VERIFICA	220.0	170.0	0.267	2712.5	129.1	VERIFICA
1	14	2559.0	356.8	1.57	32.52	90	VERIFICA	220.0	170.0	0.267	2712.5	155.6	VERIFICA
1	15	2617.0	364.8	1.58	32.35	90	VERIFICA	220.0	170.0	0.267	2704.8	176.6	VERIFICA
1	16	2617.0	364.8	1.58	32.35	90	VERIFICA	220.0	170.0	0.267	2704.8	202.3	VERIFICA
1	17	2617.0	364.8	1.58	32.35	90	VERIFICA	220.0	170.0	0.267	2704.8	227.7	VERIFICA
1	18	2617.0	364.8	1.58	32.35	90	VERIFICA	220.0	170.0	0.267	2704.8	253.0	VERIFICA
1	19	2565.0	357.6	1.57	32.50	90	VERIFICA	220.0	170.0	0.267	2711.7	406.8	VERIFICA
1	20	2565.0	302.3	1.50	33.76	90	VERIFICA	350.0	170.0	0.267	4398.6	623.2	VERIFICA
1	21	2565.0	302.3	1.50	33.76	90	VERIFICA	350.0	170.0	0.267	4398.6	833.0	VERIFICA

VANO	SECCIÓ	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
2	1	0.0	0.0	852.6	295.0	-2158.3	557.5	852.6	-2158.3	-413.0	1292.2	-244.3	C
2	2	0.0	0.0	601.1	95.8	-1213.3	811.7	601.1	-1213.3	-104.3	854.3	-244.3	A-B
2	3	0.0	0.0	348.3	-104.8	-595.5	806.4	348.3	-595.5	142.8	656.4	-244.3	A-B
2	4	0.0	0.0	253.8	-149.7	-309.9	535.2	253.8	-309.9	227.7	494.9	-244.3	A-B
2	5	0.0	0.0	230.1	-123.8	10.8	363.6	230.1	10.8	336.9	327.5	-244.3	A-B
2	6	0.0	0.0	197.0	-107.2	288.4	213.5	197.0	288.4	431.4	182.7	-244.3	A-B
2	7	0.0	0.0	163.9	-90.7	523.2	84.8	163.9	523.2	511.4	60.1	-244.3	A-B
2	8	0.0	0.0	130.8	-74.2	714.6	-22.3	130.8	714.6	576.6	-39.8	-244.3	A-B
2	9	0.0	0.0	97.7	-57.7	863.4	-108.0	97.7	863.4	627.2	-117.4	-244.3	A-B
2	10	0.0	0.0	64.6	-41.1	968.4	-172.6	64.6	968.4	663.0	-172.2	-244.3	A-B
2	11	0.0	0.0	31.5	-24.6	1031.1	-214.8	31.5	1031.1	684.3	-205.0	-244.3	A-B
2	12	0.0	0.0	41.9	-57.5	-444.0	1403.1	57.5	1403.1	796.4	-413.8	-244.3	C
2	13	0.0	0.0	56.3	-92.7	-380.3	1305.5	92.7	1305.5	763.2	-362.8	-244.3	C
2	14	0.0	0.0	70.7	-128.0	-297.7	1162.1	128.0	1162.1	714.3	-288.0	-244.3	C
2	15	0.0	0.0	85.1	-163.2	-196.4	973.1	163.2	973.1	650.0	-189.4	-244.3	A-B
2	16	0.0	0.0	99.6	-198.3	-76.5	737.8	198.3	737.8	569.8	-66.5	-244.3	A-B
2	17	0.0	0.0	114.0	-233.5	62.3	457.0	233.5	457.0	474.2	80.0	-244.3	A-B
2	18	0.0	0.0	128.4	-268.7	219.7	130.4	268.7	130.4	363.0	250.5	-244.3	A-B
2	19	0.0	0.0	118.3	-328.5	385.5	-252.4	328.5	-252.4	232.6	450.3	-244.3	A-B
2	20	0.0	0.0	-98.5	-597.4	473.1	-779.4	597.4	-779.4	27.1	642.9	-244.3	A-B
2	21	0.0	0.0	-292.9	-844.0	218.6	-1716.7	844.0	-1716.7	-279.1	1077.2	-244.3	C

VANO	SECCIÓN	Pdf. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
2	1	2479.0	292.2	1.48	34.01	90	VERIFICA	350.0	170.0	0.267	4414.2	852.6	VERIFICA
2	2	2479.0	292.2	1.48	34.01	90	VERIFICA	350.0	170.0	0.267	4414.2	601.1	VERIFICA
2	3	2479.0	345.6	1.55	32.76	90	VERIFICA	220.0	170.0	0.267	2723.1	348.3	VERIFICA
2	4	2390.0	333.2	1.54	33.04	90	VERIFICA	220.0	170.0	0.267	2735.0	253.8	VERIFICA
2	5	2390.0	333.2	1.54	33.04	90	VERIFICA	220.0	170.0	0.267	2735.0	230.1	VERIFICA
2	6	2390.0	333.2	1.54	33.04	90	VERIFICA	220.0	170.0	0.267	2735.0	197.0	VERIFICA
2	7	2390.0	333.2	1.54	33.04	90	VERIFICA	220.0	170.0	0.267	2735.0	163.9	VERIFICA
2	8	2390.0	333.2	1.54	33.04	90	VERIFICA	220.0	170.0	0.267	2735.0	130.8	VERIFICA
2	9	2390.0	333.2	1.54	33.04	90	VERIFICA	220.0	170.0	0.267	2735.0	97.7	VERIFICA
2	10	2390.0	333.2	1.54	33.04	90	VERIFICA	220.0	170.0	0.267	2735.0	64.6	VERIFICA
2	11	2390.0	333.2	1.54	33.04	90	VERIFICA	220.0	170.0	0.267	2735.0	31.5	VERIFICA
2	12	2285.0	318.6	1.52	33.38	90	VERIFICA	220.0	170.0	0.267	2749.1	57.5	VERIFICA
2	13	2285.0	318.6	1.52	33.38	90	VERIFICA	220.0	170.0	0.267	2749.1	92.7	VERIFICA
2	14	2285.0	318.6	1.52	33.38	90	VERIFICA	220.0	170.0	0.267	2749.1	128.0	VERIFICA
2	15	2285.0	318.6	1.52	33.38	90	VERIFICA	220.0	170.0	0.267	2749.1	163.2	VERIFICA
2	16	2285.0	318.6	1.52	33.38	90	VERIFICA	220.0	170.0	0.267	2749.1	198.3	VERIFICA
2	17	2285.0	318.6	1.52	33.38	90	VERIFICA	220.0	170.0	0.267	2749.1	233.5	VERIFICA
2	18	2285.0	318.6	1.52	33.38	90	VERIFICA	220.0	170.0	0.267	2749.1	268.7	VERIFICA
2	19	2285.0	318.6	1.52	33.38	90	VERIFICA	220.0	170.0	0.267	2749.1	328.5	VERIFICA
2	20	2391.0	281.8	1.47	34.27	90	VERIFICA	350.0	170.0	0.267	4430.1	597.4	VERIFICA
2	21	2391.0	281.8	1.47	34.27	90	VERIFICA	350.0	170.0	0.267	4430.1	844.0	VERIFICA

VANO	SECCIÓ	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
3	1	0.0	0.0	832.4	287.5	-2029.7	587.6	832.4	-2029.7	-371.0	1232.6	-244.3	C
3	2	0.0	0.0	620.4	119.8	-1225.4	813.5	620.4	-1225.4	-108.2	860.0	-244.3	A-B
3	3	0.0	0.0	416.8	-39.4	-651.3	858.6	416.8	-651.3	123.8	685.5	-244.3	A-B
3	4	0.0	0.0	224.9	-189.0	-377.3	651.5	224.9	-377.3	217.1	542.5	-244.3	A-B
3	5	0.0	0.0	228.0	-143.6	-108.0	486.3	228.0	-108.0	320.8	413.9	-244.3	A-B
3	6	0.0	0.0	201.7	-127.7	129.7	336.4	201.7	129.7	401.8	289.9	-244.3	A-B
3	7	0.0	0.0	175.5	-111.8	338.3	203.9	175.5	338.3	472.8	181.0	-244.3	A-B
3	8	0.0	0.0	149.0	-96.0	517.8	88.9	149.0	517.8	533.9	87.3	-244.3	A-B
3	9	0.0	0.0	119.8	-82.9	641.5	-34.8	119.8	641.5	583.3	30.0	-244.3	A-B
3	10	0.0	0.0	94.4	-66.2	760.5	-116.8	94.4	760.5	623.8	-32.1	-244.3	A-B
3	11	0.0	0.0	69.0	-49.4	850.5	-181.1	69.0	850.5	654.5	-79.0	-244.3	A-B
3	12	0.0	0.0	43.5	-32.6	912.2	-226.7	43.5	912.2	675.5	-111.3	-244.3	A-B
3	13	0.0	0.0	38.7	-43.0	-95.2	861.9	43.0	861.9	650.3	-93.1	-244.3	A-B
3	14	0.0	0.0	46.5	-71.8	-657.8	1406.9	71.8	1406.9	835.9	-377.6	-244.3	C

VANO	SECCIÓN	Pdf. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
3	1	2479.0	292.2	1.48	34.01	90	VERIFICA	350.0	170.0	0.267	4414.2	832.4	VERIFICA
3	2	2479.0	292.2	1.48	34.01	90	VERIFICA	350.0	170.0	0.267	4414.2	620.4	VERIFICA
3	3	2479.0	345.6	1.55	32.76	90	VERIFICA	220.0	170.0	0.267	2723.1	416.8	VERIFICA
3	4	2479.0	345.6	1.55	32.76	90	VERIFICA	220.0	170.0	0.267	2723.1	224.9	VERIFICA
3	5	2565.0	357.6	1.57	32.50	90	VERIFICA	220.0	170.0	0.267	2711.7	228.0	VERIFICA
3	6	2565.0	357.6	1.57	32.50	90	VERIFICA	220.0	170.0	0.267	2711.7	201.7	VERIFICA
3	7	2565.0	357.6	1.57	32.50	90	VERIFICA	220.0	170.0	0.267	2711.7	175.5	VERIFICA
3	8	2565.0	357.6	1.57	32.50	90	VERIFICA	220.0	170.0	0.267	2711.7	149.0	VERIFICA
3	9	2617.0	364.8	1.58	32.35	90	VERIFICA	220.0	170.0	0.267	2704.8	119.8	VERIFICA
3	10	2617.0	364.8	1.58	32.35	90	VERIFICA	220.0	170.0	0.267	2704.8	94.4	VERIFICA
3	11	2617.0	364.8	1.58	32.35	90	VERIFICA	220.0	170.0	0.267	2704.8	69.0	VERIFICA
3	12	2617.0	364.8	1.58	32.35	90	VERIFICA	220.0	170.0	0.267	2704.8	43.5	VERIFICA
3	13	2559.0	356.8	1.57	32.52	90	VERIFICA	220.0	170.0	0.267	2712.5	43.0	VERIFICA
3	14	2559.0	356.8	1.57	32.52	90	VERIFICA	220.0	170.0	0.267	2712.5	71.8	VERIFICA

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO: L.A.V. MADRID - ZARAGOZA
ESTRUCTURA: E-1502.0

VANO	SECCIÓ	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
3	15	0.0	0.0	57.6	-102.9	-600.1	1310.5	102.9	1310.5	802.9	-327.4	-244.3	C
3	16	0.0	0.0	68.8	-134.0	-530.0	1179.7	134.0	1179.7	758.4	-259.1	-244.3	C
3	17	0.0	0.0	79.9	-165.1	-448.0	1014.1	165.1	1014.1	702.0	-172.7	-244.3	A-B
3	18	0.0	0.0	91.1	-196.1	-353.4	814.4	196.1	814.4	634.0	-68.4	-244.3	A-B
3	19	0.0	0.0	102.3	-227.1	-246.6	580.3	227.1	580.3	554.2	53.7	-244.3	A-B
3	20	0.0	0.0	110.1	-263.7	-47.2	390.9	263.7	390.9	429.2	120.4	-244.3	A-B
3	21	0.0	0.0	118.0	-300.3	78.9	78.9	300.3	78.9	327.3	264.9	-244.3	A-B

VANO	SECCIÓN	Pd. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
3	15	2558.0	356.6	1.57	32.52	90	VERIFICA	220.0	170.0	0.267	2712.6	102.9	VERIFICA
3	16	2558.0	356.6	1.57	32.52	90	VERIFICA	220.0	170.0	0.267	2712.6	134.0	VERIFICA
3	17	2558.0	356.6	1.57	32.52	90	VERIFICA	220.0	170.0	0.267	2712.6	165.1	VERIFICA
3	18	2558.0	356.6	1.57	32.52	90	VERIFICA	220.0	170.0	0.267	2712.6	196.1	VERIFICA
3	19	2558.0	356.6	1.57	32.52	90	VERIFICA	220.0	170.0	0.267	2712.6	227.1	VERIFICA
3	20	2558.0	301.5	1.49	33.78	90	VERIFICA	350.0	170.0	0.267	4399.8	263.7	VERIFICA
3	21	2558.0	301.5	1.49	33.78	90	VERIFICA	350.0	170.0	0.267	4399.8	300.3	VERIFICA

VANO	SECCIÓ	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
4	1	0.0	0.0	442.4	49.6	-201.9	-201.9	442.4	-201.9	495.9	648.2	-244.3	A-B
4	2	0.0	0.0	423.5	38.3	80.3	-173.2	423.5	80.3	594.4	533.7	-244.3	A-B
4	3	0.0	0.0	404.4	26.8	350.2	-152.0	404.4	350.2	688.5	424.3	-244.3	A-B
4	4	0.0	0.0	385.5	15.5	607.5	-138.2	385.5	607.5	778.3	320.0	-244.3	A-B
4	5	0.0	0.0	366.6	4.1	852.6	-131.8	366.6	852.6	863.8	220.6	-244.3	A-B
4	6	0.0	0.0	347.7	-7.2	1085.0	-133.2	347.7	1085.0	944.9	126.3	-244.3	A-B
4	7	0.0	0.0	328.7	-18.6	1306.4	-140.9	328.7	1306.4	1022.1	36.6	-244.3	A-B
4	8	0.0	0.0	309.8	-30.0	1513.5	-157.3	309.8	1513.5	1094.4	-47.4	-244.3	A-B
4	9	0.0	0.0	290.9	-41.3	1709.6	-180.3	290.9	1709.6	1162.9	-126.9	-244.3	A-B
4	10	0.0	0.0	272.0	-52.6	1893.3	-210.5	272.0	1893.3	1226.9	-201.4	-244.3	A-B
4	11	0.0	0.0	252.9	-64.1	2064.0	-248.9	252.9	2064.0	1286.5	-270.6	-244.3	C
4	12	0.0	0.0	234.0	-75.4	2222.9	-294.4	234.0	2222.9	1341.9	-335.1	-244.3	C
4	13	0.0	0.0	215.1	-86.8	2369.2	-347.3	215.1	2369.2	1393.0	-394.4	-244.3	C
4	14	0.0	0.0	196.1	-98.2	2503.6	-407.1	196.1	2503.6	1439.9	-448.9	-244.3	C
4	15	0.0	0.0	177.2	-109.5	2624.6	-475.2	177.2	2624.6	1482.1	-498.0	-244.3	C
4	16	0.0	0.0	158.3	-120.9	2733.9	-550.5	158.3	2733.9	1520.3	-542.3	-244.3	C
4	17	0.0	0.0	139.3	-132.2	2830.9	-632.9	139.3	2830.9	1554.1	-581.6	-244.3	C
4	18	0.0	0.0	120.4	-143.6	2915.5	-722.6	143.6	-722.6	314.2	859.3	-244.3	A-B
4	19	0.0	0.0	101.4	-155.0	2988.8	-819.4	155.0	-819.4	280.4	898.6	-244.3	A-B
4	20	0.0	0.0	82.5	-166.3	3048.3	-924.4	166.3	-924.4	243.8	941.2	-244.3	A-B
4	21	0.0	0.0	62.6	-178.7	3094.7	-1037.4	178.7	-1037.4	204.3	987.0	-244.3	A-B

VANO	SECCIÓN	Pd. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
4	1	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	442.4	VERIFICA
4	2	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	423.5	VERIFICA
4	3	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	404.4	VERIFICA
4	4	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	385.5	VERIFICA
4	5	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	366.6	VERIFICA
4	6	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	347.7	VERIFICA
4	7	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	328.7	VERIFICA
4	8	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	309.8	VERIFICA
4	9	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	290.9	VERIFICA
4	10	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	272.0	VERIFICA
4	11	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	252.9	VERIFICA
4	12	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	234.0	VERIFICA
4	13	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	215.1	VERIFICA
4	14	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	196.1	VERIFICA
4	15	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	177.2	VERIFICA
4	16	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	158.3	VERIFICA
4	17	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	139.3	VERIFICA
4	18	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	143.6	VERIFICA
4	19	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	155.0	VERIFICA
4	20	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	166.3	VERIFICA
4	21	4389.0	566.3	1.82	28.77	90	VERIFICA	350.0	195.0	0.267	4606.5	178.7	VERIFICA

VANO	SECCIÓ	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
5	1	0.0	0.0	215.1	-682.5	-1047.1	3445.3	682.5	3445.3	1754.3	-845.0	-244.3	C
5	2	0.0	0.0	214.4	-686.0	-995.7	3278.1	686.0	3278.1	1695.9	-777.2	-244.3	C
5	3	0.0	0.0	209.3	-693.9	-944.4	3111.1	693.9	3111.1	1637.7	-709.5	-244.3	C
5	4	0.0	0.0	205.1	-701.0	-893.8	2941.9	701.0	2941.9	1578.6	-640.9	-244.3	C
5	5	0.0	0.0	200.8	-708.0	-845.1	2770.5	708.0	2770.5	1518.8	-571.3	-244.3	C
5	6	0.0	0.0	196.6	-715.1	-796.3	2598.5	715.1	2598.5	1458.8	-501.6	-244.3	C
5	7	0.0	0.0	192.4	-722.1	-749.5	2423.8	722.1	2423.8	1397.9	-430.7	-244.3	C
5	8	0.0	0.0	188.1	-729.2	-703.5	2247.8	729.2	2247.8	1336.4	-359.4	-244.3	C
5	9	0.0	0.0	183.9	-736.2	-658.3	2069.8	736.2	2069.8	1274.3	-287.2	-244.3	C
5	10	0.0	0.0	179.7	-743.3	-614.1	1890.6	743.3	1890.6	1211.8	-214.5	-244.3	A-B
5	11	0.0	0.0	175.5	-750.3	-570.8	1709.7	750.3	1709.7	1148.7	-141.1	-244.3	A-B
5	12	0.0	0.0	171.2	-757.4	-529.3	1526.0	757.4	1526.0	1084.6	-66.7	-244.3	A-B
5	13	0.0	0.0	167.0	-764.4	-487.7	1342.0	764.4	1342.0	1020.4	8.0	-244.3	A-B
5	14	0.0	0.0	162.8	-771.5	-448.2	1155.2	771.5	1155.2	955.2	83.7	-244.3	A-B
5	15	0.0	0.0	158.5	-778.5	-408.6	967.7	778.5	967.7	889.8	159.7	-244.3	A-B
5	16	0.0	0.0	154.3	-785.6	-371.1	777.6	785.6	777.6	823.5	236.8	-244.3	A-B
5	17	0.0	0.0	150.1	-792.6	-334.2	586.1	792.6	586.1	756.6	314.5	-244.3	A-B
5	18	0.0	0.0	145.8	-799.7	-298.4	392.9	799.7	392.9	689.2	392.8	-244.3	A-B
5	19	0.0	0.0	141.6	-806.7	-263.5	198.1	806.7	198.1	621.2	471.8	-244.3	A-B
5	20	0.0	0.0	137.4	-813.8	-229.7	1.4	813.8	1.4	552.6	551.6	-244.3	A-B
5	21	0.0	0.0	133.2	-820.8	-196.9	-196.9	820.8	-196.9	483.4	632.0	-244.3	A-B

VANO	SECCIÓN	Pd. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
5	1	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	682.5	VERIFICA
5	2	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	686.0	VERIFICA
5	3	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	693.9	VERIFICA
5	4	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	701.0	VERIFICA
5	5	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	708.0	VERIFICA
5	6	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	715.1	VERIFICA
5	7	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	722.1	VERIFICA
5	8	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	729.2	VERIFICA
5	9	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	736.2	VERIFICA
5	10	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	743.3	VERIFICA
5	11	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	750.3	VERIFICA
5	12	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	757.4	VERIFICA
5	13	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	764.4	VERIFICA
5	14	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	771.5	VERIFICA
5	15	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	778.5	VERIFICA
5	16	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	785.6	VERIFICA
5	17	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	792.6	VERIFICA
5	18	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	799.7	VERIFICA
5	19	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	806.7	VERIFICA
5	20	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	813.8	VERIFICA
5	21	4279.0	552.1	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.3	820.8	VERIFICA

VANO	SECCIÓ	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
6	1	0.0	0.0	834.2	-73.4	-71.7	-202.3	834.2	-71.7	526.8	581.0	-244.3	A-B
6	2	0.0	0.0	826.3	-78.2	155.5	-223.1	826.3	155.5	606.1	488.8	-244.3	A-B

VANO	SECCIÓN	Pd. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
6	1	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	834.2	VERIFICA
6	2	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	826.3	VERIFICA

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1502.0

VANO	SECCIÓ	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
6	3	0.0	0.0	818.3	-82.9	380.7	-245.2	818.3	380.7	684.7	397.5	-244.3	A-B
6	4	0.0	0.0	810.4	-87.7	603.8	-268.5	810.4	603.8	762.5	307.0	-244.3	A-B
6	5	0.0	0.0	802.4	-92.5	824.6	-293.2	802.4	824.6	839.6	217.5	-244.3	A-B
6	6	0.0	0.0	794.5	-97.2	1043.7	-318.9	794.5	1043.7	916.0	128.7	-244.3	A-B
6	7	0.0	0.0	786.4	-102.1	1259.3	-347.0	786.4	1259.3	991.3	41.2	-244.3	A-B
6	8	0.0	0.0	778.4	-106.9	1473.9	-375.4	778.4	1473.9	1066.2	-45.8	-244.3	A-B
6	9	0.0	0.0	770.5	-111.6	1685.5	-405.6	770.5	1685.5	1140.0	-131.6	-244.3	A-B
6	10	0.0	0.0	762.5	-116.4	1896.5	-436.2	762.5	1896.5	1213.6	-217.2	-244.3	A-B
6	11	0.0	0.0	754.6	-121.2	2104.3	-468.6	754.6	2104.3	1286.1	-301.4	-244.3	C
6	12	0.0	0.0	746.6	-125.9	2310.4	-502.0	746.6	2310.4	1358.0	-385.0	-244.3	C
6	13	0.0	0.0	738.7	-130.7	2513.7	-537.1	738.7	2513.7	1429.0	-467.5	-244.3	C
6	14	0.0	0.0	730.7	-135.5	2714.2	-574.1	730.7	2714.2	1498.9	-548.8	-244.3	C
6	15	0.0	0.0	722.8	-140.3	2913.4	-612.1	722.8	2913.4	1568.4	-629.5	-244.3	C
6	16	0.0	0.0	714.8	-145.0	3109.4	-651.7	714.8	3109.4	1636.8	-709.0	-244.3	C
6	17	0.0	0.0	706.9	-149.8	3305.2	-691.3	706.9	3305.2	1705.1	-788.4	-244.3	C
6	18	0.0	0.0	698.9	-154.6	3498.0	-732.8	698.9	3498.0	1772.4	-866.6	-244.3	C
6	19	0.0	0.0	691.0	-159.3	3687.6	-776.0	691.0	3687.6	1838.6	-943.5	-244.3	C
6	20	0.0	0.0	683.0	-164.1	3876.1	-820.1	683.0	3876.1	1904.3	-1019.9	-244.3	C
6	21	0.0	0.0	308.1	-59.1	1446.5	-739.7	308.1	1446.5	1056.6	-34.7	-244.3	A-B

VANO	SECCIÓN	Par. (Ton.)	σ sd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
6	3	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	818.3	VERIFICA
6	4	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	810.4	VERIFICA
6	5	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	802.4	VERIFICA
6	6	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	794.5	VERIFICA
6	7	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	786.4	VERIFICA
6	8	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	778.4	VERIFICA
6	9	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	770.5	VERIFICA
6	10	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	762.5	VERIFICA
6	11	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	754.6	VERIFICA
6	12	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	746.6	VERIFICA
6	13	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	738.7	VERIFICA
6	14	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	730.7	VERIFICA
6	15	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	722.8	VERIFICA
6	16	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	714.8	VERIFICA
6	17	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	706.9	VERIFICA
6	18	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	698.9	VERIFICA
6	19	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	691.0	VERIFICA
6	20	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	683.0	VERIFICA
6	21	4277.0	551.9	1.81	28.98	90	VERIFICA	350.0	195.0	0.267	4628.7	308.1	VERIFICA

VANO	SECCIÓ	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
7	1	0.0	0.0	165.8	-117.7	-906.6	3409.4	165.8	-906.6	258.6	942.6	-244.3	A-B
7	2	0.0	0.0	154.9	-135.9	-806.6	3330.2	154.9	-806.6	293.5	902.0	-244.3	A-B
7	3	0.0	0.0	144.0	-154.0	-712.9	3240.4	154.0	3240.4	1705.6	-739.0	-244.3	C
7	4	0.0	0.0	133.1	-172.2	-626.4	3138.8	172.2	3138.8	1670.2	-697.8	-244.3	C
7	5	0.0	0.0	122.3	-190.2	-547.1	3025.0	190.2	3025.0	1630.5	-651.7	-244.3	C
7	6	0.0	0.0	111.4	-208.4	-474.1	2900.9	208.4	2900.9	1587.2	-601.4	-244.3	C
7	7	0.0	0.0	100.5	-226.5	-408.2	2764.8	226.5	2764.8	1539.7	-546.2	-244.3	C
7	8	0.0	0.0	89.6	-244.7	-348.7	2618.0	244.7	2618.0	1488.5	-486.7	-244.3	C
7	9	0.0	0.0	78.7	-262.8	-296.4	2459.4	262.8	2459.4	1433.1	-422.4	-244.3	C
7	10	0.0	0.0	67.8	-281.0	-250.4	2290.2	281.0	2290.2	1374.1	-353.7	-244.3	C
7	11	0.0	0.0	56.9	-299.1	-211.6	2108.9	299.1	2108.9	1310.8	-280.2	-244.3	C
7	12	0.0	0.0	46.0	-317.3	-179.1	1917.3	317.3	1917.3	1244.0	-202.5	-244.3	A-B
7	13	0.0	0.0	35.2	-335.4	-153.8	1713.5	335.4	1713.5	1172.9	-119.9	-244.3	A-B
7	14	0.0	0.0	24.4	-353.4	-135.6	1497.9	353.4	1497.9	1097.6	-32.4	-244.3	A-B
7	15	0.0	0.0	13.5	-371.6	-123.8	1271.8	371.6	1271.8	1018.7	59.2	-244.3	A-B
7	16	0.0	0.0	2.6	-389.7	-118.4	1034.9	389.7	1034.9	936.1	155.3	-244.3	A-B
7	17	0.0	0.0	-8.3	-407.9	-120.3	785.9	407.9	785.9	849.2	256.3	-244.3	A-B
7	18	0.0	0.0	-19.2	-426.0	-128.8	525.9	426.0	525.9	758.5	361.7	-244.3	A-B
7	19	0.0	0.0	-30.1	-444.2	-144.2	254.4	444.2	254.4	663.7	471.8	-244.3	A-B
7	20	0.0	0.0	-41.0	-462.3	-166.4	-28.4	462.3	-28.4	565.0	586.5	-244.3	A-B
7	21	0.0	0.0	-53.3	-468.6	-202.2	-202.2	468.6	-202.2	504.4	657.0	-244.3	A-B

VANO	SECCIÓN	Par. (Ton.)	σ sd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
7	1	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	165.8	VERIFICA
7	2	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	154.9	VERIFICA
7	3	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	154.0	VERIFICA
7	4	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	172.2	VERIFICA
7	5	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	190.2	VERIFICA
7	6	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	208.4	VERIFICA
7	7	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	226.5	VERIFICA
7	8	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	244.7	VERIFICA
7	9	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	262.8	VERIFICA
7	10	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	281.0	VERIFICA
7	11	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	299.1	VERIFICA
7	12	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	317.3	VERIFICA
7	13	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	335.4	VERIFICA
7	14	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	353.4	VERIFICA
7	15	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	371.6	VERIFICA
7	16	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	389.7	VERIFICA
7	17	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	407.9	VERIFICA
7	18	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	426.0	VERIFICA
7	19	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	444.2	VERIFICA
7	20	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	462.3	VERIFICA
7	21	4456.0	575.0	1.83	28.64	90	VERIFICA	350.0	195.0	0.267	4593.4	468.6	VERIFICA

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-15C 2 .0

VANO	SECCIÓN	$f_{yα,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
1	1	4.2	485.82	-965.4	-	-	485.82	0.0	44.4	44.4
1	2	4.2	485.82	836.0	-	-	485.82	0.0	44.4	44.4
1	3	4.2	305.37	1120.4	-	-	305.37	0.0	44.4	44.4
1	4	4.2	305.37	1412.1	-	-	305.37	0.0	44.4	44.4
1	5	4.2	305.37	1585.2	-	-	305.37	0.0	44.4	44.4
1	6	4.2	305.37	1717.9	1.639	0.919	459.91	0.0	44.4	44.4
1	7	4.2	305.37	1811.9	1.608	0.939	460.92	0.0	44.4	44.4
1	8	4.2	305.37	1864.9	1.584	0.958	463.61	0.0	44.4	44.4
1	9	4.2	305.37	1877.9	-	-	305.37	0.0	44.4	44.4
1	10	4.2	305.37	1849.9	-	-	305.37	0.0	44.4	44.4
1	11	4.2	305.37	1870.5	-	-	305.37	0.0	44.4	44.4
1	12	4.2	305.37	1750.5	-	-	305.37	0.0	44.4	44.4
1	13	4.2	305.37	1583.9	-	-	305.37	0.0	44.4	44.4
1	14	4.2	305.37	1370.2	-	-	305.37	0.0	44.4	44.4
1	15	4.2	305.37	1145.3	-	-	305.37	0.0	44.4	44.4
1	16	4.2	305.37	831.5	-	-	305.37	0.0	44.4	44.4
1	17	4.2	305.37	-1300.7	-	-	305.37	0.0	44.4	44.4
1	18	4.2	305.37	-1710.4	-	-	305.37	0.0	44.4	44.4
1	19	4.2	305.37	-2088.0	-	-	305.37	10.1	44.4	44.4
1	20	4.2	485.82	-2302.2	-	-	485.82	14.3	44.4	44.4
1	21	4.2	485.82	-2410.2	1.570	0.717	546.77	29.8	44.4	44.4

VANO	SECCIÓN	$f_{yα,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
2	1	4.2	485.82	-2351.2	1.564	0.718	545.80	32.2	44.4	44.4
2	2	4.2	485.82	-2241.2	-	-	485.82	12.1	44.4	44.4
2	3	4.2	305.37	-2037.8	-	-	305.37	4.3	44.4	44.4
2	4	4.2	305.37	-1454.9	-	-	305.37	0.0	44.4	44.4
2	5	4.2	305.37	-1048.4	-	-	305.37	0.0	44.4	44.4
2	6	4.2	305.37	912.6	-	-	305.37	0.0	44.4	44.4
2	7	4.2	305.37	1194.7	-	-	305.37	0.0	44.4	44.4
2	8	4.2	305.37	1414.6	-	-	305.37	0.0	44.4	44.4
2	9	4.2	305.37	1572.4	-	-	305.37	0.0	44.4	44.4
2	10	4.2	305.37	1668.4	-	-	305.37	0.0	44.4	44.4
2	11	4.2	305.37	1701.4	-	-	305.37	0.0	44.4	44.4
2	12	4.2	305.37	1571.4	1.540	0.967	454.96	0.0	44.4	44.4
2	13	4.2	305.37	1484.8	1.548	0.948	448.03	0.0	44.4	44.4
2	14	4.2	305.37	1338.8	1.555	0.928	440.63	0.0	44.4	44.4
2	15	4.2	305.37	1133.3	-	-	305.37	0.0	44.4	44.4
2	16	4.2	305.37	868.5	-	-	305.37	0.0	44.4	44.4
2	17	4.2	305.37	-1001.5	-	-	305.37	0.0	44.4	44.4
2	18	4.2	305.37	-1385.2	-	-	305.37	0.0	44.4	44.4
2	19	4.2	305.37	-1817.8	-	-	305.37	2.4	44.4	44.4
2	20	4.2	485.82	-2142.5	-	-	485.82	11.8	44.4	44.4
2	21	4.2	485.82	-2243.5	1.696	0.729	600.86	25.8	44.4	44.4

VANO	SECCIÓN	$f_{yα,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
3	1	4.2	485.82	-2303.2	1.588	0.725	559.13	28.7	44.4	44.4
3	2	4.2	485.82	-2203.2	-	-	485.82	14.1	44.4	44.4
3	3	4.2	305.37	-2075.8	-	-	305.37	11.2	44.4	44.4
3	4	4.2	305.37	-1606.9	-	-	305.37	0.0	44.4	44.4
3	5	4.2	305.37	-1244.6	-	-	305.37	0.0	44.4	44.4
3	6	4.2	305.37	843.5	-	-	305.37	0.0	44.4	44.4
3	7	4.2	305.37	1149.4	-	-	305.37	0.0	44.4	44.4
3	8	4.2	305.37	1408.4	-	-	305.37	0.0	44.4	44.4
3	9	4.2	305.37	1660.8	-	-	305.37	0.0	44.4	44.4
3	10	4.2	305.37	1828.0	-	-	305.37	0.0	44.4	44.4
3	11	4.2	305.37	1948.0	-	-	305.37	0.0	44.4	44.4
3	12	4.2	305.37	2020.0	-	-	305.37	0.0	44.4	44.4
3	13	4.2	305.37	1993.5	-	-	305.37	0.0	44.4	44.4
3	14	4.2	305.37	1976.5	1.606	0.955	468.60	0.0	44.4	44.4

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1502.c

VANO	SECCIÓN	$f_{yc,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
3	15	4.2	305.37	1917.3	1.631	0.936	466.40	0.0	44.4	44.4
3	16	4.2	305.37	1816.3	1.665	0.917	466.06	0.0	44.4	44.4
3	17	4.2	305.37	1674.0	-	-	305.37	0.0	44.4	44.4
3	18	4.2	305.37	1489.7	-	-	305.37	0.0	44.4	44.4
3	19	4.2	305.37	1263.6	-	-	305.37	0.0	44.4	44.4
3	20	4.2	485.82	881.3	-	-	485.82	0.0	44.4	44.4
3	21	4.2	485.82	-1001.6	-	-	485.82	0.0	44.4	44.4

VANO	SECCIÓN	$f_{yc,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
4	1	4.2	557.26	1598.5	-	-	557.26	0.0	44.4	44.4
4	2	4.2	557.26	1764.2	-	-	557.26	0.0	44.4	44.4
4	3	4.2	557.26	1929.9	-	-	557.26	0.0	44.4	44.4
4	4	4.2	557.26	2095.7	-	-	557.26	0.0	44.4	44.4
4	5	4.2	557.26	2261.4	-	-	557.26	0.0	44.4	44.4
4	6	4.2	557.26	2427.6	-	-	557.26	0.0	44.4	44.4
4	7	4.2	557.26	2592.6	-	-	557.26	0.0	44.4	44.4
4	8	4.2	557.26	2758.6	-	-	557.26	0.0	44.4	44.4
4	9	4.2	557.26	2924.6	-	-	557.26	0.0	44.4	44.4
4	10	4.2	557.26	3089.6	-	-	557.26	0.0	44.4	44.4
4	11	4.2	557.26	3255.6	1.281	0.876	625.32	0.0	44.4	44.4
4	12	4.2	557.26	3421.6	1.275	0.885	628.61	0.0	44.4	44.4
4	13	4.2	557.26	3587.6	1.270	0.894	632.98	0.0	44.4	44.4
4	14	4.2	557.26	3752.6	1.267	0.904	638.23	0.0	44.4	44.4
4	15	4.2	557.26	3918.6	1.266	0.913	644.25	0.0	44.4	44.4
4	16	4.2	557.26	4084.6	1.267	0.922	650.90	0.0	44.4	44.4
4	17	4.2	557.26	4250.6	1.268	0.932	658.17	0.0	44.4	44.4
4	18	4.2	557.26	4415.6	-	-	557.26	0.0	44.4	44.4
4	19	4.2	557.26	4581.6	-	-	557.26	0.0	44.4	44.4
4	20	4.2	557.26	4747.6	-	-	557.26	0.0	44.4	44.4
4	21	4.2	557.26	4913.6	-	-	557.26	0.0	44.4	44.4

VANO	SECCIÓN	$f_{yc,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
5	1	4.2	557.26	5206.6	1.294	0.671	483.87	14.9	44.4	44.4
5	2	4.2	557.26	5024.6	1.298	0.669	484.24	15.2	44.4	44.4
5	3	4.2	557.26	4842.6	1.303	0.666	483.18	15.8	44.4	44.4
5	4	4.2	557.26	4659.6	1.308	0.662	482.68	16.4	44.4	44.4
5	5	4.2	557.26	4477.6	1.314	0.659	482.51	16.9	44.4	44.4
5	6	4.2	557.26	4294.6	1.321	0.655	482.62	17.5	44.4	44.4
5	7	4.2	557.26	4112.6	1.330	0.652	483.22	18.0	44.4	44.4
5	8	4.2	557.26	3930.6	1.340	0.649	484.35	18.4	44.4	44.4
5	9	4.2	557.26	3747.6	1.352	0.645	486.15	18.8	44.4	44.4
5	10	4.2	557.26	3565.6	-	-	557.26	14.0	44.4	44.4
5	11	4.2	557.26	3382.6	-	-	557.26	14.5	44.4	44.4
5	12	4.2	557.26	3200.6	-	-	557.26	15.0	44.4	44.4
5	13	4.2	557.26	3017.6	-	-	557.26	15.6	44.4	44.4
5	14	4.2	557.26	2835.6	-	-	557.26	16.1	44.4	44.4
5	15	4.2	557.26	2652.6	-	-	557.26	16.6	44.4	44.4
5	16	4.2	557.26	2470.6	-	-	557.26	17.2	44.4	44.4
5	17	4.2	557.26	2288.2	-	-	557.26	17.7	44.4	44.4
5	18	4.2	557.26	2105.8	-	-	557.26	18.2	44.4	44.4
5	19	4.2	557.26	1923.3	-	-	557.26	18.7	44.4	44.4
5	20	4.2	557.26	1740.9	-	-	557.26	19.3	44.4	44.4
5	21	4.2	557.26	1558.5	-	-	557.26	19.8	44.4	44.4

VANO	SECCIÓN	$f_{yc,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
6	1	4.2	557.26	1557.6	-	-	557.26	20.8	44.4	44.4
6	2	4.2	557.26	1739.8	-	-	557.26	20.2	44.4	44.4

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-150 2. a

VANO	SECCIÓN	fyα,d (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
6	3	4.2	557.26	1921.9	-	-	557.26	19.6	44.4	44.4
6	4	4.2	557.26	2104.0	-	-	557.26	19.0	44.4	44.4
6	5	4.2	557.26	2286.2	-	-	557.26	18.4	44.4	44.4
6	6	4.2	557.26	2467.9	-	-	557.26	17.8	44.4	44.4
6	7	4.2	557.26	2650.9	-	-	557.26	17.2	44.4	44.4
6	8	4.2	557.26	2832.9	-	-	557.26	16.6	44.4	44.4
6	9	4.2	557.26	3014.9	-	-	557.26	16.0	44.4	44.4
6	10	4.2	557.26	3196.9	-	-	557.26	15.4	44.4	44.4
6	11	4.2	557.26	3378.9	1.313	0.637	465.63	21.7	44.4	44.4
6	12	4.2	557.26	3560.9	1.300	0.640	463.95	21.2	44.4	44.4
6	13	4.2	557.26	3742.9	1.290	0.644	463.07	20.7	44.4	44.4
6	14	4.2	557.26	3924.9	1.282	0.648	462.80	20.1	44.4	44.4
6	15	4.2	557.26	4107.9	1.275	0.652	462.99	19.5	44.4	44.4
6	16	4.2	557.26	4289.9	1.269	0.656	463.55	18.9	44.4	44.4
6	17	4.2	557.26	4471.9	1.263	0.660	464.35	18.2	44.4	44.4
6	18	4.2	557.26	4653.9	1.259	0.663	465.42	17.5	44.4	44.4
6	19	4.2	557.26	4835.9	1.255	0.667	466.73	16.9	44.4	44.4
6	20	4.2	557.26	5017.9	1.252	0.671	468.18	16.1	44.4	44.4
6	21	4.2	557.26	5191.9	-	-	557.26	0.0	44.4	44.4

VANO	SECCIÓN	fyα,d (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
7	1	4.2	557.26	4999.9	-	-	557.26	0.0	44.4	44.4
7	2	4.2	557.26	4830.9	-	-	557.26	0.0	44.4	44.4
7	3	4.2	557.26	4661.9	1.243	0.923	639.50	0.0	44.4	44.4
7	4	4.2	557.26	4492.9	1.242	0.914	632.60	0.0	44.4	44.4
7	5	4.2	557.26	4323.9	1.241	0.905	626.24	0.0	44.4	44.4
7	6	4.2	557.26	4154.9	1.242	0.896	620.24	0.0	44.4	44.4
7	7	4.2	557.26	3985.9	1.243	0.887	614.77	0.0	44.4	44.4
7	8	4.2	557.26	3816.9	1.246	0.878	609.87	0.0	44.4	44.4
7	9	4.2	557.26	3647.9	1.250	0.869	605.67	0.0	44.4	44.4
7	10	4.2	557.26	3478.9	1.256	0.860	602.28	0.0	44.4	44.4
7	11	4.2	557.26	3309.9	1.265	0.851	600.00	0.0	44.4	44.4
7	12	4.2	557.26	3140.9	-	-	557.26	0.0	44.4	44.4
7	13	4.2	557.26	2971.9	-	-	557.26	0.0	44.4	44.4
7	14	4.2	557.26	2802.9	-	-	557.26	0.0	44.4	44.4
7	15	4.2	557.26	2633.9	-	-	557.26	0.0	44.4	44.4
7	16	4.2	557.26	2464.9	-	-	557.26	0.0	44.4	44.4
7	17	4.2	557.26	2296.0	-	-	557.26	0.0	44.4	44.4
7	18	4.2	557.26	2127.0	-	-	557.26	0.0	44.4	44.4
7	19	4.2	557.26	1958.0	-	-	557.26	0.0	44.4	44.4
7	20	4.2	557.26	1789.1	-	-	557.26	0.0	44.4	44.4
7	21	4.2	557.26	1620.1	-	-	557.26	0.0	44.4	44.4

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN Md. (+) (t x m.)	MOMEN Md. (-) (t x m.)
1	1	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	309.3	-107.3	80.9	80.9
1	2	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	271.1	-101.0	401.9	-34.3
1	3	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	233.1	-94.6	680.6	-142.5
1	4	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	200.4	-85.1	841.9	-320.5
1	5	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	167.8	-75.5	1045.4	-409.4
1	6	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	135.1	-66.0	1213.2	-487.1
1	7	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	102.5	-56.4	1343.8	-555.7
1	8	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	69.8	-46.8	1439.2	-612.7
1	9	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	42.4	-42.3	911.5	-72.2
1	10	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	29.4	-51.2	-135.8	958.7
1	11	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	46.5	-76.3	-158.0	824.0
1	12	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	62.3	-102.7	-97.8	725.1
1	13	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	78.1	-129.1	-20.2	596.8
1	14	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	93.9	-155.6	75.0	439.5
1	15	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	115.0	-176.6	167.3	232.5
1	16	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	131.7	-202.3	303.8	23.0
1	17	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	148.5	-227.7	458.7	-214.6
1	18	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	165.3	-253.0	632.2	-480.6
1	19	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	53.8	-406.8	765.5	-833.3
1	20	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	212.8	4435	4200	15455	-118.2	-623.2	807.4	-1325.4
1	21	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	212.8	4435	4200	15455	-283.6	-833.0	585.5	-2130.3

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN Md. (+) (t x m.)	MOMEN Md. (-) (t x m.)
2	1	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	212.8	4435	4200	15455	852.6	295.0	-2158.3	557.5
2	2	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	212.8	4435	4200	15455	601.1	95.8	-1213.3	811.7
2	3	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	348.3	-104.8	-595.5	806.4
2	4	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	253.8	-149.7	-309.9	535.2
2	5	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	230.1	-123.8	10.8	363.6
2	6	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	197.0	-107.2	288.4	213.5
2	7	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	163.9	-90.7	523.2	84.8
2	8	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	130.8	-74.2	714.6	-22.3
2	9	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	97.7	-57.7	863.4	-108.0
2	10	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	64.6	-41.1	968.4	-172.6
2	11	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	31.5	-24.6	1031.1	-214.8
2	12	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	41.9	-57.5	-444.0	1403.1
2	13	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	56.3	-92.7	-380.3	1305.5
2	14	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	70.7	-128.0	-297.7	1162.1
2	15	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	85.1	-163.2	-196.4	973.1
2	16	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	99.6	-198.3	-76.5	737.8
2	17	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	114.0	-233.5	62.3	457.0
2	18	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	128.4	-268.7	219.7	130.4
2	19	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	118.3	-328.5	385.5	-252.4
2	20	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	212.8	4435	4200	15455	-98.5	-597.4	473.1	-779.4
2	21	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	212.8	4435	4200	15455	-292.9	-844.0	218.6	-1716.7

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN Md. (+) (t x m.)	MOMEN Md. (-) (t x m.)
3	1	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	212.8	4435	4200	15455	832.4	287.5	-2029.7	587.6
3	2	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	212.8	4435	4200	15455	620.4	119.8	-1225.4	813.5
3	3	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	416.8	-39.4	-651.3	858.6
3	4	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	224.9	-189.0	-377.3	651.5
3	5	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	228.0	-143.6	-108.0	486.3
3	6	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	201.7	-127.7	129.7	336.4
3	7	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	175.5	-111.8	338.3	203.9
3	8	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	149.0	-96.0	517.8	88.9
3	9	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	119.8	-82.9	641.5	-34.8
3	10	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	94.4	-66.2	760.5	-116.8
3	11	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	69.0	-49.4	850.5	-181.1
3	12	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	43.5	-32.6	912.2	-226.7
3	13	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	38.7	-43.0	-95.2	861.9

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT Vrd. (+) (t.)	CORT Vrd. (-) (t.)	MOMEN Md. (+) (t x m.)	MOMEN Md. (-) (t x m.)
3	14	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	46.5	-71.8	-657.8	1406.9
3	15	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	57.6	-102.9	-600.1	1310.5
3	16	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	68.8	-134.0	-530.0	1179.7
3	17	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	79.9	-165.1	-448.0	1014.1
3	18	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	91.1	-196.1	-353.4	814.4
3	19	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	102.3	-227.1	-246.6	580.3
3	20	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	110.1	-263.7	-47.2	390.9
3	21	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	118.0	-300.3	78.9	78.9

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT Vrd. (+) (t.)	CORT Vrd. (-) (t.)	MOMEN Md. (+) (t x m.)	MOMEN Md. (-) (t x m.)
4	1	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	442.4	49.6	-201.9	-201.9
4	2	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	423.5	38.3	80.3	-173.2
4	3	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	404.4	26.8	350.2	-152.0
4	4	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	385.5	15.5	607.5	-138.2
4	5	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	366.6	4.1	852.6	-131.8
4	6	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	347.7	-7.2	1085.0	-133.2
4	7	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	328.7	-18.6	1306.4	-140.9
4	8	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	309.8	-30.0	1513.5	-157.3
4	9	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	290.9	-41.3	1709.6	-180.3
4	10	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	272.0	-52.6	1893.3	-210.5
4	11	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	252.9	-64.1	2064.0	-248.9
4	12	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	234.0	-75.4	2222.9	-294.4
4	13	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	215.1	-86.8	2369.2	-347.3
4	14	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	196.1	-98.2	2503.6	-407.1
4	15	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	177.2	-109.5	2624.6	-475.2
4	16	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	158.3	-120.9	2733.9	-550.5
4	17	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	139.3	-132.2	2830.9	-632.9
4	18	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	120.4	-143.6	2915.5	-722.6
4	19	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	101.4	-155.0	2988.8	-819.4
4	20	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	82.5	-166.3	3048.3	-924.4
4	21	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	62.6	-178.7	3094.7	-1037.4

VANO	SECCIÓN					Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT Vrd. (+) (t.)	CORT Vrd. (-) (t.)	MOMEN Md. (+) (t x m.)	MOMEN Md. (-) (t x m.)
5	1	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	215.1	-682.5	-1047.1	3445.3
5	2	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	214.4	-686.0	-995.7	3278.1
5	3	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	209.3	-693.9	-944.4	3111.1
5	4	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	205.1	-701.0	-893.8	2941.9
5	5	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	200.8	-708.0	-845.1	2770.5
5	6	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	196.6	-715.1	-796.3	2598.5
5	7	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	192.4	-722.1	-749.5	2423.8
5	8	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	188.1	-729.2	-703.5	2247.8
5	9	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	183.9	-736.2	-658.3	2069.8
5	10	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	179.7	-743.3	-614.1	1890.6
5	11	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	175.5	-750.3	-570.8	1709.7
5	12	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	171.2	-757.4	-529.3	1526.0
5	13	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	167.0	-764.4	-487.7	1342.0
5	14	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	162.8	-771.5	-448.2	1155.2
5	15	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	158.5	-778.5	-408.6	967.7
5	16	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	154.3	-785.6	-371.1	777.6
5	17	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	150.1	-792.6	-334.2	586.1
5	18	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	145.8	-799.7	-298.4	392.9
5	19	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	141.6	-806.7	-263.5	198.1
5	20	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	137.4	-813.8	-229.7	1.4
5	21	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	133.2	-820.8	-196.9	-196.9

VANO	SECCIÓN					Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT Vrd. (+) (t.)	CORT Vrd. (-) (t.)	MOMEN Md. (+) (t x m.)	MOMEN Md. (-) (t x m.)

ARMADURA DE RASANTE

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV

ESTRUCTURA : E-1502.0

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT Vrd. (+) (t.)	CORT Vrd. (-) (t.)	MOMEN Md. (+) (t x m.)	MOMEN Md. (-) (t x m.)
6	1	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	834.2	-73.4	-71.7	-202.3
6	2	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	826.3	-78.2	155.5	-223.1
6	3	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	818.3	-82.9	380.7	-245.2
6	4	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	810.4	-87.7	603.8	-268.5
6	5	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	802.4	-92.5	824.6	-293.2
6	6	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	794.5	-97.2	1043.7	-318.9
6	7	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	786.4	-102.1	1259.3	-347.0
6	8	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	778.4	-106.9	1473.9	-375.4
6	9	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	770.5	-111.6	1685.5	-405.6
6	10	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	762.5	-116.4	1896.5	-436.2
6	11	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	754.6	-121.2	2104.3	-468.6
6	12	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	746.6	-125.9	2310.4	-502.0
6	13	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	738.7	-130.7	2513.7	-537.1
6	14	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	730.7	-135.5	2714.2	-574.1
6	15	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	722.8	-140.3	2913.4	-612.1
6	16	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	714.8	-145.0	3109.4	-651.7
6	17	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	706.9	-149.8	3305.2	-691.3
6	18	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	698.9	-154.6	3498.0	-732.8
6	19	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	691.0	-159.3	3687.6	-776.0
6	20	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	683.0	-164.1	3876.1	-820.1
6	21	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	308.1	-59.1	1446.5	-739.7

VANO	SECCIÓN					Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN Md. (+) (t x m.)	MOMEN Md. (-) (t x m.)
7	1	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	165.8	-117.7	-906.6	3409.4
7	2	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	154.9	-135.9	-806.6	3330.2
7	3	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	144.0	-154.0	-712.9	3240.4
7	4	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	133.1	-172.2	-626.4	3138.8
7	5	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	122.3	-190.2	-547.1	3025.0
7	6	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	111.4	-208.4	-474.1	2900.9
7	7	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	100.5	-226.5	-408.2	2764.8
7	8	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	89.6	-244.7	-348.7	2618.0
7	9	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	78.7	-262.8	-296.4	2459.4
7	10	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	67.8	-281.0	-250.4	2290.2
7	11	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	56.9	-299.1	-211.6	2108.9
7	12	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	46.0	-317.3	-179.1	1917.3
7	13	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	35.2	-335.4	-153.8	1713.5
7	14	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	24.4	-353.4	-135.6	1497.9
7	15	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	13.5	-371.6	-123.8	1271.8
7	16	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	2.6	-389.7	-118.4	1034.9
7	17	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	-8.3	-407.9	-120.3	785.9
7	18	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	-19.2	-426.0	-128.8	525.9
7	19	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	-30.1	-444.2	-144.2	254.4
7	20	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	-41.0	-462.3	-166.4	-28.4
7	21	4.700	3.900	2.000	0.450	90	5.65	13.4	2.3	52.3	0	4435	4200	15455	-53.3	-468.6	-202.2	-202.2

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1502.0

VANO	SECCIÓN	A (cm2)	τ d ala comp (Kp/cm2)	τ d ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	τ d ala comp. (Kp/cm2)	τ d ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
1	1	-	12.9	-	30.0	8.95	ALA COMPRIMIDA	-	4.5	-	30.0	3.11	ALA COMPRIMIDA	8.95
1	2	-	11.3	-	30.0	7.84	ALA COMPRIMIDA	83.90	-	2.7	45.0	3.24	ALA TRACCIONADA	7.84
1	3	-	9.7	-	30.0	6.75	ALA COMPRIMIDA	83.90	-	2.5	45.0	3.03	ALA TRACCIONADA	6.75
1	4	-	8.3	-	30.0	5.80	ALA COMPRIMIDA	83.90	-	2.3	45.0	2.73	ALA TRACCIONADA	5.80
1	5	-	7.0	-	30.0	4.86	ALA COMPRIMIDA	83.90	-	2.0	45.0	2.42	ALA TRACCIONADA	4.86
1	6	-	5.6	-	30.0	3.91	ALA COMPRIMIDA	83.90	-	1.8	45.0	2.12	ALA TRACCIONADA	3.91
1	7	-	4.3	-	30.0	2.97	ALA COMPRIMIDA	83.90	-	1.5	45.0	1.81	ALA TRACCIONADA	2.97
1	8	-	2.9	-	30.0	2.02	ALA COMPRIMIDA	83.90	-	1.2	45.0	1.50	ALA TRACCIONADA	2.02
1	9	-	1.8	-	30.0	1.23	ALA COMPRIMIDA	83.90	-	1.1	45.0	1.36	ALA TRACCIONADA	1.36
1	10	83.90	-	0.8	45.0	0.94	ALA TRACCIONADA	-	2.1	-	30.0	1.48	ALA COMPRIMIDA	1.48
1	11	83.90	-	1.2	45.0	1.49	ALA TRACCIONADA	-	3.2	-	30.0	2.21	ALA COMPRIMIDA	2.21
1	12	83.90	-	1.7	45.0	2.00	ALA TRACCIONADA	-	4.3	-	30.0	2.97	ALA COMPRIMIDA	2.97
1	13	83.90	-	2.1	45.0	2.50	ALA TRACCIONADA	-	5.4	-	30.0	3.74	ALA COMPRIMIDA	3.74
1	14	-	3.9	-	30.0	2.72	ALA COMPRIMIDA	-	6.5	-	30.0	4.50	ALA COMPRIMIDA	4.50
1	15	-	4.8	-	30.0	3.33	ALA COMPRIMIDA	-	7.3	-	30.0	5.11	ALA COMPRIMIDA	5.11
1	16	-	5.5	-	30.0	3.81	ALA COMPRIMIDA	-	8.4	-	30.0	5.85	ALA COMPRIMIDA	5.85
1	17	-	6.2	-	30.0	4.30	ALA COMPRIMIDA	83.90	-	6.1	45.0	7.30	ALA TRACCIONADA	7.30
1	18	-	6.9	-	30.0	4.78	ALA COMPRIMIDA	83.90	-	6.7	45.0	8.11	ALA TRACCIONADA	8.11
1	19	-	2.2	-	30.0	1.56	ALA COMPRIMIDA	83.90	-	10.8	45.0	13.04	ALA TRACCIONADA	13.04
1	20	-	4.9	-	30.0	3.42	ALA COMPRIMIDA	825.48	-	1.7	45.0	2.03	ALA TRACCIONADA	3.42
1	21	-	11.8	-	30.0	8.21	ALA COMPRIMIDA	825.48	-	2.3	45.0	2.71	ALA TRACCIONADA	8.21

VANO	SECCIÓN	b (°)	τ d (Kp/cm2)	τ max (Kp/cm2)	e (cm)	armadura superior Aα,sup (cm2/m)	armadura inferior Aα,inf (cm2/m)
1	1	30	12.9	69.28	0.21	0.83	8.12
1	2	30	11.3	69.28	0.21	0.64	7.21
1	3	30	9.7	69.28	0.22	0.47	6.27
1	4	30	8.3	69.28	0.22	0.35	5.45
1	5	30	7.0	69.28	0.23	0.24	4.61
1	6	30	5.6	69.28	0.23	0.16	3.75
1	7	30	4.3	69.28	0.24	0.09	2.87
1	8	30	2.9	69.28	0.24	0.04	1.98
1	9	45	1.1	80.00	0.25	0.01	1.35
1	10	30	2.1	69.28	0.25	0.02	1.46
1	11	30	3.2	69.28	0.24	0.05	2.16
1	12	30	4.3	69.28	0.24	0.09	2.88
1	13	30	5.4	69.28	0.23	0.14	3.59
1	14	30	6.5	69.28	0.23	0.21	4.29
1	15	30	7.3	69.28	0.23	0.27	4.84
1	16	30	8.4	69.28	0.22	0.36	5.50
1	17	45	6.1	80.00	0.23	0.28	7.02
1	18	45	6.7	80.00	0.23	0.34	7.77
1	19	45	10.8	80.00	0.22	0.88	12.16
1	20	30	4.9	69.28	0.24	0.12	3.30
1	21	30	11.8	69.28	0.21	0.70	7.51

VANO	SECCIÓN	A (cm2)	τ d ala comp (Kp/cm2)	τ d ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	τ d ala comp. (Kp/cm2)	τ d ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
2	1	825.48	-	2.3	45.0	2.78	ALA TRACCIONADA	-	12.3	-	30.0	8.54	ALA COMPRIMIDA	8.54
2	2	825.48	-	1.6	45.0	1.96	ALA TRACCIONADA	-	4.0	-	30.0	2.77	ALA COMPRIMIDA	2.77
2	3	83.90	-	9.3	45.0	11.17	ALA TRACCIONADA	-	4.4	-	30.0	3.03	ALA COMPRIMIDA	11.17
2	4	83.90	-	6.8	45.0	8.14	ALA TRACCIONADA	-	6.2	-	30.0	4.33	ALA COMPRIMIDA	8.14
2	5	-	9.6	-	30.0	6.66	ALA COMPRIMIDA	-	5.1	-	30.0	3.58	ALA COMPRIMIDA	6.66
2	6	-	8.2	-	30.0	5.70	ALA COMPRIMIDA	-	4.5	-	30.0	3.10	ALA COMPRIMIDA	5.70
2	7	-	6.8	-	30.0	4.74	ALA COMPRIMIDA	-	3.8	-	30.0	2.63	ALA COMPRIMIDA	4.74
2	8	-	5.4	-	30.0	3.79	ALA COMPRIMIDA	83.90	-	2.0	45.0	2.38	ALA TRACCIONADA	3.79
2	9	-	4.1	-	30.0	2.83	ALA COMPRIMIDA	83.90	-	1.5	45.0	1.85	ALA TRACCIONADA	2.83
2	10	-	2.7	-	30.0	1.87	ALA COMPRIMIDA	83.90	-	1.1	45.0	1.32	ALA TRACCIONADA	1.87
2	11	-	1.3	-	30.0	0.91	ALA COMPRIMIDA	83.90	-	0.7	45.0	0.79	ALA TRACCIONADA	0.91
2	12	83.90	-	1.1	45.0	1.34	ALA TRACCIONADA	-	2.4	-	30.0	1.66	ALA COMPRIMIDA	1.66
2	13	83.90	-	1.5	45.0	1.80	ALA TRACCIONADA	-	3.9	-	30.0	2.68	ALA COMPRIMIDA	2.68
2	14	83.90	-	1.9	45.0	2.27	ALA TRACCIONADA	-	5.3	-	30.0	3.70	ALA COMPRIMIDA	3.70
2	15	83.90	-	2.3	45.0	2.73	ALA TRACCIONADA	-	6.8	-	30.0	4.72	ALA COMPRIMIDA	4.72
2	16	83.90	-	2.6	45.0	3.19	ALA TRACCIONADA	-	8.3	-	30.0	5.74	ALA COMPRIMIDA	5.74
2	17	-	4.7	-	30.0	3.30	ALA COMPRIMIDA	-	9.7	-	30.0	6.76	ALA COMPRIMIDA	6.76
2	18	-	5.3	-	30.0	3.72	ALA COMPRIMIDA	-	11.2	-	30.0	7.78	ALA COMPRIMIDA	7.78
2	19	-	4.9	-	30.0	3.42	ALA COMPRIMIDA	83.90	-	8.7	45.0	10.53	ALA TRACCIONADA	10.53
2	20	-	4.1	-	30.0	2.85	ALA COMPRIMIDA	825.48	-	1.6	45.0	1.95	ALA TRACCIONADA	2.85
2	21	-	12.2	-	30.0	8.48	ALA COMPRIMIDA	825.48	-	2.3	45.0	2.75	ALA TRACCIONADA	8.48

VANO	SECCIÓN	b (°)	τ d (Kp/cm2)	τ max (Kp/cm2)	e (cm)	armadura superior Aα,sup (cm2/m)	armadura inferior Aα,inf (cm2/m)
2	1	30	12.3	69.28	0.21	0.76	7.78
2	2	30	4.0	69.28	0.24	0.08	2.69
2	3	45	9.3	80.00	0.22	0.65	10.52
2	4	45	6.8	80.00	0.23	0.34	7.79
2	5	30	9.6	69.28	0.22	0.46	6.20
2	6	30	8.2	69.28	0.22	0.34	5.36
2	7	30	6.8	69.28	0.23	0.23	4.51
2	8	30	5.4	69.28	0.23	0.15	3.64
2	9	30	4.1	69.28	0.24	0.08	2.74
2	10	30	2.7	69.28	0.24	0.04	1.83
2	11	30	1.3	69.28	0.25	0.01	0.90
2	12	30	2.4	69.28	0.24	0.03	1.64
2	13	30	3.9	69.28	0.24	0.07	2.61
2	14	30	5.3	69.28	0.23	0.14	3.56
2	15	30	6.8	69.28	0.23	0.23	4.49
2	16	30	8.3	69.28	0.22	0.34	5.40
2	17	30	9.7	69.28	0.22	0.47	6.28
2	18	30	11.2	69.28	0.21	0.63	7.15
2	19	45	8.7	80.00	0.23	0.58	9.96
2	20	30	4.1	69.28	0.24	0.08	2.77
2	21	30	12.2	69.28	0.21	0.75	7.73

VANO	SECCIÓN	A (cm2)	τ d ala comp (Kp/cm2)	τ d ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	τ d ala comp. (Kp/cm2)	τ d ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
3	1	825.48	-	2.3	45.0	2.71	ALA TRACCIONADA	-	12.0	-	30.0	8.32	ALA COMPRIMIDA	8.32
3	2	825.48	-	1.7	45.0	2.02	ALA TRACCIONADA	-	5.0	-	30.0	3.47	ALA COMPRIMIDA	3.47
3	3	83.90	-	11.1	45.0	13.36	ALA TRACCIONADA	-	1.6	-	30.0	1.14	ALA COMPRIMIDA	13.36
3	4	83.90	-	6.0	45.0	7.21	ALA TRACCIONADA	-	7.9	-	30.0	5.47	ALA COMPRIMIDA	7.21
3	5	83.90	-	6.1	45.0	7.31	ALA TRACCIONADA	-	6.0	-	30.0	4.16	ALA COMPRIMIDA	7.31
3	6	-	8.4	-	30.0	5.84	ALA COMPRIMIDA	-	5.3	-	30.0	3.70	ALA COMPRIMIDA	5.84
3	7	-	7.3	-	30.0	5.08	ALA COMPRIMIDA	-	4.7	-	30.0	3.24	ALA COMPRIMIDA	5.08
3	8	-	6.2	-	30.0	4.31	ALA COMPRIMIDA	-	4.0	-	30.0	2.78	ALA COMPRIMIDA	4.31
3	9	-	5.0	-	30.0	3.47	ALA COMPRIMIDA	83.90	-	2.2	45.0	2.66	ALA TRACCIONADA	3.47
3	10	-	3.9	-	30.0	2.73	ALA COMPRIMIDA	83.90	-	1.8	45.0	2.12	ALA TRACCIONADA	2.73
3	11	-	2.9	-	30.0	2.00	ALA COMPRIMIDA	83.90	-	1.3	45.0	1.58	ALA TRACCIONADA	2.00
3	12	-	1.8	-	30.0	1.26	ALA COMPRIMIDA	83.90	-	0.9	45.0	1.04	ALA TRACCIONADA	1.26
3	13	83.90	-	1.0	45.0	1.24	ALA TRACCIONADA	-	1.8	-	30.0	1.25	ALA COMPRIMIDA	1.25

VANO	SECCIÓN	b (°)	τ d (Kp/cm2)	τ max (Kp/cm2)	e (cm)	armadura superior Aα,sup (cm2/m)	armadura inferior Aα,inf (cm2/m)
3	1	30	12.0	69.28	0.21	0.72	7.60
3	2	30	5.0	69.28	0.23	0.12	3.34
3	3	45	11.1	80.00	0.22	0.93	12.44
3	4	45	6.0	80.00	0.23	0.27	6.94
3	5	45	6.1	80.00	0.23	0.28	7.03
3	6	30	8.4	69.28	0.22	0.35	5.48
3	7	30	7.3	69.28	0.23	0.27	4.81
3	8	30	6.2	69.28	0.23	0.19	4.12
3	9	30	5.0	69.28	0.23	0.12	3.34
3	10	30	3.9	69.28	0.24	0.08	2.65
3	11	30	2.9	69.28	0.24	0.04	1.95
3	12	30	1.8	69.28	0.25	0.02	1.24
3	13	30	1.8	69.28	0.25	0.02	1.23

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1502.0

VANO	SECCIÓN	A (cm2)	t d ala comp (Kp/cm2)	t d ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2)	t d ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
3	14	83.90	-	1.2	45.0	1.49	ALA TRACCIONADA	-	3.0	-	30.0	2.08	ALA COMPRIMIDA	2.08
3	15	83.90	-	1.5	45.0	1.85	ALA TRACCIONADA	-	4.3	-	30.0	2.98	ALA COMPRIMIDA	2.98
3	16	83.90	-	1.8	45.0	2.21	ALA TRACCIONADA	-	5.6	-	30.0	3.88	ALA COMPRIMIDA	3.88
3	17	83.90	-	2.1	45.0	2.56	ALA TRACCIONADA	-	6.9	-	30.0	4.78	ALA COMPRIMIDA	4.78
3	18	83.90	-	2.4	45.0	2.92	ALA TRACCIONADA	-	8.2	-	30.0	5.68	ALA COMPRIMIDA	5.68
3	19	83.90	-	2.7	45.0	3.28	ALA TRACCIONADA	-	9.4	-	30.0	6.57	ALA COMPRIMIDA	6.57
3	20	83.90	-	2.9	45.0	3.53	ALA TRACCIONADA	-	11.0	-	30.0	7.63	ALA COMPRIMIDA	7.63
3	21	-	4.9	-	30.0	3.41	ALA COMPRIMIDA	-	12.5	-	30.0	8.69	ALA COMPRIMIDA	8.69

VANO	SECCIÓN	b (°)	t d (Kp/cm2)	t max (Kp/cm2)	e (cm)	armadura superior Aα, sup (cm2/m)	armadura inferior Aα, inf (cm2/m)
3	14	30	3.0	69.28	0.24	0.04	2.03
3	15	30	4.3	69.28	0.24	0.09	2.89
3	16	30	5.6	69.28	0.23	0.16	3.72
3	17	30	6.9	69.28	0.23	0.24	4.54
3	18	30	8.2	69.28	0.22	0.33	5.34
3	19	30	9.4	69.28	0.22	0.45	6.12
3	20	30	11.0	69.28	0.21	0.60	7.03
3	21	30	12.5	69.28	0.21	0.78	7.91

VANO	SECCIÓN	A (cm2)	t d ala comp (Kp/cm2)	t d ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2)	t d ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
4	1	56.78	-	2.4	45.0	2.62	ALA TRACCIONADA	56.78	-	0.3	45.0	0.29	ALA TRACCIONADA	2.62
4	2	-	5.0	-	30.0	3.10	ALA COMPRIMIDA	56.78	-	0.2	45.0	0.23	ALA TRACCIONADA	3.10
4	3	-	4.8	-	30.0	2.96	ALA COMPRIMIDA	56.78	-	0.1	45.0	0.16	ALA TRACCIONADA	2.96
4	4	-	4.6	-	30.0	2.82	ALA COMPRIMIDA	56.78	-	0.1	45.0	0.09	ALA TRACCIONADA	2.82
4	5	-	4.3	-	30.0	2.68	ALA COMPRIMIDA	56.78	-	0.0	45.0	0.02	ALA TRACCIONADA	2.68
4	6	-	4.1	-	30.0	2.54	ALA COMPRIMIDA	56.78	-	0.0	45.0	0.04	ALA TRACCIONADA	2.54
4	7	-	3.9	-	30.0	2.40	ALA COMPRIMIDA	56.78	-	0.1	45.0	0.11	ALA TRACCIONADA	2.40
4	8	-	3.7	-	30.0	2.27	ALA COMPRIMIDA	56.78	-	0.2	45.0	0.18	ALA TRACCIONADA	2.27
4	9	-	3.4	-	30.0	2.13	ALA COMPRIMIDA	56.78	-	0.2	45.0	0.24	ALA TRACCIONADA	2.13
4	10	-	3.2	-	30.0	1.99	ALA COMPRIMIDA	56.78	-	0.3	45.0	0.31	ALA TRACCIONADA	1.99
4	11	-	3.0	-	30.0	1.85	ALA COMPRIMIDA	56.78	-	0.4	45.0	0.38	ALA TRACCIONADA	1.85
4	12	-	2.8	-	30.0	1.71	ALA COMPRIMIDA	56.78	-	0.4	45.0	0.45	ALA TRACCIONADA	1.71
4	13	-	2.5	-	30.0	1.57	ALA COMPRIMIDA	56.78	-	0.5	45.0	0.51	ALA TRACCIONADA	1.57
4	14	-	2.3	-	30.0	1.43	ALA COMPRIMIDA	56.78	-	0.5	45.0	0.58	ALA TRACCIONADA	1.43
4	15	-	2.1	-	30.0	1.30	ALA COMPRIMIDA	56.78	-	0.6	45.0	0.65	ALA TRACCIONADA	1.30
4	16	-	1.9	-	30.0	1.16	ALA COMPRIMIDA	56.78	-	0.7	45.0	0.72	ALA TRACCIONADA	1.16
4	17	-	1.6	-	30.0	1.02	ALA COMPRIMIDA	56.78	-	0.7	45.0	0.78	ALA TRACCIONADA	1.02
4	18	-	1.4	-	30.0	0.88	ALA COMPRIMIDA	56.78	-	0.8	45.0	0.85	ALA TRACCIONADA	0.88
4	19	-	1.2	-	30.0	0.74	ALA COMPRIMIDA	56.78	-	0.9	45.0	0.92	ALA TRACCIONADA	0.92
4	20	-	1.0	-	30.0	0.60	ALA COMPRIMIDA	56.78	-	0.9	45.0	0.99	ALA TRACCIONADA	0.99
4	21	-	0.7	-	30.0	0.46	ALA COMPRIMIDA	56.78	-	1.0	45.0	1.06	ALA TRACCIONADA	1.06

VANO	SECCIÓN	b (°)	t d (Kp/cm2)	t max (Kp/cm2)	e (cm)	armadura superior Aα, sup (cm2/m)	armadura inferior Aα, inf (cm2/m)
4	1	45	2.4	80.00	0.22	0.04	2.58
4	2	30	5.0	69.28	0.21	0.11	2.98
4	3	30	4.8	69.28	0.21	0.10	2.86
4	4	30	4.6	69.28	0.21	0.09	2.73
4	5	30	4.3	69.28	0.21	0.08	2.60
4	6	30	4.1	69.28	0.21	0.08	2.47
4	7	30	3.9	69.28	0.21	0.07	2.34
4	8	30	3.7	69.28	0.21	0.06	2.21
4	9	30	3.4	69.28	0.21	0.05	2.07
4	10	30	3.2	69.28	0.21	0.05	1.94
4	11	30	3.0	69.28	0.22	0.04	1.81
4	12	30	2.8	69.28	0.22	0.03	1.68
4	13	30	2.5	69.28	0.22	0.03	1.54
4	14	30	2.3	69.28	0.22	0.02	1.41
4	15	30	2.1	69.28	0.22	0.02	1.28
4	16	30	1.9	69.28	0.22	0.02	1.14
4	17	30	1.6	69.28	0.22	0.01	1.01
4	18	30	1.4	69.28	0.22	0.01	0.87
4	19	45	0.9	80.00	0.22	0.00	0.91
4	20	45	0.9	80.00	0.22	0.01	0.98
4	21	45	1.0	80.00	0.22	0.01	1.05

VANO	SECCIÓN	A (cm2)	t d ala comp (Kp/cm2)	t d ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2)	t d ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
5	1	56.78	-	1.2	45.0	1.27	ALA TRACCIONADA	-	8.1	-	30.0	4.99	ALA COMPRIMIDA	4.99
5	2	56.78	-	1.2	45.0	1.27	ALA TRACCIONADA	-	8.1	-	30.0	5.02	ALA COMPRIMIDA	5.02
5	3	56.78	-	1.2	45.0	1.24	ALA TRACCIONADA	-	8.2	-	30.0	5.07	ALA COMPRIMIDA	5.07
5	4	56.78	-	1.1	45.0	1.21	ALA TRACCIONADA	-	8.3	-	30.0	5.13	ALA COMPRIMIDA	5.13
5	5	56.78	-	1.1	45.0	1.19	ALA TRACCIONADA	-	8.4	-	30.0	5.18	ALA COMPRIMIDA	5.18
5	6	56.78	-	1.1	45.0	1.16	ALA TRACCIONADA	-	8.5	-	30.0	5.23	ALA COMPRIMIDA	5.23
5	7	56.78	-	1.1	45.0	1.14	ALA TRACCIONADA	-	8.5	-	30.0	5.28	ALA COMPRIMIDA	5.28
5	8	56.78	-	1.0	45.0	1.11	ALA TRACCIONADA	-	8.6	-	30.0	5.33	ALA COMPRIMIDA	5.33
5	9	56.78	-	1.0	45.0	1.09	ALA TRACCIONADA	-	8.7	-	30.0	5.38	ALA COMPRIMIDA	5.38
5	10	56.78	-	1.0	45.0	1.06	ALA TRACCIONADA	-	8.8	-	30.0	5.43	ALA COMPRIMIDA	5.43
5	11	56.78	-	1.0	45.0	1.04	ALA TRACCIONADA	-	8.9	-	30.0	5.49	ALA COMPRIMIDA	5.49
5	12	56.78	-	0.9	45.0	1.01	ALA TRACCIONADA	-	9.0	-	30.0	5.54	ALA COMPRIMIDA	5.54
5	13	56.78	-	0.9	45.0	0.99	ALA TRACCIONADA	-	9.0	-	30.0	5.59	ALA COMPRIMIDA	5.59
5	14	56.78	-	0.9	45.0	0.96	ALA TRACCIONADA	-	9.1	-	30.0	5.64	ALA COMPRIMIDA	5.64
5	15	56.78	-	0.9	45.0	0.94	ALA TRACCIONADA	-	9.2	-	30.0	5.69	ALA COMPRIMIDA	5.69
5	16	56.78	-	0.9	45.0	0.91	ALA TRACCIONADA	-	9.3	-	30.0	5.74	ALA COMPRIMIDA	5.74
5	17	56.78	-	0.8	45.0	0.89	ALA TRACCIONADA	-	9.4	-	30.0	5.80	ALA COMPRIMIDA	5.80
5	18	56.78	-	0.8	45.0	0.86	ALA TRACCIONADA	-	9.5	-	30.0	5.85	ALA COMPRIMIDA	5.85
5	19	56.78	-	0.8	45.0	0.84	ALA TRACCIONADA	-	9.5	-	30.0	5.90	ALA COMPRIMIDA	5.90
5	20	56.78	-	0.8	45.0	0.81	ALA TRACCIONADA	-	9.6	-	30.0	5.95	ALA COMPRIMIDA	5.95
5	21	56.78	-	0.7	45.0	0.79	ALA TRACCIONADA	56.78	-	4.5	45.0	4.86	ALA TRACCIONADA	4.86

VANO	SECCIÓN	b (°)	t d (Kp/cm2)	t max (Kp/cm2)	e (cm)	armadura superior Aα, sup (cm2/m)	armadura inferior Aα, inf (cm2/m)
5	1	30	8.1	69.28	0.20	0.29	4.70
5	2	30	8.1	69.28	0.20	0.29	4.72
5	3	30	8.2	69.28	0.20	0.30	4.77
5	4	30	8.3	69.28	0.20	0.31	4.82
5	5	30	8.4	69.28	0.20	0.31	4.86
5	6	30	8.5	69.28	0.20	0.32	4.91
5	7	30	8.5	69.28	0.20	0.33	4.95
5	8	30	8.6	69.28	0.20	0.33	5.00
5	9	30	8.7	69.28	0.20	0.34	5.05
5	10	30	8.8	69.28	0.20	0.34	5.09
5	11	30	8.9	69.28	0.20	0.35	5.14
5	12	30	9.0	69.28	0.20	0.36	5.18
5	13	30	9.0	69.28	0.20	0.36	5.22
5	14	30	9.1	69.28	0.20	0.37	5.27
5	15	30	9.2	69.28	0.20	0.38	5.31
5	16	30	9.3	69.28	0.19	0.38	5.36
5	17	30	9.4	69.28	0.19	0.39	5.40
5	18	30	9.5	69.28	0.19	0.40	5.45
5	19	30	9.5	69.28	0.19	0.41	5.49
5	20	30	9.6	69.28	0.19	0.41	5.54
5	21	45	4.5	80.00	0.21	0.14	4.72

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1502.0

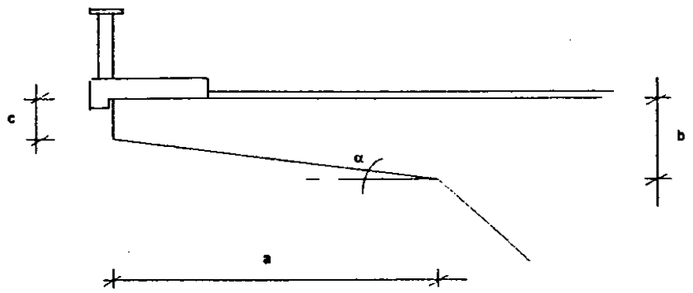
VANO	SECCIÓN	A (cm2)	τ d ala comp (Kp/cm2)	τ d ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2)	t d ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
6	1	56.78	-	4.6	45.0	4.94	ALA TRACCIONADA	56.78	-	0.4	45.0	0.43	ALA TRACCIONADA	4.94
6	2	-	9.8	-	30.0	6.04	ALA COMPRIMIDA	56.78	-	0.4	45.0	0.46	ALA TRACCIONADA	6.04
6	3	-	9.7	-	30.0	5.98	ALA COMPRIMIDA	56.78	-	0.5	45.0	0.49	ALA TRACCIONADA	5.98
6	4	-	9.6	-	30.0	5.93	ALA COMPRIMIDA	56.78	-	0.5	45.0	0.52	ALA TRACCIONADA	5.93
6	5	-	9.5	-	30.0	5.87	ALA COMPRIMIDA	56.78	-	0.5	45.0	0.55	ALA TRACCIONADA	5.87
6	6	-	9.4	-	30.0	5.81	ALA COMPRIMIDA	56.78	-	0.5	45.0	0.58	ALA TRACCIONADA	5.81
6	7	-	9.3	-	30.0	5.75	ALA COMPRIMIDA	56.78	-	0.6	45.0	0.60	ALA TRACCIONADA	5.75
6	8	-	9.2	-	30.0	5.69	ALA COMPRIMIDA	56.78	-	0.6	45.0	0.63	ALA TRACCIONADA	5.69
6	9	-	9.1	-	30.0	5.63	ALA COMPRIMIDA	56.78	-	0.6	45.0	0.66	ALA TRACCIONADA	5.63
6	10	-	9.0	-	30.0	5.58	ALA COMPRIMIDA	56.78	-	0.6	45.0	0.69	ALA TRACCIONADA	5.58
6	11	-	8.9	-	30.0	5.52	ALA COMPRIMIDA	56.78	-	0.7	45.0	0.72	ALA TRACCIONADA	5.52
6	12	-	8.8	-	30.0	5.46	ALA COMPRIMIDA	56.78	-	0.7	45.0	0.75	ALA TRACCIONADA	5.46
6	13	-	8.7	-	30.0	5.40	ALA COMPRIMIDA	56.78	-	0.7	45.0	0.77	ALA TRACCIONADA	5.40
6	14	-	8.6	-	30.0	5.34	ALA COMPRIMIDA	56.78	-	0.7	45.0	0.80	ALA TRACCIONADA	5.34
6	15	-	8.5	-	30.0	5.28	ALA COMPRIMIDA	56.78	-	0.8	45.0	0.83	ALA TRACCIONADA	5.28
6	16	-	8.4	-	30.0	5.23	ALA COMPRIMIDA	56.78	-	0.8	45.0	0.86	ALA TRACCIONADA	5.23
6	17	-	8.4	-	30.0	5.17	ALA COMPRIMIDA	56.78	-	0.8	45.0	0.89	ALA TRACCIONADA	5.17
6	18	-	8.3	-	30.0	5.11	ALA COMPRIMIDA	56.78	-	0.9	45.0	0.92	ALA TRACCIONADA	5.11
6	19	-	8.2	-	30.0	5.05	ALA COMPRIMIDA	56.78	-	0.9	45.0	0.94	ALA TRACCIONADA	5.05
6	20	-	8.1	-	30.0	4.99	ALA COMPRIMIDA	56.78	-	0.9	45.0	0.97	ALA TRACCIONADA	4.99
6	21	-	3.6	-	30.0	2.25	ALA COMPRIMIDA	56.78	-	0.3	45.0	0.35	ALA TRACCIONADA	2.25
7	1	56.78	-	0.9	45.0	0.98	ALA TRACCIONADA	-	1.4	-	30.0	0.86	ALA COMPRIMIDA	0.98
7	2	56.78	-	0.9	45.0	0.92	ALA TRACCIONADA	-	1.6	-	30.0	0.99	ALA COMPRIMIDA	0.99
7	3	56.78	-	0.8	45.0	0.85	ALA TRACCIONADA	-	1.8	-	30.0	1.13	ALA COMPRIMIDA	1.13
7	4	56.78	-	0.7	45.0	0.79	ALA TRACCIONADA	-	2.0	-	30.0	1.26	ALA COMPRIMIDA	1.26
7	5	56.78	-	0.7	45.0	0.72	ALA TRACCIONADA	-	2.2	-	30.0	1.39	ALA COMPRIMIDA	1.39
7	6	56.78	-	0.6	45.0	0.66	ALA TRACCIONADA	-	2.5	-	30.0	1.52	ALA COMPRIMIDA	1.52
7	7	56.78	-	0.6	45.0	0.60	ALA TRACCIONADA	-	2.7	-	30.0	1.66	ALA COMPRIMIDA	1.66
7	8	56.78	-	0.5	45.0	0.53	ALA TRACCIONADA	-	2.9	-	30.0	1.79	ALA COMPRIMIDA	1.79
7	9	56.78	-	0.4	45.0	0.47	ALA TRACCIONADA	-	3.1	-	30.0	1.92	ALA COMPRIMIDA	1.92
7	10	56.78	-	0.4	45.0	0.40	ALA TRACCIONADA	-	3.3	-	30.0	2.05	ALA COMPRIMIDA	2.05
7	11	56.78	-	0.3	45.0	0.34	ALA TRACCIONADA	-	3.5	-	30.0	2.19	ALA COMPRIMIDA	2.19
7	12	56.78	-	0.3	45.0	0.27	ALA TRACCIONADA	-	3.8	-	30.0	2.32	ALA COMPRIMIDA	2.32
7	13	56.78	-	0.2	45.0	0.21	ALA TRACCIONADA	-	4.0	-	30.0	2.45	ALA COMPRIMIDA	2.45
7	14	56.78	-	0.1	45.0	0.14	ALA TRACCIONADA	-	4.2	-	30.0	2.58	ALA COMPRIMIDA	2.58
7	15	56.78	-	0.1	45.0	0.08	ALA TRACCIONADA	-	4.4	-	30.0	2.72	ALA COMPRIMIDA	2.72
7	16	56.78	-	0.0	45.0	0.02	ALA TRACCIONADA	-	4.6	-	30.0	2.85	ALA COMPRIMIDA	2.85
7	17	56.78	-	0.0	45.0	0.05	ALA TRACCIONADA	-	4.8	-	30.0	2.98	ALA COMPRIMIDA	2.98
7	18	56.78	-	0.1	45.0	0.11	ALA TRACCIONADA	-	5.0	-	30.0	3.12	ALA COMPRIMIDA	3.12
7	19	56.78	-	0.2	45.0	0.18	ALA TRACCIONADA	-	5.3	-	30.0	3.25	ALA COMPRIMIDA	3.25
7	20	56.78	-	0.2	45.0	0.24	ALA TRACCIONADA	56.78	-	2.6	45.0	2.74	ALA TRACCIONADA	2.74
7	21	56.78	-	0.3	45.0	0.32	ALA TRACCIONADA	56.78	-	2.6	45.0	2.78	ALA TRACCIONADA	2.78

VANO	SECCIÓN	b (°)	t d (Kp/cm2)	t max (Kp/cm2)	e (cm)	armadura superior Aα,sup (cm2/m)	armadura inferior Aα,inf (cm2/m)
6	1	45	4.6	80.00	0.21	0.14	4.80
6	2	30	9.8	69.28	0.19	0.43	5.62
6	3	30	9.7	69.28	0.19	0.42	5.57
6	4	30	9.6	69.28	0.19	0.41	5.52
6	5	30	9.5	69.28	0.19	0.40	5.47
6	6	30	9.4	69.28	0.19	0.39	5.42
6	7	30	9.3	69.28	0.19	0.39	5.36
6	8	30	9.2	69.28	0.20	0.38	5.31
6	9	30	9.1	69.28	0.20	0.37	5.26
6	10	30	9.0	69.28	0.20	0.36	5.21
6	11	30	8.9	69.28	0.20	0.36	5.16
6	12	30	8.8	69.28	0.20	0.35	5.11
6	13	30	8.7	69.28	0.20	0.34	5.06
6	14	30	8.6	69.28	0.20	0.33	5.01
6	15	30	8.5	69.28	0.20	0.33	4.96
6	16	30	8.4	69.28	0.20	0.32	4.91
6	17	30	8.4	69.28	0.20	0.31	4.86
6	18	30	8.3	69.28	0.20	0.30	4.81
6	19	30	8.2	69.28	0.20	0.30	4.75
6	20	30	8.1	69.28	0.20	0.29	4.70
6	21	30	3.6	69.28	0.21	0.06	2.19
7	1	45	0.9	80.00	0.22	0.01	0.98
7	2	30	1.6	69.28	0.22	0.01	0.98
7	3	30	1.8	69.28	0.22	0.01	1.11
7	4	30	2.0	69.28	0.22	0.02	1.24
7	5	30	2.2	69.28	0.22	0.02	1.37
7	6	30	2.5	69.28	0.22	0.03	1.50
7	7	30	2.7	69.28	0.22	0.03	1.62
7	8	30	2.9	69.28	0.22	0.04	1.75
7	9	30	3.1	69.28	0.21	0.04	1.88
7	10	30	3.3	69.28	0.21	0.05	2.01
7	11	30	3.5	69.28	0.21	0.06	2.13
7	12	30	3.8	69.28	0.21	0.06	2.26
7	13	30	4.0	69.28	0.21	0.07	2.38
7	14	30	4.2	69.28	0.21	0.08	2.51
7	15	30	4.4	69.28	0.21	0.09	2.63
7	16	30	4.6	69.28	0.21	0.09	2.75
7	17	30	4.8	69.28	0.21	0.10	2.88
7	18	30	5.0	69.28	0.21	0.11	3.00
7	19	30	5.3	69.28	0.21	0.12	3.12
7	20	45	2.6	80.00	0.22	0.04	2.69
7	21	45	2.6	80.00	0.22	0.04	2.73

CALCULO DE ARMADURA DE VOLADIZO

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1502.0

DATOS GEOMETRIA

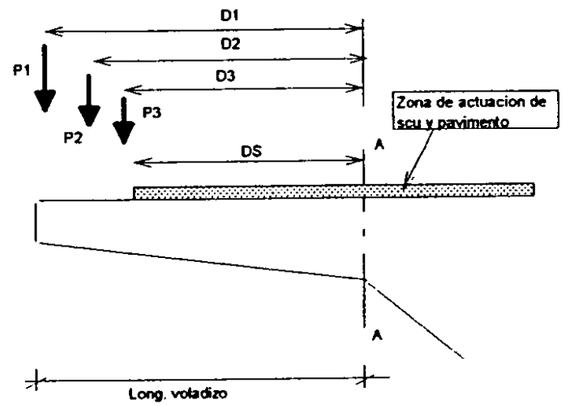


a (longitud voladizo) (m.) =	2.8
b (canto en base del voladizo) (m.) =	0.506
c (canto en extremo del voladizo) (m.) =	0.200
α (angulo cara inferior voladizo) (rad) =	0.109
Recubrimiento (c.d.g. armadura) (m.) =	0.050

DATOS MATERIALES

HORMIGONES		
	Fck(kp/cm2)	γc
Tablero	400	1.5
ACEROS		
	Fk(kp/cm2)	γs
Acero pasivo	5100	1.15

DATOS CARGAS (P1, P2, P3 son cargas permanentes).



Cargas actuantes (valores caracteristicos)

Peso propio hormigón (t/m3) =	2.50

P1(t/m)=	0.75	D1(m.)=	2.80
P2(t/m)=	0.00	D2(m.)=	0.00
P3(t/m)=	0.00	D3(m)=	0.00

Peso pavimento (t/m2)=	0.00
Valor s.c.u. (t/m2)=	0.50

Distancia actuacion s.c. DS(m.)=	2.80

Esfuerzos debidos al carro en Seccion A-A

Momento Mk(m.t/m)=	0.00
Cortante Vk(m.t/m)=	0.00

Coeficientes de ponderacion de acciones

ESTADOS LIMITES ULTIMOS	
	γf
Acciones permanentes desfav.	1.5
Acciones variables desfavorables	1.5

CALCULO

ESFUERZOS (DE SERVICIO) DEBIDOS A LAS CARGAS:

Carga		Momento(mT/	ortante (T/m)
Peso propio		-2.96	2.47
P1		-2.10	0.75
P2		0.00	0.00
P3		0.00	0.00
Pavimento		0.00	0.00
Sobrecarga repartida (s.c.u.)		-1.96	1.40
Carro		0.00	0.00
	TOTAL	-7.02	4.62

ESFUERZOS DE DISEÑO PARA EL DIMENSIONAMIENTO

Carga		Momento(mT/	ortante (T/m	V.reducido (T/
Peso propio		-4.44	3.71	2.64
P1		-3.15	1.13	0.37
P2		0.00	0.00	0.00
P3		0.00	0.00	0.00
Pavimento		0.00	0.00	0.00
Sobrecarga repartida (s.c.u.)		-2.94	2.10	1.40
Carro		0.00	0.00	0.00
	TOTAL	-10.53	6.93	4.41

ARMADO FLEXION (por metro)

As sup.(cm²)	omprobació	Def.sup.(o/oo	Def.inf.(o/oo)	ef. acero(o/oo)
5.34	Vale	-11.179	0.750	-10.000

ARMADO CORTANTE (como viga, por metro)

As 90ª(cm²/m)	omprobació	Vu1 (T)	Vcu (T)	Vsu (T)
0.00	Vale	364.80	37.23	0.00

CÁLCULO DE ARMADURA DE TORSION . ART. 48.2 EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA . SUBTRAMO XV
ESTRUCTURA : E-1502.0

VANO	SECC	PP	PRET	CM	GRAD	SC1	SC2	SC3	SC4	SC5	SC6	ENVOLVENTE SC		VALORES EN E.L.U		Datos geometricos		Dimensionamiento armaduras			
		T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T(+) (m.t.)	T(-) (m.t.)	Td(+) (m.t.)	Td(-) (m.t.)	Ae (m2)	he (m.)	Tu1 (m.t.)	Td/Tu1	At (cm2/m)	Al (cm2/m)
1	1	117	-163	34	-16	-56	105	22	29	-3	-3	134	-75	265	-164	5.027	0.292	1321	0.20	6.27	5.93
1	2	117	-163	34	-16	-48	97	22	29	-3	-3	126	-67	253	-152	5.027	0.292	1321	0.19	5.99	5.67
1	3	117	-163	34	-16	-41	89	22	29	-3	-3	118	-60	241	-141	5.254	0.200	946	0.26	5.47	5.18
1	4	117	-163	34	-16	-33	81	22	29	-3	-3	110	-52	230	-129	5.254	0.200	946	0.24	5.20	4.93
1	5	117	-163	34	-16	-25	74	22	29	-3	-3	103	-44	218	-117	5.254	0.200	946	0.23	4.94	4.68
1	6	117	-163	34	-16	-17	66	22	29	-3	-3	95	-36	206	-106	5.254	0.200	946	0.22	4.68	4.43
1	7	117	-163	34	-16	-10	58	22	29	-3	-3	87	-29	195	-94	5.254	0.200	946	0.21	4.41	4.18
1	8	117	-163	34	-16	-2	50	22	29	-3	-3	79	-21	183	-83	5.254	0.200	946	0.19	4.15	3.93
1	9	117	-163	34	-16	6	43	22	29	-3	-3	72	-19	172	-80	5.254	0.200	946	0.18	3.89	3.68
1	10	117	-163	34	-16	14	35	22	29	-3	-3	64	-19	160	-80	5.254	0.200	946	0.17	3.63	3.43
1	11	117	-163	34	-16	21	27	22	29	-3	-3	56	-19	148	-80	5.254	0.200	946	0.16	3.36	3.18
1	12	117	-163	34	-16	29	19	22	29	-3	-3	58	-19	151	-80	5.254	0.200	946	0.16	3.43	3.25
1	13	117	-163	34	-16	37	12	22	29	-3	-3	66	-19	163	-80	5.254	0.200	946	0.17	3.69	3.50
1	14	117	-163	34	-16	45	4	22	29	-3	-3	74	-19	175	-80	5.254	0.200	946	0.18	3.96	3.75
1	15	117	-163	34	-16	52	-4	22	29	-3	-3	81	-23	186	-86	5.254	0.200	946	0.20	4.22	4.00
1	16	117	-163	34	-16	60	-12	22	29	-3	-3	89	-31	198	-97	5.254	0.200	946	0.21	4.48	4.25
1	17	117	-163	34	-16	68	-19	22	29	-3	-3	97	-38	209	-109	5.254	0.200	946	0.22	4.75	4.49
1	18	117	-163	34	-16	76	-27	22	29	-3	-3	105	-46	221	-120	5.254	0.200	946	0.23	5.01	4.74
1	19	117	-163	34	-16	83	-35	22	29	-3	-3	112	-54	233	-132	5.254	0.200	946	0.25	5.27	4.99
1	20	117	-163	34	-16	91	-43	22	29	-3	-3	120	-62	244	-144	5.027	0.292	1321	0.18	5.79	5.48
1	21	117	-163	34	-16	99	-50	22	29	-3	-3	128	-69	256	-155	5.027	0.292	1321	0.19	6.06	5.74
2	1	-189	259	-56	25	-16	-20	-133	49	-19	-14	74	-172	189	-366	5.027	0.292	1321	0.28	8.67	8.21
2	2	-189	259	-56	25	-16	-20	-124	40	-19	-14	65	-163	175	-352	5.027	0.292	1321	0.27	8.34	7.90
2	3	-189	259	-56	25	-16	-20	-114	31	-19	-14	56	-153	161	-339	5.254	0.200	946	0.36	7.67	7.27
2	4	-189	259	-56	25	-16	-20	-105	22	-19	-14	47	-144	148	-325	5.254	0.200	946	0.34	7.36	6.97
2	5	-189	259	-56	25	-16	-20	-96	13	-19	-14	38	-135	134	-311	5.254	0.200	946	0.33	7.05	6.68
2	6	-189	259	-56	25	-16	-20	-87	3	-19	-14	29	-126	120	-298	5.254	0.200	946	0.31	6.74	6.39
2	7	-189	259	-56	25	-16	-20	-78	-6	-19	-14	25	-117	115	-284	5.254	0.200	946	0.30	6.44	6.09
2	8	-189	259	-56	25	-16	-20	-69	-15	-19	-14	25	-108	115	-270	5.254	0.200	946	0.29	6.13	5.80
2	9	-189	259	-56	25	-16	-20	-60	-24	-19	-14	25	-99	115	-257	5.254	0.200	946	0.27	5.82	5.51
2	10	-189	259	-56	25	-16	-20	-51	-33	-19	-14	25	-90	115	-243	5.254	0.200	946	0.26	5.51	5.22
2	11	-189	259	-56	25	-16	-20	-42	-42	-19	-14	25	-81	115	-230	5.254	0.200	946	0.24	5.22	4.94
2	12	-189	259	-56	25	-16	-20	-32	-51	-19	-14	25	-90	115	-244	5.254	0.200	946	0.26	5.53	5.23
2	13	-189	259	-56	25	-16	-20	-23	-60	-19	-14	25	-99	115	-258	5.254	0.200	946	0.27	5.83	5.53
2	14	-189	259	-56	25	-16	-20	-14	-69	-19	-14	25	-108	115	-271	5.254	0.200	946	0.29	6.14	5.82
2	15	-189	259	-56	25	-16	-20	-5	-79	-19	-14	25	-118	115	-285	5.254	0.200	946	0.30	6.45	6.11

CÁLCULO DE ARMADURA DE TORSION . ART. 48.2 EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA . SUBTRAMO XV
ESTRUCTURA : E-1502.0

VANO	SECC	PP	PRET	CM	GRAD	SC1	SC2	SC3	SC4	SC5	SC6	ENVOLVENTE SC		VALORES EN E.L.U		Datos geometricos		Dimensionamiento armaduras			
		T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T(+) (m.t.)	T(-) (m.t.)	Td(+) (m.t.)	Td(-) (m.t.)	Ae (m2)	he (m.)	Tu1 (m.t.)	Td/Tu1	At (cm2/m)	Al (cm2/m)
2	16	-189	259	-56	25	-16	-20	4	-88	-19	-14	29	-127	121	-298	5.254	0.200	946	0.32	6.76	6.40
2	17	-189	259	-56	25	-16	-20	13	-97	-19	-14	38	-136	135	-312	5.254	0.200	946	0.33	7.07	6.70
2	18	-189	259	-56	25	-16	-20	22	-106	-19	-14	47	-145	148	-326	5.254	0.200	946	0.34	7.38	6.99
2	19	-189	259	-56	25	-16	-20	31	-115	-19	-14	56	-154	162	-339	5.254	0.200	946	0.36	7.69	7.28
2	20	-189	259	-56	25	-16	-20	40	-124	-19	-14	66	-163	176	-353	5.027	0.292	1321	0.27	8.36	7.92
2	21	-189	259	-56	25	-16	-20	49	-133	-19	-14	75	-172	189	-367	5.027	0.292	1321	0.28	8.68	8.22
3	1	105	-142	31	-14	-3	-3	27	20	-52	97	124	-69	249	-144	5.027	0.292	1321	0.19	5.90	5.59
3	2	105	-142	31	-14	-3	-3	27	20	-45	89	116	-61	237	-132	5.027	0.292	1321	0.18	5.62	5.33
3	3	105	-142	31	-14	-3	-3	27	20	-37	82	108	-54	226	-120	5.254	0.200	946	0.24	5.12	4.85
3	4	105	-142	31	-14	-3	-3	27	20	-29	74	101	-46	214	-109	5.254	0.200	946	0.23	4.85	4.60
3	5	105	-142	31	-14	-3	-3	27	20	-21	66	93	-38	203	-97	5.254	0.200	946	0.21	4.59	4.35
3	6	105	-142	31	-14	-3	-3	27	20	-14	59	85	-30	191	-86	5.254	0.200	946	0.20	4.33	4.10
3	7	105	-142	31	-14	-3	-3	27	20	-6	51	77	-23	179	-74	5.254	0.200	946	0.19	4.07	3.85
3	8	105	-142	31	-14	-3	-3	27	20	2	43	70	-17	168	-65	5.254	0.200	946	0.18	3.80	3.60
3	9	105	-142	31	-14	-3	-3	27	20	10	35	62	-17	156	-65	5.254	0.200	946	0.17	3.54	3.35
3	10	105	-142	31	-14	-3	-3	27	20	17	28	54	-17	145	-65	5.254	0.200	946	0.15	3.28	3.10
3	11	105	-142	31	-14	-3	-3	27	20	25	20	52	-17	141	-65	5.254	0.200	946	0.15	3.19	3.02
3	12	105	-142	31	-14	-3	-3	27	20	33	12	59	-17	152	-65	5.254	0.200	946	0.16	3.45	3.27
3	13	105	-142	31	-14	-3	-3	27	20	40	4	67	-17	164	-65	5.254	0.200	946	0.17	3.72	3.52
3	14	105	-142	31	-14	-3	-3	27	20	48	-3	75	-20	176	-70	5.254	0.200	946	0.19	3.98	3.77
3	15	105	-142	31	-14	-3	-3	27	20	56	-11	83	-28	187	-82	5.254	0.200	946	0.20	4.24	4.02
3	16	105	-142	31	-14	-3	-3	27	20	64	-19	90	-36	199	-93	5.254	0.200	946	0.21	4.51	4.27
3	17	105	-142	31	-14	-3	-3	27	20	71	-27	98	-43	210	-105	5.254	0.200	946	0.22	4.77	4.52
3	18	105	-142	31	-14	-3	-3	27	20	79	-34	106	-51	222	-117	5.254	0.200	946	0.23	5.03	4.76
3	19	105	-142	31	-14	-3	-3	27	20	87	-42	114	-59	234	-128	5.254	0.200	946	0.25	5.29	5.01
3	20	105	-142	31	-14	-3	-3	27	20	95	-50	121	-67	245	-140	5.027	0.292	1321	0.19	5.81	5.50
3	21	105	-142	31	-14	-3	-3	27	20	102	-58	129	-74	257	-151	5.027	0.292	1321	0.19	6.08	5.76

ESTADO LIMITE ULTIMO DE ROTURA POR FLEXION

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1602.0

ESTADO LIMITE ULTIMO DE ROTURA POR FLEXION.

Se verificara que el momento que Md < Mu para las secciones mas comprometidas del tablero .

Md= momento de diseño que solicita la seccion.
Mu= momento ultimo que resite la seccion.

Para el calculo de Md se tienen en cuenta los siguientes estado de carga y coeficientes de ponderacion:

	Coeficiente caso desfavorable	Coeficiente caso favorable
CARGA PERMANENTE	1.50	0.90
SOBRECARGAS DE USO	1.50	0.00
GRADIENTE TERMICO	1.50	0.00
PRETENSADO HIPERESTATICO	1.00	0.70

Para el calculo de Mu se utilizara el programa FAGUS-2 . En este programa se introducira la geometria y armaduras de cada seccion junto con la predeformacion del acero activo hasta el estado de neutralizacion .
Para calcular las prederformaciones del acero activo se utiliza la hoja de calculo FLEXION.XLS cuyo metodo de calculo se explica en las hojas adjuntas.

OBTENCION DE MOMENTOS DE DISEÑO

	HIPOTESIS					Md(m.t)
SECCION	PESO PROPIO	CARGA MUERTA	ENVOL. SCOBREC.	GRADIENTE TERMICO	PRET. HIPEREST.	
S9 - VANO 1	661.1	317.3	742.7	93.3	302.5	3024.1
S01- VANO 2	-1000.0	-498.6	-911.7	233.2	754.8	-3087.1
S11- VANO 2	558.3	256.2	737.6	230.2	726.6	3400.1
S21-VANO 6	2607.3	911.3	1666.3	-50.1	-480.0	7297.3

S09-V1

ESTADO LIMITE ULTIMO DE AGOTAMIENTO POR FLEXION

CALCULO DE PREDEFORMACION DE ACERO ACTIVO

DATOS:

Proyecto	L.A.V. MADRID-ZARAGOZA
Nombre estructura:	E-1502.0
Vano nº:	1
Seccion nº:	9

	DATOS PRETENSADO	
Hipotesis	(t=0)	(t=infinito)
AXIL(t.)	2921.8	2542
MOMENTO(m.t)	-1405.7	-1223
M.HIPERESTATICO	347.1	302

CARACT. DE SECCION BRUTA	
AREA(m2)	7.173
INERCIA(m4)	2.029
V(m.)	0.691
V' (m.)	-1.059

MODULOS ELASTICIDAD		
ACERO ACTIVO (KP/CM2)	Ep=	1900000
HORMIGON (KP/CM2)	Ec=	350000

SECCION HOMOGENEIZADA.	
AREA(m2)	7.173
INERCIA(m4)	2.029
V(m.)	0.691
V' (m.)	-1.059

DATOS DE FAMILIAS DE CABLES DE PRETENSADO
(Dejar en blanco las que no existan)

FAMILIA Nº	Nº CABLES	AREA CABLE (cm2)	DIAM VAINA. (cm.)	DISTANCIA A BORDE SUP(m.)
1	8	26.6	10	1.29
2				
3				
4				
5				
6				
7				
8				
9				
10				

RESULTADOS:

PREDEFORMACIONES DE FAMILIAS DE CABLES DE PRETENSADO

FAMILIA Nº	Alargamiento de tesado εpf	P.isostatico inicial S.Neta εcpo	Perd.diferidas S.Homogeneiz. εcΔpf	Suma de def. anteriores Estado neutralizado
1	6.29E-03	2.68E-04	-3.44E-05	6.52E-03
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-

S11-V2

ESTADO LIMITE ULTIMO DE AGOTAMIENTO POR FLEXION

CALCULO DE PREDEFORMACION DE ACERO ACTIVO

DATOS:

Proyecto	L.A.V. MADRID-ZARAGOZA
Nombre estructura:	E-1502.0
Vano nº:	2
Seccion nº:	11

	DATOS PRETENSADO	
Hipotesis	(t=0)	(t=infinito)
AXIL(t.)	2747.1	2390
MOMENTO(m.t)	-1221.8	-1063
M.HIPERESTATICO	767.4	667.6

CARACT. DE SECCION BRUTA	
AREA(m2)	7.173
INERCIA(m4)	2.029
V(m.)	0.691
V' (m.)	-1.059

MODULOS ELASTICIDAD		
ACERO ACTIVO (KP/CM2)	Ep=	1900000
HORMIGON (KP/CM2)	Ec=	350000

SECCION HOMOGENEIZADA.	
AREA(m2)	7.173
INERCIA(m4)	2.029
V(m.)	0.691
V' (m.)	-1.059

DATOS DE FAMILIAS DE CABLES DE PRETENSADO
(Dejar en blanco las que no existan)

FAMILIA Nº	Nº CABLES	AREA CABLE (cm2)	DIAM VAINA. (cm.)	DISTANCIA A BORDE SUP(m.)
1	8	26.6	10	1.4
2				
3				
4				
5				
6				
7				
8				
9				
10				

RESULTADOS:

PREDEFORMACIONES DE FAMILIAS DE CABLES DE PRETENSADO

FAMILIA Nº	Alargamiento de tesado εpf	P.isostatico inicial S.Neta εcpo	Perd.diferidas S.Homogeneiz. εcΔpf	Suma de def. anteriores Estado neutralizado
1	5.91E-03	3.14E-04	-4.00E-05	6.19E-03
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-

ESTADO LIMITE ULTIMO DE AGOTAMIENTO POR FLEXION

CALCULO DE PREDEFORMACION DE ACERO ACTIVO

DATOS:

Proyecto	L.A.V. MADRID-ZARAGOZA
Nombre estructura:	E-1502.0
Vano nº:	2
Seccion nº:	1

	DATOS PRETENSADO	
Hipotesis	(t=0)	(t=infinito)
AXIL(t.)	2849.4	2479
MOMENTO(m.t)	1674.7	1457
M.HIPERESTATICO	434.3	377.8

CARACT. DE SECCION BRUTA	
AREA(m2)	8.485
INERCIA(m4)	2.215
V(m.)	0.723
V' (m.)	-1.027

MODULOS ELASTICIDAD		
ACERO ACTIVO (KP/CM2)	Ep=	1900000
HORMIGON (KP/CM2)	Ec=	350000

SECCION HOMOGENEIZADA.	
AREA(m2)	8.485
INERCIA(m4)	2.215
V(m.)	0.723
V' (m.)	-1.027

DATOS DE FAMILIAS DE CABLES DE PRETENSADO
(Dejar en blanco las que no existan)

FAMILIA Nº	Nº CABLES	AREA CABLE (cm2)	DIAM VAINA. (cm.)	DISTANCIA A BORDE SUP(m.)
1	8	26.6	10	0.4
2				
3				
4				
5				
6				
7				
8				
9				
10				

RESULTADOS:

PREDEFORMACIONES DE FAMILIAS DE CABLES DE PRETENSADO

FAMILIA Nº	Alargamiento de tesado εpf	P.Isostatico inicial S.Neta εcpo	Perd.diferidas S.Homogeneiz. εcΔpf	Suma de def. anteriores Estado neutralizado
1	6.13E-03	1.49E-04	-1.92E-05	6.26E-03
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-

ESTADO LIMITE ULTIMO DE AGOTAMIENTO POR FLEXION

CALCULO DE PREDEFORMACION DE ACERO ACTIVO

DATOS:

Proyecto	L.A.V. MADRID-ZARAGOZA
Nombre estructura:	E-1502.0
Vano nº:	6
Seccion nº:	21

	DATOS PRETENSADO	
Hipotesis	(t=0)	(t=infinito)
AXIL(t.)	4916.1	4277
MOMENTO(m.t)	-4403.4	-3831
M.HIPERESTATICO	983.9	856

CARACT. DE SECCION BRUTA	
AREA(m2)	7.738
INERCIA(m4)	2.651
V(m.)	0.952
V' (m.)	1.048

MODULOS ELASTICIDAD		
ACERO ACTIVO (KP/CM2)	Ep=	1900000
HORMIGON (KP/CM2)	Ec=	350000

SECCION HOMOGENEIZADA.	
AREA(m2)	7.738
INERCIA(m4)	2.651
V(m.)	0.952
V' (m.)	1.048

DATOS DE FAMILIAS DE CABLES DE PRETENSADO
(Dejar en blanco las que no existan)

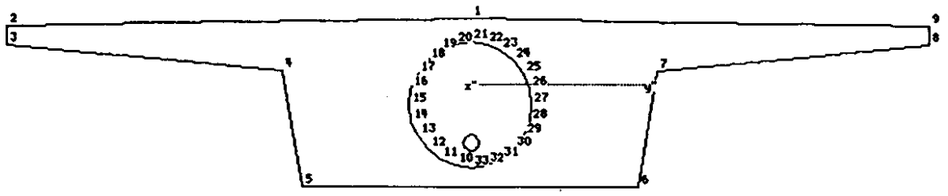
FAMILIA Nº	Nº CABLES	AREA CABLE (cm2)	DIAM VAINA. (cm.)	DISTANCIA A BORDE SUP(m.)
1	10	37.8	12	1.75
2				
3				
4				
5				
6				
7				
8				
9				
10				

RESULTADOS:

PREDEFORMACIONES DE FAMILIAS DE CABLES DE PRETENSADO

FAMILIA Nº	Alargamiento de tesado εpf	P.Isostatico inicial S.Neta εcpo	Perd.diferidas S.Homogeneiz. εcΔpf	Suma de def. anteriores Estado neutralizado
1	5.96E-03	6.68E-04	-8.38E-05	6.54E-03
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-

Mstb. 1 : 60.0



Sección :"S09-V1" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			
Puntos aligeramiento: 10			-16.82	-152.78	
11	-32.50	-146.29	12	-45.96	-135.96
13	-56.29	-122.50	14	-62.78	-106.82
15	-65.00	-90.00	16	-62.78	-73.18
17	-56.29	-57.50	18	-45.96	-44.04
19	-32.50	-33.71	20	-16.82	-27.21
21	0.00	-25.00	22	16.82	-27.21
23	32.50	-33.71	24	45.96	-44.04
25	56.29	-57.50	26	62.78	-73.18
27	65.00	-90.00	28	62.78	-106.82
29	56.29	-122.50	30	45.96	-135.96
31	32.50	-146.29	32	16.82	-152.78
33	0.00	-155.00			

Características mecánicas de la sección:
Area : Ax= 7.173 [m2]
Momentos de inercia : Iy= 2.029 [m4] Iz= 28.311 [m4]
Inercia a torsión : Ix= 8.188 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.691547 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.960	0.831
dch.	Iz	4.750	5.960	-0.831
abajo	Iy	-1.058	-1.917	0.409
arriba	Iy	0.692	2.935	-0.267

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	212.80	0.00	-129.00		
Total:			212.80	Cuantía de armadura: 0.297 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	6.520E-0003				

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [N/mm2]	0.85*fcd,fyd [N/mm2]	eps-fc [o/oo]	fct [N/mm2]	fcv [N/mm2]	fcw,mín [N/mm2]
"H400"	38000.0	-22.660	-2.000	0.0	0.817000	40.000
"A1900"	200000.0	1554.000				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

---

Cálculo Resistencia Ultima: Viga "S09-V1"/"B1"

Solicitación Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				3024.000	

Coeficiente de seguridad 1.269

Deformaciones y tensiones extremas (Rotura):

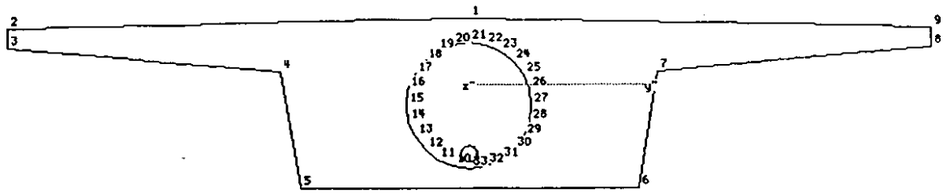
1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	
Hormigón-Min	0.00	0.00	-2.637	-22.660	"H400"
Hormigón-Max	175.00	-175.00	14.506	0.000	"H400"
Armadura-Max	0.00	-129.00	10.000	1554.000	"A1900"

Fibra neutra zn -26.92 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 26.92 cm Zona comprimida/Canto útil 0.21

Deformaciones y tensiones de armadura de pretensado (Rotura):

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-129.000	6.520	10.000	16.520	250.000	1554.000

Mstb. 1 : 60.0



Sección :"S11-V2" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			
Puntos aligeramiento: 10				-16.82	-152.78
11	-32.50	-146.29	12	-45.96	-135.96
13	-56.29	-122.50	14	-62.78	-106.82
15	-65.00	-90.00	16	-62.78	-73.18
17	-56.29	-57.50	18	-45.96	-44.04
19	-32.50	-33.71	20	-16.82	-27.21
21	0.00	-25.00	22	16.82	-27.21
23	32.50	-33.71	24	45.96	-44.04
25	56.29	-57.50	26	62.78	-73.18
27	65.00	-90.00	28	62.78	-106.82
29	56.29	-122.50	30	45.96	-135.96
31	32.50	-146.29	32	16.82	-152.78
33	0.00	-155.00			

Características mecánicas de la sección:
Area : Ax= 7.173 [m2]
Momentos de inercia : Iy= 2.029 [m4] Iz= 28.311 [m4]
Inercia a torsión : Ix= 8.188 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.691547 [m]

I:		R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.960	0.831
dch.	Iz	4.750	5.960	-0.831
abajo	Iy	-1.058	-1.917	0.409
arriba	Iy	0.692	2.935	-0.267

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	212.80	0.00	-140.00		
Total:			212.80	Cuantía de armadura: 0.297 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	6.190E-0003				

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [N/mm2]	0.85*fcd,fyd [N/mm2]	eps-fc [o/oo]	fct [N/mm2]	fcv [N/mm2]	fcw,mín [N/mm2]
"H400"	38000.0	-22.660	-2.000	0.0	0.817000	40.000
"A1900"	200000.0	1554.000				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

---

Cálculo Resistencia Ultima: Viga "S11-V2"/"B1"

Solicitación Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				3400.000	

Coeficiente de seguridad 1.234

Deformaciones y tensiones extremas (Rotura):

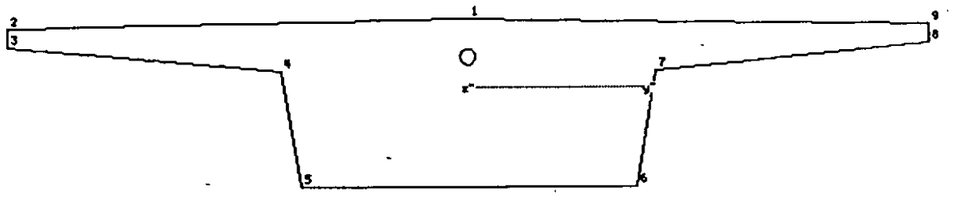
1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	
Hormigón-Min	0.00	0.00	-2.456	-22.660	"H400"
Hormigón-Max	175.00	-175.00	13.114	0.000	"H400"
Armadura-Max	-0.00	-140.00	10.000	1554.000	"A1900"

Fibra neutra zn -27.60 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 27.60 cm Zona comprimida/Canto útil 0.20

Deformaciones y tensiones de armadura de pretensado (Rotura):

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-140.000	6.190	10.000	16.190	316.000	1554.000

Mstb. 1 : 60.0



Sección :"S1-V2" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			

Características mecánicas de la sección:
Area : Ax= 8.485 [m2]
Momentos de inercia : Iy= 2.215 [m4] Iz= 28.448 [m4]
Inercia a torsión : Ix= 11.458 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.723786 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.989	0.706
dch.	Iz	4.750	5.989	-0.706
abajo	Iy	-1.026	-2.158	0.361
arriba	Iy	0.724	3.060	-0.254

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	212.80	0.00	-40.00		
	Total:		212.80	Cuantía de armadura: 0.251 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	6.260E-0003				

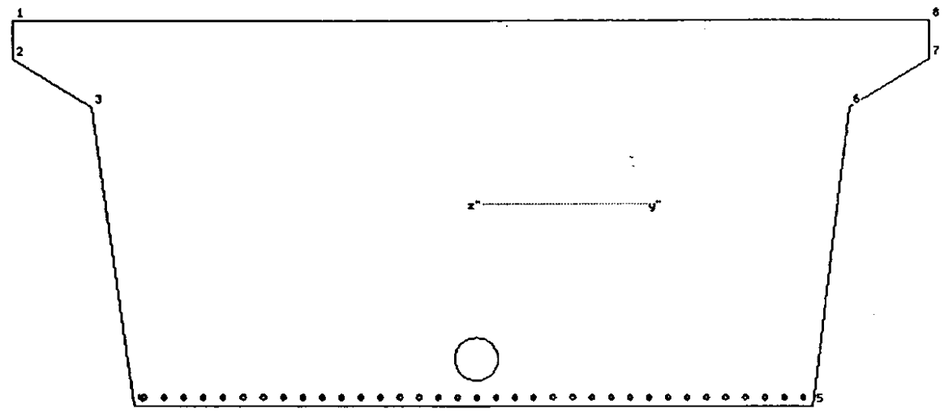
¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [N/mm2]	0.85*fcd,fyd [N/mm2]	eps-fc [o/oo]	fct [N/mm2]	fcv [N/mm2]	fcw,mín [N/mm2]
"H400"	38000.0	-22.660	-2.000	0.0	0.817000	40.000
"A1900"	200000.0	1554.000				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Mstb. 1 : 30.0



Sección :"S21-V6" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	-235.00	0.00	2	-235.00	-20.00
3	-195.00	-45.00	4	-175.00	-200.00
5	175.00	-200.00	6	195.00	-45.00
7	235.00	-20.00	8	235.00	0.00

Características mecánicas de la sección:
Area : Ax= 7.750 [m2]
Momentos de inercia : Iy= 2.651 [m4] Iz= 9.963 [m4]
Inercia a torsión : Ix= 9.559 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.952839 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-2.350	-4.240	0.547
dch.	Iz	2.350	4.240	-0.547
abajo	Iy	-1.047	-2.531	0.359
arriba	Iy	0.953	2.782	-0.327

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	378.00	0.00	-175.00		
2	AEH500	(2)	171.81	-170.00	-195.00	170.00	-195.00
	Total:		549.81	Cuantía de armadura: 0.709 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada

Cálculo Resistencia Ultima: Viga "S1-V2"/"B1"

Solicitación Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				-3087.000	

Coeficiente de seguridad 1.220

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	
Hormigón-Min	175.00	-175.00	-3.500	-22.660	"H400"
Hormigón-Max	-0.00	0.00	8.628	0.000	"H400"
Armadura-Max	-0.00	-40.00	5.856	1554.000	"A1900"

Fibra neutra zn -124.50 cm yn 0.00 cm Angulo 0.0
Ancho zona comprim. 50.50 cm Zona comprimida/Canto útil 0.37

Deformaciones y tensiones de armadura de pretensado (Rotura):

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-40.000	6.260	5.856	12.116	302.000	1554.000

--

Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	6.540E-0003				

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [N/mm2]	0.85*fcd,fyd [N/mm2]	eps-fc [o/oo]	fct [N/mm2]	fcv [N/mm2]	fcw,mín [N/mm2]
"H400"	38000.0	-22.660	-2.000	0.0	0.817000	40.000
"AEH500"	210000.0	443.470				
"A1900"	200000.0	1554.000				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Cálculo Resistencia Ultima: Viga "S21-V6"/"B1"

Solicitación Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				7297.000	

Coeficiente de seguridad 1.307

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	
Hormigón-Min	-235.00	0.00	-3.500	-22.660	"H400"
Hormigón-Max	175.00	-200.00	4.752	0.000	"H400"
Armadura-Max	170.00	-195.00	4.546	443.470	"AEH500"

Fibra neutra zn -84.83 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 84.83 cm Zona comprimida/Canto útil 0.48

Deformaciones y tensiones de armadura de pretensado (Rotura):

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-175.000	6.540	3.720	10.260	246.000	1554.000

Reacciones

	Node	PP	CM	PRET T=INF	GRAD	REACCIONES DEBIDAS A TREN B Y SC. EN PASEOS					
						VANO 1		VANO 2		VANO 3	
						T+ SC1	T- SC2	T+ SC3	T- SC4	T+ SC5	T- SC6
E1	151	129	52	-53	-1	36	103	0	3	0	0
	152	38	25	73	11	3	3	-20	-18	17	84
P1	65	290	59	15	-1	37	45	39	49	-5	-5
	107	551	176	-47	-10	124	115	137	126	-11	-11
P2	108	529	166	-40	-9	-11	-10	119	130	109	118
	150	306	66	15	-1	-6	-6	54	45	51	43
E2	153	31	23	83	12	83	16	-19	-22	2	2
	154	126	51	-45	-1	0	0	2	-1	102	35
SUMAS		2000	618	0	0	265	265	312	312	265	265

	Node	Envolvente SC		Reacciones en E.L.S		Reacciones en E.L.U		
		Rmax	Rmin	Rmax	Rmin	Rmax	Rmin	
E1	154	106	-2	239	112	377	99	
	156	97	-20	252	108	323	99	
P1	67	94	-6	462	357	682	321	POT 600 T
	109	261	-21	947	647	1436	569	POT 1000 T
P2	111	247	-20	906	624	1374	549	POT 1000 T
	153	105	-7	496	379	732	340	POT 600 T
E2	155	97	-22	256	107	323	100	
	157	104	-1	240	118	376	105	

GINPROSA

ASUNTO
E-1502.0
DIMENSIONAMIENTO DE TACOS EN ESTRIBOS.

FECHA

PAG. 1

Según la disposición de apoyos adoptada la fuerza de frenado y viento se toma integramente por los tacos dispuestos al efecto en los estribos. Las fuerzas de frenado y coacción se toman por el tensón dispuesto en el estribo 1. Las fuerzas de viento y fuerza centrífuga son:

VIENTO

$f_w = 154 (2-0,7\lambda) = 200 \ kp/m^2$

$A = 0,2 \times (1,75 + 0,70 + 3,50 + 1,50) = 1,50 \ t/m.$

FUERZA CENTRIFUGA

$F_c = Q \cdot \frac{v^2}{127 r}$.

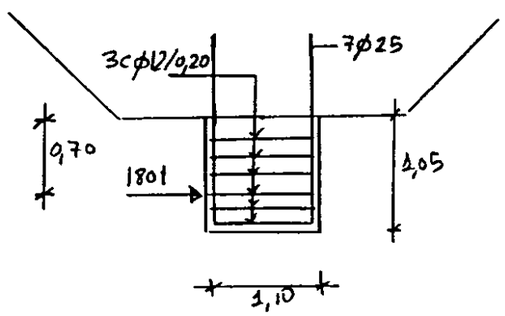
$r = 2500$
$Q = 121 t$
$v = 220 \ km/h.$

$F_c = 1,83 \ t/m.$

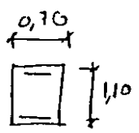
Las fuerzas transversales actuantes sobre los tacos son:

$F_T = \frac{(4 + 22,12 \times 2 + 26)}{2} \times (1,83 + 1,50) = 124 \ tn.$

$F_{Hd} = 124 \times 1,50 = 186 \ tn.$



$H_d = 186 \times 0,70 = 131 \ mt.$



A_s. flexion $= 28,1 \ cm^2 \rightarrow 7\phi 25$

$V_d = 186 \ tn. \quad V_{cu} = 60 \ tn.$

$A_{90} = \frac{186-60}{0,9 \cdot 4,2 \cdot 1,05} = 31 \ cm^2/m.$

GINPROSA

ASUNTO E-1502.0
TENDONES DE ANCLAJE AL ESTRIBO

PAG. 1

Peso d tablero + carga muerta = 2618 tn.

Fuerza de coacción sobre punto fijo = $0,03 \times 2584 = 78,6$ tn.

Carga de frenado = $\frac{(10 \times 74,24 + 30 \times 2)}{8} = 100,3$ tn.

Fuerza total en punto fijo = $78,6 + 100,3 = 178,9$ tn.

Esta fuerza se toma con tensón las fuerzas de diseño del caso mismo son:

En servicio = $H_s = 178,9$ Ton

En rotura $H_u = H_s \times 1,5 = 268,3$ Ton

Se dispone 1 tensón de $19 \times 0,6''$ con una carga de rotura $P_u = 505$ tn. Estos tensones se tesan al 40% de la carga de rotura $P_o = 0,40 \times 505 = 202$ tn.

Se hincan 2 neoprenos por tensón de $250 \times 400 \times 60$ (24)

GINPROSA

ASUNTO
E - 1502.0
ARMADURA EN RIOSTRA DE ESTRIBOS

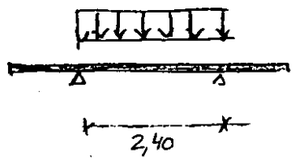
FECHA

PAG. 1

La reacción máxima sobre los apoyos de estribos es:

$R_{max} = 376 \text{ tm} \times 2 = 744 \text{ tm}.$

Para calcular la armadura inferior supondremos concentrada la reacción en los 2,40 del núcleo inferior:



$q = \frac{744}{2,40} = 310 \text{ t/m}.$

$M_d = 310 \times \frac{2,40^2}{8} = 223,2 \text{ mt}$

$V_d = 376 \text{ tm}.$

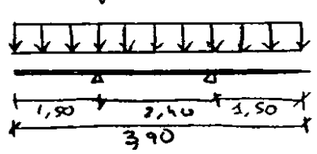
Suponemos un ancho de 2,00 m para tomar estos esfuerzos

y tenemos $A_{s,flexión} = 16,20 \text{ cm}^2/\text{m}. \rightarrow \phi 25/g20$

$A_{90,cortante} = 41 \text{ cm}^2/\text{m}. \rightarrow 2c\phi 16/0,20$



Para el cálculo de la armadura superior supondremos concentrada la reacción en el ancho superior del núcleo.



$q = \frac{744}{3,90} = 190,1 \text{ t/m}.$

$M_d = 190,1 \times \frac{1,50^2}{2} = 215 \text{ mt} \rightarrow$ mínimo

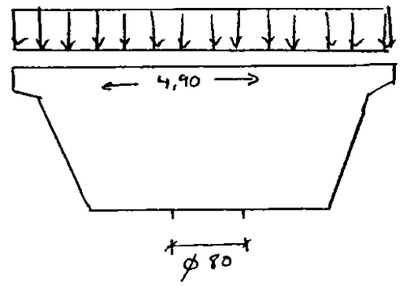
GINPROSA

ASUNTO
E-1502.0
ARMADURA EN RIOSTRA DE PILAS

PAG. 1

En la situación más desfavorable tenemos: una reacción vertical

$R_d, max = 1436 \text{ tm}.$



$q = \frac{1436}{4,90} = 293 \text{ t/m}$

$M_d = 293 \cdot \left(\frac{4,90}{2}\right)^2 \cdot 1/2 = 880 \text{ mt}.$

$V_d = 293 \times \frac{4,90}{2} = 718,1 \text{ tm}.$

Suponemos un ancho de viga colaborante de 2,00 m.

$A_{s,flexión} = 53,7 \text{ cm}^2/\text{m}. \rightarrow \phi 32/0,15$

$V_{cu} = 318,4 \text{ tm} \rightarrow A_{90} = 54 \text{ cm}^2/2,00 \text{ m} = 27 \text{ cm}^2/\text{m}.$

$2c\phi 16/0,25$

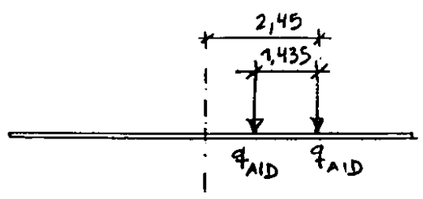
GINPROSA

ASUNTO: COMPROBACIONES FRENTE AL DESCARRILAMIENTO SEGÚN EUROCODIGO. E-1502.0

FECHA:

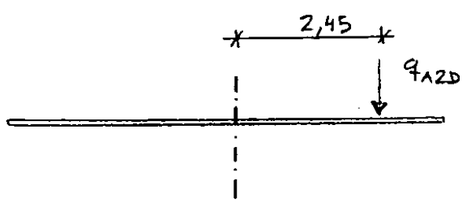
PAG. 1 /

SITUACIÓN 1



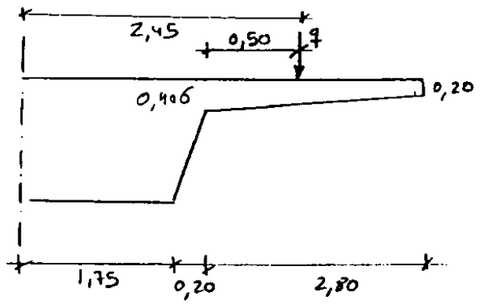
q_{A1D} = 50 KN/m. Continuas en bloques de 6,40 m separados 1,40 m

SITUACIÓN 2



q_{A2D} = 80 KN/m. y 20 m. de longitud.

COMPROBACIÓN DEL VOLADIZO



q_{A2} = 80 KN/m.

$V_d = \left(0,20 + \frac{0,206}{2}\right) \cdot 2,8 \cdot 2,5 + 0,75 + 8 = 10,9$ t/m.

$M_d = \left(0,20 \frac{2,80}{2} + \frac{0,206}{2} \cdot \frac{2,8}{3}\right) \cdot 2,8 \cdot 2,5 + 0,75 \cdot 2,8 + 8 \cdot 0,5 = 8,73$ mt/m.

V_{cu} = 25,0 t >

GINPROSA

ASUNTO: COMPROBACIONES FRENTE AL DESCARRILAMIENTO SEGÚN EUROCODIGO E-1502.0

1

PAG. 2 /

ESTABILIDAD DEL CONJUNTO

Dada la forma en planta del tablero es imposible el vuelco del mismo

El tensor máximo que podría actuar sobre la sección

$T_d = \left(2,45 - \frac{1,435}{2}\right) \cdot 10 \cdot \frac{20,0}{2} = 225$ mt.

El tensor último es.

$T_u = 2 \cdot A_c \cdot A_x \cdot f_{td} = 2 \cdot 5,254 \cdot 20,91 \cdot 4,2 = 922,9$ mt.

$T_u >> T_d$ ok

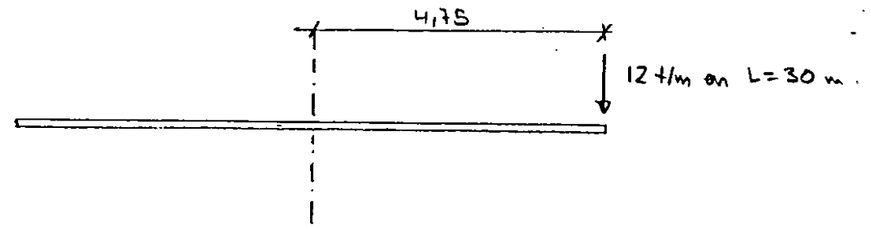
GINPROSA

ASUNTO

COMPROBACION FRENTE AL DESCARRILAMIENTO SEGÚN UIC-776-1 . E-1502.0

PAG. 1 /

CASO A



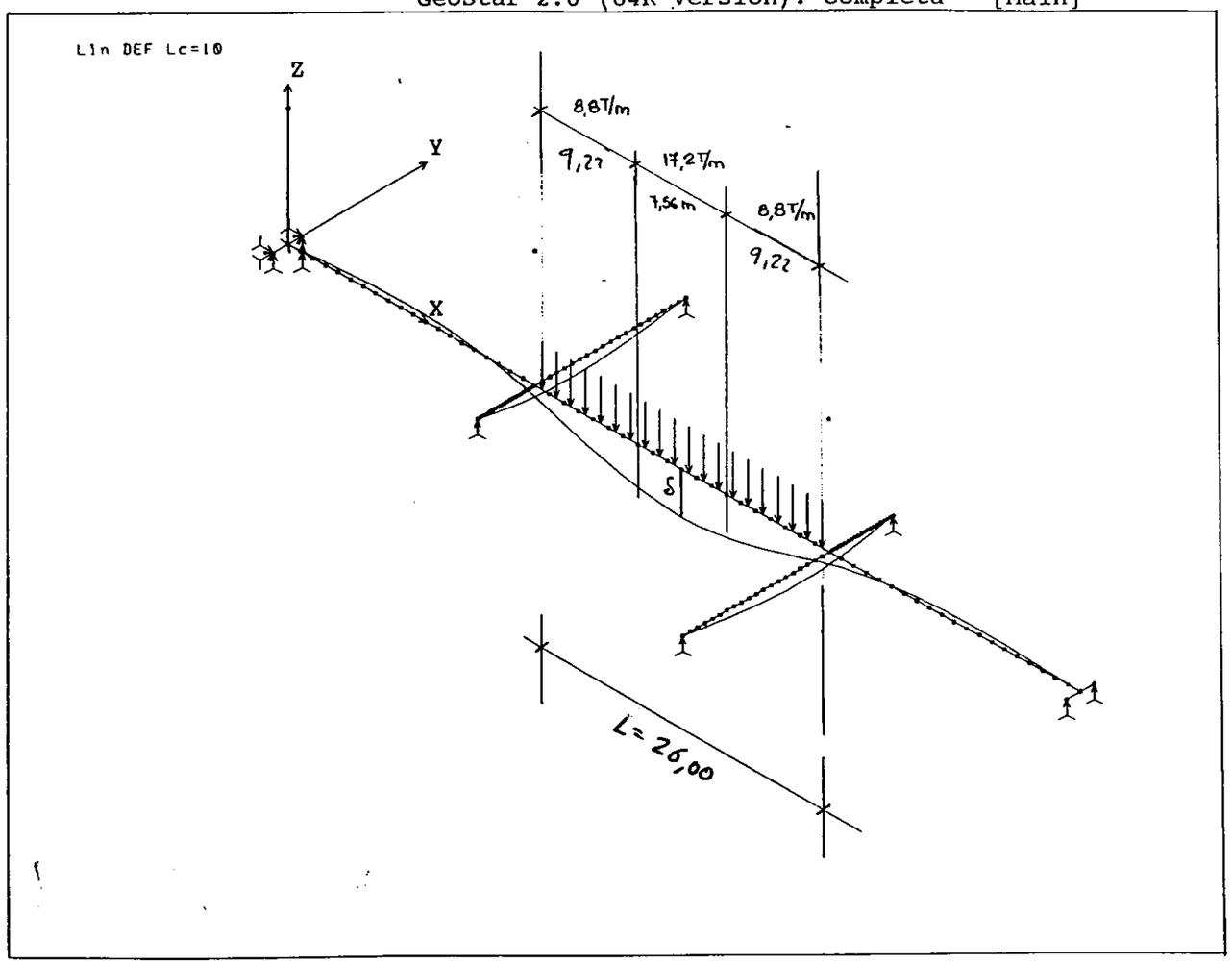
Momento volcador = 30 x 12 x 4,75 = 1710 mt

Debido a la dispersión en planta del tablero, es imposible el vuelco de la estructura

Tasar momento = 4,75 x 12 x .26/2 = 741 mt

Tasar último = 922,9 mt > 741 ok

ESTADO LIMITE DE DEFORMACIONES E-1502.0



$$\frac{\delta}{L} = \frac{6,85}{26000} = \frac{1}{3795} < \frac{1}{1363} \quad \therefore \text{ Verifica}$$

Node	UX	UY	UZ	RX	RY	RZ
1	0.000000	0.000000	0.000000	0.000000	-0.000170	0.000000
2	0.000000	0.000000	0.000187	-0.000008	-0.000168	0.000000
3	0.000000	0.000000	0.000371	-0.000016	-0.000164	0.000000
4	0.000000	0.000000	0.000547	-0.000024	-0.000155	0.000000
5	0.000000	0.000000	0.000712	-0.000032	-0.000143	0.000000
6	0.000000	0.000000	0.000862	-0.000039	-0.000128	0.000000
7	0.000000	0.000000	0.000993	-0.000047	-0.000109	0.000000
8	0.000000	0.000000	0.001101	-0.000055	-0.000086	0.000000
9	0.000000	0.000000	0.001182	-0.000063	-0.000061	0.000000
10	0.000000	0.000000	0.001234	-0.000071	-0.000031	0.000000
11	0.000000	0.000000	0.001251	-0.000079	0.000001	0.000000
12	0.000000	0.000000	0.001230	-0.000087	0.000037	0.000000
13	0.000000	0.000000	0.001167	-0.000094	0.000077	0.000000
14	0.000000	0.000000	0.001059	-0.000102	0.000120	0.000000
15	0.000000	0.000000	0.000901	-0.000110	0.000166	0.000000
16	0.000000	0.000000	0.000691	-0.000118	0.000216	0.000000
17	0.000000	0.000000	0.000423	-0.000126	0.000269	0.000000
18	0.000000	0.000000	0.000095	-0.000134	0.000325	0.000000
19	0.000000	0.000000	-0.000298	-0.000142	0.000385	0.000000
20	0.000000	0.000000	-0.000756	-0.000150	0.000444	0.000000
21	0.000000	0.000000	-0.001280	-0.000158	0.000505	0.000000
22	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24	0.000000	0.000000	-0.001978	-0.000142	0.000563	0.000000
25	0.000000	0.000000	-0.002731	-0.000127	0.000592	0.000000
26	0.000000	0.000000	-0.003504	-0.000112	0.000593	0.000000
27	0.000000	0.000000	-0.004261	-0.000097	0.000567	0.000000
28	0.000000	0.000000	-0.004968	-0.000082	0.000517	0.000000
29	0.000000	0.000000	-0.005597	-0.000067	0.000446	0.000000
30	0.000000	0.000000	-0.006119	-0.000052	0.000356	0.000000
31	0.000000	0.000000	-0.006514	-0.000037	0.000250	0.000000
32	0.000000	0.000000	-0.006763	-0.000022	0.000133	0.000000
33	0.000000	0.000000	-0.006857	-0.000007	0.000010	0.000000
34	0.000000	0.000000	-0.006791	0.000008	-0.000112	0.000000
35	0.000000	0.000000	-0.006568	0.000023	-0.000229	0.000000
36	0.000000	0.000000	-0.006199	0.000039	-0.000336	0.000000
37	0.000000	0.000000	-0.005702	0.000054	-0.000427	0.000000
38	0.000000	0.000000	-0.005097	0.000069	-0.000500	0.000000
39	0.000000	0.000000	-0.004411	0.000084	-0.000552	0.000000
40	0.000000	0.000000	-0.003673	0.000099	-0.000579	0.000000
41	0.000000	0.000000	-0.002917	0.000114	-0.000580	0.000000
42	0.000000	0.000000	-0.002177	0.000129	-0.000554	0.000000
43	0.000000	0.000000	-0.001490	0.000144	-0.000498	0.000000
46	0.000000	0.000000	-0.000972	0.000137	-0.000439	0.000000
47	0.000000	0.000000	-0.000518	0.000130	-0.000383	0.000000
48	0.000000	0.000000	-0.000126	0.000122	-0.000325	0.000000
49	0.000000	0.000000	0.000203	0.000115	-0.000271	0.000000
50	0.000000	0.000000	0.000474	0.000108	-0.000219	0.000000
51	0.000000	0.000000	0.000689	0.000101	-0.000171	0.000000
52	0.000000	0.000000	0.000854	0.000094	-0.000127	0.000000
53	0.000000	0.000000	0.000971	0.000086	-0.000085	0.000000
54	0.000000	0.000000	0.001044	0.000079	-0.000047	0.000000
55	0.000000	0.000000	0.001077	0.000072	-0.000013	0.000000
56	0.000000	0.000000	0.001074	0.000065	0.000019	0.000000
57	0.000000	0.000000	0.001037	0.000058	0.000047	0.000000
58	0.000000	0.000000	0.000971	0.000050	0.000072	0.000000
59	0.000000	0.000000	0.000880	0.000043	0.000093	0.000000
60	0.000000	0.000000	0.000767	0.000036	0.000111	0.000000
61	0.000000	0.000000	0.000635	0.000029	0.000126	0.000000
62	0.000000	0.000000	0.000489	0.000022	0.000138	0.000000
63	0.000000	0.000000	0.000332	0.000014	0.000146	0.000000
64	0.000000	0.000000	0.000168	0.000007	0.000151	0.000000
65	0.000000	0.000000	0.000000	0.000000	0.000152	0.000000

PUENTE E-1502.0

3º CALCULO DE PILAS

GINPROSA

ASUNTO
E - 1502.0
CALCULO DE PILAS.

PAG. 1

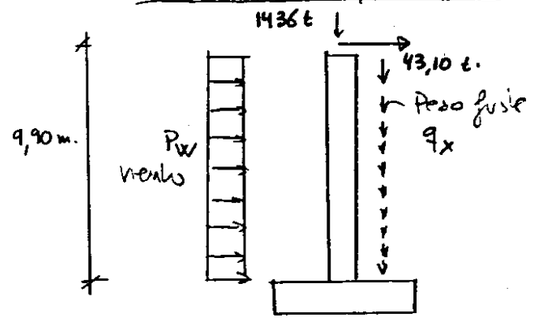
En todas las pilas se disponen apoyos POT libres por lo que las fuerzas actuantes en cabeza de las mismas son el 3% de la cara vertical total. Del calculo de reacciones en ELU efectuado en el cálculo del tablero se obtienen las siguientes reacciones:

P1-DCHA y P2-17DA $R_{max,d}$ = 1436 ton. → H_d = 43,1 ton.

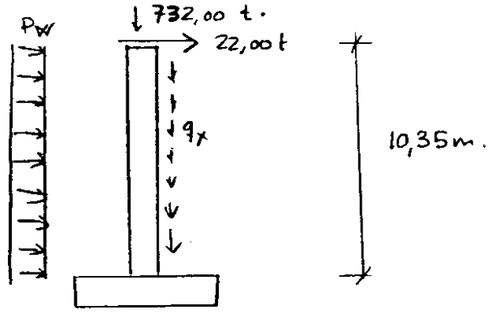
P1-17DA y P2-DCHA $R_{max,d}$ = 732 ton. → H_d = 22,00 ton.

La altura de fuste es de 9,90m. y 10,40m respec. Se realiza un calculo con el programa PYDUS que tiene en cuenta los efectos de 2º orden.

Pilas P1-DCHA y P2-17DA



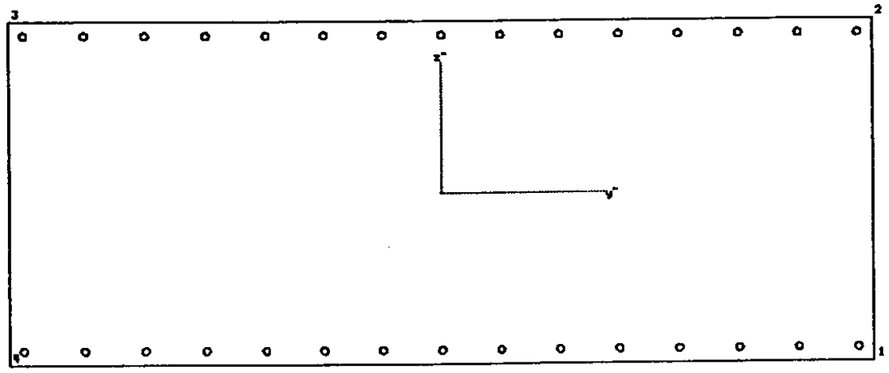
Pilas P1-17DA y P2-DCHA



q_x = 3,75 m² x 2,5 x1,50 = 14,1 t/m.

P_w = 3,75 x 0,2 x 1,50 = 0,98 t/m.

Mstb. 1 : 20.0



Sección :"FUSTE" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H300PIL"

Ancho = 300.00 cm Canto = 120.00 cm

Características mecánicas de la sección:
Area : Ax= 3.600 [m2]
Momentos de inercia : Iy= 0.432000 [m4] Iz= 2.700 [m4]
Inercia a torsión : Ix= 1.293 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.600000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-1.500	-1.800	0.500
dch.	Iz	1.500	1.800	-0.500
abajo	Iy	-0.600	-0.719999	0.200
arriba	Iy	0.600	0.719999	-0.200

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	73.63	-145.00	5.00	145.00	5.00
2	AEH500	(2)	73.63	-145.00	115.00	145.00	115.00

Total: 147.26 Cuantía de armadura: 0.409 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H300PIL")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	300.00 [cm]	116.00 [cm]	0.00
Vy	0.00 [cm2/m]	120.00 [cm]	296.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H300PIL"	210000.0	-153.000	-2.000	0.0	10.000	300.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Pila ''P1-D'
****

Título : 'PILAS . SUBTRAMO XV'
Altura de la pila : 9.900 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo
Nu [m] d-xyz r-xyz

Nu	[m]	d-xyz	r-xyz
2	9.900		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba	Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :					
Nudo 2	Fuerza	x [kN]	-14360.000		
	Fuerza	z [kN]	431.000		
Barra 1	Fuerza	x [kN/m]	-141.000		
Barra 1	Fuerza	z [kN/m]	9.800		

D I M E N S I O N A M I E N T O (global) <B.P1-D.1>

PARAMETROS DE CALCULO:
Norma..... EH
Criterio de rotura..... Agotamiento de secciones o del sistema
Rotura de secciones..... Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada).... -2.000 [o/oo]
- Hormigón (flexión)..... -3.500 [o/oo]
- Acero ..... 10.00 [o/oo]
Coef. min. resist. (gamma_r)... 1.000
Coeficiente de fluencia..... 2.000
Carga contribuyente a fluencia. 1.000 * Carga permanente G1
Nº de elementos 6
Tolerancia desequi. fuerzas.... 0.156 [kN]
Tolerancia desequi. momentos... 0.047 [kNm]
Mayoración de cargas..... 1.000 * Carga permanente G1

RESULTADOS DEL CALCULO NO LINEAL:
La armadura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	3.000	1.200	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-7.69	0.00	0.00	0.000	-10.408	0.000
Máxima	0.00	0.00	69.26	0.000	0.000	0.000

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-15639.57	0.00	-519.93	0.00	-2.22	0.00
Máxima	-14476.32	0.00	-439.08	0.00	5776.98	0.00

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	Ely [kNm²]	Elz [kNm²]
Mínima	-8.8	-416.7	-0.699	-1.984	2.585E+6	1.096E+7
Máxima	0.0	98.3	0.193	0.468	2.877E+6	1.430E+7

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	9.900	FUSTE	147.3	0.41	24
	8.250	FUSTE	147.3	0.41	27
	6.600	FUSTE	147.3	0.41	31
	4.950	FUSTE	147.3	0.41	36
	3.300	FUSTE	147.3	0.41	41
	1.650	FUSTE	147.3	0.41	46
	0.000	FUSTE	147.3	0.41	52

(≤) : Armadura ≤ μ_min = 0.40%
(≥) : Armadura ≥ μ_max = 8.00%

ESFUERZOS (global)
<B.P1-D.1> Carga: 1.00*G1

Coord-x	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
9.900	-14476.32	0.00	-439.08	0.00	-2.22	0.00
8.250	-14476.32	0.00	-439.08	0.00	968.63	0.00
8.250	-14708.97	0.00	-455.25	0.00	968.63	0.00
6.600	-14708.97	0.00	-455.25	0.00	1956.59	0.00
6.600	-14941.62	0.00	-471.42	0.00	1956.59	0.00
4.950	-14941.62	0.00	-471.42	0.00	2947.24	0.00
4.950	-15174.27	0.00	-487.59	0.00	2947.24	0.00
3.300	-15174.27	0.00	-487.59	0.00	3925.39	0.00
3.300	-15406.92	0.00	-503.76	0.00	3925.39	0.00
1.650	-15406.92	0.00	-503.76	0.00	4874.88	0.00
1.650	-15639.57	0.00	-519.93	0.00	4874.88	0.00
0.000	-15639.57	0.00	-519.93	0.00	5776.98	0.00

Pila ''P1-I'
****

Título : 'PILAS SUBTRAMO XV'
Altura de la pila : 10.350 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo

Nu	[m]	d-xyz	r-xyz
2	10.350		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba		Tipo Car.		Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :							
Nudo	2	Fuerza	x	[kN]	-7320.000		
		Fuerza	z	[kN]	220.000		
Barra	1	Fuerza	x	[kN/m]	-141.000		
Barra	1	Fuerza	z	[kN/m]	9.800		

D I M E N S I O N A M I E N T O (global) <B.P1-1.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia	1.000 * Carga permanente G1
No de elementos	6
Tolerancia desequi. fuerzas	0.087 [kN]
Tolerancia desequi. momentos	0.028 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	3.000	1.200	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-4.08	0.00	0.00	0.000	-5.247	0.000
Máxima	0.00	0.00	36.84	0.000	0.000	0.000

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-8657.74	0.00	-312.98	0.00	-2.43	0.00
Máxima	-7441.61	0.00	-228.45	0.00	3089.84	0.00

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	Ely [kNm²]	Elz [kNm²]
Mínima	-5.0	-213.7	-0.358	-1.018	2.760E+6	1.216E+7
Máxima	0.0	44.1	0.089	0.210	3.007E+6	1.512E+7

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	10.35	FUSTE	147.3	0.41	12
	8.625	FUSTE	147.3	0.41	14
	6.900	FUSTE	147.3	0.41	16
	5.175	FUSTE	147.3	0.41	19
	3.450	FUSTE	147.3	0.41	22
	1.725	FUSTE	147.3	0.41	25
	0.000	FUSTE	147.3	0.41	28

(≤) : Armadura ≤ μ_min = 0.40%
(≥) : Armadura ≥ μ_max = 8.00%

ESFUERZOS (global)
<B.P1-1.1> Carga: 1.00*G1

Coord-x	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
10.350	-7441.61	0.00	-228.45	0.00	-2.43	0.00
8.625	-7441.61	0.00	-228.45	0.00	458.44	0.00
8.625	-7684.84	0.00	-245.36	0.00	458.44	0.00
6.900	-7684.84	0.00	-245.36	0.00	947.13	0.00
6.900	-7928.06	0.00	-262.26	0.00	947.13	0.00
5.175	-7928.06	0.00	-262.26	0.00	1459.58	0.00
5.175	-8171.29	0.00	-279.17	0.00	1459.58	0.00
3.450	-8171.29	0.00	-279.17	0.00	1991.16	0.00
3.450	-8414.51	0.00	-296.07	0.00	1991.16	0.00
1.725	-8414.51	0.00	-296.07	0.00	2536.66	0.00
1.725	-8657.74	0.00	-312.98	0.00	2536.66	0.00
0.000	-8657.74	0.00	-312.98	0.00	3089.84	0.00

SUBTRAMO XV
E-1502.0

DIMENSIONAMIENTO DE ZAPATAS DE PILAS

PILAS P1-DCHA Y P2-IZDA.

Dimensiones de zapata

A=	7.00	m.	Peso de zapata=	162.75	t.
B=	6.20	m.			
Cz=	1.50	m.			

Cargas de servicio

	En cabeza de fustes	En cara sup. de zapata	En cara infe. de zapata
N=	947	1039.813	1202.6
H=	28.41	34.845	34.845
M=	0	313.112	365.380

Tension cobaricentrica= 31 t/m2

Armaduras de la zapata

Direcc. Z	Vuelo flexion	2.68 m.	Md,z=	165.5 m.t/m
			As,inf,z=	31.09 cm2/m
	Vuelo cortante	1.75 m.	Vd,z=	80.6 t/m
			Vcu=	90.4 t/m
				No necesita armadura de cortante
Direcc. Y	Vuelo flexion	2.38 m.	Md,y=	130.5 m.t/m
			As,inf,y=	24.52 cm2/m
	Vuelo cortante	1.15 m.	Vd,y=	53.0 t/m
			Vcu=	90.4 t/m
				No necesita armadura de cortante

PILAS P1-IZDA. Y P2-DCHA.

Dimensiones de zapata

A=	6.00	m.	Peso de zapata=	101.25	t.
B=	4.50	m.			
Cz=	1.50	m.			

Cargas de servicio

	En cabeza de fustes	En cara sup. de zapata	En cara infe. de zapata
N=	496	593.500	694.8
H=	14.88	21.640	21.640
M=	0	183.952	216.412

Tension cobaricentrica= 30 t/m2

Armaduras de la zapata

Direcc. Z	Vuelo flexion	1.83 m.	Md,z=	75.0 m.t/m
			As,inf,z=	14.10 cm2/m
	Vuelo cortante	0.9 m.	Vd,z=	40.3 t/m
			Vcu=	90.4 t/m
				No necesita armadura de cortante
Direcc. Y	Vuelo flexion	1.88 m.	Md,y=	79.2 m.t/m
			As,inf,y=	14.88 cm2/m
	Vuelo cortante	0.65 m.	Vd,y=	29.1 t/m
			Vcu=	90.4 t/m
				No necesita armadura de cortante

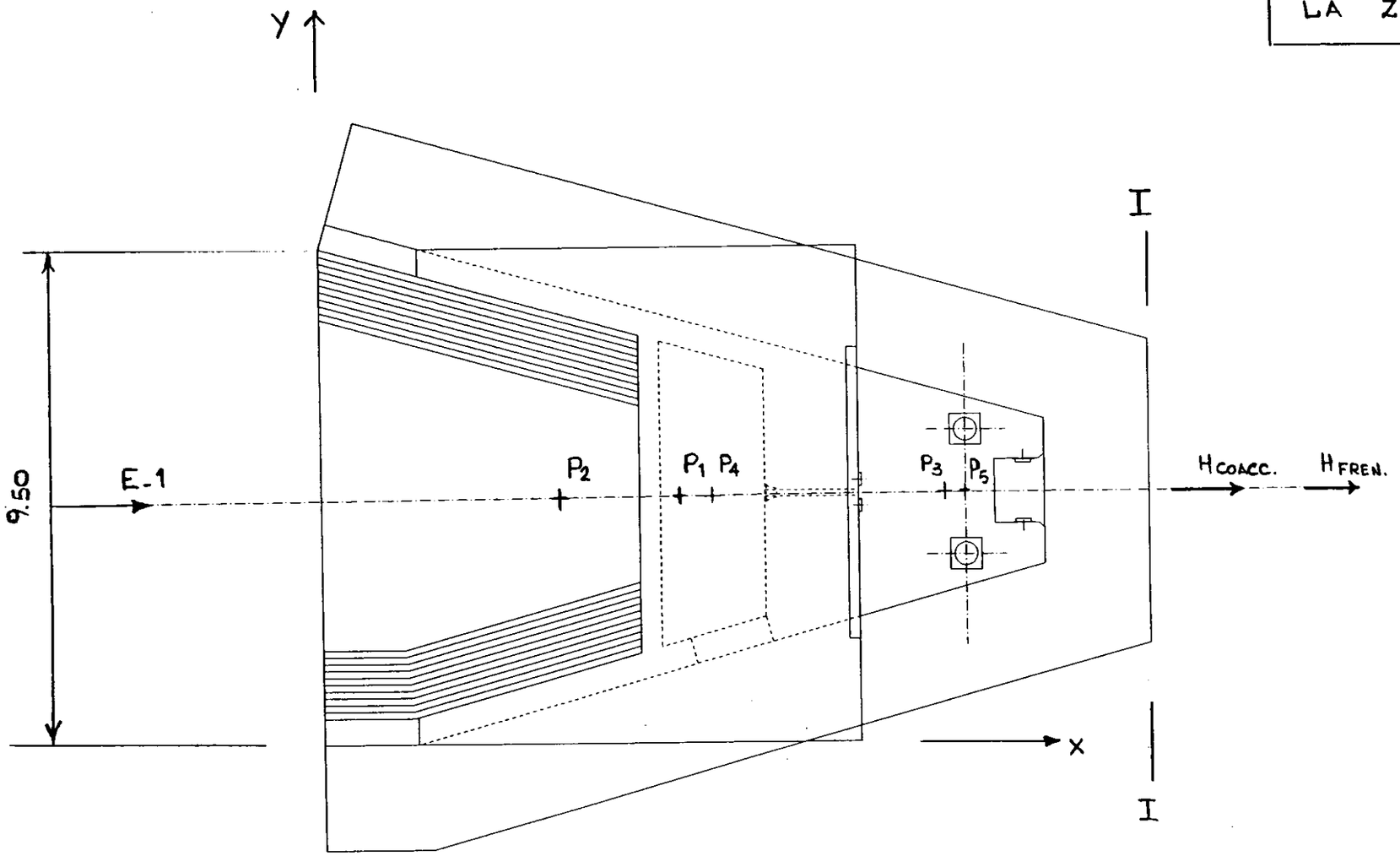
PUENTE E-1502.0

4º CALCULO DE ESTRIBOS

E_1502.0

CALCULO ESTRIBO 1

CARGAS SOBRE LA ZAPATA



ESTADOS LIMITES DE EQUILIBRIO

CARGAS VERTICALES

	Permanentes ton.	Variables ton.	X m.	Y m.
P-1	764		6.84	4.75
P-2	2020	234	4.52	4.75
P-3	352		11.89	4.75
P-4	-42		7.44	4.75
P-5	260	115	12.32	4.75
TOTAL =	3354	349		

CARGAS HORIZONTALES

		H coacc ton.	H frenado ton.			
H-5		78	97			
	Empuje de tierras					
E-1	0.5	9.834		14.9	9.50	696 ton.
	1.0	0.990		14.9	9.50	140 ton.
						836 ton.

SEGURIDAD AL DESLIZAMIENTO

En Construcción v_D máx = 1.35

Cargas Deslizantes	836 ton.
Cargas Resistentes	1935 ton.
v_D =	2.31

En Servicio sin Frenado v_D máx = 1.5

	78 ton.
	836 ton.
Cargas Deslizantes	914 ton.
Cargas Resistentes	2070 ton.
v_D =	2.26

En Servicio con Frenado v_D máx = 1.35

	78 ton.
	97 ton.
	836 ton.
Cargas Deslizantes	1011 ton.
Cargas Resistentes	2070 ton.
v_D =	2.05

SEGURIDAD AL VOLCAMIENTO

Ancho de Zapata = 15.82 m.

	Permanentes Totales ton.	Ancho - x m.	mT.	Variables Totales ton.	Ancho - x m.	mT.
P-1	764	8.98	6862	0	8.98	0
P-2	2020	11.30	22823	234	11.30	2650
P-3	352	3.93	1384	0	3.93	0
P-4	-42	8.38	-356	0	8.38	0
P-5	260	3.50	910	115	3.50	403
TOTAL =	3354	9.43	31624	349	8.73	3052

En Servicio con Frenado v V máx = 1.35

Momento de Vuelco

78	10.70	835
97	10.70	1038
696	4.97	3457
140	7.45	1044
		6373 Tm.

Momento Resistente

3354	9.43	31624
349	8.73	3052
		34676 Tm.

v V = 5.44

SEGURIDAD AL HUNDIMIENTO

Area = 160.88 m2.
Inercia = 3092.67 m4.
Distancia fibra mas comprimida = 8.98 m.
Distancia fibra menos comprimida = 6.84 m.

	Ton.	Ancho - x m.	Tm.
	3354	9.43	31624
	349	8.73	3052
V =	3703	9.36	34676 Tm.

Distancia de V respecto a I-I = 9.36

M tierras =	696	4.97	3457
	140	7.45	1044
			4501 Tm.

M frenado+coacción =	175	10.70	1873
			1873 Tm.

Esfuerzos sobre el centro de Gravedad de la zapata

V = 3703 Ton.
M v = -1422 mT.

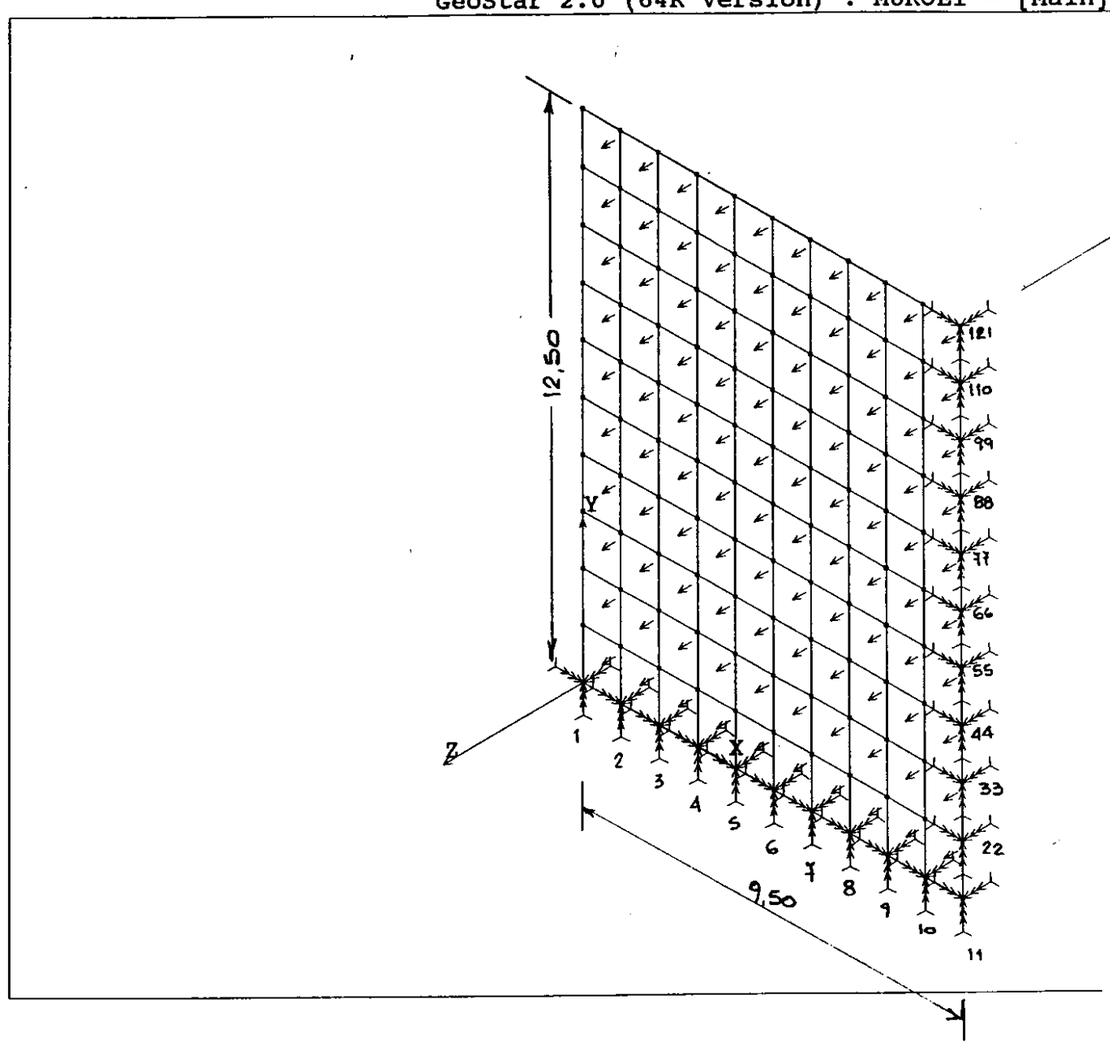
M fren.+coacc = 1873 mT.

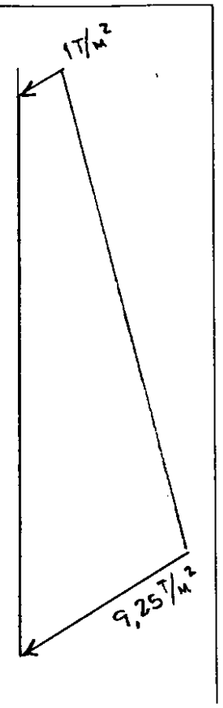
M tierras = 4501 mT.

σ máx = 37.4 T/m2.
σ med = 23.0 T/m2.
σ mín = 12.1 T/m2.

σ adm = 30.0 T/m2.
1.25 x σ adm = 37.5 T/m2.

Estribo 1 Estado Límite de Equilibrio





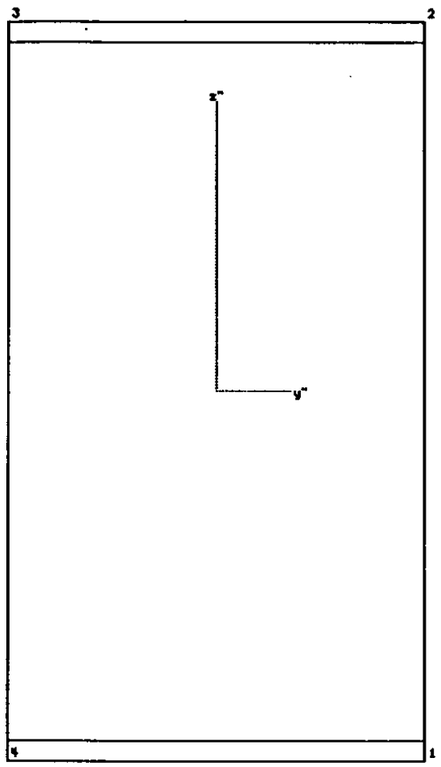
SOLICITACIONES ARISTA HORIZONTAL

NODO	my Tm/m	vy T/m	Tracción nx T/m
1	-192.6	-62.7	78
2	-184.0	-66.1	78
3	-172.9	-61.3	78
4	-154.3	-53.6	78
5	-132.3	-46.2	
6	-108.3	-38.6	
7	-83.3	-30.3	
8	-58.5	-21.1	
9	-36.1	-11.7	
10	-18.4	-4.6	

SOLICITACIONES ARISTA VERTICAL

NODO	mx Tm/m	vx	Espesor m.	175 Ton./ 2 = 87.5 Ton	Empuje s/ muro frontal T/m	Tracción nx T/m
121	-22.8	-9.8	0.50	21.9		
110	-30.2	-15.1	0.63	43.8	4.6	39.6
99	-43.8	-20.4	0.76	21.9	6.6	24.1
88	-56.4	-25.8	0.89		8.7	8.7
77	-66.0	-30.3	1.02		10.8	10.8
66	-70.1	-32.3	1.15		12.8	12.8
55	-66.8	-30.9	1.28		14.9	14.9
44	-55.6	-25.3	1.41			
33	-38.7	-16.1	1.54			
22	-21.0	-6.5	1.67			
11			1.80			

Mstb. 1 : 15.0



Sección :"M1VERT" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 180.00 cm

Características mecánicas de la sección:
Area : Ax= 1.800 [m2]
Momentos de inercia : Iy= 0.486000 [m4] Iz= 0.150000 [m4]
Inercia a torsión : Ix= 0.391651 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.900000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.500	-0.300000	0.167
dch.	Iz	0.500	0.300000	-0.167
abajo	Iy	-0.900	-0.539999	0.300
arriba	Iy	0.900	0.539999	-0.300

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	49.10	-50.00	5.00	50.00	5.00
2	AEH500	(2)	24.55	-50.00	175.00	50.00	175.00
	Total:		73.65	Cuantía de armadura: 0.409 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	176.00 [cm]	0.00
Vy	0.00 [cm2/m]	180.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

ARISTA HORIZONTAL

N_d 78 × 1,50 = 117 Ton/m

M_d 192,6 × 1,50 = 288,9 Tm/m

Dimensionamiento : Viga "M1VERT"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
117.000				288.900		45.0

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	49.10	51.52	51.52
2 "AEH500"	-50.0	175.0	50.0	175.0	24.55	-	24.55

Cuantía arm. 0.42 [o/o] Suma 76.07

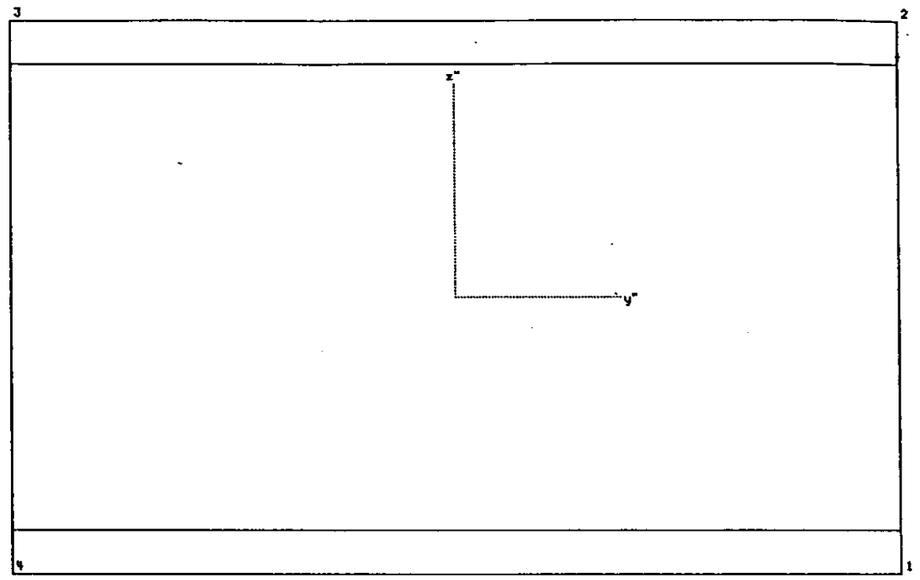
Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	180.00	-0.915	-99.893	"H250"
Armadura-Min	-50.00	175.00	-0.603	-1265.722	"AEH500"
Hormigón-Max	50.00	-0.00	10.312	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 165.34 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 14.66 cm Zona comprimida/Canto útil 0.08

ARISTA VERTICAL

Mstb. 1 : 7.0



Sección :"M1HOR01" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 63.00 cm

Características mecánicas de la sección:
Area : Ax= 0.630000 [m2]
Momentos de inercia : Iy= 0.020837 [m4] Iz= 0.052500 [m4]
Inercia a torsión : Ix= 0.050698 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.315000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.500	-0.105000	0.167
dch.	Iz	0.500	0.105000	-0.167
abajo	Iy	-0.315	-0.066150	0.105
arriba	Iy	0.315	0.066150	-0.105

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	24.55	-50.00	5.00	50.00	5.00
2	AEH500	(2)	13.40	-50.00	58.00	50.00	58.00

Total: 37.95 Cuantía de armadura: 0.602 [o/o]

Cód. dimensionamiento: (0) = As constante

ARISTA VERTICAL

Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	59.00 [cm]	0.00
Vy	0.00 [cm2/m]	63.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

ARISTA VERTICAL

$N_d = 1{,}50 \times 39{,}6 = 59{,}4$ T/m
$M_d = 1{,}50 \times 30{,}2 = 45{,}3$ Tm/m

Dimensionamiento : Viga "M1HORO1"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
59.400				45.300		45.0

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. As [cm2]	As-nuevo [cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	24.55	25.45	25.45
2 "AEH500"	-50.0	58.0	50.0	58.0	13.40	-	13.40

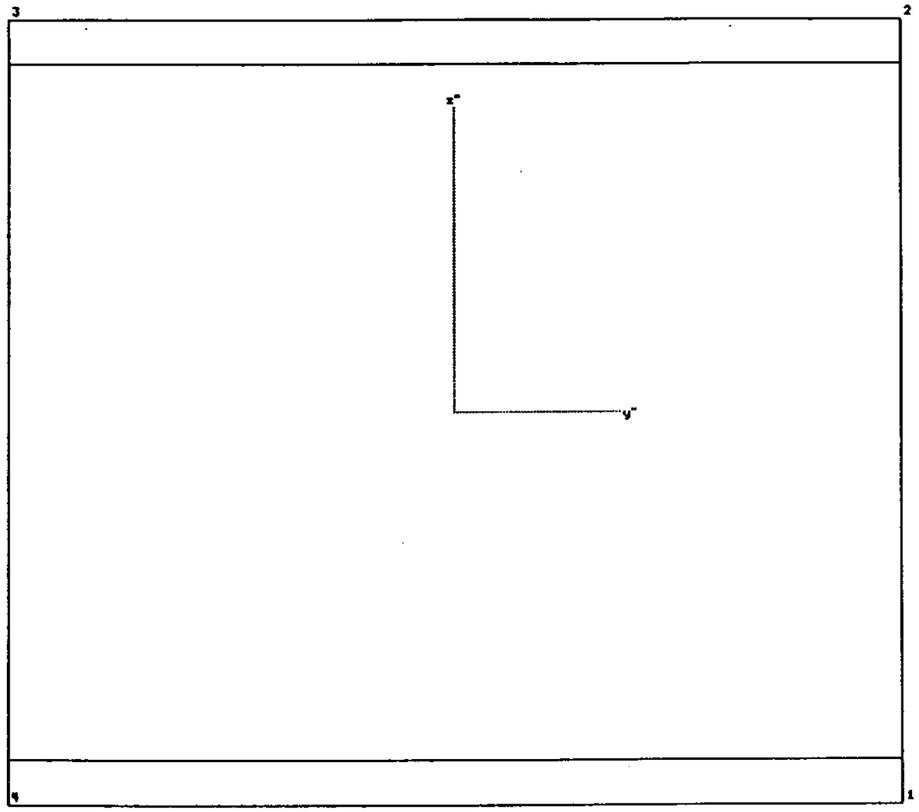
Cuantía arm. 0.62 [o/o] Suma 38.85

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	63.00	-1.255	-121.972	"H250"
Armadura-Min	-50.00	58.00	-0.285	-598.663	"AEH500"
Hormigón-Max	50.00	0.00	10.970	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 56.53 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 6.47 cm Zona comprimida/Canto útil 0.11

Mstb. 1 : 7.0



Sección :"M1HOR02" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 89.00 cm

Características mecánicas de la sección:
Area : Ax= 0.890000 [m2]
Momentos de inercia : Iy= 0.058747 [m4] Iz= 0.074167 [m4]
Inercia a torsión : Ix= 0.110054 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.445000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.500	-0.148333	0.167
dch.	Iz	0.500	0.148333	-0.167
abajo	Iy	-0.445	-0.132017	0.148
arriba	Iy	0.445	0.132017	-0.148

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	24.55	-50.00	5.00	50.00	5.00
2	AEH500	(2)	13.40	-50.00	84.00	50.00	84.00
	Total:		37.95	Cuantía de armadura: 0.426 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	85.00 [cm]	0.00
Vy	0.00 [cm2/m]	89.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

ARISTA VERTICAL

$N_d = 1{,}50 \cdot 8{,}7\ T/m = 13{,}0\ T/m$

$M_d = 1{,}50 \cdot 56{,}4\ Tm/m = 84{,}6\ Tm/m$

Dimensionamiento : Viga "M1HOR02"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
13.000				84.600		45.0

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	24.55	25.32	25.32
2 "AEH500"	-50.0	84.0	50.0	84.0	13.40	-	13.40

Cuantía arm. 0.44 [o/o] Suma 38.72

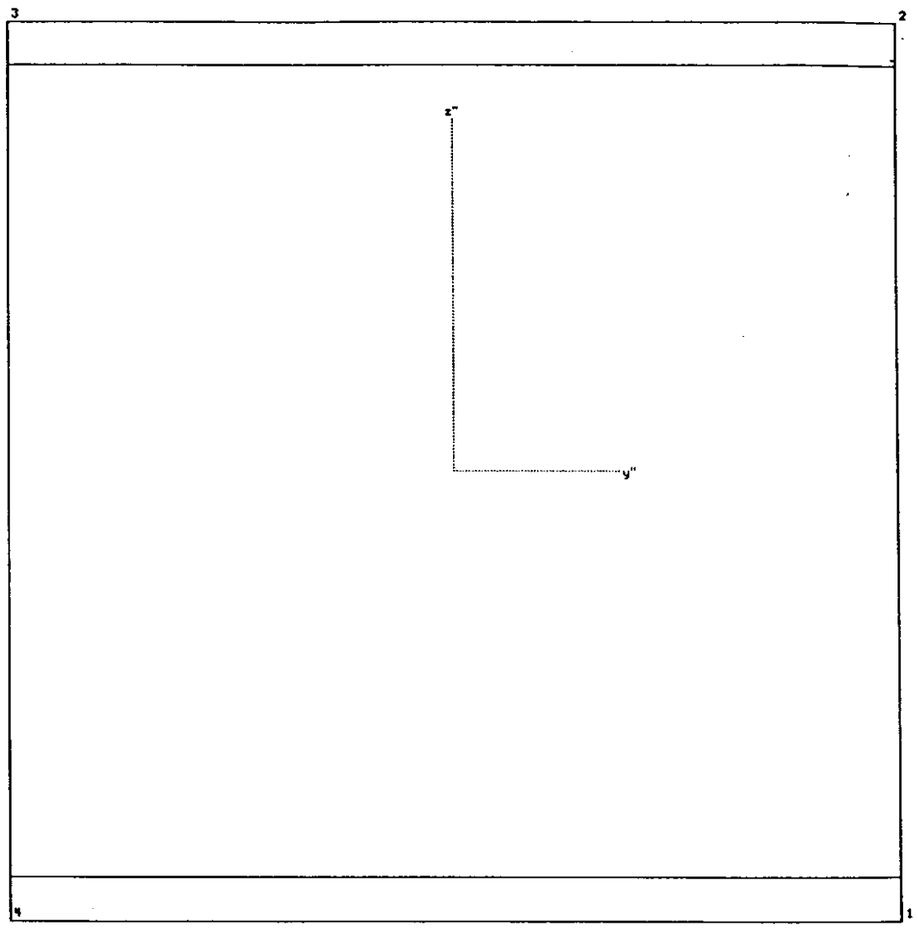
Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	89.00	-1.406	-129.105	"H250"
Armadura-Min	-50.00	84.00	-0.727	-1526.632	"AEH500"
Hormigón-Max	50.00	0.00	10.679	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 78.65 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 10.35 cm Zona comprimida/Canto útil 0.12

ARISTA VERTICAL

Mstb. 1 : 7.0



Sección :"M1HOR03" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 102.00 cm

Características mecánicas de la sección:
Area : Ax= 1.020 [m2]
Momentos de inercia : Iy= 0.088434 [m4] Iz= 0.085000 [m4]
Inercia a torsión : Ix= 0.146013 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.510000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.500	-0.170000	0.167
dch.	Iz	0.500	0.170000	-0.167
abajo	Iy	-0.510	-0.173400	0.170

ARISTA VERTICAL

arriba Iy 0.510 0.173400 -0.170

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	20.94	-50.00	5.00	50.00	5.00
2	AEH500	(2)	13.40	-50.00	97.00	50.00	97.00
	Total:		34.34	Cuantía de armadura: 0.337 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	98.00 [cm]	0.00
Vy	0.00 [cm2/m]	102.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

ARISTA VERTICAL

Nd = 1,50 x 10,8 = 16,2
Md = 1,50 x 66,0 = 99,0

Dimensionamiento : Viga "M1HOR03"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
16.200				99.000		45.0

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. As [cm2]	As-nuevo [cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	20.94	25.89	25.89
2 "AEH500"	-50.0	97.0	50.0	97.0	13.40	-	13.40
				Cuantía arm. 0.39 [o/o]		Suma	39.29

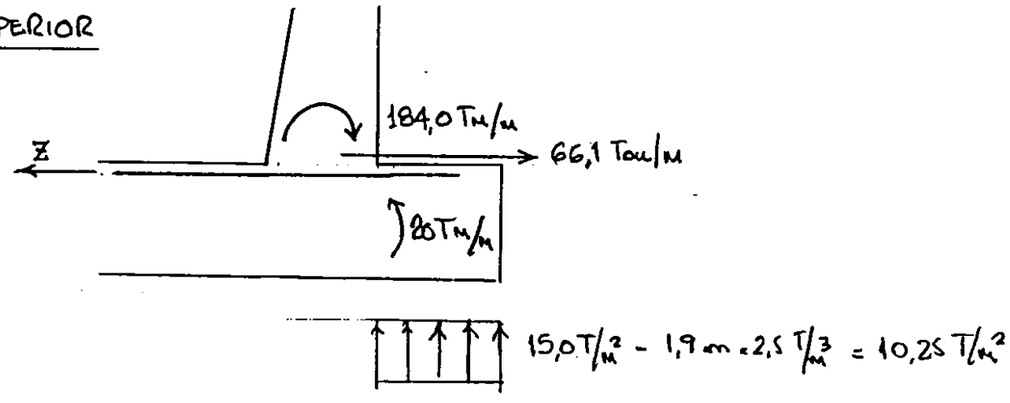
Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	102.00	-1.286	-123.563	"H250"
Armadura-Min	-50.00	97.00	-0.704	-1479.301	"AEH500"
Hormigón-Max	50.00	0.00	10.582	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

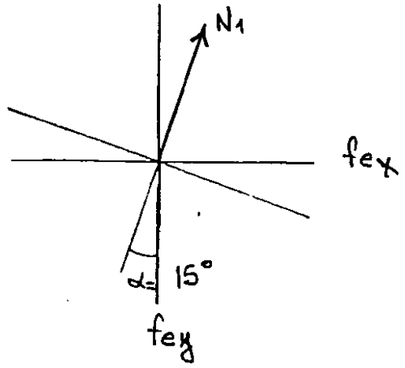
Fibra neutra zn 90.95 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 11.05 cm Zona comprimida/Canto útil 0.11

ARMADURA DE SAPATA

SUPERIOR



$$a_{s\,z} = \frac{(184,0 - 20,0) \times 1,5}{0,9 \times 1,85 \times 4,435} + \frac{66,1 \times 1,5}{4,435} = 55,4 \text{ cm}^2/\text{m}$$



$$R=0 \leftarrow \begin{cases} N_1 = 55,4 \text{ Tou} \\ N_2 = 0,0 \end{cases}$$

$f_{ey} = 1,18 \cdot a_{sz}$

$f_{ey} = 65,4 \text{ cm}^2/\text{m}$

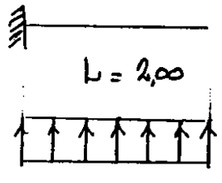
$f_{ex} = 0,3 \times a_{sz}$

$f_{ex} = 16,6 \text{ cm}^2/\text{m}$

$f_{ey} = 2 \times \phi 25/0,15$ (SUPERIOR)

$f_{ex} = \phi 20/0,15$ (SUPERIOR)

INFERIOR



$q = 37,4 \text{ T/m}^2 - 1,9 \times 2,5 = 32,65 \text{ Tm/m}$

$$M_d = 1,50 \times 32,65 \text{ Tm/m} \left(2,00\right)^2 \frac{1}{2} = 98,0 \text{ Tm/m}$$

$A_s = 12,1 \text{ cm}^2/\text{m}$

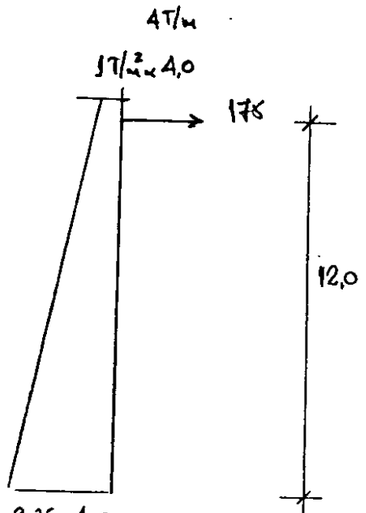
$f_{ey} = 1,18 \times 12,1 \text{ cm}^2/\text{m} = 14,3 \text{ cm}^2/\text{m}$

$f_{ex} = 0,30 \times 12,1 \text{ cm}^2/\text{m} = 3,7 \text{ cm}^2/\text{m}$

$f_{ey} = \phi\ 20/0,20$

$f_{ex} = \phi\ 20/0,20$

ARMADURA DEL NUCLEO



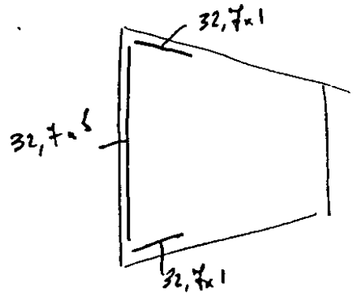
37T/m

$$M_{d\,BASE} = \left(175 \times 12{,}0 + 4 \times \frac{(12{,}0)^2}{2} + \frac{1}{2}\,33 \times 12{,}5 \times \frac{12{,}5}{3}\right) \times 1{,}50$$

$$= \cancel{3}\ 4908\ T_M \qquad 3150\ T_M.$$

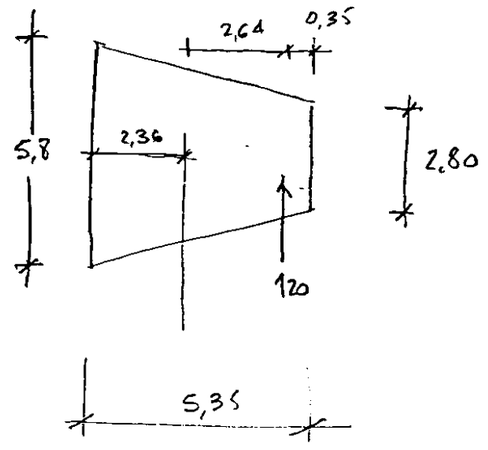
Secc. $4{,}00 \times 5{,}35$

$$A_s = \frac{212\ cm^2}{5{,}5\ m} = 38{,}5\ cm^2 \qquad \underline{\phi 25/0{,}15.}$$



$32{,}7 \times 5 + 32{,}0 \times 2 = 229\ cm^2$

$\underline{> 212\ cm^2}$



22,96

$$T_d = 2{,}64 \times 120\ Tm \times 1{,}5 = 475{,}2\ Tm$$

$$\frac{A_t}{s} = \frac{A_{sl}}{s} = \frac{T_d}{2\,A_e\,f_{yd}} = \frac{475{,}2}{2 \times (4{,}60)^2 \times 4{,}2} = \underline{2{,}7\ cm^2/m.}$$

$\underline{5{,}35 \times 4{,}30.}$

$M = 120 \times 12 = 1440\ T_M$

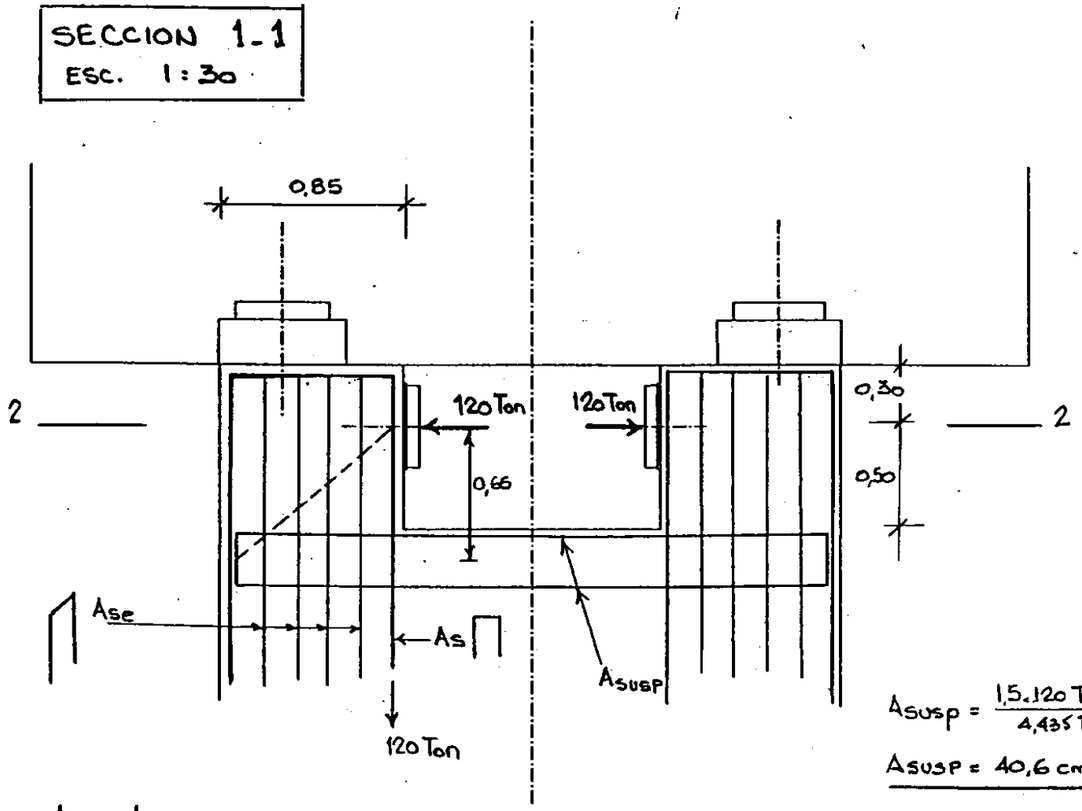
$M_2 = 1{,}5 \times 1440 = 2160\ Tm.$

$$A_s = \frac{115{,}52\ cm^2}{5{,}35\ m} = 21{,}6\ \frac{cm^2}{m}$$

$\phi 25/0{,}15$

Horiz. $\phi 20/0{,}20$

CALCULO DE ARMADURAS EN ZONA DEL APOYO TRANSVERSAL



$A_{susp} = \frac{1,5 \cdot 120\ T}{4,435\ T/cm^2}$

$A_{susp} = 40,6\ cm^2$

$A_{s1} = A_{sff} + A_{sn}$

A_{sff} { $M_d = 1,50 \times 120\ Ton \times 0,65\ m = 117\ Tm$; $b = 0,68 m.$, $h = 0,85 m$, $d = 0,80 m$ } $A_{sff} = 36,9\ cm^2$

$$A_{sn} = \frac{N_d}{f_{yd}} = 0$$

$$A_{s1} = 36,9\ cm^2$$

$$A_{s2} = 2/3\ A_{sv} + A_{sn}$$

$$A_{sv} = \frac{V_d}{f_{yd}\ \cot g\ \theta} = \frac{1,5 \times 120T}{4,2\ T/cm^2 \times (1,0)} = 42,9\ cm^2$$

$$A_{s2} = 42,9\ cm^2$$

$$A_{s3} = 0,04\ \frac{f_{cd}}{f_{yd}}\ b\ d$$

$$A_{s3} = 0,04\ \frac{167}{4935} \times 68\ cm \times 85\ cm$$

$$A_{s3} = 8,7\ cm^2$$

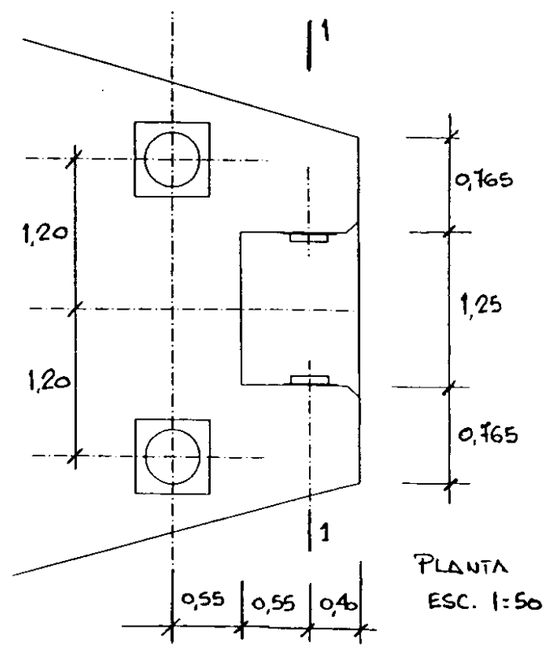
$$\therefore\ \underline{A_s = A_{s2} = 42,9\ cm^2}$$

$$\tau_d = \frac{V_d}{b.d} = \frac{1,50 \times 120\ Ton}{0,68 \times 0,80\ m^2} = 330,9\ T/m^2 =$$

$\tau_d = 33,1\ Kg/cm^2 < 50\ Kg/cm^2$ Verifica la compresión en las bielas.

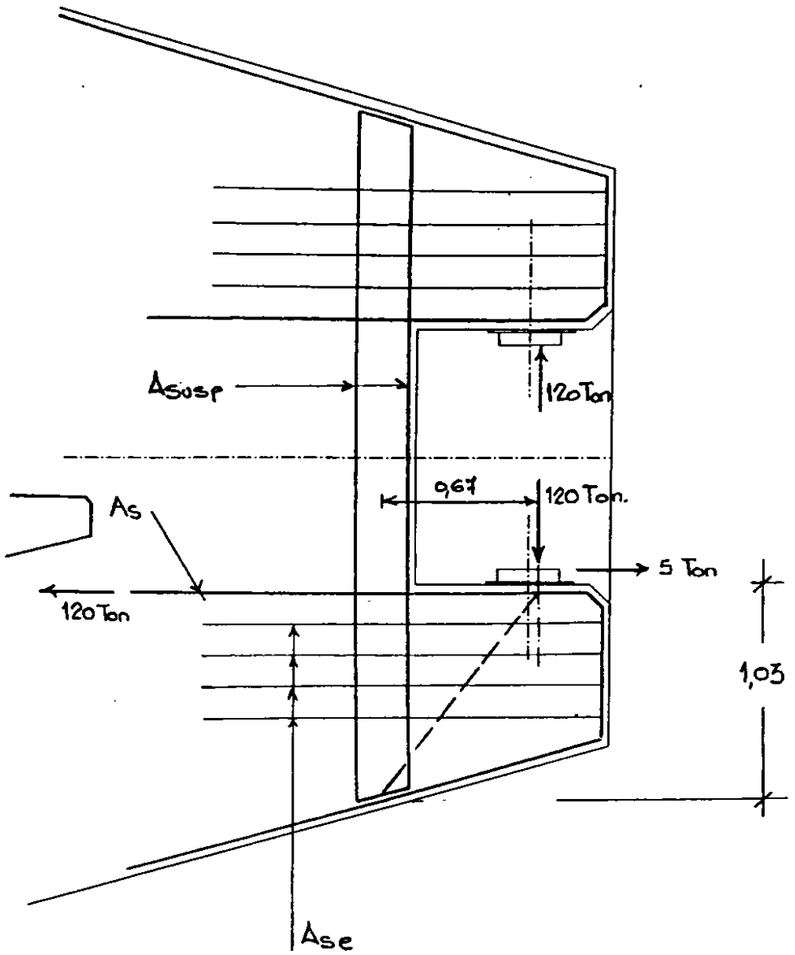
$A_{sf} > \frac{2}{3} A_{sv}$ $\therefore$ $A_{se} = 0,50\ A_{sf} = 18,5\ cm^2$

$$\underline{A_{se} = 18,5\ cm^2}$$



PLANTA
ESC. 1:50

SECCION 2.2
ESC. 1:30



$A_{s_1} = A_{sff} + A_{sn}$

A_{sff} { $M_d = 1,50 \times 120\,Ton \times 0,67\,m = 121\,Tm$; $b = 0,60\,m$; $h = 1,03\,m$; $d = 0,98\,m$ } $\quad A_{sff} = 30,3\,cm^2$

$$A_{sn} = \frac{5\ Ton}{4,435\ T/cm^2} = 1,1\ cm^2$$

$$A_{s_1} = 31,4\ cm^2$$

$$A_{s_2} = \tfrac{2}{3} A_{sv} + A_{sn} \qquad A_{sv} = \frac{V_d}{f_{yd}\,Cotg\,\theta} = \frac{1,5 \times 120\,Ton}{4,27\,T/cm^2 \times (1.0)}$$

$$A_{sv} = 42,9\ cm^2$$

$$A_{s_2} = 44,0\ cm^2$$

$$A_{s_3} = 0,04 \cdot \frac{167}{4435} \cdot 60 \times 103 = 9,3\ cm^2$$

$$\therefore \underline{A_s = A_{s_2} = 42,9\ cm^2}$$

$$\tau_d = \frac{V_d}{b\,d} = \frac{1,5 \times 120}{0,60 \cdot 0,98} = 375\ T/m^2$$

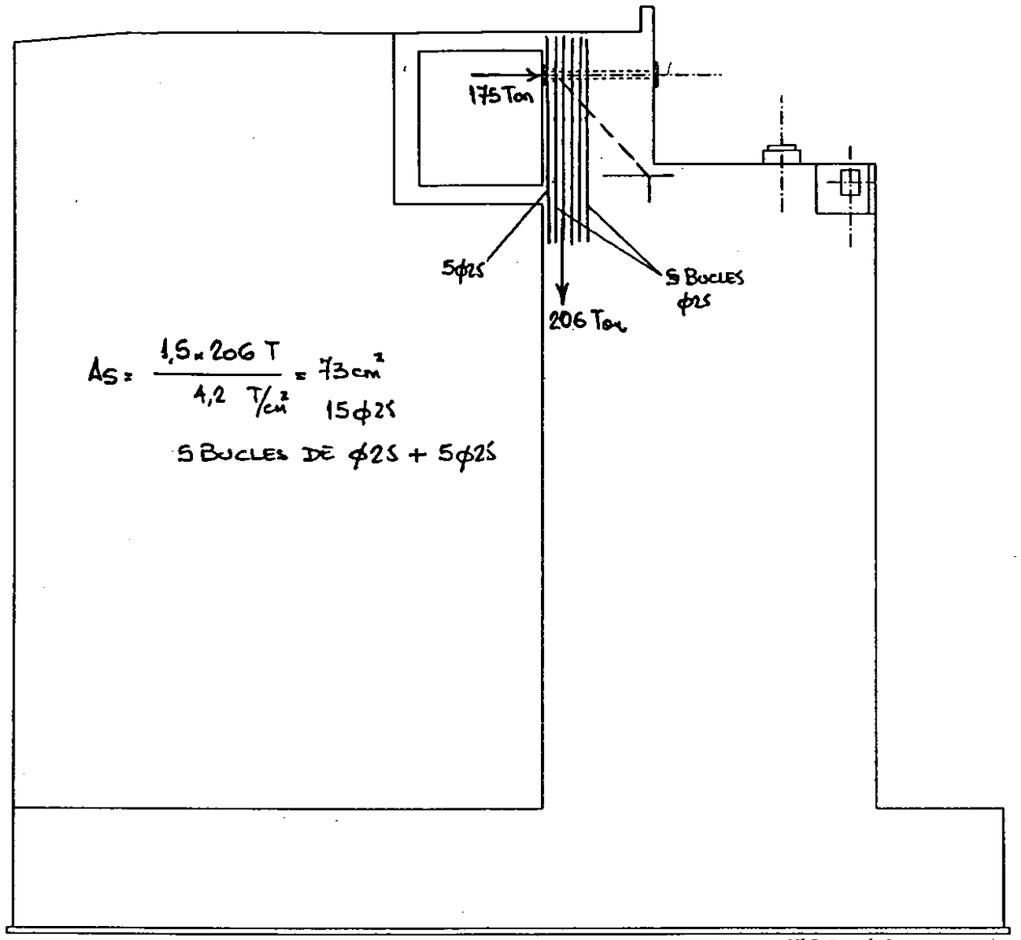
$\tau_d = 37,5\ Kg/cm^2 < 50\ Kg/cm^2$ Verifica compresión en bielas.

$A_{sf} > \frac{2}{3} A_{sv}$ ∴ $A_{se} = 0,50\,A_{sf} = 15,2\ cm^2$

$$\underline{A_{se} = 15,2\ cm^2}$$

$$A_{susp} = \frac{1,5 \times 120\,T}{4,435\,T/cm^2} = 40,6\ cm^2$$

$$\underline{A_{susp} = 40,6\ cm^2}$$



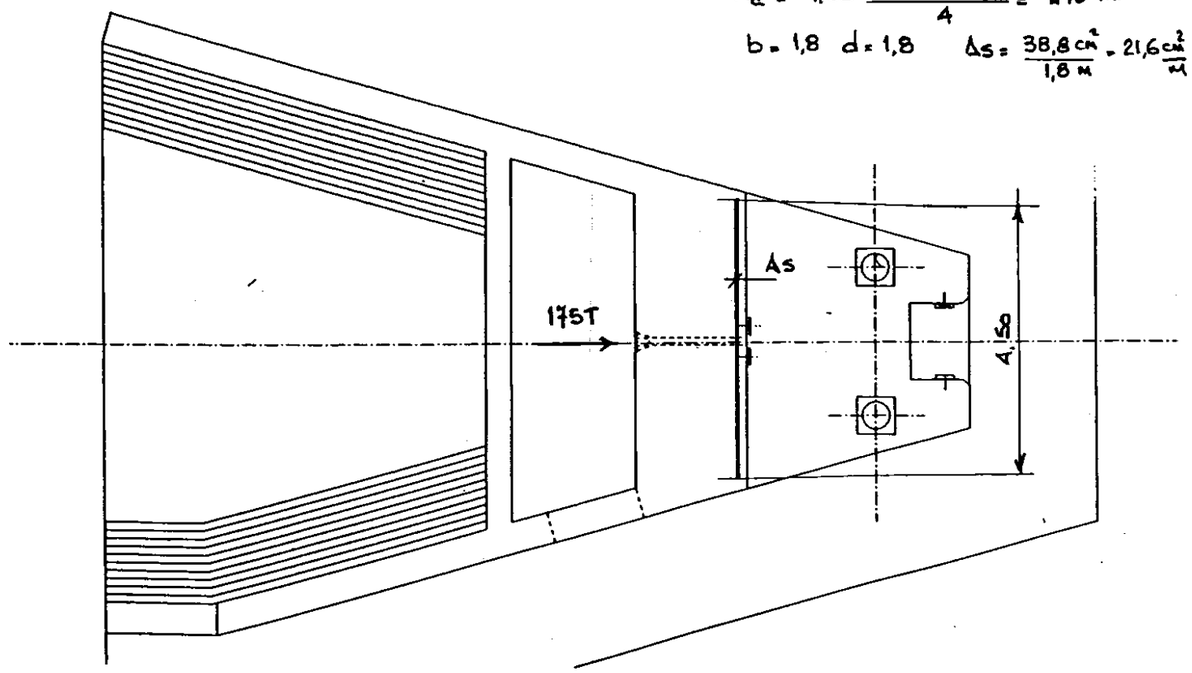
$$A_S = \frac{1,5 \times 206\ T}{4,2\ T/cm^2} = 73 cm^2$$

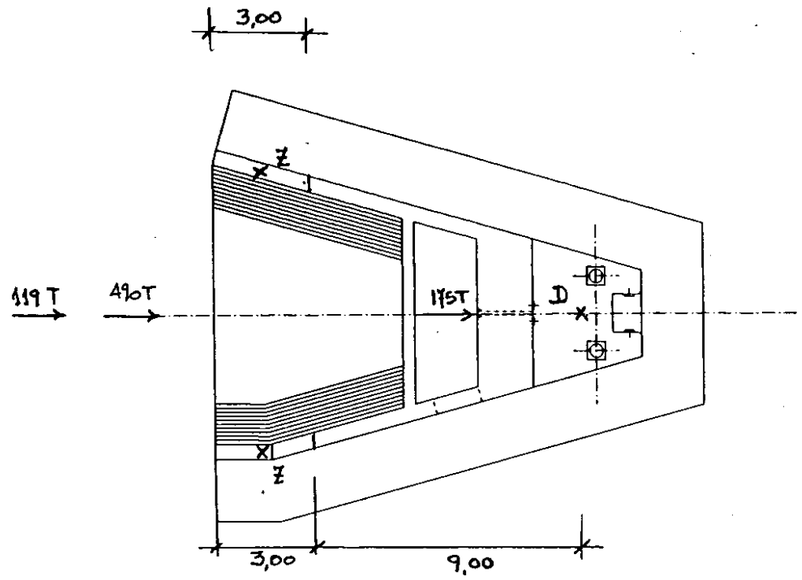
15φ25

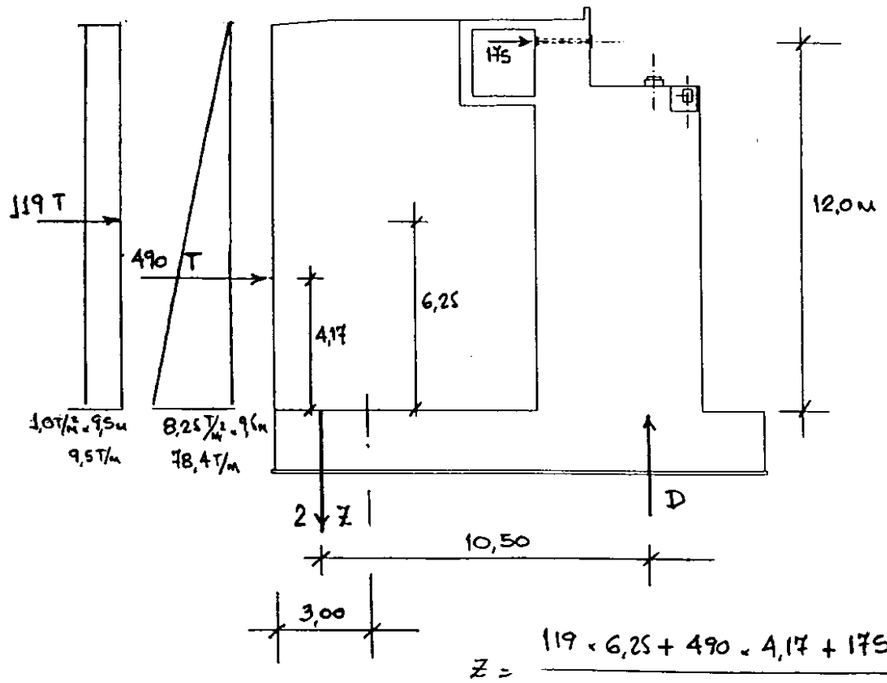
5 Bucles de φ25 + 5φ25

$$M_d = 1,50\ \frac{175T \cdot 4,5m}{4} = 295\ Tm$$

$b = 1,8$ $d = 1,8$ $\quad As = \frac{38,8\ cm^2}{1,8\ m} = 21,6 \frac{cm^2}{m}$





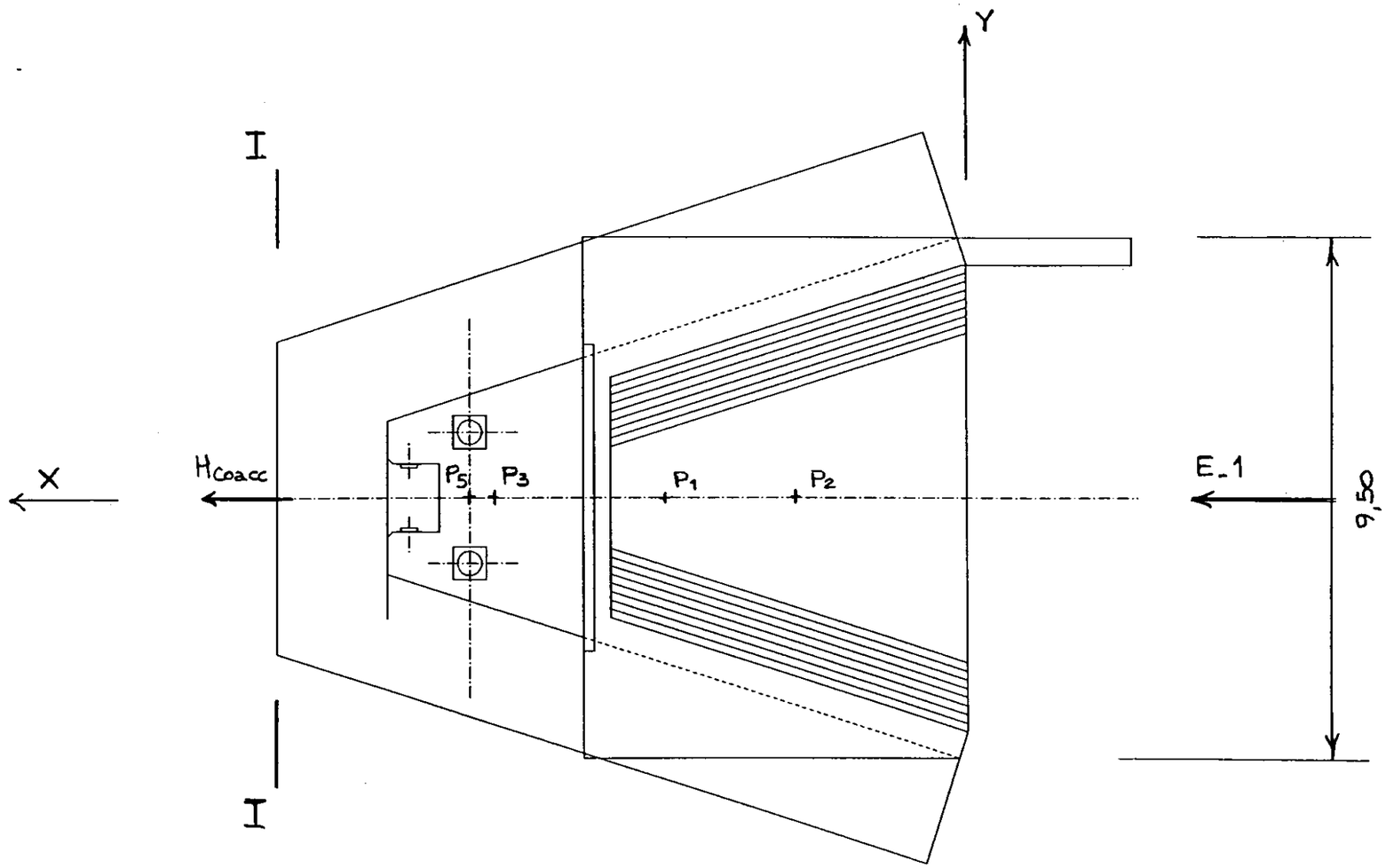


$$Z = \frac{119 \cdot 6,25 + 490 \cdot 4,17 + 175 \cdot 12,0}{2 \cdot 10,5} = 232,7\ To$$

$$= \frac{Z}{3,00} = 78\ Tou/m.$$

CALCULO ESTRIBO 2

CARGAS SOBRE LA ZAPATA



ESTADOS LIMITES DE EQUILIBRIO

CARGAS VERTICALES

	Permanentes ton.	Variables ton.	X m.	Y m.
P-1	569		5.46	0.00
P-2	1218	152	3.11	0.00
P-3	334		8.53	0.00
P-4	0		0.00	0.00
P-5	264	116	8.98	0.00
TOTAL =	2384	268		

CARGAS HORIZONTALES

	H coacc ton.	H frenado ton.			
H-5	8	0			
	Empuje de tierras				
E-1	0.5	9.240	14.0	9.50	614 ton.
	1.0	0.990	14.0	9.50	132 ton.
					746 ton.

SEGURIDAD AL DESLIZAMIENTO

En Construcción v D máx = 1.35

Cargas Deslizantes	746 ton.
Cargas Resistentes	1376 ton.
v D =	1.84

En Servicio sin Frenado v D máx = 1.5

	8 ton.
	746 ton.
Cargas Deslizantes	754 ton.
Cargas Resistentes	1464 ton.
v D =	1.94

En Servicio con Frenado v D máx = 1.35

	8 ton.
	0 ton.
	746 ton.
Cargas Deslizantes	754 ton.
Cargas Resistentes	1464 ton.
v D =	1.94

SEGURIDAD AL VOLCAMIENTO

Ancho de Zapata = 12.48 m.

	Permanentes Totales ton.	Ancho - x m.	mT.	Variables Totales ton.	Ancho - x m.	mT.
P-1	569	7.02	3995	0	7.02	0
P-2	1218	9.37	11409	152	9.37	1429
P-3	334	3.95	1317	0	3.95	0
P-4	0	12.48	0	0	12.48	0
P-5	264	3.50	924	116	3.50	406
TOTAL =	2384	7.40	17645	268	6.83	1835

En Servicio con Frenado v v máx = 1.35

Momento de Vuelco

8	10.80	86
0	10.80	0
614	4.67	2867
132	7.00	922
		3875 Tm.

Momento Resistente

2384	7.40	17645
268	6.83	1835
		19480 Tm.

v V = 5.03

SEGURIDAD AL HUNDIMIENTO

Area = 119.76 m2.
Inercia = 1436.44 m4.
Distancia fibra mas comprimida = 7.02 m.
Distancia fibra menos comprimida = 5.46 m.

	Ton.	Ancho - x m.	Tm.
	2384	7.40	17645
	268	6.83	1835
V =	2652	7.34	19480 Tm.

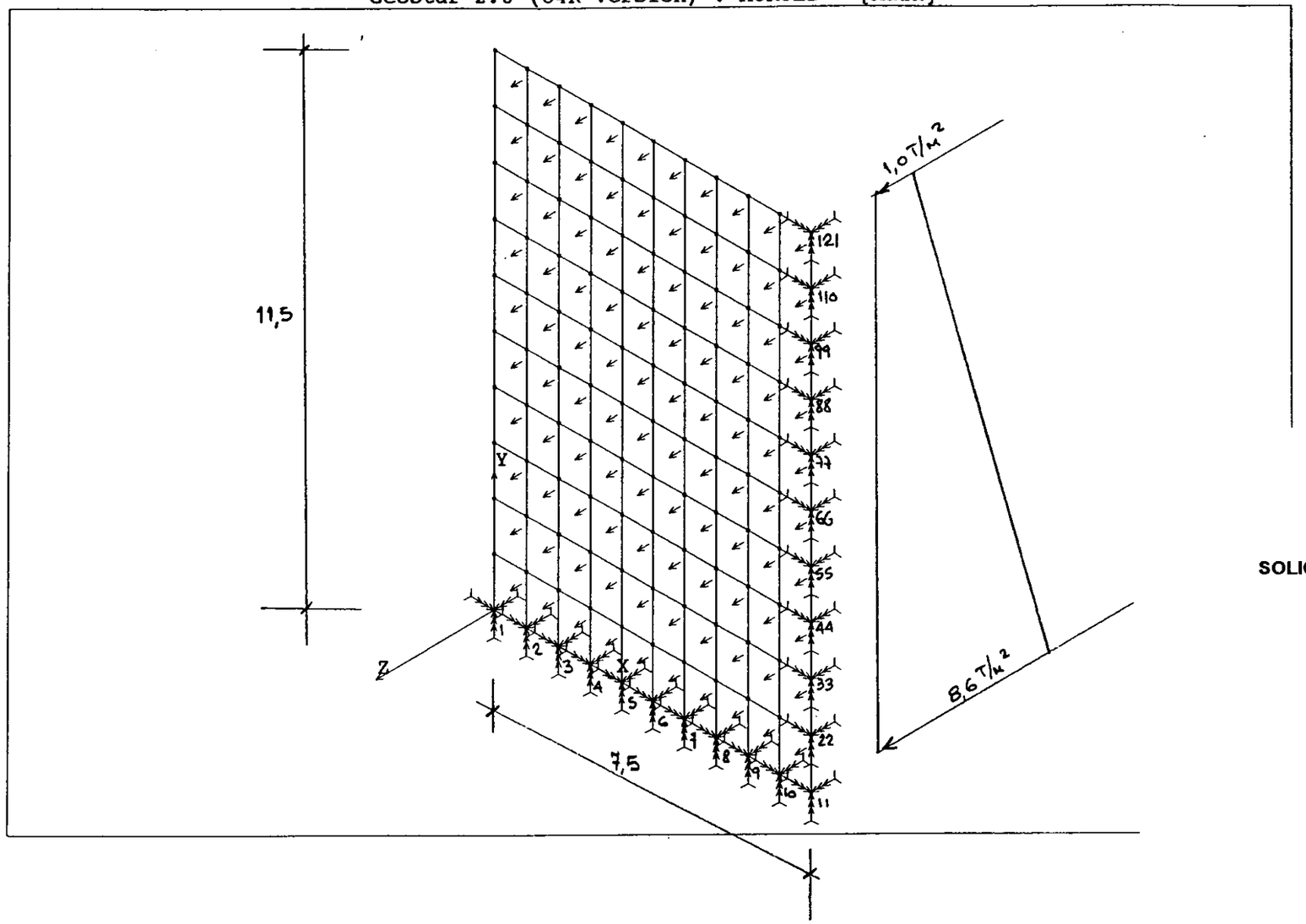
Distancia de V respecto a I-I = 7.34

M tierras =	614	4.67	2867
	132	7.00	922
			3789 Tm.

M frenado+coacción =	8	10.80	86
			86 Tm.

Esfuerzos sobre el centro de Gravedad de la zapata

V =	2652 Ton.
M v =	-852 mT.
M fren.+coacc =	86 mT.
M tierras =	3789 mT.
σ máx =	36.9 T/m2.
σ med =	22.1 T/m2.
σ mín =	10.7 T/m2.
σ adm =	30.0 T/m2.
1.25 x σ adm =	37.5 T/m2.



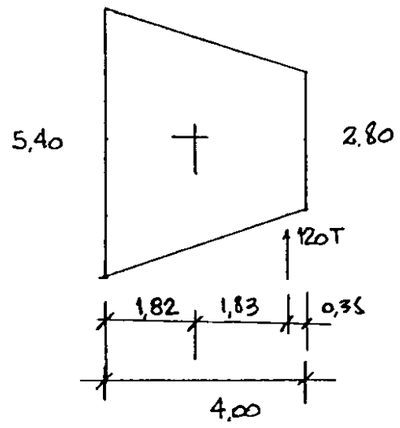
SOLICITACIONES ARISTA HORIZONTAL

NODO	my Tm/m	vy T/m	Tracción nx T/m
1	-127.1	-55.3	50
2	-122.0	-54.1	50
3	-113.2	-48.3	50
4	-99.7	-41.5	50
5	-84.4	-35.0	
6	-68.4	-28.7	
7	-52.3	-22.1	
8	-36.9	-15.3	
9	-23.4	-8.6	
10	-12.6	-3.8	

SOLICITACIONES ARISTA VERTICAL

NODO	mx Tm/m	vx	Espesor m.	Empuje s/ muro frontal T/m	Tracción nx T/m
121	-17.4	-8.0	0.50		
110	-22.7	-12.4	0.62	3.3	3.3
99	-32.4	-16.6	0.74	4.8	4.8
88	-41.4	-21.0	0.86	6.3	6.3
77	-48.4	-24.6	0.98	7.7	7.7
66	-51.6	-26.5	1.10	9.2	9.2
55	-49.4	-25.6	1.22	10.7	10.7
44	-41.6	-21.4	1.34		
33	-29.4	-14.0	1.46		
22	-16.2	-6.0	1.58		
11			1.70		

ARMADURA DEL NUCLEO



$A = 16,72\ m^2$

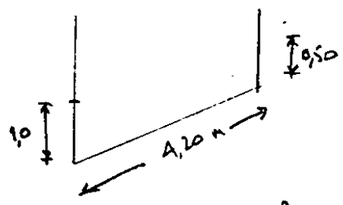
$T_H = 120\ Ton \cdot 1,83\ m \cdot 1,50 = 330\ Tm$

$\frac{A_t}{S} = \frac{\Delta P}{S} = \frac{330\ T}{2(3,9)^2 \cdot 4,2} = 2,6\ cm^2/m$

$M_d = 1,50 \cdot 120 \cdot 11,0 = 1980\ Tm$

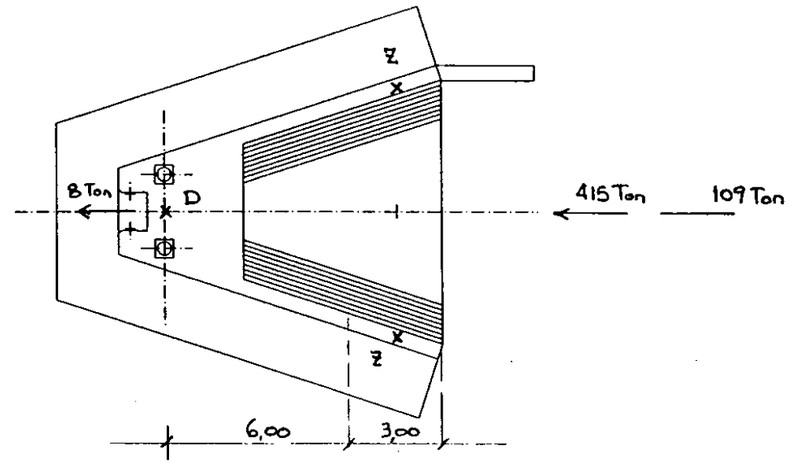
$4,00 \cdot 4,10$

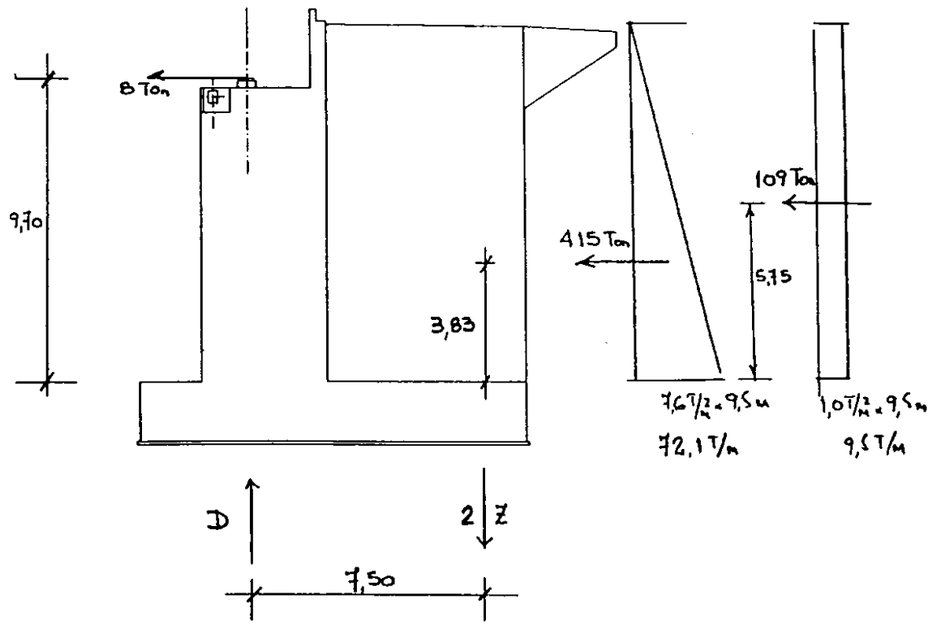
$A_S = 111,4\ cm^2$



$\phi 25 / 0,20 = 24,55\ \frac{cm^2}{m} \cdot (1,0 + 4,2 + 0,5) = 139\ cm^2$

$139\ cm^2 - (1 + 4,2 + 0,5) \cdot 2,6 = 124\ cm^2 > 111,4\ cm^2$

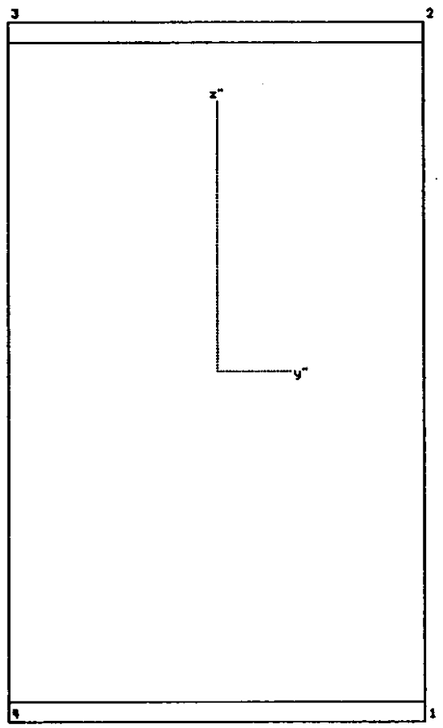




$Z = \frac{109\ Ton \cdot 5,75\ m + 415\ Ton \cdot 3,83\ m + 8\ Ton \cdot 9,70\ m}{2 \cdot 7,5} = 148\ Ton$

$n_x = \frac{Z}{3,00\ m} = \frac{148\ Ton}{3,0\ m} = 50\ Ton/m$

Mstb. 1 : 15.0



Sección :"M2VERT" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 170.00 cm

Características mecánicas de la sección:
Area : Ax= 1.700 [m2]
Momentos de inercia : Iy= 0.409416 [m4] Iz= 0.141667 [m4]
Inercia a torsión : Ix= 0.358742 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.850000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.500	-0.283333	0.167
dch.	Iz	0.500	0.283333	-0.167
abajo	Iy	-0.850	-0.481666	0.283
arriba	Iy	0.850	0.481666	-0.283

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	49.10	-50.00	5.00	50.00	5.00

2	AEH500	(2)	24.55	-50.00	165.00	50.00	165.00

Total: 73.65 Cuantía de armadura: 0.433 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	166.00 [cm]	0.00
Vy	0.00 [cm2/m]	170.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

ARISTA HORIZONTAL

Dimensionamiento : Viga "M2VERT"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
75.000				190.650		45.0

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección 1.39
Factor necesario de minoración de la resistencia de la sección .. 1.00

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado (As-min)	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	49.10	-	49.10
2 "AEH500"	-50.0	165.0	50.0	165.0	24.55	-	24.55
				Cuantía arm. 0.43 [o/o]		Suma	73.65

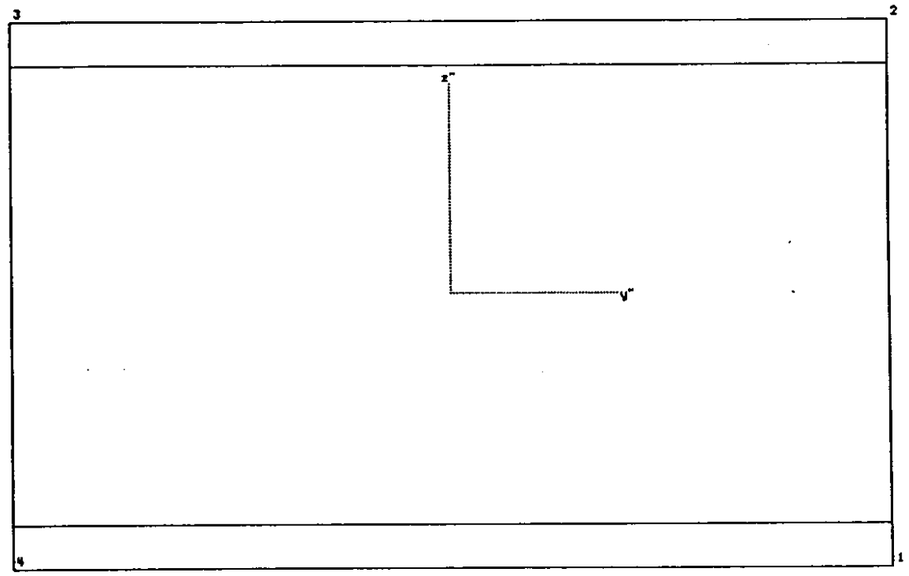
Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	170.00	-0.953	-102.807	"H250"
Armadura-Min	-50.00	165.00	-0.621	-1304.641	"AEH500"
Hormigón-Max	50.00	0.00	10.332	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 155.64 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 14.36 cm Zona comprimida/Canto útil 0.09

ARISTA VERTICAL

Mstb. 1 : 7.0



Sección :"M2HOR01" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 62.00 cm

Características mecánicas de la sección:
Area : Ax= 0.620000 [m2]
Momentos de inercia : Iy= 0.019861 [m4] Iz= 0.051667 [m4]
Inercia a torsión : Ix= 0.048791 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.310000 [m]

I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq. Iz	-0.500	-0.103333	0.167
dch. Iz	0.500	0.103333	-0.167
abajo Iy	-0.310	-0.064067	0.103
arriba Iy	0.310	0.064067	-0.103

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	24.55	-50.00	5.00	50.00	5.00
2	AEH500	(2)	13.40	-50.00	57.00	50.00	57.00
	Total:		37.95	Cuantía de armadura: 0.612 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada

Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	58.00 [cm]	0.00
Vy	0.00 [cm2/m]	62.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Dimensionamiento : Viga "M2HOR01"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
5.000				34.050		45.0

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección 1.64
Factor necesario de minoración de la resistencia de la sección .. 1.00

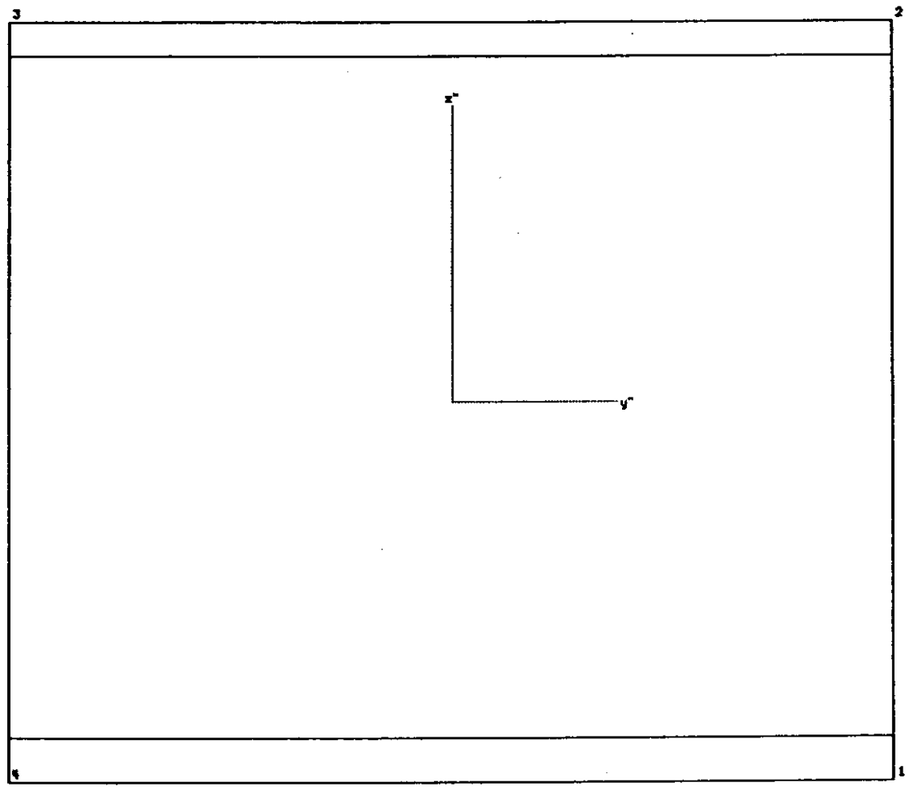
Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado (As-min)	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	24.55	-	24.55
2 "AEH500"	-50.0	57.0	50.0	57.0	13.40	-	13.40
					Cuantía arm. 0.61 [o/o]	Suma	37.95

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	62.00	-1.818	-140.430	"H250"
Armadura-Min	-50.00	57.00	-0.782	-1641.181	"AEH500"
Hormigón-Max	50.00	0.00	11.037	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 53.23 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 8.77 cm Zona comprimida/Canto útil 0.15

Mstb. 1 : 7.0



Sección :"M2HOR02" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 86.00 cm

Características mecánicas de la sección:
Area : Ax= 0.860000 [m2]
Momentos de inercia : Iy= 0.053005 [m4] Iz= 0.071667 [m4]
Inercia a torsión : Ix= 0.102333 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.430000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.500	-0.143333	0.167
dch.	Iz	0.500	0.143333	-0.167
abajo	Iy	-0.430	-0.123267	0.143
arriba	Iy	0.430	0.123267	-0.143

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	24.55	-50.00	5.00	50.00	5.00
2	AEH500	(2)	13.40	-50.00	82.00	50.00	82.00
	Total:		37.95	Cuantía de armadura: 0.441 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	82.00 [cm]	0.00
Vy	0.00 [cm2/m]	86.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

ARISTA VERTICAL

Dimensionamiento : Viga "M2HOR02"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
9.450				61.650		45.0

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección 1.29
Factor necesario de minoración de la resistencia de la sección .. 1.00

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado (As-min)	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	24.55	-	24.55
2 "AEH500"	-50.0	82.0	50.0	82.0	13.40	-	13.40
					Cuantía arm. 0.44 [o/o]	Suma	37.95

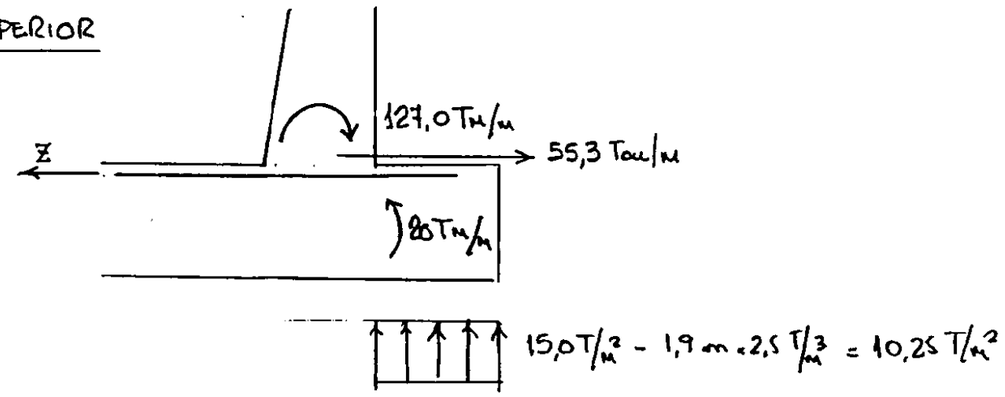
Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	86.00	-1.378	-127.906	"H250"
Armadura-Min	-50.00	82.00	-0.816	-1713.915	"AEH500"
Hormigón-Max	50.00	0.00	10.702	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

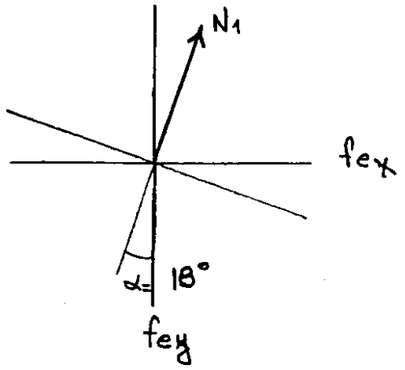
Fibra neutra zn 76.19 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 9.81 cm Zona comprimida/Canto útil 0.12

ARMADURA DE SAPATA

SUPERIOR



$$a_{s\,z} = \frac{(127,0 - 20,0) \times 1,5}{0,9 \times 3,85 \times 4,435} + \frac{55,3 \times 1,5}{4,435} = 40,4 \text{ cm}^2/\text{m}$$



$$R = 0 \leftarrow \begin{cases} N_1 = 40,4 \text{ Ton} \\ N_2 = 0,0 \end{cases}$$

$f_{ey} = 1,20 \cdot a_{sz}$

$f_{ey} = 48,5 \text{ cm}^2/\text{m}$

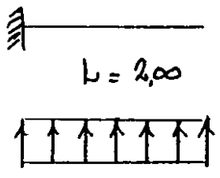
$f_{ex} = 0,4 \times a_{sz}$

$f_{ex} = 16,2 \text{ cm}^2/\text{m}$

$f_{ey} = 2 \times \phi 25/0,20$ (SUPERIOR)

$f_{ex} = \phi 20/0,15$ (SUPERIOR)

INFERIOR



$$M_d = 1,50 \times 32,65 \text{ Tm/m} \left(2,00\right)^2 \frac{1}{2} = 98,0 \text{ Tm/m}$$

$A_s = 12,1 \text{ cm}^2/\text{m}$

$f_{ey} = 1,20 \times 12,1 \text{ cm}^2/\text{m} = 14,5 \text{ cm}^2/\text{m}$

$f_{ex} = 0,40 \times 12,1 \text{ cm}^2/\text{m} = 4,9 \text{ cm}^2/\text{m}$

$f_{ey} = \phi 20/0,20$

$f_{ex} = \phi 20/0,20$

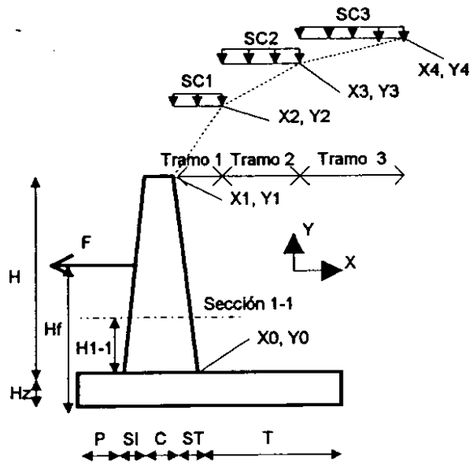
CALCULO DE MUROS.

NOMBRE PROYECTO : L.A.V. MADRID-ZARAGOZA
NOMBRE OBRA : E-1502.0 Muro 1 Módulo A

DATOS

GEOMETRIA DE CALCULO DEL MURO

C. Canto del muro en coronación (m) :	0.500
ST. Sobreespesor muro en trasdós (m) :	1.300
SI. Sobreespesor muro en intradós (m) :	0.000
P. Puntera zapata (m) :	2.500
T. Talón zapata (m) :	5.500
H. Altura muro (m) :	12.500
Hz. Canto zapata (m) :	1.900
Anchura total cimentación (m) :	9.800
Angulo trasdós muro (°) :	84.063



DEFINICION TERRENO

	X	Y
0. Coordenadas base trasdos (m) :	0.000	0.000
1. Coordenadas coronación trasdos (m) :	-1.300	12.500
2. Coordenadas fin tramo 1 terreno (m) :	3.784	13.378
3. Coordenadas fin tramo 2 terreno (m) :	8.668	12.500
4. Coordenadas fin tramo 3 terreno (m) :	28.670	2.647

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Ψo (coeficiente combinación variables) :	1.00

	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS DEL TERRENO

γ. Peso específico (T/m³) :	2.00
ϕ. Angulo rozamiento interno (°) :	30.000
δmt. Angulo rozamiento muro-tierras (°) :	0.000
ϕtt. Angulo rozamiento tierras-tierras (°) :	0.000
μ. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	30.000

ARMADO

H1-1. Dist. sección 1 a sup. zapata (m) :	4.000
Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050

Cuantías mínimas

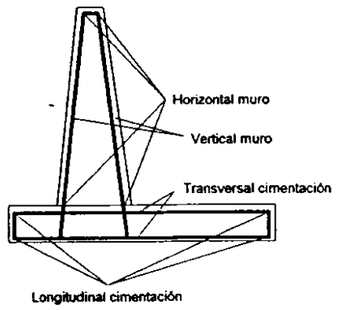
Vertical muros (1/3 min cara)(o/oo) :	0.900
Horizontal muros (1/3 min. cara)(o/oo) :	1.600
Cortante o montaje alzado (cm²/m²) :	4.500
Transversal zapata (sup+inf)(o/oo) :	1.447
Longitudinal zapata (sup+inf)(o/oo) :	1.447
Cortante zapata (cm²/m²) :	0.000
Perimetral zapata (en canto)(cm²/m) :	13.747

CARGAS (sin mayorar)

Acciones permanentes (G)	
Peso propio barrera coronación (T/m) :	0.000
Acciones permanentes de valor no constante (G*)	
Fg. Carga horizontal sobre muro (T/m) :	0.000
Hfg. Posición Fg a inferior zapata (m) :	10.000
Acciones variables (Q)	
SC1. Sobrecarga en tramo 1 (T/m) :	3.500
SC2. Sobrecarga en tramo 2 (T/m) :	3.500
SC3. Sobrecarga en tramo 3 (T/m) :	0.000
Fq. Carga horizontal sobre muro (T/m) :	0.000
Hfq. Posición Fq a inferior zapata (m) :	10.000

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H - 250
Hormigón cimentación (T/m²) :	H - 250
Acero (T/m²) :	AEH - 500



9/07/98 Calculos muro1-a.xls

RESUMEN ACCIONES SOBRE EL MURO

		F.vertical (T / m)	X (m)	F. Horizontal (T / m)	Y (m)
Acciones permanentes (G)					
Peso propio muro + barrera	Sobre sección 1 (ΣP' i, i=1..3)	20.018	3.006	---	---
	Sobre sección base muro (ΣP i, i=1..3)	35.938	3.136	---	---
	Total peso propio (ΣP i, i=1..6)	82.488	4.132	---	---
Acciones permanentes de valor no constante (G*)					
Tierras	Sobre sección 1 (E1't)	3.034	3.589	29.169	8.733
	Sobre sección base muro (E1t)	6.561	3.867	63.082	6.067
	Total tierras (E2t + ΣT)	160.698	6.738	61.003	4.990
	Verticales sobre talón (ΣT' ij)	144.156	7.068	---	---
	Verticales sobre talón (cortante) (ΣT'' ij)	96.484	7.976	---	---
Fuerza Fg	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fg	---	---	0.000	10.000
Acciones variables (Q)					
Sobrecargas sobre terreno	Sección 1 (E1'sc)	1.187	3.442	11.411	10.150
	Base muro (E1sc)	1.745	3.650	16.781	8.150
	Inf. cimentación (E2sc + ΣS)	34.888	7.208	5.316	7.485
	Verticales sobre talón (ΣS' i, i=1..3)	30.338	7.741	---	---
	Verticales sobre talón (cortante) (ΣS'' i)	12.775	7.975	---	---
Fuerza Fq	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fq	---	---	0.000	10.000

COMPROBACIONES

SEGURIDAD AL DESLIZAMIENTO (Planteamiento clásico)

	Fuerzas (T / m) Opuestas	Deslizantes
Acciones permanentes (G)		
Peso propio muro	47.843	---
Acciones permanentes de valor no constante (G*)		
Tierras	93.205	61.003
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	---	---
Fuerza Fq	---	0.000
TOTAL	**141.047**	**61.003**

Csd=	**2.310**	Vale

SEGURIDAD AL VUELCO (Planteamiento clásico)

	Momentos (mT / m) Estabilizadores	Volcadores
Acciones permanentes (G)		
Peso propio muro	340.803	---
Acciones permanentes de valor no constante (G*)		
Tierras	1082.789	304.395
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	---	---
Fuerza Fq	---	0.000
TOTAL	**1423.592**	**304.395**

Csv=	**4.677**	Vale

TENSIONES MAXIMAS EN CIMENTACION

	N (T / m)	M (mT / m)
Acciones permanentes (G)		
Peso propio muro	82.488	63.385
Acciones permanentes de valor no constante (G*)		
Tierras	160.698	9.025
Fuerza Fg	0.000	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	34.888	-40.727
Fuerza Fq	0.000	0.000
TOTAL	**278.073**	**31.683**

D (m) =	**9.80**
σ puntera (T / m²) =	**30.35**
σ talón (T / m²) =	**26.40**
σmed (T / m²) =	**28.37**
σcob (T / m²) =	**29.05**
Vale	

9/07/98 Calculos muro1-a.xls

ARMADO

Secciones

Elemento	Designación	Datos reales Ancho (m)	Datos reales Canto (m)	Datos de cálculo Ancho (m)	Datos de cálculo Canto (m)
ALZADO	0-0	1.00	1.80	1.00	1.80
	1-1	1.00	1.38	1.00	1.38
PUNTERA	2-2 f	1.00	1.90	1.00	1.90
	2-2 c	1.00	1.90	1.00	1.90
TALON	3-3 f	1.00	1.90	1.00	1.90
	3-3 c	1.00	1.90	1.00	1.90

Esfuerzos mayorados

Elemento	Sección	Nd (T / m)	Md (mT / m)	Vd (T / m)
ALZADO	0-0 (+)	44.802	554.867	119.794
	0-0 (-)	32.344	8.531	0.000
	1-1 (+)	24.346	197.819	60.870
	1-1 (-)	18.016	3.359	0.000
PUNTERA	2-2 f (+)	0.000	145.197	---
	2-2 f (-)	0.000	23.758	---
	2-2 c (+)	---	---	59.738
	2-2 c (-)	---	---	9.909
TALON	3-3 f (+)	0.000	31.499	---
	3-3 f (-)	-58.190	-278.437	---
	3-3 c (+)	---	---	15.542
	3-3 c (-)	---	---	-53.003

Armaduras

Elemento	Armadura	Sección	ARMADURA DE CALCULO Necesaria cm2/m	Minima cm2/m	Control cálculo	Adoptada cm2/m
ALZADO	Vert. trasdós	0-0 (+)	72.386	10.800	Vale	**72.386**
		0-0 (-)	0.000	5.400	Vale	
		1-1 (+)	32.262	8.304	Vale	**32.262**
		1-1 (-)	0.000	4.152	Vale	
	Vert. intrados	0-0 (+)	0.000	5.400	Vale	**5.400**
		0-0 (-)	0.000	5.400	Vale	
		1-1 (+)	0.000	4.152	Vale	
		1-1 (-)	0.000	4.152	Vale	
	Hor. trasdós (*)	---	14.477	19.200	Vale	**19.200**
	Hor. intradós (*)	---	0.000	9.600	Vale	**9.600**
	Cortante	0-0 (+)	1.033	4.500	Vale	**4.500 (cm²/m²)**
		0-0 (-)	0.000	4.500	Vale	
		1-1 (+)	0.000	4.500	Vale	
		1-1 (-)	0.000	4.500	Vale	
PUNTERA	Trans. inferior	2-2 f (+)	17.971	13.747	Vale	**17.971**
		2-2 f (-)	2.903	13.747	Vale	
	Long. inf. (*)	---	3.594	13.747	Vale	**13.747**
	Trans. superior	2-2 f (+)	0.000	13.747	Vale	**48.094**
		2-2 f (-)	0.000	13.747	Vale	
	Long. sup. (*)	---	0.000	13.747	Vale	**13.747**
	Cortante	2-2 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		2-2 c (-)	0.000	0.000	Vale	
TALON	Trans. inferior	3-3 f (+)	3.852	13.747	Vale	**17.971**
		3-3 f (-)	0.000	13.747	Vale	
	Long. inf. (*)	---	0.770	13.747	Vale	**13.747**
	Trans. superior	3-3 f (+)	0.000	13.747	Vale	**48.094**
		3-3 f (-)	48.094	13.747	Vale	
	Long. sup. (*)	---	9.619	13.747	Vale	**13.747**
	Cortante	3-3 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		3-3 c (-)	0.000	0.000	Vale	
ZAPATA	Perimetral	---	0.000	13.747	Vale	**13.747**

(*) Calculada como el 20% de la armadura perpendicular a ella

CALCULO DE MUROS.

NOMBRE PROYECTO : L.A.V. MADRID-ZARAGOZA
NOMBRE OBRA : E-1502.o Muro 1 Módulo B

DATOS

GEOMETRIA DE CALCULO DEL MURO

C. Canto del muro en coronación (m) :	0.500
ST. Sobreespesor muro en trasdós (m) :	1.182
SI. Sobreespesor muro en intradós (m) :	0.000
P. Puntera zapata (m) :	2.500
T. Talón zapata (m) :	5.118
H. Altura muro (m) :	11.321
Hz. Canto zapata (m) :	1.800
Anchura total cimentación (m) :	9.300
Angulo trasdós muro (°) :	84.039

DEFINICION TERRENO

	X	Y
0. Coordenadas base trasdos (m) :	0.000	0.000
1. Coordenadas coronación trasdos (m) :	-1.182	11.321
2. Coordenadas fin tramo 1 terreno (m) :	2.308	13.000
3. Coordenadas fin tramo 2 terreno (m) :	10.148	13.000
4. Coordenadas fin tramo 3 terreno (m) :	30.108	2.740

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Ψo (coeficiente combinación variables) :	1.00

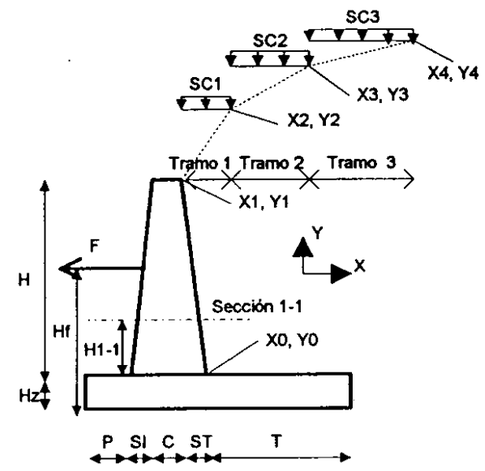
	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G°)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS DEL TERRENO

γ. Peso específico (T/m³) :	2.00
ϕ. Angulo rozamiento interno (°) :	30.000
δmt. Angulo rozamiento muro-tierras (°) :	0.000
ϕtt. Angulo rozamiento tierras-tierras (°) :	0.000
μ. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	30.000

ARMADO

H1-1. Dist. sección 1 a sup. zapata (m) :	4.000
Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050
Cuantias mínimas	
Vertical muros (1/3 min cara)(o/oo) :	0.900
Horizontal muros (1/3 min. cara)(o/oo) :	1.600
Cortante o montaje alzado (cm²/m²) :	4.500
Transversal zapata (sup+inf)(o/oo) :	1.447
Longitudinal zapata (sup+inf)(o/oo) :	1.447
Cortante zapata (cm²/m²) :	0.000
Perimetral zapata (en canto)(cm²/m) :	13.024

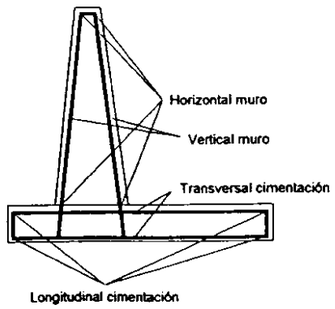


CARGAS (sin mayorar)

Acciones permanentes (G)	
Peso propio barrera coronación (T/m) :	0.000
Acciones permanentes de valor no constante (G°)	
Fg. Carga horizontal sobre muro (T/m) :	0.000
Hfg. Posición Fg a inferior zapata (m) :	10.000
Acciones variables (Q)	
SC1. Sobrecarga en tramo 1 (T/m) :	0.000
SC2. Sobrecarga en tramo 2 (T/m) :	3.500
SC3. Sobrecarga en tramo 3 (T/m) :	0.000
Fq. Carga horizontal sobre muro (T/m) :	0.000
Hfq. Posición Fq a inferior zapata (m) :	10.000

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H - 250
Hormigón cimentación (T/m²) :	H - 250
Acero (T/²) :	AEH - 500



RESUMEN ACCIONES SOBRE EL MURO

		F.vertical (T / m)	X (m)	F. Horizontal (T / m)	Y (m)
Acciones permanentes (G)					
Peso propio muro + barrera	Sobre sección 1 (ΣP' i, i=1..3)	16.146	2.969	---	---
	Sobre sección base muro (ΣP i, i=1..3)	30.878	3.099	---	---
	Total peso propio (ΣP i, i=1..6)	72.728	3.991	---	---
Acciones permanentes de valor no constante (G°)					
Tierras	Sobre sección 1 (E1't)	2.573	3.510	24.642	8.240
	Sobre sección base muro (E1t)	6.152	3.788	58.925	5.574
	Total tierras (E2t + ΣT)	144.559	6.486	65.237	4.933
	Verticales sobre talón (ΣT' ij)	130.505	6.776	---	---
	Verticales sobre talón (cortante) (ΣT'' ij)	87.418	7.619	---	---
Fuerza Fg	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fg	---	---	0.000	10.000
Acciones variables (Q)					
Sobrecargas sobre terreno	Sección 1 (E1'sc)	0.694	3.382	6.649	9.461
	Base muro (E1sc)	1.074	3.591	10.283	7.461
	Inf. cimentación (E2sc + ΣS)	27.440	7.895	7.714	7.400
	Verticales sobre talón (ΣS' i, i=1..3)	27.440	7.895	---	---
	Verticales sobre talón (cortante) (ΣS'' i)	9.835	7.895	---	---
Fuerza Fq	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fq	---	---	0.000	10.000

COMPROBACIONES

SEGURIDAD AL DESLIZAMIENTO (Planteamiento clásico)

	Fuerzas (T / m) Opuestas	Deslizantes
Acciones permanentes (G)		
Peso propio muro	42.182	---
Acciones permanentes de valor no constante (G*)		
Tierras	83.844	65.237
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	---	---
Fuerza Fq	---	0.000
TOTAL	**126.026**	**65.237**

Csd=	**1.930**	Vale

SEGURIDAD AL VUELCO (Planteamiento clásico)

	Momentos (mT / m) Estabilizadores	Volcadores
Acciones permanentes (G)		
Peso propio muro	290.289	---
Acciones permanentes de valor no constante (G*)		
Tierras	937.558	321.837
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	---	---
Fuerza Fq	---	0.000
TOTAL	**1227.847**	**321.837**

Csv=	**3.815**	Vale

TENSIONES MAXIMAS EN CIMENTACION

	N (T / m)	M (mT / m)
Acciones permanentes (G)		
Peso propio muro	72.728	47.896
Acciones permanentes de valor no constante (G*)		
Tierras	144.559	56.478
Fuerza Fg	0.000	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	27.440	-31.960
Fuerza Fq	0.000	0.000
TOTAL	**244.727**	**72.414**

D (m) =	**9.30**
σ puntera (T / m²) =	**31.34**
σ talón (T / m²) =	**21.29**
σmed (T / m²) =	**26.31**
σcob (T / m²) =	**28.10**
Vale	

9/07/98 Calculos muro1-b.xls

ARMADO

Secciones

Elemento	Designación	Datos reales Ancho (m)	Datos reales Canto (m)	Datos de cálculo Ancho (m)	Datos de cálculo Canto (m)
ALZADO	0-0	1.00	1.68	1.00	1.68
	1-1	1.00	1.26	1.00	1.26
PUNTERA	2-2 f	1.00	1.80	1.00	1.80
	2-2 c	1.00	1.80	1.00	1.80
TALON	3-3 f	1.00	1.80	1.00	1.80
	3-3 c	1.00	1.80	1.00	1.80

Esfuerzos mayorados

Elemento	Sección	Nd (T / m)	Md (mT / m)	Vd (T / m)
ALZADO	0-0 (+)	38.629	423.052	103.811
	0-0 (-)	27.790	6.729	0.000
	1-1 (+)	19.432	127.370	46.937
	1-1 (-)	14.532	2.376	0.000
PUNTERA	2-2 f (+)	0.000	146.847	---
	2-2 f (-)	0.000	20.410	---
	2-2 c (+)	---	---	63.279
	2-2 c (-)	---	---	8.866
TALON	3-3 f (+)	0.000	27.615	---
	3-3 f (-)	-58.934	-326.446	---
	3-3 c (+)	---	---	13.365
	3-3 c (-)	---	---	-61.585

Armaduras

Elemento	Armadura	Sección	ARMADURA DE CALCULO Necesaria cm2/m	Minima cm2/m	Control cálculo	Adoptada cm2/m
ALZADO	Vert. trasdós	0-0 (+)	58.266	10.092	Vale	**58.266**
		0-0 (-)	0.000	5.046	Vale	
		1-1 (+)	22.286	7.586	Vale	**22.286**
		1-1 (-)	0.000	3.793	Vale	
	Vert. intrados	0-0 (+)	0.000	5.046	Vale	**5.046**
		0-0 (-)	0.000	5.046	Vale	
		1-1 (+)	0.000	3.793	Vale	
		1-1 (-)	0.000	3.793	Vale	
	Hor. trasdós (*)	---	11.653	17.941	Vale	**17.941**
	Hor. intradós (*)	---	0.000	8.971	Vale	**8.971**
	Cortante	0-0 (+)	0.000	4.500	Vale	**4.500**
		0-0 (-)	0.000	4.500	Vale	**(cm²/m²)**
		1-1 (+)	0.000	4.500	Vale	
		1-1 (-)	0.000	4.500	Vale	
PUNTERA	Trans. inferior	2-2 f (+)	19.253	13.024	Vale	**19.253**
		2-2 f (-)	2.636	13.024	Vale	
	Long. inf. (*)	---	3.851	13.024	Vale	**13.024**
	Trans. superior	2-2 f (+)	0.000	13.024	Vale	**57.066**
		2-2 f (-)	0.000	13.024	Vale	
	Long. sup. (*)	---	0.000	13.024	Vale	**13.024**
	Cortante	2-2 c (+)	0.000	0.000	Vale	**0.000**
		2-2 c (-)	0.000	0.000	Vale	**(cm²/m²)**
TALON	Trans. inferior	3-3 f (+)	3.570	13.024	Vale	**19.253**
		3-3 f (-)	0.000	13.024	Vale	
	Long. inf. (*)	---	0.714	13.024	Vale	**13.024**
	Trans. superior	3-3 f (+)	0.000	13.024	Vale	**57.066**
		3-3 f (-)	57.066	13.024	Vale	
	Long. sup. (*)	---	11.413	13.024	Vale	**13.024**
	Cortante	3-3 c (+)	0.000	0.000	Vale	**0.000**
		3-3 c (-)	0.000	0.000	Vale	**(cm²/m²)**
ZAPATA	Perimetral	---	0.000	13.024	Vale	**13.024**

(*) Calculada como el 20% de la armadura perpendicular a ella

CALCULO DE MUROS.

NOMBRE PROYECTO : L.A.V. MADRID-ZARAGOZA
NOMBRE OBRA : E-1502.o Muro 1 Módulo C

DATOS

GEOMETRIA DE CALCULO DEL MURO

C. Canto del muro en coronación (m) :	0.500
ST. Sobreespesor muro en trasdós (m) :	1.064
SI. Sobreespesor muro en intradós (m) :	0.000
P. Puntera zapata (m) :	2.000
T. Talón zapata (m) :	5.236
H. Altura muro (m) :	10.188
Hz. Canto zapata (m) :	1.700
Anchura total cimentación (m) :	8.800
Angulo trasdós muro (°) :	84.038

DEFINICION TERRENO

	X	Y
0. Coordenadas base trasdos (m) :	0.000	0.000
1. Coordenadas coronación trasdos (m) :	-1.064	10.188
2. Coordenadas fin tramo 1 terreno (m) :	4.946	13.090
3. Coordenadas fin tramo 2 terreno (m) :	12.786	13.090
4. Coordenadas fin tramo 3 terreno (m) :	33.746	2.830

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Ψo (coeficiente combinación variables) :	1.00

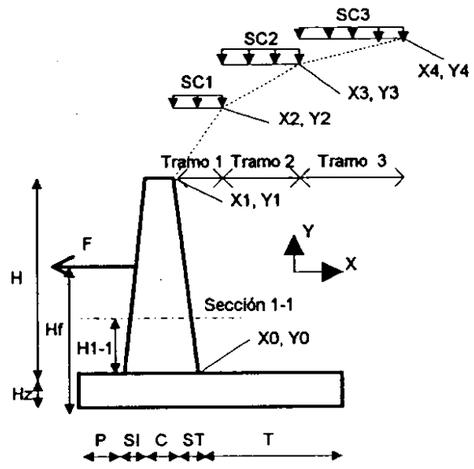
	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS DEL TERRENO

γ. Peso específico (T/m³) :	2.00
ϕ. Angulo rozamiento interno (°) :	30.000
δmt. Angulo rozamiento muro-tierras (°) :	0.000
ϕt. Angulo rozamiento tierras-tierras (°) :	0.000
μ. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	30.000

ARMADO

H1-1. Dist. sección 1 a sup. zapata (m) :	3.500
Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050
Cuantias mínimas	
Vertical muros (1/3 min cara)(o/oo) :	0.900
Horizontal muros (1/3 mín. cara)(o/oo) :	1.600
Cortante o montaje alzado (cm²/m²) :	4.500
Transversal zapata (sup+inf)(o/oo) :	1.447
Longitudinal zapata (sup+inf)(o/oo) :	1.447
Cortante zapata (cm²/m²) :	0.000
Perimetral zapata (en canto)(cm²/m) :	12.300



CARGAS (sin mayorar)

Acciones permanentes (G)

Peso propio barrera coronación (T/m) :	0.000

Acciones permanentes de valor no constante (G*)

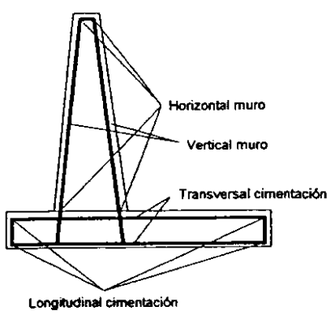
Fg. Carga horizontal sobre muro (T/m) :	0.000
Hfg. Posición Fg a inferior zapata (m) :	10.000

Acciones variables (Q)

SC1. Sobrecarga en tramo 1 (T/m) :	0.000
SC2. Sobrecarga en tramo 2 (T/m) :	3.500
SC3. Sobrecarga en tramo 3 (T/m) :	0.000
Fq. Carga horizontal sobre muro (T/m) :	0.000
Hfq. Posición Fq a inferior zapata (m) :	10.000

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H - 250
Hormigón cimentación (T/m²) :	H - 250
Acero (T/m²) :	AEH - 500



9/07/98 Calculos muro1-c.xls

RESUMEN ACCIONES SOBRE EL MURO

		F.vertical (T / m)	X (m)	F. Horizontal (T / m)	Y (m)
Acciones permanentes (G)					
Peso propio muro + barrera	Sobre sección 1 (ΣP i, i=1..3)	14.199	2.449	---	---
	Sobre sección base muro (ΣP i, i=1..3)	26.285	2.562	---	---
	Total peso propio (ΣP i, i=1..6)	63.685	3.641	---	---
Acciones permanentes de valor no constante (G*)					
Tierras	Sobre sección 1 (E1*t)	2.404	2.966	23.018	7.429
	Sobre sección base muro (E1t)	5.578	3.209	53.414	5.096
	Total tierras (E2t + ΣT)	136.653	6.018	72.396	4.930
	Verticales sobre talón (ΣT' ij)	125.266	6.273	---	---
	Verticales sobre talón (cortante) (ΣT'' ij)	88.636	7.048	---	---
Fuerza Fg	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fg	---	---	0.000	10.000
Acciones variables (Q)					
Sobrecargas sobre terreno	Sección 1 (E1'sc)	0.435	2.849	4.161	8.544
	Base muro (E1sc)	0.662	3.032	6.338	6.794
	Inf. cimentación (E2sc + ΣS)	27.440	8.655	8.566	7.395
	Verticales sobre talón (ΣS' i, i=1..3)	27.440	8.655	---	---
	Verticales sobre talón (cortante) (ΣS'' i)	1.015	8.655	---	---
Fuerza Fq	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fq	---	---	0.000	10.000

COMPROBACIONES

SEGURIDAD AL DESLIZAMIENTO (Planteamiento clásico)

	Fuerzas (T / m) Opuestas	Deslizantes
Acciones permanentes (G)		
Peso propio muro	36.937	---
Acciones permanentes de valor no constante (G*)		
Tierras	79.259	72.396
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	---	---
Fuerza Fq	---	0.000
TOTAL	**116.196**	**72.396**

Csd=	**1.610**	Vale

SEGURIDAD AL VUELCO (Planteamiento clásico)

	Momentos (mT / m) Estabilizadores	Volcadores
Acciones permanentes (G)		
Peso propio muro	231.895	---
Acciones permanentes de valor no constante (G*)		
Tierras	822.390	356.910
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	---	---
Fuerza Fq	---	0.000
TOTAL	**1054.284**	**356.910**

Csv=	**2.954**	Vale

TENSIONES MAXIMAS EN CIMENTACION

	N (T / m)	M (mT / m)
Acciones permanentes (G)		
Peso propio muro	63.685	48.320
Acciones permanentes de valor no constante (G*)		
Tierras	136.653	135.793
Fuerza Fg	0.000	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	0.000	0.000
Fuerza Fq	0.000	0.000
TOTAL	**200.338**	**184.113**

D (m) =	**8.80**
σ puntera (T / m²) =	**37.03**
σ talón (T / m²) =	**8.50**
σmed (T / m²) =	**22.77**
σcob (T / m²) =	**28.78**
Vale	

9/07/98 Calculos muro1-c.xls

ARMADO

Secciones

Elemento	Designación	Datos reales Ancho (m)	Datos reales Canto (m)	Datos de cálculo Ancho (m)	Datos de cálculo Canto (m)
ALZADO	0-0	1.00	1.56	1.00	1.56
	1-1	1.00	1.20	1.00	1.20
PUNTERA	2-2 f	1.00	1.70	1.00	1.70
	2-2 c	1.00	1.70	1.00	1.70
TALON	3-3 f	1.00	1.70	1.00	1.70
	3-3 c	1.00	1.70	1.00	1.70

Esfuerzos mayorados

Elemento	Sección	Nd (T / m)	Md (mT / m)	Vd (T / m)
ALZADO	0-0 (+)	33.017	321.906	89.628
	0-0 (-)	23.657	5.211	0.000
	1-1 (+)	17.037	98.283	40.768
	1-1 (-)	12.779	1.926	0.000
PUNTERA	2-2 f (+)	0.000	113.722	---
	2-2 f (-)	0.000	12.503	---
	2-2 c (+)	---	---	54.419
	2-2 c (-)	---	---	5.765
TALON	3-3 f (+)	0.000	17.838	---
	3-3 f (-)	-64.774	-427.027	---
	3-3 c (+)	---	---	32.574
	3-3 c (-)	---	---	-80.475

Armaduras

Elemento	Armadura	Sección	ARMADURA DE CALCULO Necesaria cm2/m	Minima cm2/m	Control cálculo	Adoptada cm2/m
ALZADO	Vert. trasdós	0-0 (+)	47.183	9.384	Vale	**47.183**
		0-0 (-)	0.000	4.692	Vale	
		1-1 (+)	17.939	7.191	Vale	**17.939**
		1-1 (-)	0.000	3.595	Vale	
	Vert. intrados	0-0 (+)	0.000	4.692	Vale	**4.692**
		0-0 (-)	0.000	4.692	Vale	
		1-1 (+)	0.000	3.595	Vale	
		1-1 (-)	0.000	3.595	Vale	
	Hor. trasdós (*)	---	9.437	16.683	Vale	**16.683**
	Hor. intradós (*)	---	0.000	8.341	Vale	**8.341**
	Cortante	0-0 (+)	0.000	4.500	Vale	**4.500 (cm²/m²)**
		0-0 (-)	0.000	4.500	Vale	
		1-1 (+)	0.000	4.500	Vale	
		1-1 (-)	0.000	4.500	Vale	
PUNTERA	Trans. inferior	2-2 f (+)	15.777	12.300	Vale	**15.777**
		2-2 f (-)	1.712	12.300	Vale	
	Long. inf. (*)	---	3.155	12.300	Vale	**12.300**
	Trans. superior	2-2 f (+)	0.000	12.300	Vale	**76.611**
		2-2 f (-)	0.000	12.300	Vale	
	Long. sup. (*)	---	0.000	12.300	Vale	**15.322**
	Cortante	2-2 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		2-2 c (-)	0.000	0.000	Vale	
TALON	Trans. inferior	3-3 f (+)	2.443	12.300	Vale	**15.777**
		3-3 f (-)	0.000	12.300	Vale	
	Long. inf. (*)	---	0.489	12.300	Vale	**12.300**
	Trans. superior	3-3 f (+)	0.000	12.300	Vale	**76.611**
		3-3 f (-)	76.611	12.300	Vale	
	Long. sup. (*)	---	15.322	12.300	Vale	**15.322**
	Cortante	3-3 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		3-3 c (-)	0.000	0.000	Vale	
ZAPATA	Perimetral	---	0.000	12.300	Vale	**12.300**

(*) Calculada como el 20% de la armadura perpendicular a ella

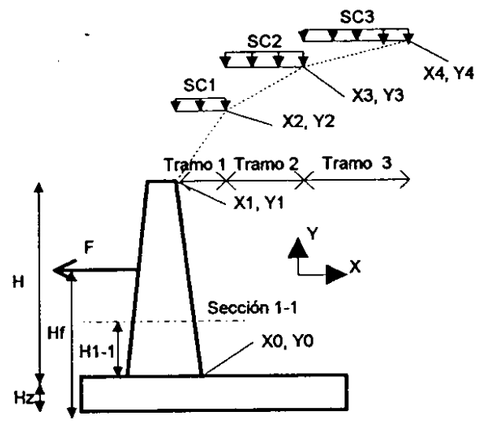
CALCULO DE MUROS.

NOMBRE PROYECTO : L.A.V. MADRID-ZARAGOZA
NOMBRE OBRA : E-1502.0 Muro 1 Módulo D

DATOS

GEOMETRIA DE CALCULO DEL MURO

C. Canto del muro en coronación (m) :	0.500
ST. Sobreespesor muro en trasdós (m) :	0.945
SI. Sobreespesor muro en intradós (m) :	0.000
P. Puntera zapata (m) :	2.000
T. Talón zapata (m) :	5.355
H. Altura muro (m) :	9.048
Hz. Canto zapata (m) :	1.700
Anchura total cimentación (m) :	8.800
Angulo trasdós muro (°) :	84.037



DEFINICION TERRENO

	X	Y
0. Coordenadas base trasdos (m) :	0.000	0.000
1. Coordenadas coronación trasdos (m) :	-0.945	9.048
2. Coordenadas fin tramo 1 terreno (m) :	7.575	13.170
3. Coordenadas fin tramo 2 terreno (m) :	15.415	13.170
4. Coordenadas fin tramo 3 terreno (m) :	36.365	2.910

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Ψo (coeficiente combinación variables) :	1.00

	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS DEL TERRENO

γ. Peso específico (T/m³) :	2.00
ϕ. Angulo rozamiento interno (°) :	30.000
δmt. Angulo rozamiento muro-tierras (°) :	0.000
ϕtt. Angulo rozamiento tierras-tierras (°) :	12.000
μ. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	30.000

ARMADO

H1-1. Dist. sección 1 a sup. zapata (m) :	3.000
Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050

Cuantías mínimas

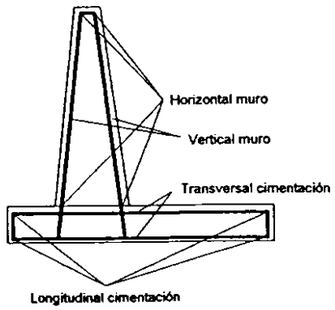
Vertical muros (1/3 min cara)(o/oo) :	0.900
Horizontal muros (1/3 min. cara)(o/oo) :	1.600
Cortante o montaje alzado (cm²/m²) :	4.500
Transversal zapata (sup+inf)(o/oo) :	1.447
Longitudinal zapata (sup+inf)(o/oo) :	1.447
Cortante zapata (cm²/m²) :	0.000
Perimetral zapata (en canto)(cm²/m) :	12.300

CARGAS (sin mayorar)

Acciones permanentes (G)	
Peso propio barrera coronación (T/m) :	0.000
Acciones permanentes de valor no constante (G*)	
Fg. Carga horizontal sobre muro (T/m) :	0.000
Hfg. Posición Fg a inferior zapata (m) :	10.000
Acciones variables (Q)	
SC1. Sobrecarga en tramo 1 (T/m) :	0.000
SC2. Sobrecarga en tramo 2 (T/m) :	3.500
SC3. Sobrecarga en tramo 3 (T/m) :	0.000
Fq. Carga horizontal sobre muro (T/m) :	0.000
Hfq. Posición Fq a inferior zapata (m) :	10.000

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H - 250
Hormigón cimentación (T/m²) :	H - 250
Acero (T/²) :	AEH - 500



9/07/98 Calculos muro1-d.xls

RESUMEN ACCIONES SOBRE EL MURO

		F.vertical (T / m)	X (m)	F. Horizontal (T / m)	Y (m)
Acciones permanentes (G)					
Peso propio muro + barrera	Sobre sección 1 (ΣP i, i=1..3)	12.335	2.428	---	---
	Sobre sección base muro (ΣP i, i=1..3)	21.998	2.525	---	---
	Total peso propio (ΣP i, i=1..6)	59.398	3.705	---	---
Acciones permanentes de valor no constante (G*)					
Tierras	Sobre sección 1 (E1't)	2.129	2.921	20.388	6.716
	Sobre sección base muro (E1t)	4.766	3.130	45.632	4.716
	Total tierras (E2t + ΣT)	138.440	6.284	64.846	4.599
	Verticales sobre talón (ΣT' ij)	115.674	6.230	---	---
	Verticales sobre talón (cortante) (ΣT'' ij)	82.990	6.997	---	---
Fuerza Fg	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fg	---	---	0.000	10.000
Acciones variables (Q)					
Sobrecargas sobre terreno	Sección 1 (E1'sc)	0.205	2.816	1.959	7.724
	Base muro (E1sc)	0.306	2.973	2.931	6.224
	Inf. cimentación (E2sc + ΣS)	2.569	8.800	12.088	6.898
	Verticales sobre talón (ΣS' i, i=1..3)	0.000	0.000	---	---
	Verticales sobre talón (cortante) (ΣS'' i)	0.000	0.000	---	---
Fuerza Fq	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fq	---	---	0.000	10.000

COMPROBACIONES

SEGURIDAD AL DESLIZAMIENTO (Planteamiento clásico)

	Fuerzas (T / m) Opuestas	Deslizantes
Acciones permanentes (G)		
Peso propio muro	34.451	---
Acciones permanentes de valor no constante (G*)		
Tierras	80.295	64.846
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	1.490	12.088
Fuerza Fq	---	0.000
TOTAL	**116.236**	**76.934**
Csd=	**1.510**	Vale

SEGURIDAD AL VUELCO (Planteamiento clásico)

	Momentos (mT / m) Estabilizadores	Volcadores
Acciones permanentes (G)		
Peso propio muro	220.094	---
Acciones permanentes de valor no constante (G*)		
Tierras	870.007	298.206
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	22.610	83.380
Fuerza Fq	---	0.000
TOTAL	**1112.711**	**381.585**
Csv=	**2.916**	Vale

TENSIONES MAXIMAS EN CIMENTACION

	N (T / m)	M (mT / m)
Acciones permanentes (G)		
Peso propio muro	59.398	41.257
Acciones permanentes de valor no constante (G*)		
Tierras	138.440	37.335
Fuerza Fg	0.000	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	2.569	72.075
Fuerza Fq	0.000	0.000
TOTAL	**200.407**	**150.667**

D (m) =	**8.80**
σ puntera (T / m²) =	**34.45**
σ talón (T / m²) =	**11.10**
σmed (T / m²) =	**22.77**
σcob (T / m²) =	**27.47**
Vale	

9/07/98 Calculos muro1-d.xls

ARMADO

Secciones

Elemento	Designación	Datos reales Ancho (m)	Datos reales Canto (m)	Datos de cálculo Ancho (m)	Datos de cálculo Canto (m)
ALZADO	0-0	1.00	1.45	1.00	1.45
	1-1	1.00	1.13	1.00	1.13
PUNTERA	2-2 f	1.00	1.70	1.00	1.70
	2-2 c	1.00	1.70	1.00	1.70
TALON	3-3 f	1.00	1.70	1.00	1.70
	3-3 c	1.00	1.70	1.00	1.70

Esfuerzos mayorados

Elemento	Sección	Nd (T / m)	Md (mT / m)	Vd (T / m)
ALZADO	0-0 (+)	27.406	227.220	72.844
	0-0 (-)	19.798	3.920	0.000
	1-1 (+)	14.603	70.857	33.522
	1-1 (-)	11.102	1.527	0.000
PUNTERA	2-2 f (+)	0.000	104.066	---
	2-2 f (-)	0.000	11.409	---
	2-2 c (+)	---	---	50.475
	2-2 c (-)	---	---	5.573
TALON	3-3 f (+)	0.000	15.192	---
	3-3 f (-)	-59.186	-252.617	---
	3-3 c (+)	---	---	3.607
	3-3 c (-)	---	---	-60.545

Armaduras

Elemento	Armadura	Sección	ARMADURA DE CALCULO Necesaria cm2/m	Mínima cm2/m	Control cálculo	Adoptada cm2/m
ALZADO	Vert. trasdós	0-0 (+)	35.474	8.670	Vale	**35.474**
		0-0 (-)	0.000	4.335	Vale	
		1-1 (+)	13.455	6.790	Vale	**13.455**
		1-1 (-)	0.000	3.395	Vale	
	Vert. intrados	0-0 (+)	0.000	4.335	Vale	**4.335**
		0-0 (-)	0.000	4.335	Vale	
		1-1 (+)	0.000	3.395	Vale	
		1-1 (-)	0.000	3.395	Vale	
	Hor. trasdós (*)	---	7.095	15.413	Vale	**15.413**
	Hor. intradós (*)	---	0.000	7.707	Vale	**7.707**
	Cortante	0-0 (+)	0.000	4.500	Vale	**4.500 (cm²/m²)**
		0-0 (-)	0.000	4.500	Vale	
		1-1 (+)	0.000	4.500	Vale	
		1-1 (-)	0.000	4.500	Vale	
PUNTERA	Trans. inferior	2-2 f (+)	14.419	12.300	Vale	**14.419**
		2-2 f (-)	1.561	12.300	Vale	
	Long. inf. (*)	---	2.884	12.300	Vale	**12.300**
	Trans. superior	2-2 f (+)	0.000	12.300	Vale	**49.080**
		2-2 f (-)	0.000	12.300	Vale	
	Long. sup. (*)	---	0.000	12.300	Vale	**12.300**
	Cortante	2-2 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		2-2 c (-)	0.000	0.000	Vale	
TALÓN	Trans. inferior	3-3 f (+)	2.080	12.300	Vale	**14.419**
		3-3 f (-)	0.000	12.300	Vale	
	Long. inf. (*)	---	0.416	12.300	Vale	**12.300**
	Trans. superior	3-3 f (+)	0.000	12.300	Vale	**49.080**
		3-3 f (-)	49.080	12.300	Vale	
	Long. sup. (*)	---	9.816	12.300	Vale	**12.300**
	Cortante	3-3 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		3-3 c (-)	0.000	0.000	Vale	
ZAPATA	Perimetral	---	0.000	12.300	Vale	**12.300**

(*) Calculada como el 20% de la armadura perpendicular a ella

CALCULO DE MUROS.

NOMBRE PROYECTO : L.A.V. MADRID-ZARAGOZA
NOMBRE OBRA : E-1502.c Muro 1 Módulo E

DATOS

GEOMETRIA DE CALCULO DEL MURO

C. Canto del muro en coronación (m) :	0.500
ST. Sobreespesor muro en trasdós (m) :	0.825
SI. Sobreespesor muro en intradós (m) :	0.000
P. Puntera zapata (m) :	1.500
T. Talón zapata (m) :	5.475
H. Altura muro (m) :	7.902
Hz. Canto zapata (m) :	1.600
Anchura total cimentación (m) :	8.300
Angulo trasdós muro (°) :	84.040

DEFINICION TERRENO

	X	Y
0. Coordenadas base trasdos (m) :	0.000	0.000
1. Coordenadas coronación trasdos (m) :	-0.825	7.902
2. Coordenadas fin tramo 1 terreno (m) :	10.225	13.240
3. Coordenadas fin tramo 2 terreno (m) :	18.065	13.240
4. Coordenadas fin tramo 3 terreno (m) :	39.015	2.980

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Ψo (coeficiente combinación variables) :	1.00

	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS DEL TERRENO

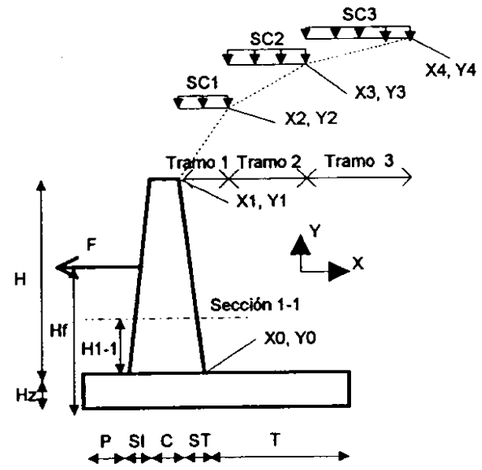
γ. Peso específico (T/m³) :	2.00
ϕ. Angulo rozamiento interno (°) :	30.000
δmt. Angulo rozamiento muro-tierras (°) :	0.000
ϕtt. Angulo rozamiento tierras-tierras (°) :	15.000
μ. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	30.000

ARMADO

H1-1. Dist. sección 1 a sup. zapata (m) :	2.500
Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050

Cuantias mínimas

Vertical muros (1/3 min cara)(o/oo) :	0.900
Horizontal muros (1/3 min. cara)(o/oo) :	1.600
Cortante o montaje alzado (cm²/m²) :	4.500
Transversal zapata (sup+inf)(o/oo) :	1.447
Longitudinal zapata (sup+inf)(o/oo) :	1.447
Cortante zapata (cm²/m²) :	0.000
Perimetral zapata (en canto)(cm²/m) :	11.576

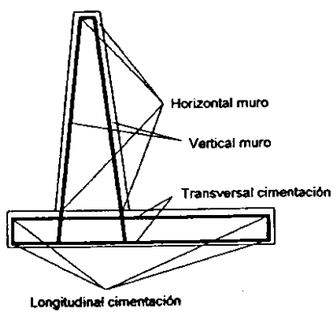


CARGAS (sin mayorar)

Acciones permanentes (G)	
Peso propio barrera coronación (T/m) :	0.000
Acciones permanentes de valor no constante (G*)	
Fg. Carga horizontal sobre muro (T/m) :	0.000
Hfg. Posición Fg a inferior zapeta (m) :	10.000
Acciones variables (Q)	
SC1. Sobrecarga en tramo 1 (T/m) :	0.000
SC2. Sobrecarga en tramo 2 (T/m) :	3.500
SC3. Sobrecarga en tramo 3 (T/m) :	0.000
Fq. Carga horizontal sobre muro (T/m) :	0.000
Hfq. Posición Fq a inferior zapata (m) :	10.000

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H - 250
Hormigón cimentación (T/m²) :	H - 250
Acero (T/²) :	AEH - 500



9/07/98 Calculos muro1-e.xls

RESUMEN ACCIONES SOBRE EL MURO

		F.vertical (T / m)	X (m)	F. Horizontal (T / m)	Y (m)
Acciones permanentes (G)					
Peso propio muro + barrera	Sobre sección 1 (ΣP' i, i=1..3)	10.561	1.908	---	---
	Sobre sección base muro (ΣP i, i=1..3)	18.026	1.987	---	---
	Total peso propio (ΣP i, i=1..6)	51.226	3.389	---	---
Acciones permanentes de valor no constante (G*)					
Tierras	Sobre sección 1 (E1't)	1.740	2.376	16.664	5.901
	Sobre sección base muro (E1t)	3.723	2.550	35.657	4.234
	Total tierras (E2t + ΣT)	128.125	5.844	59.360	4.182
	Verticales sobre talón (ΣT' ij)	105.371	5.688	---	---
	Verticales sobre talón (cortante) (ΣT'' ij)	78.479	6.400	---	---
Fuerza Fg	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fg	---	---	0.000	10.000
Acciones variables (Q)					
Sobrecargas sobre terreno	Sección 1 (E1'sc)	0.148	2.282	1.421	6.801
	Base muro (E1sc)	0.217	2.413	2.079	5.551
	Inf. cimentación (E2sc + ΣS)	2.229	8.300	8.319	6.273
	Verticales sobre talón (ΣS' i, i=1..3)	0.000	0.000	---	---
	Verticales sobre talón (cortante) (ΣS'' i)	0.000	0.000	---	---
Fuerza Fq	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fq	---	---	0.000	10.000

COMPROBACIONES

SEGURIDAD AL DESLIZAMIENTO (Planteamiento clásico)

	Fuerzas (T / m) Opuestas	Deslizantes
Acciones permanentes (G)		
Peso propio muro	29.711	---
Acciones permanentes de valor no constante (G*)		
Tierras	74.312	59.360
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	1.293	8.319
Fuerza Fq	---	0.000
TOTAL	**105.317**	**67.678**

Csd=	**1.560**	Vale

SEGURIDAD AL VUELCO (Planteamiento clásico)

	Momentos (mT / m) Estabilizadores	Volcadores
Acciones permanentes (G)		
Peso propio muro	173.604	---
Acciones permanentes de valor no constante (G*)		
Tierras	748.819	248.230
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	18.501	52.182
Fuerza Fq	---	0.000
TOTAL	**940.924**	**300.411**

Csv=	**3.132**	Vale

TENSIONES MAXIMAS EN CIMENTACION

	N (T / m)	M (mT / m)
Acciones permanentes (G)		
Peso propio muro	51.226	38.985
Acciones permanentes de valor no constante (G*)		
Tierras	128.125	31.129
Fuerza Fg	0.000	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	2.229	42.931
Fuerza Fq	0.000	0.000
TOTAL	**181.580**	**113.045**

D (m) =	**8.30**
σ puntera (T / m²) =	**31.72**
σ talón (T / m²) =	**12.03**
σmed (T / m²) =	**21.88**
σcob (T / m²) =	**25.74**
Vale	

9/07/98 Calculos muro1-e.xls

ARMADO

Secciones

Elemento	Designación	Datos reales Ancho (m)	Datos reales Canto (m)	Datos de cálculo Ancho (m)	Datos de cálculo Canto (m)
ALZADO	0-0	1.00	1.33	1.00	1.33
	1-1	1.00	1.06	1.00	1.06
PUNTERA	2-2 f	1.00	1.60	1.00	1.60
	2-2 c	1.00	1.60	1.00	1.14
TALON	3-3 f	1.00	1.60	1.00	1.60
	3-3 c	1.00	1.60	1.00	1.60

Esfuerzos mayorados

Elemento	Sección	Nd (T / m)	Md (mT / m)	Vd (T / m)
ALZADO	0-0 (+)	22.133	153.798	56.604
	0-0 (-)	16.224	2.842	0.000
	1-1 (+)	12.337	50.993	27.128
	1-1 (-)	9.505	1.179	0.000
PUNTERA	2-2 f (+)	0.000	57.093	---
	2-2 f (-)	0.000	6.628	---
	2-2 c (+)	---	---	29.213
	2-2 c (-)	---	---	3.439
TALON	3-3 f (+)	0.000	7.818	---
	3-3 f (-)	-59.793	-184.805	---
	3-3 c (+)	---	---	2.250
	3-3 c (-)	---	---	-43.922

Armaduras

Elemento	Armadura	Sección	ARMADURA DE CALCULO Necesaria cm2/m	Minima cm2/m	Control cálculo	Adoptada cm2/m
ALZADO	Vert. trasdós	0-0 (+)	25.768	7.950	Vale	**25.768**
		0-0 (-)	0.000	3.975	Vale	
		1-1 (+)	10.138	6.384	Vale	**10.138**
		1-1 (-)	0.000	3.192	Vale	
	Vert. intrados	0-0 (+)	0.000	3.975	Vale	**3.975**
		0-0 (-)	0.000	3.975	Vale	
		1-1 (+)	0.000	3.192	Vale	
		1-1 (-)	0.000	3.192	Vale	
	Hor. trasdós (*)	---	5.154	14.133	Vale	**14.133**
	Hor. intradós (*)	---	0.000	7.067	Vale	**7.067**
	Cortante	0-0 (+)	0.000	4.500	Vale	**4.500 (cm²/m²)**
		0-0 (-)	0.000	4.500	Vale	
		1-1 (+)	0.000	4.500	Vale	
		1-1 (-)	0.000	4.500	Vale	
PUNTERA	Trans. inferior	2-2 f (+)	8.377	11.576	Vale	**11.576**
		2-2 f (-)	0.965	11.576	Vale	
	Long. inf. (*)	---	1.675	11.576	Vale	**11.576**
	Trans. superior	2-2 f (+)	0.000	11.576	Vale	**41.140**
		2-2 f (-)	0.000	11.576	Vale	
	Long. sup. (*)	---	0.000	11.576	Vale	**11.576**
	Cortante	2-2 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		2-2 c (-)	0.000	0.000	Vale	
TALON	Trans. inferior	3-3 f (+)	1.139	11.576	Vale	**11.576**
		3-3 f (-)	0.000	11.576	Vale	
	Long. inf. (*)	---	0.228	11.576	Vale	**11.576**
	Trans. superior	3-3 f (+)	0.000	11.576	Vale	**41.140**
		3-3 f (-)	41.140	11.576	Vale	
	Long. sup. (*)	---	8.228	11.576	Vale	**11.576**
	Cortante	3-3 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		3-3 c (-)	0.000	0.000	Vale	
ZAPATA	Perimetral	---	0.000	11.576	Vale	**11.576**

(*) Calculada como el 20% de la armadura perpendicular a ella

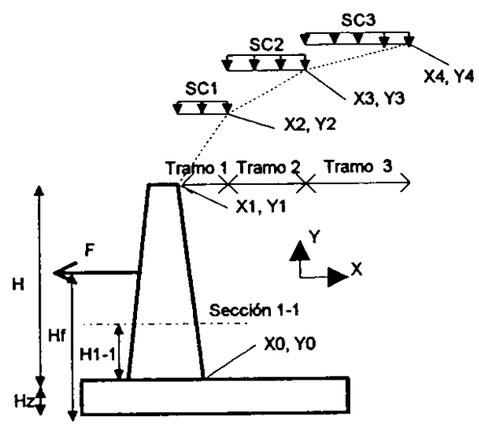
CALCULO DE MUROS.

NOMBRE PROYECTO : L.A.V. MADRID-ZARAGOZA
NOMBRE OBRA : E-1502.o Muro 1 Módulo F

DATOS

GEOMETRIA DE CALCULO DEL MURO

C. Canto del muro en coronación (m) :	0.500
ST. Sobreespesor muro en trasdós (m) :	0.705
SI. Sobreespesor muro en intradós (m) :	0.000
P. Puntera zapata (m) :	1.200
T. Talón zapata (m) :	5.095
H. Altura muro (m) :	6.750
Hz. Canto zapata (m) :	1.500
Anchura total cimentación (m) :	7.500
Angulo trasdós muro (°) :	84.037



DEFINICION TERRENO

	X	Y
0. Coordenadas base trasdos (m) :	0.000	0.000
1. Coordenadas coronación trasdos (m) :	-0.705	6.750
2. Coordenadas fin tramo 1 terreno (m) :	12.855	13.300
3. Coordenadas fin tramo 2 terreno (m) :	20.695	13.300
4. Coordenadas fin tramo 3 terreno (m) :	41.645	3.040

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Ψo (coeficiente combinación variables) :	1.00

	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS DEL TERRENO

γ. Peso específico (T/m³) :	2.00
ϕ. Angulo rozamiento interno (°) :	30.000
δmt. Angulo rozamiento muro-tierras (°) :	0.000
ϕtt. Angulo rozamiento tierras-tierras (°) :	15.000
μ. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	30.000

ARMADO

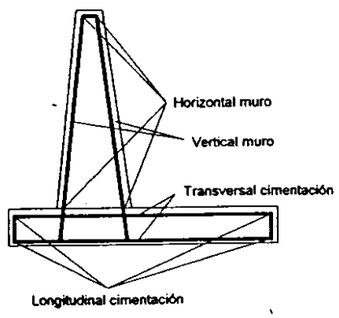
H1-1. Dist. sección 1 a sup. zapata (m) :	0.000
Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050
Cuantias mínimas	
Vertical muros (1/3 min cara)(o/oo) :	0.900
Horizontal muros (1/3 min. cara)(o/oo) :	1.600
Cortante o montaje alzado (cm²/m²) :	4.500
Transversal zapata (sup+inf)(o/oo) :	1.447
Longitudinal zapata (sup+inf)(o/oo) :	1.447
Cortante zapata (cm²/m²) :	0.000
Perimetral zapata (en canto)(cm²/m) :	10.853

CARGAS (sin mayorar)

Acciones permanentes (G)	
Peso propio barrera coronación (T/m) :	0.000
Acciones permanentes de valor no constante (G*)	
Fg. Carga horizontal sobre muro (T/m) :	0.000
Hfg. Posición Fg a inferior zapata (m) :	10.000
Acciones variables (Q)	
SC1. Sobrecarga en tramo 1 (T/m) :	0.000
SC2. Sobrecarga en tramo 2 (T/m) :	3.500
SC3. Sobrecarga en tramo 3 (T/m) :	0.000
Fq. Carga horizontal sobre muro (T/m) :	0.000
Hfq. Posición Fq a inferior zapata (m) :	10.000

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H - 250
Hormigón cimentación (T/m²) :	H - 250
Acero (T/m²) :	AEH - 500



9/07/98 Calculos muro1-f.xls

RESUMEN ACCIONES SOBRE EL MURO

		F.vertical (T / m)	X (m)	F. Horizontal (T / m)	Y (m)
Acciones permanentes (G)					
Peso propio muro + barrera	Sobre sección 1 (ΣP' i, i=1..3)	14.386	1.651	---	---
	Sobre sección base muro (ΣP i, i=1..3)	14.386	1.651	---	---
	Total peso propio (ΣP i, i=1..6)	42.511	3.040	---	---
Acciones permanentes de valor no constante (G*)					
Tierras	Sobre sección 1 (E1't)	2.791	2.170	26.725	3.750
	Sobre sección base muro (E1t)	2.791	2.170	26.725	3.750
	Total tierras (E2t + ΣT)	103.657	5.262	51.750	3.684
	Verticales sobre talón (ΣT' ij)	84.792	5.078	---	---
	Verticales sobre talón (cortante) (ΣT'' ij)	63.214	5.739	---	---
Fuerza Fg	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fg	---	---	0.000	10.000
Acciones variables (Q)					
Sobrecargas sobre terreno	Sección 1 (E1'sc)	0.000	2.053	0.000	4.875
	Base muro (E1sc)	0.000	2.053	0.000	4.875
	Inf. cimentación (E2sc + ΣS)	1.323	7.500	4.938	5.526
	Verticales sobre talón (ΣS' i, i=1..3)	0.000	0.000	---	---
	Verticales sobre talón (cortante) (ΣS'' i)	0.000	0.000	---	---
Fuerza Fq	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fq	---	---	0.000	10.000

COMPROBACIONES

SEGURIDAD AL DESLIZAMIENTO (Planteamiento clásico)

	Fuerzas (T / m) Opuestas	Deslizantes
Acciones permanentes (G)		
Peso propio muro	24.656	---
Acciones permanentes de valor no constante (G*)		
Tierras	60.121	51.750
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	0.767	4.938
Fuerza Fq	---	0.000
TOTAL	**85.545**	**56.688**

Csd=	**1.510**	Vale

SEGURIDAD AL VUELCO (Planteamiento clásico)

	Momentos (mT / m) Estabilizadores	Volcadores
Acciones permanentes (G)		
Peso propio muro	129.213	---
Acciones permanentes de valor no constante (G*)		
Tierras	545.424	190.640
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	9.924	27.288
Fuerza Fq	---	0.000
TOTAL	**684.562**	**217.928**

Csv=	**3.141**	Vale

TENSIONES MAXIMAS EN CIMENTACION

	N (T / m)	M (mT / m)
Acciones permanentes (G)		
Peso propio muro	42.511	30.203
Acciones permanentes de valor no constante (G*)		
Tierras	103.657	33.929
Fuerza Fg	0.000	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	1.323	22.326
Fuerza Fq	0.000	0.000
TOTAL	**147.491**	**86.458**

D (m) =	**7.50**
σ puntera (T / m²) =	**28.89**
σ talón (T / m²) =	**10.44**
σmed (T / m²) =	**19.67**
σcob (T / m²) =	**23.31**
Vale	

9/07/98 Calculos muro1-f.xls

ARMADO

Secciones

Elemento	Designación	Datos reales Ancho (m)	Datos reales Canto (m)	Datos de cálculo Ancho (m)	Datos de cálculo Canto (m)
ALZADO	0-0	1.00	1.21	1.00	1.21
	1-1	1.00	1.21	1.00	1.21
PUNTERA	2-2 f	1.00	1.50	1.00	1.50
	2-2 c	1.00	1.50	1.00	0.76
TALON	3-3 f	1.00	1.50	1.00	1.50
	3-3 c	1.00	1.50	1.00	1.50

Esfuerzos mayorados

Elemento	Sección	Nd (T / m)	Md (mT / m)	Vd (T / m)
ALZADO	0-0 (+)	17.134	90.626	40.087
	0-0 (-)	12.947	1.967	0.000
	1-1 (+)	17.134	90.626	40.087
	1-1 (-)	12.947	1.967	0.000
PUNTERA	2-2 f (+)	0.000	34.325	---
	2-2 f (-)	0.000	4.070	---
	2-2 c (+)	---	---	17.494
	2-2 c (-)	---	---	2.110
TALON	3-3 f (+)	0.000	4.327	---
	3-3 f (-)	-51.726	-134.698	---
	3-3 c (+)	---	---	1.434
	3-3 c (-)	---	---	-34.293

Armaduras

Elemento	Armadura	Sección	ARMADURA DE CÁLCULO Necesaria cm2/m	Mínima cm2/m	Control cálculo	Adoptada cm2/m
ALZADO	Vert. trasdós	0-0 (+)	16.224	7.230	Vale	**16.224**
		0-0 (-)	0.000	3.615	Vale	
		1-1 (+)	16.224	7.230	Vale	**16.224**
		1-1 (-)	0.000	3.615	Vale	
	Vert. intrados	0-0 (+)	0.000	3.615	Vale	**3.615**
		0-0 (-)	0.000	3.615	Vale	
		1-1 (+)	0.000	3.615	Vale	
		1-1 (-)	0.000	3.615	Vale	
	Hor. trasdós (*)	---	3.245	12.853	Vale	**12.853**
	Hor. intradós (*)	---	0.000	6.427	Vale	**6.427**
	Cortante	0-0 (+)	0.000	4.500	Vale	**4.500 (cm²/m²)**
		0-0 (-)	0.000	4.500	Vale	
		1-1 (+)	0.000	4.500	Vale	
		1-1 (-)	0.000	4.500	Vale	
PUNTERA	Trans. inferior	2-2 f (+)	5.369	10.853	Vale	**10.853**
		2-2 f (-)	0.633	10.853	Vale	
	Long. inf. (*)	---	1.074	10.853	Vale	**10.853**
	Trans. superior	2-2 f (+)	0.000	10.853	Vale	**33.107**
		2-2 f (-)	0.000	10.853	Vale	
	Long. sup. (*)	---	0.000	10.853	Vale	**10.853**
	Cortante	2-2 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		2-2 c (-)	0.000	0.000	Vale	
TALON	Trans. inferior	3-3 f (+)	0.673	10.853	Vale	**10.853**
		3-3 f (-)	0.000	10.853	Vale	
	Long. inf. (*)	---	0.135	10.853	Vale	**10.853**
	Trans. superior	3-3 f (+)	0.000	10.853	Vale	**33.107**
		3-3 f (-)	33.107	10.853	Vale	
	Long. sup. (*)	---	6.621	10.853	Vale	**10.853**
	Cortante	3-3 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		3-3 c (-)	0.000	0.000	Vale	
ZAPATA	Perimetral	---	0.000	10.853	Vale	**10.853**

(*) Calculada como el 20% de la armadura perpendicular a ella

CALCULO DE MUROS.

NOMBRE PROYECTO : L.A.V. MADRID-ZARAGOZA
NOMBRE OBRA : E-1602.G Muro 1 Módulo G

DATOS

GEOMETRIA DE CALCULO DEL MURO

C. Canto del muro en coronación (m) :	0.500
ST. Sobreespesor muro en trasdós (m) :	0.578
SI. Sobreespesor muro en intradós (m) :	0.000
P. Puntera zapata (m) :	1.000
T. Talón zapata (m) :	4.322
H. Altura muro (m) :	5.541
Hz. Canto zapata (m) :	1.300
Anchura total cimentación (m) :	6.400
Angulo trasdós muro (°) :	84.045

DEFINICION TERRENO

	X	Y
0. Coordenadas base trasdos (m) :	0.000	0.000
1. Coordenadas coronación trasdos (m) :	-0.578	5.541
2. Coordenadas fin tramo 1 terreno (m) :	15.502	13.310
3. Coordenadas fin tramo 2 terreno (m) :	23.340	13.310
4. Coordenadas fin tramo 3 terreno (m) :	44.300	3.050

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Ψo (coeficiente combinación variables) :	1.00

	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS DEL TERRENO

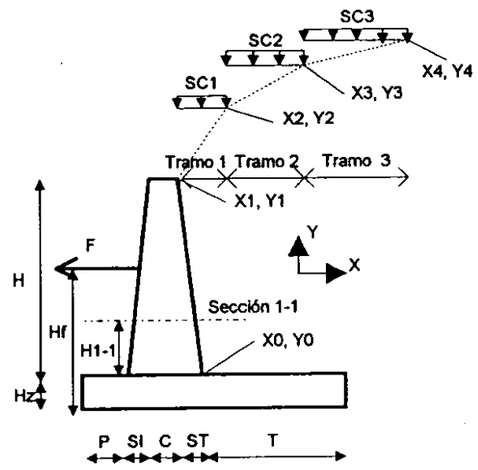
γ. Peso específico (T/m³) :	2.00
ϕ. Angulo rozamiento interno (°) :	30.000
δmt. Angulo rozamiento muro-tierras (°) :	0.000
ϕtt. Angulo rozamiento tierras-tierras (°) :	18.000
μ. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	30.000

ARMADO

H1-1. Dist. sección 1 a sup. zapata (m) :	0.000
Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050

Cuantias mínimas

Vertical muros (1/3 min cara)(o/oo) :	0.900
Horizontal muros (1/3 min. cara)(o/oo) :	1.600
Cortante o montaje alzado (cm²/m²) :	4.500
Transversal zapata (sup+inf)(o/oo) :	1.447
Longitudinal zapata (sup+inf)(o/oo) :	1.447
Cortante zapata (cm²/m²) :	0.000
Perimetral zapata (en canto)(cm²/m) :	9.406



CARGAS (sin mayorar)

Acciones permanentes (G)

Peso propio barrera coronación (T/m) :	0.000

Acciones permanentes de valor no constante (G*)

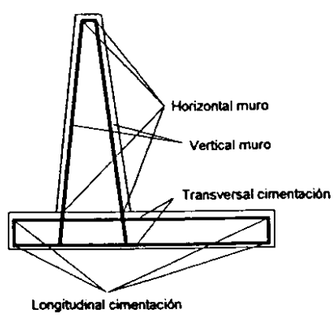
Fg. Carga horizontal sobre muro (T/m) :	0.000
Hfg. Posición Fg a inferior zapata (m) :	10.000

Acciones variables (Q)

SC1. Sobrecarga en tramo 1 (T/m) :	0.000
SC2. Sobrecarga en tramo 2 (T/m) :	3.500
SC3. Sobrecarga en tramo 3 (T/m) :	0.000
Fq. Carga horizontal sobre muro (T/m) :	0.000
Hfq. Posición Fq a inferior zapata (m) :	10.000

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H - 250
Hormigón cimentación (T/m²) :	H - 250
Acero (T/m²) :	AEH - 500



9/07/98 Calculos muro1-g.xls

RESUMEN ACCIONES SOBRE EL MURO

		F.vertical (T / m)	X (m)	F. Horizontal (T / m)	Y (m)
Acciones permanentes (G)					
Peso propio muro + barrera	Sobre sección 1 (ΣP' i, i=1..3)	10.930	1.412	---	---
	Sobre sección base muro (ΣP i, i=1..3)	10.930	1.412	---	---
	Total peso propio (ΣP i, i=1..6)	31.730	2.584	---	---
Acciones permanentes de valor no constante (G*)					
Tierras	Sobre sección 1 (E1't)	1.871	1.885	17.941	3.147
	Sobre sección base muro (E1t)	1.871	1.885	17.941	3.147
	Total tierras (E2t + ΣT)	75.287	4.581	38.739	3.069
	Verticales sobre talón (ΣT' ij)	59.335	4.349	---	---
	Verticales sobre talón (cortante) (ΣT'' ij)	44.030	4.917	---	---
Fuerza Fg	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fg	---	---	0.000	10.000
Acciones variables (Q)					
Sobrecargas sobre terreno	Sección 1 (E1'sc)	0.000	1.789	0.000	4.071
	Base muro (E1sc)	0.000	1.789	0.000	4.071
	Inf. cimentación (E2sc + ΣS)	0.656	6.400	2.019	4.604
	Verticales sobre talón (ΣS' i, i=1..3)	0.000	0.000	---	---
	Verticales sobre talón (cortante) (ΣS'' i)	0.000	0.000	---	---
Fuerza Fq	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fq	---	---	0.000	10.000

COMPROBACIONES

SEGURIDAD AL DESLIZAMIENTO (Planteamiento clásico)

	Fuerzas (T / m) Opuestas	Deslizantes
Acciones permanentes (G)		
Peso propio muro	18.403	---
Acciones permanentes de valor no constante (G*)		
Tierras	43.666	38.739
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	0.381	2.019
Fuerza Fq	---	0.000
TOTAL	**62.450**	**40.758**

Csd=	**1.530**	Vale

SEGURIDAD AL VUELCO (Planteamiento clásico)

	Momentos (mT / m) Estabilizadores	Volcadores
Acciones permanentes (G)		
Peso propio muro	81.994	---
Acciones permanentes de valor no constante (G*)		
Tierras	344.924	118.909
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	4.199	9.297
Fuerza Fq	---	0.000
TOTAL	**431.117**	**128.206**

Csv=	**3.363**	Vale

TENSIONES MAXIMAS EN CIMENTACION

	N (T / m)	M (mT / m)
Acciones permanentes (G)		
Peso propio muro	31.730	19.541
Acciones permanentes de valor no constante (G*)		
Tierras	75.287	14.902
Fuerza Fg	0.000	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	0.656	7.197
Fuerza Fq	0.000	0.000
TOTAL	**107.672**	**41.640**

D (m) =	**6.40**
σ puntera (T / m²) =	**22.92**
σ talón (T / m²) =	**10.72**
σmed (T / m²) =	**16.82**
σcob (T / m²) =	**19.14**
Vale	

9/07/98 Calculos muro1-g.xls

ARMADO

Secciones

Elemento	Designación	Datos reales Ancho (m)	Canto (m)	Datos de cálculo Ancho (m)	Canto (m)
ALZADO	0-0	1.00	1.08	1.00	1.08
	1-1	1.00	1.08	1.00	1.08
PUNTERA	2-2 f	1.00	1.30	1.00	1.30
	2-2 c	1.00	1.30	1.00	0.61
TALON	3-3 f	1.00	1.30	1.00	1.30
	3-3 c	1.00	1.30	1.00	1.30

Esfuerzos mayorados

Elemento	Sección	Nd (T / m)	Md (mT / m)	Vd (T / m)
ALZADO	0-0 (+)	12.644	49.981	26.911
	0-0 (-)	9.837	1.248	0.000
	1-1 (+)	12.644	49.981	26.911
	1-1 (-)	9.837	1.248	0.000
PUNTERA	2-2 f (+)	0.000	19.166	---
	2-2 f (-)	0.000	2.565	---
	2-2 c (+)	---	---	10.865
	2-2 c (-)	---	---	1.486
TALON	3-3 f (+)	0.000	2.748	---
	3-3 f (-)	-38.550	-61.931	---
	3-3 c (+)	---	---	1.011
	3-3 c (-)	---	---	-18.517

Armaduras

Elemento	Armadura	Sección	ARMADURA DE CALCULO Necesaria cm2/m	Minima cm2/m	Control cálculo	Adoptada cm2/m
ALZADO	Vert. trasdós	0-0 (+)	9.709	6.468	Vale	**9.709**
		0-0 (-)	0.000	3.234	Vale	
		1-1 (+)	9.709	6.468	Vale	**9.709**
		1-1 (-)	0.000	3.234	Vale	
	Vert. intrados	0-0 (+)	0.000	3.234	Vale	**3.234**
		0-0 (-)	0.000	3.234	Vale	
		1-1 (+)	0.000	3.234	Vale	
		1-1 (-)	0.000	3.234	Vale	
	Hor. trasdós (*)	---	1.942	11.499	Vale	**11.499**
	Hor. intradós (*)	---	0.000	5.749	Vale	**5.749**
	Cortante	0-0 (+)	0.000	4.500	Vale	**4.500**
		0-0 (-)	0.000	4.500	Vale	**(cm²/m²)**
		1-1 (+)	0.000	4.500	Vale	
		1-1 (-)	0.000	4.500	Vale	
PUNTERA	Trans. inferior	2-2 f (+)	3.472	9.406	Vale	**9.406**
		2-2 f (-)	0.463	9.406	Vale	
	Long. inf. (*)	---	0.694	9.406	Vale	**9.406**
	Trans. superior	2-2 f (+)	0.000	9.406	Vale	**20.025**
		2-2 f (-)	0.000	9.406	Vale	
	Long. sup. (*)	---	0.000	9.406	Vale	**9.406**
	Cortante	2-2 c (+)	0.000	0.000	Vale	**0.000**
		2-2 c (-)	0.000	0.000	Vale	**(cm²/m²)**
TALON	Trans. inferior	3-3 f (+)	0.496	9.406	Vale	**9.406**
		3-3 f (-)	0.000	9.406	Vale	
	Long. inf. (*)	---	0.099	9.406	Vale	**9.406**
	Trans. superior	3-3 f (+)	0.000	9.406	Vale	**20.025**
		3-3 f (-)	20.025	9.406	Vale	
	Long. sup. (*)	---	4.005	9.406	Vale	**9.406**
	Cortante	3-3 c (+)	0.000	0.000	Vale	**0.000**
		3-3 c (-)	0.000	0.000	Vale	**(cm²/m²)**
ZAPATA	Perimetral	---	0.000	9.406	Vale	**9.406**

(*) Calculada como el 20% de la armadura perpendicular a ella

CALCULO DE MUROS.

NOMBRE PROYECTO : L.A.V. MADRID-ZARAGOZA
NOMBRE OBRA : E-1502.o Muro 1 Módulo H

DATOS

GEOMETRIA DE CALCULO DEL MURO

C. Canto del muro en coronación (m) :	0.500
ST. Sobreespesor muro en trasdós (m) :	0.457
SI. Sobreespesor muro en intradós (m) :	0.000
P. Puntera zapata (m) :	1.000
T. Talón zapata (m) :	3.043
H. Altura muro (m) :	4.380
Hz. Canto zapata (m) :	1.200
Anchura total cimentación (m) :	5.000
Angulo trasdós muro (°) :	84.043

DEFINICION TERRENO

	X	Y
0. Coordenadas base trasdos (m) :	0.000	0.000
1. Coordenadas coronación trasdos (m) :	-0.457	4.380
2. Coordenadas fin tramo 1 terreno (m) :	18.143	13.360
3. Coordenadas fin tramo 2 terreno (m) :	25.983	13.360
4. Coordenadas fin tramo 3 terreno (m) :	46.943	3.100

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Ψo (coeficiente combinación variables) :	1.00

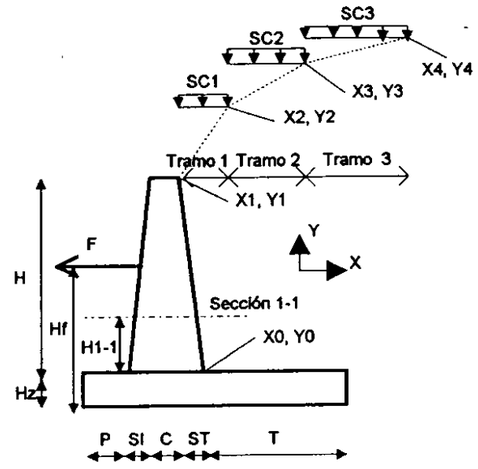
	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS DEL TERRENO

γ. Peso específico (T/m³) :	2.00
ϕ. Angulo rozamiento interno (°) :	30.000
δmt. Angulo rozamiento muro-tierras (°) :	0.000
ϕtt. Angulo rozamiento tierras-tierras (°) :	18.000
μ. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	30.000

ARMADO

H1-1. Dist. sección 1 a sup. zapata (m) :	0.000
Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050
Cuantías mínimas	
Vertical muros (1/3 min cara)(o/oo) :	0.900
Horizontal muros (1/3 min. cara)(o/oo) :	1.600
Cortante o montaje alzado (cm²/m²) :	4.500
Transversal zapata (sup+inf)(o/oo) :	1.447
Longitudinal zapata (sup+inf)(o/oo) :	1.447
Cortante zapata (cm²/m²) :	0.000
Perimetral zapata (en canto)(cm²/m) :	8.682

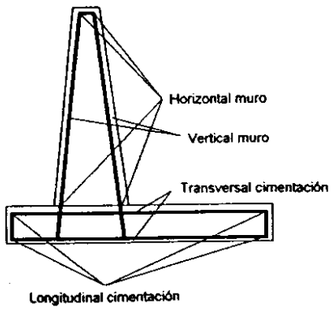


CARGAS (sin mayorar)

Acciones permanentes (G)	
Peso propio barrera coronación (T/m) :	0.000
Acciones permanentes de valor no constante (G*)	
Fg. Carga horizontal sobre muro (T/m) :	0.000
Hfg. Posición Fg a inferior zapata (m) :	10.000
Acciones variables (Q)	
SC1. Sobrecarga en tramo 1 (T/m) :	0.000
SC2. Sobrecarga en tramo 2 (T/m) :	3.500
SC3. Sobrecarga en tramo 3 (T/m) :	0.000
Fq. Carga horizontal sobre muro (T/m) :	0.000
Hfq. Posición Fq a inferior zapata (m) :	10.000

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H - 250
Hormigón cimentación (T/m²) :	H - 250
Acero (T/m²) :	AEH - 500



RESUMEN ACCIONES SOBRE EL MURO

		F.vertical (T / m)	X (m)	F. Horizontal (T / m)	Y (m)
Acciones permanentes (G)					
Peso propio muro + barrera	Sobre sección 1 (ΣP' i, i=1..3)	7.977	1.376	---	---
	Sobre sección base muro (ΣP i, i=1..3)	7.977	1.376	---	---
	Total peso propio (ΣP i, i=1..6)	22.977	2.110	---	---
Acciones permanentes de valor no constante (G*)					
Tierras	Sobre sección 1 (E1't)	1.171	1.805	11.219	2.660
	Sobre sección base muro (E1t)	1.171	1.805	11.219	2.660
	Total tierras (E2t + ΣT)	42.414	3.730	24.133	2.423
	Verticales sobre talón (ΣT' ij)	32.470	3.548	---	---
	Verticales sobre talón (cortante) (ΣT'' ij)	21.250	4.079	---	---
Fuerza Fg	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fg	---	---	0.000	10.000
Acciones variables (Q)					
Sobrecargas sobre terreno	Sección 1 (E1'sc)	0.000	1.729	0.000	3.390
	Base muro (E1sc)	0.000	1.729	0.000	3.390
	Inf. cimentación (E2sc + ΣS)	0.389	5.000	1.197	3.635
	Verticales sobre talón (ΣS' i, i=1..3)	0.000	0.000	---	---
	Verticales sobre talón (cortante) (ΣS'' i)	0.000	0.000	---	---
Fuerza Fq	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fq	---	---	0.000	10.000

COMPROBACIONES

SEGURIDAD AL DESLIZAMIENTO (Planteamiento clásico)

	Fuerzas (T / m) Opuestas	Deslizantes
Acciones permanentes (G)		
Peso propio muro	13.327	---
Acciones permanentes de valor no constante (G*)		
Tierras	24.600	24.133
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	0.226	1.197
Fuerza Fq	---	0.000
TOTAL	**38.152**	**25.330**

Csd=	**1.510**	Vale

SEGURIDAD AL VUELCO (Planteamiento clásico)

	Momentos (mT / m) Estabilizadores	Volcadores
Acciones permanentes (G)		
Peso propio muro	48.478	---
Acciones permanentes de valor no constante (G*)		
Tierras	158.215	58.480
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	1.945	4.351
Fuerza Fq	---	0.000
TOTAL	**208.637**	**62.830**

Csv=	**3.321**	Vale

TENSIONES MAXIMAS EN CIMENTACION

	N (T / m)	M (mT / m)
Acciones permanentes (G)		
Peso propio muro	22.977	8.965
Acciones permanentes de valor no constante (G*)		
Tierras	42.414	6.299
Fuerza Fg	0.000	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	0.389	3.378
Fuerza Fq	0.000	0.000
TOTAL	**65.780**	**18.643**

D (m) =	**5.00**
σ puntera (T / m²) =	**17.63**
σ talón (T / m²) =	**8.68**
σmed (T / m²) =	**13.16**
σcob (T / m²) =	**14.84**
Vale	

9/07/98 Calculos muro1-h.xls

ARMADO

Secciones

Elemento	Designación	Datos reales Ancho (m)	Datos reales Canto (m)	Datos de cálculo Ancho (m)	Datos de cálculo Canto (m)
ALZADO	0-0	1.00	0.96	1.00	0.96
	1-1	1.00	0.96	1.00	0.96
PUNTERA	2-2 f	1.00	1.20	1.00	1.20
	2-2 c	1.00	1.20	1.00	0.69
TALON	3-3 f	1.00	1.20	1.00	1.20
	3-3 c	1.00	1.20	1.00	1.20

Esfuerzos mayorados

Elemento	Sección	Nd (T / m)	Md (mT / m)	Vd (T / m)
ALZADO	0-0 (+)	8.935	24.731	16.828
	0-0 (-)	7.179	0.734	0.000
	1-1 (+)	8.935	24.731	16.828
	1-1 (-)	7.179	0.734	0.000
PUNTERA	2-2 f (+)	0.000	13.680	---
	2-2 f (-)	0.000	2.012	---
	2-2 c (+)	---	---	9.084
	2-2 c (-)	---	---	1.363
TALON	3-3 f (+)	0.000	2.727	---
	3-3 f (-)	-21.410	-27.841	---
	3-3 c (+)	---	---	0.734
	3-3 c (-)	---	---	-11.226

Armaduras

Elemento	Armadura	Sección	ARMADURA DE CALCULO Necesaria cm2/m	Minima cm2/m	Control cálculo	Adoptada cm2/m
ALZADO	Vert. trasdós	0-0 (+)	5.175	5.742	Vale	**5.742**
		0-0 (-)	0.000	2.871	Vale	
		1-1 (+)	5.175	5.742	Vale	**5.742**
		1-1 (-)	0.000	2.871	Vale	
	Vert. intrados	0-0 (+)	0.000	2.871	Vale	**2.871**
		0-0 (-)	0.000	2.871	Vale	
		1-1 (+)	0.000	2.871	Vale	
		1-1 (-)	0.000	2.871	Vale	
	Hor. trasdós (*)	---	1.035	10.208	Vale	**10.208**
	Hor. intradós (*)	---	0.000	5.104	Vale	**5.104**
	Cortante	0-0 (+)	0.000	4.500	Vale	**4.500 (cm²/m²)**
		0-0 (-)	0.000	4.500	Vale	
		1-1 (+)	0.000	4.500	Vale	
		1-1 (-)	0.000	4.500	Vale	
PUNTERA	Trans. inferior	2-2 f (+)	2.692	8.682	Vale	**8.682**
		2-2 f (-)	0.395	8.682	Vale	
	Long. inf. (*)	---	0.538	8.682	Vale	**8.682**
	Trans. superior	2-2 f (+)	0.000	8.682	Vale	**10.328**
		2-2 f (-)	0.000	8.682	Vale	
	Long. sup. (*)	---	0.000	8.682	Vale	**8.682**
	Cortante	2-2 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		2-2 c (-)	0.000	0.000	Vale	
TALON	Trans. inferior	3-3 f (+)	0.535	8.682	Vale	**8.682**
		3-3 f (-)	0.000	8.682	Vale	
	Long. inf. (*)	---	0.107	8.682	Vale	**8.682**
	Trans. superior	3-3 f (+)	0.000	8.682	Vale	**10.328**
		3-3 f (-)	10.328	8.682	Vale	
	Long. sup. (*)	---	2.066	8.682	Vale	**8.682**
	Cortante	3-3 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		3-3 c (-)	0.000	0.000	Vale	
ZAPATA	Perimetral	---	0.000	8.682	Vale	**8.682**

(*) Calculada como el 20% de la armadura perpendicular a ella

CALCULO DE MUROS.

NOMBRE PROYECTO : L.A.V. MADRID-ZARAGOZA
NOMBRE OBRA : E-1502.0 Muro 1 Módulo I

DATOS

GEOMETRIA DE CALCULO DEL MURO

C. Canto del muro en coronación (m) :	0.500
ST. Sobreespesor muro en trasdós (m) :	0.334
SI. Sobreespesor muro en intradós (m) :	0.000
P. Puntera zapata (m) :	0.800
T. Talón zapata (m) :	2.466
H. Altura muro (m) :	3.205
Hz. Canto zapata (m) :	1.000
Anchura total cimentación (m) :	4.100
Angulo trasdós muro (°) :	84.051

DEFINICION TERRENO

	X	Y
0. Coordenadas base trasdos (m) :	0.000	0.000
1. Coordenadas coronación trasdos (m) :	-0.334	3.205
2. Coordenadas fin tramo 1 terreno (m) :	20.786	13.410
3. Coordenadas fin tramo 2 terreno (m) :	28.626	13.410
4. Coordenadas fin tramo 3 terreno (m) :	49.586	3.150

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Ψo (coeficiente combinación variables) :	1.00

	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS DEL TERRENO

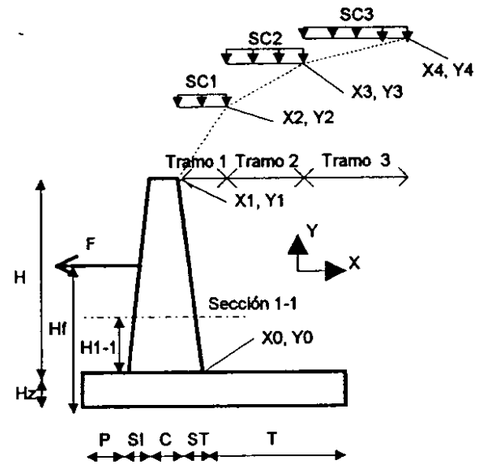
γ. Peso específico (T/m³) :	2.00
ϕ. Angulo rozamiento interno (°) :	30.000
δmt. Angulo rozamiento muro-tierras (°) :	0.000
ϕlt. Angulo rozamiento tierras-tierras (°) :	18.000
μ. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	30.000

ARMADO

H1-1. Dist. sección 1 a sup. zapata (m) :	0.000
Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050

Cuantias mínimas

Vertical muros (1/3 min cara)(o/oo) :	0.900
Horizontal muros (1/3 min. cara)(o/oo) :	1.600
Cortante o montaje alzado (cm²/m²) :	4.500
Transversal zapata (sup+inf)(o/oo) :	1.447
Longitudinal zapata (sup+inf)(o/oo) :	1.447
Cortante zapata (cm²/m²) :	0.000
Perimetral zapata (en canto)(cm²/m) :	7.235

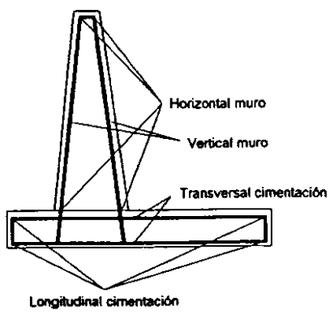


CARGAS (sin mayorar)

Acciones permanentes (G)	
Peso propio barrera coronación (T/m) :	0.000
Acciones permanentes de valor no constante (G*)	
Fg. Carga horizontal sobre muro (T/m) :	0.000
Hfg. Posición Fg a inferior zapata (m) :	10.000
Acciones variables (Q)	
SC1. Sobrecarga en tramo 1 (T/m) :	0.000
SC2. Sobrecarga en tramo 2 (T/m) :	3.500
SC3. Sobrecarga en tramo 3 (T/m) :	0.000
Fq. Carga horizontal sobre muro (T/m) :	0.000
Hfq. Posición Fq a inferior zapata (m) :	10.000

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H - 250
Hormigón cimentación (T/m²) :	H - 250
Acero (T/²) :	AEH - 500



9/07/98 Calculos muro1-I.xls

RESUMEN ACCIONES SOBRE EL MURO

		F.vertical (T / m)	X (m)	F. Horizontal (T / m)	Y (m)
Acciones permanentes (G)					
Peso propio muro + barrera	Sobre sección 1 (ΣP' i, i=1..3)	5.344	1.140	---	---
	Sobre sección base muro (ΣP i, i=1..3)	5.344	1.140	---	---
	Total peso propio (ΣP i, i=1..6)	15.594	1.738	---	---
Acciones permanentes de valor no constante (G*)					
Tierras	Sobre sección 1 (E1't)	0.627	1.523	6.015	2.068
	Sobre sección base muro (E1t)	0.627	1.523	6.015	2.068
	Total tierras (E2t + ΣT)	25.439	3.086	14.690	1.853
	Verticales sobre talón (ΣT' ij)	19.541	2.929	---	---
	Verticales sobre talón (cortante) (ΣT'' ij)	12.709	3.364	---	---
Fuerza Fg	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fg	---	---	0.000	10.000
Acciones variables (Q)					
Sobrecargas sobre terreno	Sección 1 (E1'sc)	0.000	1.467	0.000	2.603
	Base muro (E1sc)	0.000	1.467	0.000	2.603
	Inf. cimentación (E2sc + ΣS)	0.000	0.000	0.000	2.779
	Verticales sobre talón (ΣS' i, i=1..3)	0.000	0.000	---	---
	Verticales sobre talón (cortante) (ΣS'' i)	0.000	0.000	---	---
Fuerza Fq	Sobre sección 1	---	---	0.000	10.000
	Sobre sección base muro	---	---	0.000	10.000
	Total Fq	---	---	0.000	10.000

COMPROBACIONES

SEGURIDAD AL DESLIZAMIENTO (Planteamiento clásico)

	Fuerzas (T / m) Opuestas	Deslizantes
Acciones permanentes (G)		
Peso propio muro	9.045	---
Acciones permanentes de valor no constante (G*)		
Tierras	14.755	14.690
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	0.000	0.000
Fuerza Fq	---	0.000
TOTAL	**23.799**	**14.690**

Csd=	**1.620**	Vale

SEGURIDAD AL VUELCO (Planteamiento clásico)

	Momentos (mT / m) Estabilizadores	Volcadores
Acciones permanentes (G)		
Peso propio muro	27.108	---
Acciones permanentes de valor no constante (G*)		
Tierras	78.514	27.215
Fuerza Fg	---	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	0.000	0.000
Fuerza Fq	---	0.000
TOTAL	**105.622**	**27.215**

Csv=	**3.881**	Vale

TENSIONES MAXIMAS EN CIMENTACION

	N (T / m)	M (mT / m)
Acciones permanentes (G)		
Peso propio muro	15.594	4.861
Acciones permanentes de valor no constante (G*)		
Tierras	25.439	0.850
Fuerza Fg	0.000	0.000
Acciones variables (Q)		
Sobrecargas sobre terreno	0.000	0.000
Fuerza Fq	0.000	0.000
TOTAL	**41.033**	**5.711**

D (m) =	**4.10**
σ puntera (T / m²) =	**12.05**
σ talón (T / m²) =	**7.97**
σmed (T / m²) =	**10.01**
σcob (T / m²) =	**10.74**
Vale	

ARMADO

Secciones

Elemento	Designación	Datos reales Ancho (m)	Datos reales Canto (m)	Datos de cálculo Ancho (m)	Datos de cálculo Canto (m)
ALZADO	0-0	1.00	0.83	1.00	0.83
	1-1	1.00	0.83	1.00	0.83
PUNTERA	2-2 f	1.00	1.00	1.00	1.00
	2-2 c	1.00	1.00	1.00	0.54
TALON	3-3 f	1.00	1.00	1.00	1.00
	3-3 c	1.00	1.00	1.00	1.00

Esfuerzos mayorados

Elemento	Sección	Nd (T / m)	Md (mT / m)	Vd (T / m)
ALZADO	0-0 (+)	5.750	9.720	9.022
	0-0 (-)	4.810	0.368	0.000
	1-1 (+)	5.750	9.720	9.022
	1-1 (-)	4.810	0.368	0.000
PUNTERA	2-2 f (+)	0.000	5.931	---
	2-2 f (-)	0.000	1.070	---
	2-2 c (+)	---	---	4.575
	2-2 c (-)	---	---	0.849
TALON	3-3 f (+)	0.000	1.508	---
	3-3 f (-)	-13.114	-10.358	---
	3-3 c (+)	---	---	0.478
	3-3 c (-)	---	---	-5.103

Armaduras

Elemento	Armadura	Sección	ARMADURA DE CALCULO Necesaria cm2/m	Minima cm2/m	Control cálculo	Adoptada cm2/m
ALZADO	Vert. trasdós	0-0 (+)	2.129	5.004	Vale	**5.004**
		0-0 (-)	0.000	2.502	Vale	
		1-1 (+)	2.129	5.004	Vale	**5.004**
		1-1 (-)	0.000	2.502	Vale	
	Vert. intrados	0-0 (+)	0.000	2.502	Vale	**2.502**
		0-0 (-)	0.000	2.502	Vale	
		1-1 (+)	0.000	2.502	Vale	
		1-1 (-)	0.000	2.502	Vale	
	Hor. trasdós (*)	---	0.426	8.896	Vale	**8.896**
	Hor. intradós (*)	---	0.000	4.448	Vale	**4.448**
	Cortante	0-0 (+)	0.000	4.500	Vale	**4.500 (cm²/m²)**
		0-0 (-)	0.000	4.500	Vale	
		1-1 (+)	0.000	4.500	Vale	
		1-1 (-)	0.000	4.500	Vale	
PUNTERA	Trans. inferior	2-2 f (+)	1.411	7.235	Vale	**7.235**
		2-2 f (-)	0.254	7.235	Vale	
	Long. inf. (*)	---	0.282	7.235	Vale	**7.235**
	Trans. superior	2-2 f (+)	0.000	7.235	Vale	**7.235**
		2-2 f (-)	0.000	7.235	Vale	
	Long. sup. (*)	---	0.000	7.235	Vale	**7.235**
	Cortante	2-2 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		2-2 c (-)	0.000	0.000	Vale	
TALON	Trans. inferior	3-3 f (+)	0.358	7.235	Vale	**7.235**
		3-3 f (-)	0.000	7.235	Vale	
	Long. inf. (*)	---	0.072	7.235	Vale	**7.235**
	Trans. superior	3-3 f (+)	0.000	7.235	Vale	**7.235**
		3-3 f (-)	5.426	7.235	Vale	
	Long. sup. (*)	---	1.085	7.235	Vale	**7.235**
	Cortante	3-3 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		3-3 c (-)	0.000	0.000	Vale	
ZAPATA	Perimetral	---	0.000	7.235	Vale	**7.235**

(*) Calculada como el 20% de la armadura perpendicular a ella

CALCULO DE SECUENCIA DE MUROS . Datos.

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1502.0. Muros estribo 2.

GESTION DE FICHEROS

Directorio de trabajo :	G:\MAZAXV\E-1502.0\ESTRIBO

VALORES VARIABLES

GEOMETRIA MURO

	Sección inicial	Sección final	
C. Canto del muro en coronación (m) :	0.500	0.500	(1)
SI. Sobreespesor muro en intradós (m) :	0.000	0.000	(2)
P. Puntera zapata (m) :	2.500	1.000	(1)
Hz. Canto zapata (m) :	1.800	1.000	(1)
Ancho total de la zapata (m) :	9.300	6.400	(1)
H1-1. Dist. sección 1 a sup. zapata (m) :	2.500	2.000	(2)
Cota coronación :	313.030	304.300	(2)
Cota cimentación :	299.500	299.500	(1)

DEFINICION TERRENO

	Sección inicial X	Sección final X	Sección inicial Y	Sección final Y	
0. Coordenadas base trasdos (m) :	0.000	0.000	0.000	0.000	(2)
1. Coordenadas coronación trasdos (m) :	-1.222	-0.396	11.730	3.800	(2)
2. Coordenadas fin tramo 1 terreno (m) :	0.100	9.764	11.730	8.250	(2)
3. Coordenadas fin tramo 2 terreno (m) :	0.150	19.924	11.730	12.700	(2)
4. Coordenadas fin tramo 3 terreno (m) :	20.000	29.924	11.730	12.700	(2)

VALORES CONSTANTES

GEOMETRIA MURO

Pendiente trasdós :	9.600	
Longitud total muro (m) :	60.000	
Número de módulos :	6	
Secciones a verificar por módulo :	3	(Mínimo 2)
Longitud módulo (m) :	10.000	

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Yo (coeficiente combinación variables) :	1.00

	Estado Límite Ultimo	
	- Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

ARMADO

Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050

CARGAS (sin mayorar)

Acciones permanentes (G)	
Peso propio barrera coronación (T/m) :	0.000
Acciones permanentes de valor no constante (G*)	
Fg. Carga horizontal sobre muro (T/m) :	0.000
Hfg. Posición Fg a inferior zapata (m) :	0.000
Acciones variables (Q)	
SC1. Sobrecarga en tramo 1 (T/m) :	0.000
SC2. Sobrecarga en tramo 2 (T/m) :	0.000
SC3. Sobrecarga en tramo 3 (T/m) :	3.000
Fq. Carga horizontal sobre muro (T/m) :	0.000
Hfq. Posición Fq a inferior zapata (m) :	0.000

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H - 250
Hormigón cimentación (T/m²) :	H - 250
Acero (T/²) :	AEH - 500

CARACTERISTICAS DEL TERRENO

g. Peso específico (T/m³) :	2.00
f. Angulo rozamiento interno (°) :	30.000
dmt. Angulo rozamiento muro-tierras (°) :	0.000
ftt. Angulo rozamiento tierras-tierras (°) :	10.000
m. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	30.000

(1) Es el valor que toma para los módulos extremos. El valor es constante dentro del módulo y varia linealmente de un módulo a otro.
(2) Es el valor que toma en los extremos del muro completo. El valor varia linealmente dentro de cada módulo.

CALCULO DE SECUENCIA DE MUROS . Resultados.

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1502.Q Muros estribo 2.

	Módulo 1			Módulo 2			Módulo 3			Módulo 4			Módulo 5			Módulo 6		
	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3
GEOMETRIA SECCION																		
C. Canto del muro en coronación (m) :	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
ST. Sobreespesor muro en trasdós (m) :	1.222	1.146	1.070	1.087	1.011	0.935	0.952	0.876	0.801	0.817	0.741	0.666	0.682	0.607	0.531	0.547	0.472	0.396
SI. Sobreespesor muro en intradós (m) :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
P. Puntera zapata (m) :	2.500	2.500	2.500	2.200	2.200	2.200	1.900	1.900	1.900	1.600	1.600	1.600	1.300	1.300	1.300	1.000	1.000	1.000
T. Talón zapata (m) :	5.078	5.154	5.230	4.933	5.009	5.085	4.788	4.864	4.939	4.643	4.719	4.794	4.498	4.573	4.649	4.353	4.428	4.504
H. Altura muro (m) :	11.730	11.003	10.275	10.435	9.707	8.980	9.140	8.412	7.685	7.845	7.118	6.390	6.550	5.823	5.095	5.255	4.528	3.800
Hz. Canto zapata (m) :	1.800	1.800	1.800	1.640	1.640	1.640	1.480	1.480	1.480	1.320	1.320	1.320	1.160	1.160	1.160	1.000	1.000	1.000
H1-1. Dist. sección 1 a sup. zapata (m) :	2.500	2.458	2.417	2.417	2.375	2.333	2.333	2.292	2.250	2.250	2.208	2.167	2.167	2.125	2.083	2.083	2.042	2.000
Cota cimentación :	299.500	299.500	299.500	299.500	299.500	299.500	299.500	299.500	299.500	299.500	299.500	299.500	299.500	299.500	299.500	299.500	299.500	299.500
TERRENO																		
X0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X1																		
X2	0.100	0.905	1.711	1.711	2.516	3.321	3.321	4.127	4.932	4.932	5.737	6.543	6.543	7.348	8.153	8.153	8.959	9.764
X3	0.150	1.798	3.446	3.446	5.094	6.741	6.741	8.389	10.037	10.037	11.685	13.333	13.333	14.981	16.628	16.628	18.276	19.924
X4	20.000	20.827	21.654	21.654	22.481	23.308	23.308	24.135	24.962	24.962	25.789	26.616	26.616	27.443	28.270	28.270	29.097	29.924
Y0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Y1																		
Y2	11.730	11.440	11.150	11.150	10.860	10.570	10.570	10.280	9.990	9.990	9.700	9.410	9.410	9.120	8.830	8.830	8.540	8.250
Y3	11.730	11.811	11.892	11.892	11.973	12.053	12.053	12.134	12.215	12.215	12.296	12.377	12.377	12.458	12.538	12.538	12.619	12.700
Y4	11.730	11.811	11.892	11.892	11.973	12.053	12.053	12.134	12.215	12.215	12.296	12.377	12.377	12.458	12.538	12.538	12.619	12.700
Vale terreno	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
COMPROBACIONES																		
Coeficiente seguridad deslizamiento :	2.271	2.218	2.136	2.056	1.623	1.604	1.561	1.578	1.557	1.511	1.527	1.571	1.546	1.629	1.731	1.708	1.804	1.915
	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Coeficiente seguridad al vuelco :	4.986	5.003	4.832	4.375	3.108	3.252	2.997	3.210	3.410	3.115	3.345	3.670	3.371	3.808	4.493	4.100	4.708	5.483
	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Tensión máxima (T/m²) :	23.649	20.637	20.278	23.639	31.762	29.044	31.729	28.342	25.378	28.026	24.743	21.389	23.614	19.859	16.126	18.002	14.801	11.964
Tensión media (T/m²) :	24.998	24.171	23.098	22.612	21.995	20.936	21.019	19.886	18.767	18.891	17.689	16.450	16.573	15.263	13.949	14.069	12.718	11.370
Tensión cobaricentrica (T/m²) :	25.456	25.409	24.078	22.960	25.817	24.039	25.319	23.170	21.264	22.521	20.401	18.280	19.307	16.966	14.714	15.515	13.452	11.572
	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
ARMADO																		
1. Inferior transversal cimentación (cm²/m) :	14.620	13.024	13.024	12.383	16.458	14.763	14.100	12.332	10.792	10.143	9.551	9.551	8.393	8.393	8.393	7.235	7.235	7.235
2. Superior transversal cimentación (cm²/m) :	27.570	32.523	34.183	35.435	43.724	40.715	42.438	38.355	34.924	36.946	32.946	28.555	30.189	25.080	19.791	21.150	16.928	13.231
3. Inferior longitudinal cimentación (cm²/m) :	13.024	13.024	13.024	11.866	11.866	11.866	10.708	10.708	10.708	9.551	9.551	9.551	8.393	8.393	8.393	7.235	7.235	7.235
4. Superior longitudinal cimentación (cm²/m) :	13.024	13.024	13.024	11.866	11.866	11.866	10.708	10.708	10.708	9.551	9.551	9.551	8.393	8.393	8.393	7.235	7.235	7.235
5. Perimetral cimentación (cm²/m) :	13.024	13.024	13.024	11.866	11.866	11.866	10.708	10.708	10.708	9.551	9.551	9.551	8.393	8.393	8.393	7.235	7.235	7.235
6a. Espera 6b (cm²/m) :	30.833	27.240	23.088	23.540	19.245	15.098	15.494	10.817	8.212	8.570	6.200	5.640	5.740	5.311	4.882	4.982	4.554	4.125
6b. Vertical trasdós con solape (cm²/m) :	30.833	27.240	23.088	23.540	19.245	15.098	15.494	10.817	8.212	8.570	6.200	5.640	5.740	5.311	4.882	4.982	4.554	4.125
7. Vertical trasdós sin solape (cm²/m) :	20.957	20.542	19.331	19.214	17.501	15.459	15.382	13.439	11.820	11.837	10.150	7.079	7.381	4.609	2.230	2.539	1.276	1.250
8a. Espera 8b (cm²/m) :	5.166	4.938	4.711	4.761	4.534	4.306	4.356	4.129	3.902	3.952	3.724	3.497	3.547	3.320	3.092	3.142	2.915	2.688
8b. Vertical intradós (cm²/m) :	5.166	4.938	4.711	4.761	4.534	4.306	4.356	4.129	3.902	3.952	3.724	3.497	3.547	3.320	3.092	3.142	2.915	2.688
9. Horquilla coronación (cm²/m) :																		
10. Horizontal trasdós (cm²/m) :	18.367	17.558	16.750	16.928	16.119	15.311	15.489	14.681	13.872	14.050	13.242	12.433	12.611	11.803	10.994	11.172	10.364	9.556
11. Horizontal intradós (cm²/m) :	9.183	8.779	8.375	8.464	8.060	7.656	7.744	7.340	6.936	7.025	6.621	6.217	6.306	5.901	5.497	5.586	5.182	4.778
12. Montaje muro y cortante (cm²/m²) :	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500
13. Horquillas horizontales bordes (cm²/m) :	18.367	17.558	16.750	16.928	16.119	15.311	15.489	14.681	13.872	14.050	13.242	12.433	12.611	11.803	10.994	11.172	10.364	9.556

PUENTE E-1502.0

5º PROYECTO DE PRUEBA DE CARGA

PRUEBA DE CARGA

OBJETO DE LA PRUEBA

El objeto de la prueba es comprobar la respuesta estructural, frente a situaciones de carga estática, de manera tal que confrontando la respuesta real con la teórica, determinar la fiabilidad del comportamiento en servicio del puente.

Esta prueba de carga se realizará antes de la colocación del balasto, carriles, etc., mediante el empleo de camiones cargados con arena, y servirá para obtener una recepción provisional de la obra. Para la recepción definitiva de la estructura será necesario realizar otra prueba de carga con locomotoras, una vez colocada la infraestructura ferroviaria, que no es objeto del presente documento.

CARGA DE PRUEBA

La prueba se realizará empleando camiones, el la disposición que se adjunta a continuación, de tres ejes separados 3.825 y 1.36 m. con cargas por eje de 7.6, 13.7 y 13.7 T.

APARATOS DE MEDIDA Y MEDICIONES

Para la realización de las mediciones se colocarán flexímetros en el centro del vano (medidas f1) y apoyos (medidas f2). Los valores de los desplazamientos que se adjuntan son los descensos relativos esperados entre los puntos de los vanos y los fijos de los apoyos. Estos valores deben ser del orden de la magnitud del valor f1-f2 medido en obra.

La apreciación mínima de cualquiera de los flexímetros será del orden del 3% de los valores máximos esperados de las magnitudes a medir.

El rango de los aparatos deberá ser como mínimo superior en un 50% a los esperados de dicha magnitud.

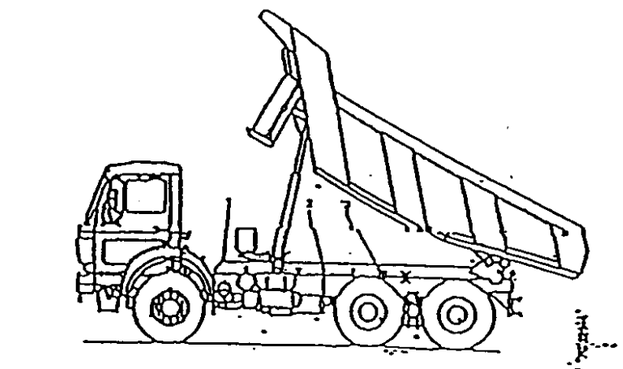
Las medidas se realizarán inmediatamente antes de la carga, inmediatamente después de su colocación y a los quince minutos de haberla retirado.

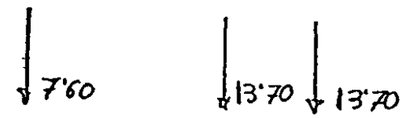
Durante la realización de la prueba se deberá anotar las condiciones climatológicas existentes a lo largo de la misma.

ANALISIS

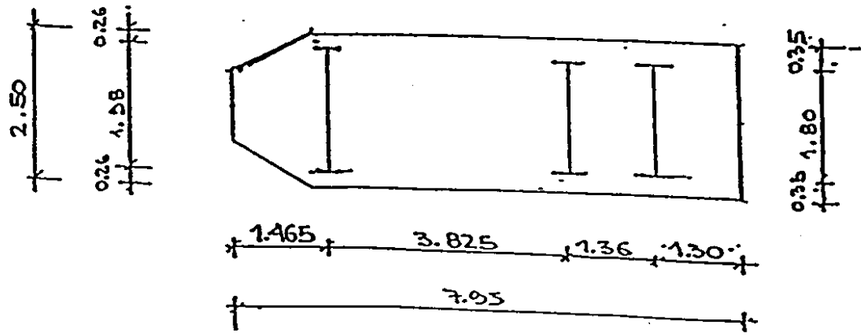
Para obtener las solicitaciones y desplazamientos verticales en los puntos a medir se procesó la estructura mediante el programa COSMOS/M. El modelo es el mismo usado en el cálculo del tablero. Los esfuerzos que se consiguen son del orden del 30 % de los obtenidos en la realización de una prueba de carga con locomotoras y la infraestructura ferroviaria colocada.

CAMION VOLQUETE DE 35 Ton.

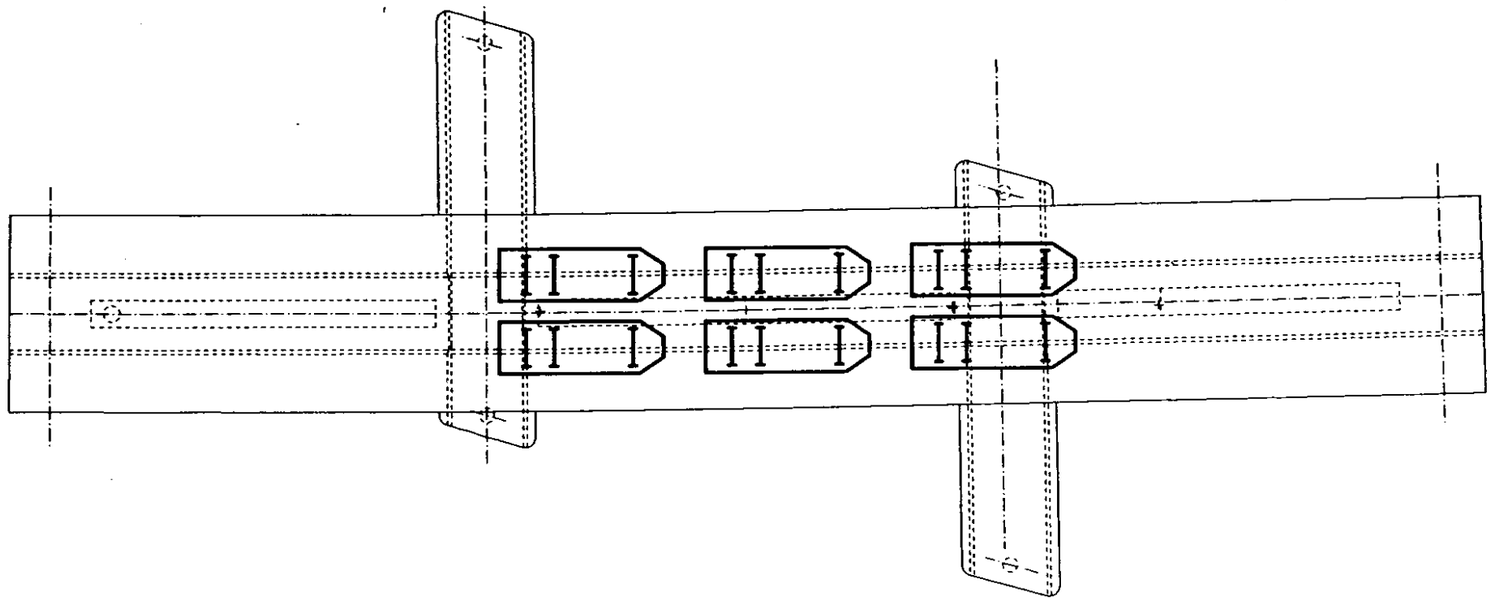




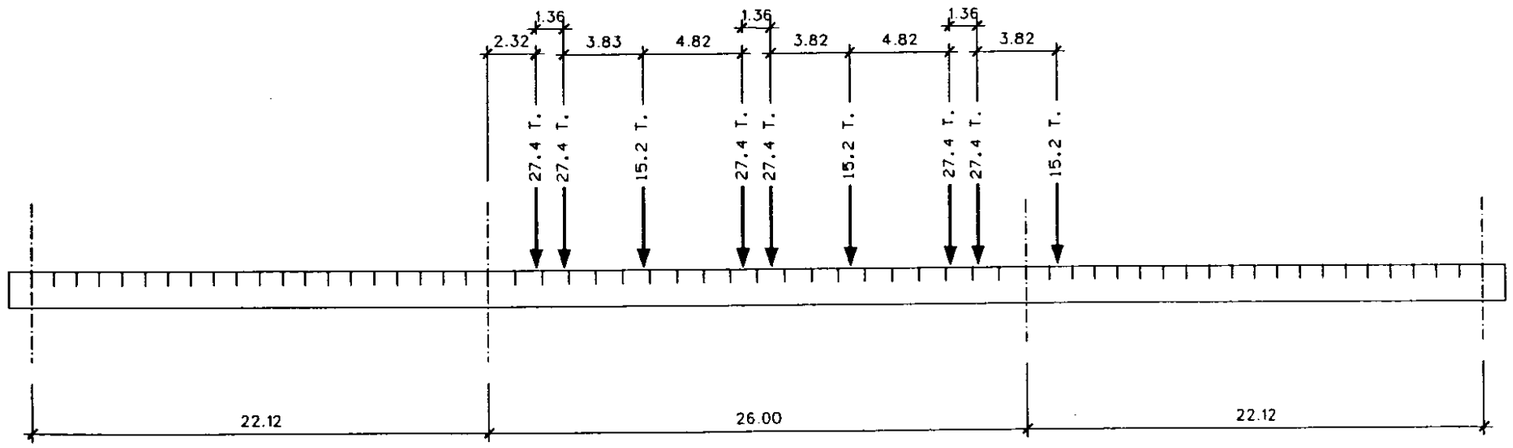
ALZADO



PLANTA



SITUACION EN PLANTA DE CAMIONES EN PRUEBA DE CARGA



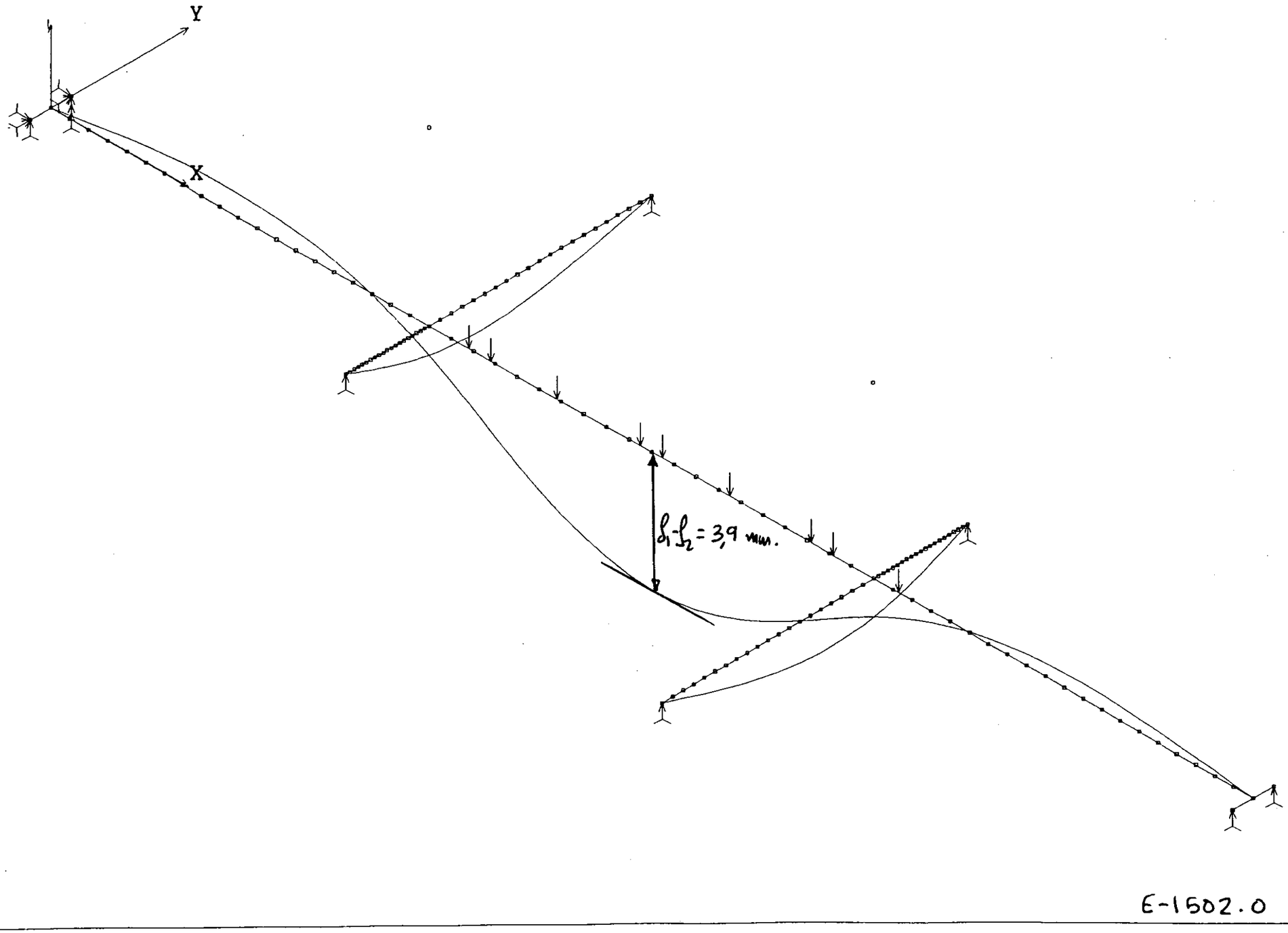
SITUACION EN ALZADO DE EJES DE CAMIONES

E-1502.0

Load case 9

Node	UX	UY	UZ	RX	RY	RZ
1	0.00000	0.00000	0.00000	0.00000	-0.00009	0.00000
2	0.00000	0.00000	0.00010	-0.00001	-0.00009	0.00000
3	0.00000	0.00000	0.00021	-0.00001	-0.00009	0.00000
4	0.00000	0.00000	0.00030	-0.00002	-0.00009	0.00000
5	0.00000	0.00000	0.00039	-0.00002	-0.00008	0.00000
6	0.00000	0.00000	0.00048	-0.00003	-0.00007	0.00000
7	0.00000	0.00000	0.00055	-0.00003	-0.00006	0.00000
8	0.00000	0.00000	0.00060	-0.00004	-0.00005	0.00000
9	0.00000	0.00000	0.00065	-0.00004	-0.00003	0.00000
10	0.00000	0.00000	0.00067	-0.00005	-0.00001	0.00000
11	0.00000	0.00000	0.00068	-0.00005	0.00001	0.00000
12	0.00000	0.00000	0.00066	-0.00006	0.00003	0.00000
13	0.00000	0.00000	0.00062	-0.00006	0.00005	0.00000
14	0.00000	0.00000	0.00055	-0.00007	0.00007	0.00000
15	0.00000	0.00000	0.00045	-0.00007	0.00010	0.00000
16	0.00000	0.00000	0.00033	-0.00008	0.00013	0.00000
17	0.00000	0.00000	0.00017	-0.00008	0.00016	0.00000
18	0.00000	0.00000	-0.00003	-0.00009	0.00019	0.00000
19	0.00000	0.00000	-0.00026	-0.00009	0.00023	0.00000
20	0.00000	0.00000	-0.00053	-0.00010	0.00026	0.00000
21	0.00000	0.00000	-0.00084	-0.00010	0.00030	0.00000
22	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
24	0.00000	0.00000	-0.00125	-0.00009	0.00033	0.00000
25	0.00000	0.00000	-0.00168	-0.00008	0.00034	0.00000
26	0.00000	0.00000	-0.00212	-0.00007	0.00033	0.00000
27	0.00000	0.00000	-0.00254	-0.00006	0.00031	0.00000
28	0.00000	0.00000	-0.00293	-0.00005	0.00028	0.00000
29	0.00000	0.00000	-0.00327	-0.00004	0.00024	0.00000
30	0.00000	0.00000	-0.00356	-0.00003	0.00019	0.00000
31	0.00000	0.00000	-0.00377	-0.00002	0.00014	0.00000
32	0.00000	0.00000	-0.00392	-0.00001	0.00008	0.00000
33	0.00000	0.00000	-0.00398	0.00000	0.00001	0.00000
34	0.00000	0.00000	-0.00395	0.00001	-0.00006	0.00000
35	0.00000	0.00000	-0.00383	0.00002	-0.00012	0.00000
36	0.00000	0.00000	-0.00364	0.00003	-0.00017	0.00000
37	0.00000	0.00000	-0.00338	0.00004	-0.00022	0.00000
38	0.00000	0.00000	-0.00306	0.00005	-0.00026	0.00000
39	0.00000	0.00000	-0.00270	0.00006	-0.00029	0.00000
40	0.00000	0.00000	-0.00231	0.00007	-0.00031	0.00000
41	0.00000	0.00000	-0.00189	0.00009	-0.00032	0.00000
42	0.00000	0.00000	-0.00148	0.00010	-0.00031	0.00000
43	0.00000	0.00000	-0.00110	0.00011	-0.00028	0.00000
46	0.00000	0.00000	-0.00081	0.00010	-0.00025	0.00000
47	0.00000	0.00000	-0.00055	0.00010	-0.00022	0.00000
48	0.00000	0.00000	-0.00033	0.00009	-0.00019	0.00000
49	0.00000	0.00000	-0.00014	0.00009	-0.00016	0.00000
50	0.00000	0.00000	0.00002	0.00008	-0.00013	0.00000
51	0.00000	0.00000	0.00015	0.00007	-0.00010	0.00000
52	0.00000	0.00000	0.00025	0.00007	-0.00008	0.00000
53	0.00000	0.00000	0.00033	0.00006	-0.00006	0.00000
54	0.00000	0.00000	0.00038	0.00006	-0.00004	0.00000
55	0.00000	0.00000	0.00042	0.00005	-0.00002	0.00000
56	0.00000	0.00000	0.00043	0.00005	0.00000	0.00000
57	0.00000	0.00000	0.00042	0.00004	0.00001	0.00000
58	0.00000	0.00000	0.00041	0.00004	0.00002	0.00000
59	0.00000	0.00000	0.00037	0.00003	0.00004	0.00000
60	0.00000	0.00000	0.00033	0.00003	0.00004	0.00000
61	0.00000	0.00000	0.00027	0.00002	0.00005	0.00000
62	0.00000	0.00000	0.00021	0.00002	0.00006	0.00000
63	0.00000	0.00000	0.00014	0.00001	0.00006	0.00000
64	0.00000	0.00000	0.00007	0.00001	0.00007	0.00000
65	0.00000	0.00000	0.00000	0.00000	0.00007	0.00000
67	0.00000	0.00000	0.00000	0.00015	0.00030	0.00000
68	0.00000	0.00000	-0.00010	0.00015	0.00030	0.00000
69	0.00000	0.00000	-0.00019	0.00015	0.00030	0.00000
70	0.00000	0.00000	-0.00029	0.00014	0.00030	0.00000
71	0.00000	0.00000	-0.00038	0.00014	0.00030	0.00000
72	0.00000	0.00000	-0.00046	0.00013	0.00030	0.00000
73	0.00000	0.00000	-0.00055	0.00013	0.00030	0.00000
74	0.00000	0.00000	-0.00063	0.00012	0.00030	0.00000
75	0.00000	0.00000	-0.00070	0.00011	0.00030	0.00000
76	0.00000	0.00000	-0.00077	0.00010	0.00030	0.00000
77	0.00000	0.00000	-0.00083	0.00009	0.00030	0.00000
78	0.00000	0.00000	-0.00088	0.00007	0.00030	0.00000
79	0.00000	0.00000	-0.00092	0.00006	0.00030	0.00000
80	0.00000	0.00000	-0.00095	0.00004	0.00030	0.00000
81	0.00000	0.00000	-0.00097	0.00002	0.00030	0.00000
82	0.00000	0.00000	-0.00098	0.00001	0.00030	0.00000
83	0.00000	0.00000	-0.00098	-0.00001	0.00030	0.00000
84	0.00000	0.00000	-0.00097	-0.00003	0.00030	0.00000
85	0.00000	0.00000	-0.00094	-0.00006	0.00030	0.00000
86	0.00000	0.00000	-0.00090	-0.00008	0.00030	0.00000
88	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
90	0.00000	0.00000	-0.00081	-0.00011	0.00030	0.00000
91	0.00000	0.00000	-0.00078	-0.00012	0.00030	0.00000
92	0.00000	0.00000	-0.00075	-0.00013	0.00030	0.00000
93	0.00000	0.00000	-0.00072	-0.00014	0.00030	0.00000
94	0.00000	0.00000	-0.00068	-0.00015	0.00030	0.00000
95	0.00000	0.00000	-0.00065	-0.00016	0.00030	0.00000
96	0.00000	0.00000	-0.00061	-0.00016	0.00030	0.00000
97	0.00000	0.00000	-0.00057	-0.00017	0.00030	0.00000
98	0.00000	0.00000	-0.00053	-0.00018	0.00030	0.00000
99	0.00000	0.00000	-0.00048	-0.00018	0.00030	0.00000
100	0.00000	0.00000	-0.00044	-0.00019	0.00030	0.00000
101	0.00000	0.00000	-0.00039	-0.00019	0.00030	0.00000
102	0.00000	0.00000	-0.00034	-0.00019	0.00030	0.00000
103	0.00000	0.00000	-0.00030	-0.00020	0.00030	0.00000
104	0.00000	0.00000	-0.00025	-0.00020	0.00030	0.00000
105	0.00000	0.00000	-0.00020	-0.00020	0.00030	0.00000
106	0.00000	0.00000	-0.00015	-0.00021	0.00030	0.00000
107	0.00000	0.00000	-0.00010	-0.00021	0.00030	0.00000
108	0.00000	0.00000	-0.00005	-0.00021	0.00030	0.00000
109	0.00000	0.00000	0.00000	-0.00021	0.00030	0.00000
111	0.00000	0.00000	0.00000	0.00025	-0.00028	0.00000
112	0.00000	0.00000	-0.00007	0.00025	-0.00028	0.00000
113	0.00000	0.00000	-0.00014	0.00025	-0.00028	0.00000
114	0.00000	0.00000	-0.00020	0.00024	-0.00028	0.00000
115	0.00000	0.00000	-0.00027	0.00024	-0.00028	0.00000
116	0.00000	0.00000	-0.00033	0.00024	-0.00028	0.00000
117	0.00000	0.00000	-0.00040	0.00023	-0.00028	0.00000
118	0.00000	0.00000	-0.00046	0.00023	-0.00028	0.00000
119	0.00000	0.00000	-0.00053	0.00022	-0.00028	0.00000
120	0.00000	0.00000	-0.00059	0.00022	-0.00028	0.00000
121	0.00000	0.00000	-0.00065	0.00021	-0.00028	0.00000
122	0.00000	0.00000	-0.00070	0.00020	-0.00028	0.00000
123	0.00000	0.00000	-0.00076	0.00020	-0.00028	0.00000
124	0.00000	0.00000	-0.00081	0.00019	-0.00028	0.00000
125	0.00000	0.00000	-0.00086	0.00018	-0.00028	0.00000
126	0.00000	0.00000	-0.00091	0.00017	-0.00028	0.00000
127	0.00000	0.00000	-0.00095	0.00016	-0.00028	0.00000
128	0.00000	0.00000	-0.00099	0.00015	-0.00028	0.00000
129	0.00000	0.00000	-0.00103	0.00013	-0.00028	0.00000
130	0.00000	0.00000	-0.00107	0.00012	-0.00028	0.00000
132	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
134	0.00000	0.00000	-0.00116	0.00008	-0.00028	0.00000
135	0.00000	0.00000	-0.00120	0.00005	-0.00028	0.00000
136	0.00000	0.00000	-0.00122	0.00003	-0.00028	0.00000
137	0.00000	0.00000	-0.00123	0.00000	-0.00028	0.00000
138	0.00000	0.00000	-0.00122	-0.00002	-0.00028	0.00000
139	0.00000	0.00000	-0.00120	-0.00004	-0.00028	0.00000
140	0.00000	0.00000	-0.00117	-0.00006	-0.00028	0.00000
141	0.00000	0.00000	-0.00112	-0.00008	-0.00028	0.00000
142	0.00000	0.00000	-0.00107	-0.00010	-0.00028	0.00000
143	0.00000	0.00000	-0.00100	-0.00011	-0.00028	0.00000
144	0.00000	0.00000	-0.00093	-0.00013	-0.00028	0.00000
145	0.00000	0.00000	-0.00085	-0.00014	-0.00028	0.00000
146	0.00000	0.00000	-0.00076	-0.00015	-0.00028	0.00000
147	0.00000	0.00000	-0.00066	-0.00016	-0.00028	0.00000
148	0.00000	0.00000	-0.00056	-0.00017	-0.00028	0.00000
149	0.00000	0.00000	-0.00045	-0.00017	-0.00028	0.00000
150	0.00000	0.00000	-0.00034	-0.00018	-0.00028	0.00000
151	0.00000	0.00000	-0.00023	-0.00018	-0.00028	0.00000
152	0.00000	0.00000	-0.00012	-0.00018	-0.00028	0.00000
153	0.00000	0.00000	0.00000	-0.00019	-0.00028	0.00000
154	0.00000	0.00000	0.00000	0.00000	-0.00009	0.00000
155	0.00000	0.00000	0.00000	0.00000	0.00007	0.00000
156	0.00000	0.00000	0.00000	0.00000	-0.00009	0.00000
157	0.00000	0.00000	0.00000	0.00000	0.00007	0.00000

GeoStar 2.0 (64K Version): completa - [Main]



E-1502.0

PRUEBA DE CARGA DINAMICA

El objeto de la prueba de carga dinámica es el de obtener el valor de los principales parámetros dinámicos de cálculo que presenta la estructura. Es el caso de las frecuencias propias de vibración libre.

La valoración del período o frecuencia de vibración vertical correspondiente al modo fundamental, tiene especial repercusión en el coeficiente de amplificación dinámico al paso de la sobrecarga, utilizado en el cálculo.

Para la obtención de estos parámetros es necesaria la excitación dinámica de la estructura. Esto se obtiene mediante el paso de un camión, a distintas velocidades, sobre un obstáculo colocado en el tablero. Las características del mismo serán las de un tablón de forma redondeada de 50cm por 300cm con un espesor de 6 cm.

Se utilizará un solo vehículo pudiendo ser un camión de 2 o 3 ejes con un peso total suficiente para provocar la respuesta de la estructura con la debida amplitud.

El ensayo consistirá en efectuar algunas pasadas a muy baja velocidad, e ir incrementando la velocidad en escalones de 10 km/h.

La instrumentación a disponer consistirá en anillos extensométricos, para la medida de flechas, para registrar los desplazamientos de cada vano y en dos acelerómetros piezoeléctricos, para la medida de vibraciones, colocados en una de los centros de vanos del puente, de manera de determinar las frecuencias principales de vibración vertical, que deberán coincidir con los valores calculados a continuación.

```
**********************************************************
*****
**********************************************************
*****
**                                  **
**                                  **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS   / M    M **
** C    O  O  S     MM  MM  O  O  S      / MM  MM **
** C    O  O  SSSS  M M M M  O  O  SSSS  / M M M M **
** C    O  O     S  M  M  M  O  O     S / M  M  M **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS /  M    M **
**                                  **
**                                  **
**              VERSION: 2.00               **
**              DISTRIBUTED BY:             **
**     STRUCTURAL RESEARCH AND ANALYSIS CORPORATION
**
**          12121 WILSHIRE BLVD. SUITE 700          **
**        LOS ANGELES,  CALIFORNIA  90025           **
**          TEL. NO.  (310) 207-2800            **
**          COPYRIGHT  1988  S. R. A. C.            **
**                                  **
**********************************************************
*****
**********************************************************
*****
Problem name: PCARGA
Date     : 11/17/1998    Time:  10:09:44
Title    :
Subtitle :


Element group data
------------------
 Element group number=   1
 Element name:
 BEAM3D  Three dimensional Elastic Beam elements
 Type of beam element = . . . . . .  0
   EQ. 0 ; Symmetric beam element
   EQ. 1 ; Unsymmetric beam element
   EQ. 2 ; Symmetric tapered beam element


Real constant data
------------------
 Real constant set   1
 Associated with :
 BEAM3D  Three dimensional Elastic Beam elements
  Area                          =   7.1730
  Moment of Inertia about element Y-axis =  28.311
  Moment of Inertia about element Z-axis =   2.0290
  Depth of beam (y-axis)        =   1.7500
  Width of beam (z-axis)        =   9.5000
  End release code (I-node) [000000]  =   0
  End release code (J-node) [000000]  =   0
  Moment of inertia about element x-axis =   2.3600
  Shear factor in the element y-axis  =  .00000
  Shear factor in the element z-axis  =  .00000
  Temp. difference in the element y-axis =   5.0000
  Temp. difference in the element z-axis =  .00000
  Orientation angle             =  .00000
  Torsion const for max shear stress  =   1.0000
 Real constant set   2
 Associated with :
 BEAM3D  Three dimensional Elastic Beam elements
  Area                          =   8.4850
  Moment of Inertia about element Y-axis =  28.448
  Moment of Inertia about element Z-axis =   2.2150
  Depth of beam (y-axis)        =   1.7500
  Width of beam (z-axis)        =   9.5000
  End release code (I-node) [000000]  =   0
  End release code (J-node) [000000]  =   0
  Moment of inertia about element x-axis =   2.3600
  Shear factor in the element y-axis  =  .00000
  Shear factor in the element z-axis  =  .00000
  Temp. difference in the element y-axis =   5.0000
  Temp. difference in the element z-axis =  .00000
  Orientation angle             =  .00000
  Torsion const for max shear stress  =   1.0000
 Real constant set   3
 Associated with :
 BEAM3D  Three dimensional Elastic Beam elements
  Area                          =   7.7500
  Moment of Inertia about element Y-axis =   9.9630
  Moment of Inertia about element Z-axis =   2.6510
  Depth of beam (y-axis)        =   2.0000
  Width of beam (z-axis)        =   4.7000
  End release code (I-node) [000000]  =   0
  End release code (J-node) [000000]  =   0
  Moment of inertia about element x-axis =   9.5550
  Shear factor in the element y-axis  =  .00000
  Shear factor in the element z-axis  =  .00000
  Temp. difference in the element y-axis =   5.0000
  Temp. difference in the element z-axis =  .00000
  Orientation angle             =  .00000
  Torsion const for max shear stress  =   1.0000
 Real constant set   4
 Associated with :
 BEAM3D  Three dimensional Elastic Beam elements
  Area                          =  100.00
  Moment of Inertia about element Y-axis =  100.00
  Moment of Inertia about element Z-axis =  100.00
  Depth of beam (y-axis)        =  .00000
  Width of beam (z-axis)        =  .00000
  End release code (I-node) [000000]  =   0
  End release code (J-node) [000000]  =   0
  Moment of inertia about element x-axis =  100.00
  Shear factor in the element y-axis  =  .00000
  Shear factor in the element z-axis  =  .00000
  Temp. difference in the element y-axis =  .00000
  Temp. difference in the element z-axis =  .00000
  Orientation angle             =  .00000
  Torsion const for max shear stress  =  .00000


Material propery data
---------------------
 Material property set   1
                          Value      Temp curve no.
  EX   : X Elastic Modulus        .35000E+07     0
  NUXY : Poisson Ratio            .20000         0
  ALPX : X thermal expansion      .10000E-04     0
  DENS : Mass Density             .25500         0
 Material property set   2
                          Value      Temp curve no.
  EX   : X Elastic Modulus        .35000E+07     0
  NUXY : Poisson Ratio            .20000         0
  DENS : Mass Density             .25500         0
 Material property set   3
                          Value      Temp curve no.
  EX   : X Elastic Modulus        .35000E+07     0
  NUXY : Poisson Ratio            .20000         0


Nodal input data
----------
   NODE  BOUNDARY CONDITION CODES        NODAL POINT COORDINATES
         (0 = FREE ; 1 = FIXED) ------------------------------------
          X  Y  Z  XX  YY  ZZ       X          Y          Z
     1    0  0  0  0   0   0     .00000     .00000     .00000
     2    0  0  0  0   0   0    1.1060     .00000     .00000
     3    0  0  0  0   0   0    2.2120     .00000     .00000
     4    0  0  0  0   0   0    3.3180     .00000     .00000
     5    0  0  0  0   0   0    4.4240     .00000     .00000
     6    0  0  0  0   0   0    5.5300     .00000     .00000
     7    0  0  0  0   0   0    6.6360     .00000     .00000
     8    0  0  0  0   0   0    7.7420     .00000     .00000
     9    0  0  0  0   0   0    8.8480     .00000     .00000
    10    0  0  0  0   0   0    9.9540     .00000     .00000
    11    0  0  0  0   0   0   11.060      .00000     .00000
    12    0  0  0  0   0   0   12.166      .00000     .00000
    13    0  0  0  0   0   0   13.272      .00000     .00000
    14    0  0  0  0   0   0   14.378      .00000     .00000
    15    0  0  0  0   0   0   15.484      .00000     .00000
    16    0  0  0  0   0   0   16.590      .00000     .00000
    17    0  0  0  0   0   0   17.696      .00000     .00000
    18    0  0  0  0   0   0   18.802      .00000     .00000
    19    0  0  0  0   0   0   19.908      .00000     .00000
    20    0  0  0  0   0   0   21.014      .00000     .00000
    21    0  0  0  0   0   0   22.120      .00000     .00000
    22    1  1  1  1   1   1    .00000     .00000    10.000
    24    0  0  0  0   0   0   23.420      .00000     .00000
    25    0  0  0  0   0   0   24.720      .00000     .00000
    26    0  0  0  0   0   0   26.020      .00000     .00000
    27    0  0  0  0   0   0   27.320      .00000     .00000
    28    0  0  0  0   0   0   28.620      .00000     .00000
    29    0  0  0  0   0   0   29.920      .00000     .00000
    30    0  0  0  0   0   0   31.220      .00000     .00000
    31    0  0  0  0   0   0   32.520      .00000     .00000
    32    0  0  0  0   0   0   33.820      .00000     .00000
    33    0  0  0  0   0   0   35.120      .00000     .00000
    34    0  0  0  0   0   0   36.420      .00000     .00000
    35    0  0  0  0   0   0   37.720      .00000     .00000
    36    0  0  0  0   0   0   39.020      .00000     .00000
    37    0  0  0  0   0   0   40.320      .00000     .00000
    38    0  0  0  0   0   0   41.620      .00000     .00000
    39    0  0  0  0   0   0   42.920      .00000     .00000
    40    0  0  0  0   0   0   44.220      .00000     .00000
    41    0  0  0  0   0   0   45.520      .00000     .00000
    42    0  0  0  0   0   0   46.820      .00000     .00000
    43    0  0  0  0   0   0   48.120      .00000     .00000
    46    0  0  0  0   0   0   49.226      .00000     .00000
    47    0  0  0  0   0   0   50.332      .00000     .00000
    48    0  0  0  0   0   0   51.438      .00000     .00000
    49    0  0  0  0   0   0   52.544      .00000     .00000
    50    0  0  0  0   0   0   53.650      .00000     .00000
    51    0  0  0  0   0   0   54.756      .00000     .00000
    52    0  0  0  0   0   0   55.862      .00000     .00000
    53    0  0  0  0   0   0   56.968      .00000     .00000
    54    0  0  0  0   0   0   58.074      .00000     .00000
    55    0  0  0  0   0   0   59.180      .00000     .00000
    56    0  0  0  0   0   0   60.286      .00000     .00000
    57    0  0  0  0   0   0   61.392      .00000     .00000
    58    0  0  0  0   0   0   62.498      .00000     .00000
    59    0  0  0  0   0   0   63.604      .00000     .00000
    60    0  0  0  0   0   0   64.710      .00000     .00000
    61    0  0  0  0   0   0   65.816      .00000     .00000
    62    0  0  0  0   0   0   66.922      .00000     .00000
    63    0  0  0  0   0   0   68.028      .00000     .00000
    64    0  0  0  0   0   0   69.134      .00000     .00000
    65    0  0  0  0   0   0   70.240      .00000     .00000
    67    0  1  1  0   0   0   22.120     13.035      .00000
    68    0  0  0  0   0   0   22.120     12.383      .00000
    69    0  0  0  0   0   0   22.120     11.732      .00000
    70    0  0  0  0   0   0   22.120     11.080      .00000
    71    0  0  0  0   0   0   22.120     10.428      .00000
    72    0  0  0  0   0   0   22.120      9.7762     .00000
    73    0  0  0  0   0   0   22.120      9.1245     .00000
    74    0  0  0  0   0   0   22.120      8.4728     .00000
    75    0  0  0  0   0   0   22.120      7.8210     .00000
    76    0  0  0  0   0   0   22.120      7.1692     .00000
    77    0  0  0  0   0   0   22.120      6.5175     .00000
    78    0  0  0  0   0   0   22.120      5.8657     .00000
    79    0  0  0  0   0   0   22.120      5.2140     .00000
    80    0  0  0  0   0   0   22.120      4.5622     .00000
    81    0  0  0  0   0   0   22.120      3.9105     .00000
    82    0  0  0  0   0   0   22.120      3.2587     .00000
    83    0  0  0  0   0   0   22.120      2.6070     .00000
    84    0  0  0  0   0   0   22.120      1.9552     .00000
    85    0  0  0  0   0   0   22.120      1.3035     .00000
    86    0  0  0  0   0   0   22.120      .65175     .00000
    88    1  1  1  1   1   1   22.120      .00000    10.000
    90    0  0  0  0   0   0   22.120     -.24260     .00000
    91    0  0  0  0   0   0   22.120     -.48520     .00000
    92    0  0  0  0   0   0   22.120     -.72780     .00000
    93    0  0  0  0   0   0   22.120     -.97040     .00000
    94    0  0  0  0   0   0   22.120     -1.2130     .00000
    95    0  0  0  0   0   0   22.120     -1.4556     .00000
    96    0  0  0  0   0   0   22.120     -1.6982     .00000
    97    0  0  0  0   0   0   22.120     -1.9408     .00000
    98    0  0  0  0   0   0   22.120     -2.1834     .00000
    99    0  0  0  0   0   0   22.120     -2.4260     .00000
   100    0  0  0  0   0   0   22.120     -2.6686     .00000
   101    0  0  0  0   0   0   22.120     -2.9112     .00000
   102    0  0  0  0   0   0   22.120     -3.1538     .00000
   103    0  0  0  0   0   0   22.120     -3.3964     .00000
   104    0  0  0  0   0   0   22.120     -3.6390     .00000
   105    0  0  0  0   0   0   22.120     -3.8816     .00000
   106    0  0  0  0   0   0   22.120     -4.1242     .00000
   107    0  0  0  0   0   0   22.120     -4.3668     .00000
   108    0  0  0  0   0   0   22.120     -4.6094     .00000
   109    0  0  1  0   0   0   22.120     -4.8520     .00000
   111    0  0  1  0   0   0   48.120      5.4780     .00000
   112    0  0  0  0   0   0   48.120      5.2041     .00000
   113    0  0  0  0   0   0   48.120      4.9302     .00000
   114    0  0  0  0   0   0   48.120      4.6563     .00000
   115    0  0  0  0   0   0   48.120      4.3824     .00000
   116    0  0  0  0   0   0   48.120      4.1085     .00000
   117    0  0  0  0   0   0   48.120      3.8346     .00000
   118    0  0  0  0   0   0   48.120      3.5607     .00000
   119    0  0  0  0   0   0   48.120      3.2868     .00000
   120    0  0  0  0   0   0   48.120      3.0129     .00000
   121    0  0  0  0   0   0   48.120      2.7390     .00000
   122    0  0  0  0   0   0   48.120      2.4651     .00000
   123    0  0  0  0   0   0   48.120      2.1912     .00000
   124    0  0  0  0   0   0   48.120      1.9173     .00000
   125    0  0  0  0   0   0   48.120      1.6434     .00000
   126    0  0  0  0   0   0   48.120      1.3695     .00000
   127    0  0  0  0   0   0   48.120      1.0956     .00000
   128    0  0  0  0   0   0   48.120      .82170     .00000
   129    0  0  0  0   0   0   48.120      .54780     .00000
   130    0  0  0  0   0   0   48.120      .27390     .00000
   132    1  1  1  1   1   1   48.120      .00000    10.000
   134    0  0  0  0   0   0   48.120     -.62395     .00000
   135    0  0  0  0   0   0   48.120     -1.2479     .00000
   136    0  0  0  0   0   0   48.120     -1.8719     .00000
   137    0  0  0  0   0   0   48.120     -2.4958     .00000
   138    0  0  0  0   0   0   48.120     -3.1198     .00000
   139    0  0  0  0   0   0   48.120     -3.7437     .00000
   140    0  0  0  0   0   0   48.120     -4.3677     .00000
```

141	0	0	0	0	0	0	48.120	-4.9916	.00000
142	0	0	0	0	0	0	48.120	-5.6156	00000
143	0	0	0	0	0	0	48.120	-6.2395	.00000
144	0	0	0	0	0	0	48.120	-6.8635	.00000
145	0	0	0	0	0	0	48.120	-7.4874	.00000
146	0	0	0	0	0	0	48.120	-8.1114	.00000
147	0	0	0	0	0	0	48.120	-8.7353	.00000
148	0	0	0	0	0	0	48.120	-9.3593	.00000
149	0	0	0	0	0	0	48.120	-9.9832	.00000
150	0	0	0	0	0	0	48.120	-10.607	.00000
151	0	0	0	0	0	0	48.120	-11.231	.00000
152	0	0	0	0	0	0	48.120	-11.855	.00000
153	0	1	1	0	0	0	48.120	-12.479	.00000
154	1	1	1	0	0	1	.00000	1.2000	.00000
155	1	1	1	0	0	0	70.240	1.2000	.00000
156	1	1	1	0	0	0	.00000	-1.2000	.00000
157	0	0	1	0	0	0	70.240	-1.2000	.00000

Element input data

ELEM EGRP MP REAL ECS NODE 1 NODE 2 NODE 3 NODE 4 NODE 5 NODE 6
NODE 7 NODE 8 NODE 9 NODE10 NODE11 NODE12
NODE13 NODE14 NODE15 NODE16 NODE17 NODE18
NODE19 NODE20

1	1	1	2	-1	1	2	22	
2	1	1	2	-1	2	3	22	
3	1	1	1	-1	3	4	22	
4	1	1	1	-1	4	5	22	
5	1	1	1	-1	5	6	22	
6	1	1	1	-1	6	7	22	
7	1	1	1	-1	7	8	22	
8	1	1	1	-1	8	9	22	
9	1	1	1	-1	9	10	22	
10	1	1	1	-1	10	11	22	
11	1	1	1	-1	11	12	22	
12	1	1	1	-1	12	13	22	
13	1	1	1	-1	13	14	22	
14	1	1	1	-1	14	15	22	
15	1	1	1	-1	15	16	22	
16	1	1	1	-1	16	17	22	
17	1	1	1	-1	17	18	22	
18	1	1	1	-1	18	19	22	
19	1	1	2	-1	19	20	22	
20	1	1	2	-1	20	21	22	
21	1	1	2	-1	21	24	22	
22	1	1	2	-1	24	25	22	
23	1	1	1	-1	25	26	22	
24	1	1	1	-1	26	27	22	
25	1	1	1	-1	27	28	22	
26	1	1	1	-1	28	29	22	
27	1	1	1	-1	29	30	22	
28	1	1	1	-1	30	31	22	
29	1	1	1	-1	31	32	22	
30	1	1	1	-1	32	33	22	
31	1	1	1	-1	33	34	22	
32	1	1	1	-1	34	35	22	
33	1	1	1	-1	35	36	22	
34	1	1	1	-1	36	37	22	
35	1	1	1	-1	37	38	22	
36	1	1	1	-1	38	39	22	
37	1	1	1	-1	39	40	22	
38	1	1	1	-1	40	41	22	
39	1	1	2	-1	41	42	22	
40	1	1	2	-1	42	43	22	
41	1	1	2	-1	43	46	22	
42	1	1	2	-1	46	47	22	
43	1	1	1	-1	47	48	22	
44	1	1	1	-1	48	49	22	
45	1	1	1	-1	49	50	22	
46	1	1	1	-1	50	51	22	
47	1	1	1	-1	51	52	22	
48	1	1	1	-1	52	53	22	
49	1	1	1	-1	53	54	22	
50	1	1	1	-1	54	55	22	
51	1	1	1	-1	55	56	22	
52	1	1	1	-1	56	57	22	
53	1	1	1	-1	57	58	22	
54	1	1	1	-1	58	59	22	
55	1	1	1	-1	59	60	22	
56	1	1	1	-1	60	61	22	
57	1	1	1	-1	61	62	22	
58	1	1	1	-1	62	63	22	
59	1	1	2	-1	63	64	22	
60	1	1	2	-1	64	65	22	
61	1	2	3	-1	67	68	88	
62	1	2	3	-1	68	69	88	
63	1	2	3	-1	69	70	88	
64	1	2	3	-1	70	71	88	
65	1	2	3	-1	71	72	88	
66	1	2	3	-1	72	73	88	
67	1	2	3	-1	73	74	88	
68	1	2	3	-1	74	75	88	
69	1	2	3	-1	75	76	88	
70	1	2	3	-1	76	77	88	
71	1	2	3	-1	77	78	88	
72	1	2	3	-1	78	79	88	
73	1	2	3	-1	79	80	88	
74	1	2	3	-1	80	81	88	
75	1	2	3	-1	81	82	88	
76	1	2	3	-1	82	83	88	
77	1	2	3	-1	83	84	88	
78	1	2	3	-1	84	85	88	
79	1	2	3	-1	85	86	88	
80	1	2	3	-1	86	21	88	
81	1	2	3	-1	21	90	88	
82	1	2	3	-1	90	91	88	
83	1	2	3	-1	91	92	88	
84	1	2	3	-1	92	93	88	
85	1	2	3	-1	93	94	88	
86	1	2	3	-1	94	95	88	
87	1	2	3	-1	95	96	88	
88	1	2	3	-1	96	97	88	
89	1	2	3	-1	97	98	88	
90	1	2	3	-1	98	99	88	
91	1	2	3	-1	99	100	88	
92	1	2	3	-1	100	101	88	
93	1	2	3	-1	101	102	88	
94	1	2	3	-1	102	103	88	
95	1	2	3	-1	103	104	88	
96	1	2	3	-1	104	105	88	
97	1	2	3	-1	105	106	88	
98	1	2	3	-1	106	107	88	
99	1	2	3	-1	107	108	88	
100	1	2	3	-1	108	109	88	
101	1	2	3	-1	111	112	132	
102	1	2	3	-1	112	113	132	
103	1	2	3	-1	113	114	132	
104	1	2	3	-1	114	115	132	
105	1	2	3	-1	115	116	132	
106	1	2	3	-1	116	117	132	
107	1	2	3	-1	117	118	132	
108	1	2	3	-1	118	119	132	
109	1	2	3	-1	119	120	132	
110	1	2	3	-1	120	121	132	
111	1	2	3	-1	121	122	132	
112	1	2	3	-1	122	123	132	
113	1	2	3	-1	123	124	132	
114	1	2	3	-1	124	125	132	
115	1	2	3	-1	125	126	132	
116	1	2	3	-1	126	127	132	
117	1	2	3	-1	127	128	132	
118	1	2	3	-1	128	129	132	
119	1	2	3	-1	129	130	132	
120	1	2	3	-1	130	43	132	
121	1	2	3	-1	43	134	132	
122	1	2	3	-1	134	135	132	
123	1	2	3	-1	135	136	132	
124	1	2	3	-1	136	137	132	
125	1	2	3	-1	137	138	132	
126	1	2	3	-1	138	139	132	
127	1	2	3	-1	139	140	132	
128	1	2	3	-1	140	141	132	
129	1	2	3	-1	141	142	132	
130	1	2	3	-1	142	143	132	
131	1	2	3	-1	143	144	132	
132	1	2	3	-1	144	145	132	
133	1	2	3	-1	145	146	132	
134	1	2	3	-1	146	147	132	
135	1	2	3	-1	147	148	132	
136	1	2	3	-1	148	149	132	
137	1	2	3	-1	149	150	132	
138	1	2	3	-1	150	151	132	
139	1	2	3	-1	151	152	132	
140	1	2	3	-1	152	153	132	
141	1	3	4	-1	156	1	22	
142	1	3	4	-1	1	154	22	
143	1	3	4	-1	157	65	64	
144	1	3	4	-1	65	155	64	

CONTROL INFORMATION
NUMBER OF LOAD CASES ..... (NLCASE) = 1
SOLUTION MODE ..... (MODEX) = 2
EQ. 0, STATIC ANALYSIS
EQ. 1, BUCKLING ANALYSIS
EQ. 2, DYNAMIC ANALYSIS
THERMAL LOADING FLAG ..... (ITHERM) = 0
EQ. 0, NO THERMAL EFFECTS CONSIDERED
EQ. 1, ADD TEMPERATURE EFFECT
GRAVITY LOADING FLAG ..... (IGRAV) = 0
EQ. 0, NO GRAVITY LOADING CONSIDERED
EQ. 1, ADD GRAVITY LOADING EFFECT
CENTRIFUGAL LOADING FLAG ..... (ICNTRF) = 0
EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
IN-PLANE STIFFENING FLAG ..... (INPLN) = 0
EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
EQ. 1, IN-PLANE EFFECTS CONSIDERED
SOFT SPRING ADDITION FLAG ..... (ISOFT) = 0
EQ. 0, NO SOFT SPRING OPTION
EQ. 1, SOFT SPRING ADDED

SAVE DECOMPOSED STIFFNESS MATRIX FLAG ... (ISAVK) = 0
EQ. 0, DO NOT SAVE DECOMPOSED K
EQ. 1, SAVE DECOMPOSED K
FORM STIFFNESS MATRIX FLAG ..... (IFORMK) = 0
EQ. 0, FORM STIFFNESS MATRIX
EQ. 1, USE EXISTING DECOMPOSED STIFFNESS MATRIX

SPIN SOFTENING FLAG ..... (ISPIN) = 0
EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
INERTIA RELIEF FLAG ..... (IFORMK) = 0
EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
RIGID CONNECTIONS FLAG ..... (IRIGID) = 0
EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS & SHELLS
EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS & SHELLS

TOTAL SYSTEM DATA
NUMBER OF EQUATIONS ..... (NEQ) = 853
NUMBER OF MATRIX ELEMENTS ..... (NWK) = 15977
MAXIMUM HALF BANDWIDTH ..... (MK) = 45
MEAN HALF BANDWIDTH ..... (MM) = 18
NUMBER OF ELEMENTS ..... (NUME) = 144
NUMBER OF NODAL POINTS ..... (NUMNP)= 148
ADJUSTED BLOCK SIZE ..... (MTBLK)= 15978
EXTRA MEMORY AVAILABLE (in 8-byte words) . . .(XMTBLK)= 4882926
NUMBER OF STIFFNESS BLOCKS ..... (NBLK) = 1

MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE = .586136E+11 (820)
MINIMUM DIAGONAL STIFFNESS MATRIX VALUE = .529486E+07 (246)
1

MASS MOMENT INFORMATION		
MASS .204013E+03	VOLUME .128005E+04	WEIGHT .000000E+00
MASS MOMENT OF INERTIA W.R.T. C.G.		
IX .291881E+04	IY .670252E+05	IZ .699436E+05
MASS PRODUCT OF INERTIA W.R.T. C.G.		
PXY -.349530E+04	PXZ .000000E+00	PYZ .000000E+00
RADII OF GYRATION W.R.T. C.G.		
RX .378245E+01	RY .181255E+02	RZ .185159E+02
CENTER OF GRAVITY		
CGx .351288E+02	CGy .100028E+00	CGz .000000E+00
PRINCIPAL MASS MOMENT OF INERTIA		
P1 .699436E+05	P2 .672152E+05	P3 .272879E+04
PRINCIPAL RADII OF GYRATION		
R1 .185159E+02	R2 .181512E+02	R3 .365726E+01
PRINCIPAL AXES (DIRECTION COSINES IN ROWS W.R.T C.G)		
N_11 .640918E+00	N_12 .767609E+00	N_13 .000000E+00
N_21 .542849E-01	N_22 .998525E+00	N_23 .000000E+00
N_31 .000000E+00	N_32 .000000E+00	N_33 .598304E+00

Note: In the above table, WEIGHT is computed based on the user defined acceleration for the first active Load Case

SOLUTION PARAMETERS
NUMBER OF EIGENVALUES.....(NFR)= 2
MASS TYPE: 1-LUMPED,2-CONSISTENT....(MASS)= 1
MODE SHAPE PRINT FLAG.....(MPRNT)= 1
INTERMEDIATE SOLUTION PRINT FLAG....(IFPR)= 0
STURM SEQUENCE CHECK FLAG.....(IFSS)= 0
MAXIMUM NUMBER OF ITERATIONS.....(ITMAX)= 16
FREQUENCY SHIFT FLAG.....(IFRSH)= 0
FREQUENCY SHIFT.....(FRSH)= .0000000E+00
MODE SHAPE NO. 1

NODE	X-DISPLACEMENT	Y-DISPLACEMENT	Z-DISPLACEMENT	X - ROTATION	Y - ROTATION	Z - ROTATION
1	-.1158362E-12	-.2261155E-13	-.1005936E-05	.3097567E-06	.8790533E-02	-.9966703E-14
2	-.1295179E-10	.3900750E-12	-.9687781E-02	.1745086E-03	.8694087E-02	.7832406E-12
3	-.2575634E-10	.1769644E-11	-.1916195E-01	.3487073E-03	.8406743E-02	.1738457E-11
4	-.4083482E-10	.4298198E-11	-.2819277E-01	.5229062E-03	.7890807E-02	.2861119E-11
5	-.5581433E-10	.8158596E-11	-.3654530E-01	.6971051E-03	.7181944E-02	.4146946E-11
6	-.7065852E-10	.1353179E-10	-.4401264E-01	.8713037E-03	.6292451E-02	.5597006E-11
7	-.8533141E-10	.2060061E-10	-.5040324E-01	.1045503E-02	.5237620E-02	.7213720E-11
8	-.9979732E-10	.2955165E-10	-.5554391E-01	.1219701E-02	.4035385E-02	.9001635E-11
9	-.1140211E-09	.4057818E-10	-.5928258E-01	.1393900E-02	.2705859E-02	.1096843E-10
10	-.1279681E-09	.5388417E-10	-.6149039E-01	.1568099E-02	.1270852E-02	.1312605E-10
11	-.1416044E-09	.6968987E-10	-.6206327E-01	.1742298E-02	-.2467084E-03	.1549211E-10
12	-.1548965E-09	.8823871E-10	-.6092289E-01	.1916497E-02	-.1823353E-02	.1809140E-10
13	-.1678121E-09	.1098065E-09	-.5801684E-01	.2090696E-02	-.3435737E-02	.2095776E-10
14	-.1803193E-09	.1347123E-09	-.5331819E-01	.2264894E-02	-.5061266E-02	.2413600E-10
15	-.1923873E-09	.1633318E-09	-.4682426E-01	.2439093E-02	-.6678803E-02	.2768423E-10
16	-.2039865E-09	.1961135E-09	-.3855463E-01	.2613292E-02	-.8269332E-02	.3167644E-10
17	-.2150880E-09	.2335980E-09	-.2854842E-01	.2787491E-02	-.9816640E-02	.3620535E-10
18	-.2256643E-09	.2764399E-09	-.1686086E-01	.2961690E-02	-.1130798E-01	.4138572E-10
19	-.2356888E-09	.3254352E-09	-.3558975E-02	.3135889E-02	-.1273474E-01	.4735807E-10
20	-.2436308E-09	.3815359E-09	.1121951E-01	.3310087E-02	-.1397891E-01	.5426796E-10
21	-.2509758E-09	.4459180E-09	.2733981E-01	.3484286E-02	-.1516195E-01	.6237735E-10
22	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
24	-.2615688E-09	.5455308E-09	.4778348E-01	.3116725E-02	-.1617585E-01	.8919354E-10
25	-.2712789E-09	.6735919E-09	.6910746E-01	.2749163E-02	-.1652158E-01	.1062502E-09
26	-.2817699E-09	.8178781E-09	.9045524E-01	.2381602E-02	-.1621027E-01	.1142701E-09
27	-.2913176E-09	.9670799E-09	.1109779E+00	.2014040E-02	-.1526138E-01	.1139491E-09
28	-.2998935E-09	.1110920E-08	.1298855E+00	.1646479E-02	-.1373701E-01	.1061847E-09
29	-.3074721E-09	.1240388E-08	.1464769E+00	.1278917E-02	-.1171146E-01	.9202317E-10
30	-.3140309E-09	.1347922E-08	.1601550E+00	.9113552E-03	-.9269928E-02	.7264899E-10
31	-.3195507E-09	.1427582E-08	.1704395E+00	.5437933E-03	-.6506982E-02	.4936673E-10
32	-.3240151E-09	.1475188E-08	.1769781E+00	.1762331E-03	-.3524576E-02	.2357597E-10
33	-.3274113E-09	.1488427E-08	.1795547E+00	-.1913292E-03	-.4298141E-03	-.3259102E-11
34	-.3297296E-09	.1466911E-08	.1780946E+00	-.5588895E-03	.2667327E-02	-.2964190E-10
35	-.3309635E-09	.1412201E-08	.1726664E+00	-.9264518E-03	.5656595E-02	-.5407923E-10
36	-.3311099E-09	.1327779E-08	.1634810E+00	-.1294013E-02	.8429800E-02	-.7511435E-10
37	-.3301689E-09	.1218979E-08	.1508874E+00	-.1661577E-02	.1088331E-01	-.9135976E-10
38	-.3281439E-09	.1092879E-08	.1353650E+00	-.2029137E-02	.1292014E-01	-.1015243E-09
39	-.3250417E-09	.9581583E-09	.1175138E+00	-.2396699E-02	.1445206E-01	-.1044362E-09
40	-.3208721E-09	.8249375E-09	.9804224E-01	-.2764259E-02	.1540108E-01	-.9905689E-10
41	-.3156484E-09	.7045933E-09	.7775246E-01	-.3131821E-02	.1570072E-01	-.8448743E-10
42	-.3102747E-09	.6095260E-09	.5751072E-01	-.3499382E-02	.1532869E-01	-.6005071E-10
43	-.3038798E-09	.5530821E-09	.3819669E-01	-.3866944E-02	.1426697E-01	-.2495095E-10
46	-.2997334E-09	.5326728E-09	.2308543E-01	-.3673615E-02	.1305762E-01	-.1252047E-10
47	-.2948757E-09	.5242008E-09	.9318332E-02	-.3480285E-02	.1183452E-01	-.3307289E-11
48	-.2883696E-09	.5243076E-09	-.3022227E-02	-.3286955E-02	.1047715E-01	.3040633E-11

CONVERGENCE TOLERANCE.....(RTOL)= .1000000E-04
COMPOSITE MODAL DAMPING CALC. FLAG...(IMDC)= 0
MODAL ACCELERATION FLAG.....(IMAM)= 0

SUBSPACE ITERATION

ITERATION NUMBER 1

ITERATION NUMBER 2

ITERATION NUMBER 3

ITERATION NUMBER 4

ITERATION NUMBER 5

ITERATION NUMBER 6

ITERATION NUMBER 7

ITERATION NUMBER 8

ITERATION NUMBER 9

ITERATION NUMBER 10

ITERATION NUMBER 11

ITERATION NUMBER 12

ITERATION NUMBER 13

CONVERGENCE REACHED FOR RTOL .1000E-04

FREQUENCY ANALYSIS
by
SUBSPACE ALGORITHM

FREQUENCY NUMBER	FREQUENCY (RAD/SEC)	FREQUENCY (CYCLES/SEC)	PERIOD (SECONDS)
1	.3301330E+02	.5254229E+01	.1903229E+00
2	.3876332E+02	.6169374E+01	.1620910E+00

49	-.2811868E-09	.5299586E-09	-.1384845E-01	-.3093625E-02	.9096294E-02	.6762925E-11
50	-.2733485E-09	.5383968E-09	-.2313573E-01	-.2900295E-02	.7695146E-02	.8124431E-11
51	-.2648768E-09	.5471562E-09	-.3086523E-01	-.2706964E-02	.6280726E-02	.7387228E-11
52	-.2557958E-09	.5540602E-09	-.3702759E-01	-.2513635E-02	.4863303E-02	.4813102E-11
53	-.2461302E-09	.5572223E-09	-.4162647E-01	-.2320305E-02	.3455749E-02	.6645525E-12
54	-.2359065E-09	.5550467E-09	-.4468087E-01	-.2126974E-02	.2073010E-02	-.4795211E-11
55	-.2251521E-09	.5462287E-09	-.4622718E-01	-.1933643E-02	.7314758E-03	-.1130350E-10
56	-.2138957E-09	.5297528E-09	-.4632046E-01	-.1740314E-02	-.5515834E-03	-.1860013E-10
57	-.2021669E-09	.5048886E-09	-.4503510E-01	-.1546984E-02	-.1758607E-02	-.2643045E-10
58	-.1899961E-09	.4711825E-09	-.4246484E-01	-.1353654E-02	-.2872246E-02	-.3454856E-10
59	-.1774151E-09	.4284468E-09	-.3872224E-01	-.1160323E-02	-.3875881E-02	-.4272123E-10
60	-.1644563E-09	.3767429E-09	-.3393765E-01	-.9669939E-03	-.4754089E-02	-.5073217E-10
61	-.1511527E-09	.3163588E-09	-.2825752E-01	-.7736634E-03	-.5493086E-02	-.5838661E-10
62	-.1375384E-09	.2477856E-09	-.2184263E-01	-.5803341E-03	-.6081051E-02	-.6551546E-10
63	-.1236477E-09	.1716835E-09	-.1486543E-01	-.3870036E-03	-.6508477E-02	-.7198017E-10
64	-.1116822E-09	.8886525E-10	-.7521078E-02	-.1936730E-03	-.6746329E-02	-.7764544E-10
65	-.9950564E-10	.2420613E-12	-.8323150E-06	-.3437756E-06	-.6826128E-02	-.8246964E-10
67	.2825409E-08	.0000000E+00	.0000000E+00	-.5123780E-02	-.1516195E-01	-.3215796E-09
68	.2615842E-08	.2343642E-10	.3334073E-02	-.5099138E-02	-.1516195E-01	-.3214749E-09
69	.2406452E-08	.4685537E-10	.6636038E-02	-.5025316E-02	-.1516195E-01	-.3209739E-09
70	.2197615E-08	.7023963E-10	.9873959E-02	-.4902636E-02	-.1516195E-01	-.3197246E-09
71	.1989920E-08	.9357167E-10	.1301613E-01	-.4731629E-02	-.1516195E-01	-.3174199E-09
72	.1784145E-08	.1168342E-09	.1603129E-01	-.4513030E-02	-.1516195E-01	-.3137964E-09
73	.1581221E-08	.1400101E-09	.1888873E-01	-.4247771E-02	-.1516195E-01	-.3086347E-09
74	.1382212E-08	.1630819E-09	.2155837E-01	-.3936977E-02	-.1516195E-01	-.3017581E-09
75	.1188281E-08	.1860328E-09	.2401097E-01	-.3581944E-02	-.1516195E-01	-.2930314E-09
76	.1000668E-08	.2088454E-09	.2621814E-01	-.3184139E-02	-.1516195E-01	-.2823598E-09
77	.8206597E-09	.2315030E-09	.2815255E-01	-.2745175E-02	-.1516195E-01	-.2696864E-09
78	.6495709E-09	.2539886E-09	.2978792E-01	-.2266801E-02	-.1516195E-01	-.2549902E-09
79	.4887168E-09	.2762857E-09	.3109917E-01	-.1750876E-02	-.1516195E-01	-.2382832E-09
80	.3393964E-09	.2983775E-09	.3206245E-01	-.1199357E-02	-.1516195E-01	-.2196070E-09
81	.2028721E-09	.3202477E-09	.3265524E-01	-.6142757E-03	-.1516195E-01	-.1990296E-09
82	.8035483E-10	.3418801E-09	.3285632E-01	.2290362E-05	-.1516195E-01	-.1766405E-09
83	-.2700863E-10	.3632586E-09	.3264587E-01	.6482349E-03	-.1516195E-01	-.1525471E-09
84	-.1181462E-09	.3843672E-09	.3200542E-01	.1321454E-02	-.1516195E-01	-.1268693E-09
85	-.1920662E-09	.4051903E-09	.3091788E-01	.2019870E-02	-.1516195E-01	-.9973420E-10
86	-.2478612E-09	.4257123E-09	.2936749E-01	.2741460E-02	-.1516195E-01	-.7127121E-10
88	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
90	-.2305238E-09	.4468256E-09	.2645631E-01	.3796487E-02	-.1516195E-01	.1058779E-09
91	-.2048583E-09	.4476874E-09	.2549897E-01	.4093254E-02	-.1516195E-01	.1057149E-09
92	-.1792281E-09	.4485031E-09	.2447152E-01	.4374503E-02	-.1516195E-01	.1055861E-09
93	-.1536255E-09	.4492727E-09	.2337773E-01	.4640150E-02	-.1516195E-01	.1054869E-09
94	-.1280439E-09	.4499959E-09	.2222139E-01	.4890116E-02	-.1516195E-01	.1054126E-09
95	-.1024776E-09	.4506729E-09	.2100632E-01	.5124325E-02	-.1516195E-01	.1053594E-09
96	-.7692209E-10	.4513035E-09	.1973635E-01	.5342705E-02	-.1516195E-01	.1053235E-09
97	-.5137351E-10	.4518876E-09	.1841532E-01	.5545190E-02	-.1516195E-01	.1053014E-09
98	-.2582899E-10	.4524252E-09	.1704711E-01	.5731716E-02	-.1516195E-01	.1052901E-09
99	-.2860991E-12	.4529163E-09	.1563559E-01	.5902224E-02	-.1516195E-01	.1052868E-09
100	.2525668E-10	.4533607E-09	.1418465E-01	.6056660E-02	-.1516195E-01	.1052892E-09

101	.5080057E-10	.4537585E-09	.1269820E-01	.6194975E-02	-.1516195E-01	.1052952E-09
102	.7634611E-10	.4541096E-09	.1118015E-01	.6317123E-02	-.1516195E-01	.1053030E-09
103	.1018936E-09	.4544139E-09	.9634437E-02	.6423067E-02	-.1516195E-01	.1053113E-09
104	.1274431E-09	.4546714E-09	.8064992E-02	.6512769E-02	-.1516195E-01	.1053189E-09
105	.1529943E-09	.4548822E-09	.6475756E-02	.6586203E-02	-.1516195E-01	.1053253E-09
106	.1785468E-09	.4550462E-09	.4870681E-02	.6643343E-02	-.1516195E-01	.1053298E-09
107	.2041002E-09	.4551633E-09	.3253727E-02	.6684171E-02	-.1516195E-01	.1053326E-09
108	.2296540E-09	.4552336E-09	.1628845E-02	.6708673E-02	-.1516195E-01	.1053338E-09
109	.2552080E-09	.4552570E-09	.0000000E+00	.6716841E-02	-.1516195E-01	.1053341E-09
111	.4005145E-09	.5671818E-09	.0000000E+00	-.8539750E-02	.1426696E-01	-.1251952E-09
112	.3662235E-09	.5671464E-09	.2337959E-02	-.8527890E-02	.1426696E-01	-.1251959E-09
113	.3319320E-09	.5670403E-09	.4669413E-02	-.8492313E-02	.1426696E-01	-.1251995E-09
114	.2976386E-09	.5668633E-09	.6987881E-02	-.8433038E-02	.1426696E-01	-.1252095E-09
115	.2633412E-09	.5666156E-09	.9286875E-02	-.8350091E-02	.1426696E-01	-.1252293E-09
116	.2290367E-09	.5662972E-09	.1155990E-01	-.8243513E-02	.1426696E-01	-.1252630E-09
117	.1947205E-09	.5659082E-09	.1380051E-01	-.8113351E-02	.1426696E-01	-.1253148E-09
118	.1603872E-09	.5654485E-09	.1600225E-01	-.7959667E-02	.1426696E-01	-.1253892E-09
119	.1260298E-09	.5649182E-09	.1815868E-01	-.7782532E-02	.1426696E-01	-.1254913E-09
120	.9164009E-10	.5643174E-09	.2026339E-01	-.7582028E-02	.1426696E-01	-.1256261E-09
121	.1499570E-09	.5636470E-09	.2230994E-01	-.7358246E-02	.1426697E-01	.5633681E-09
122	.1271360E-09	.5629061E-09	.2429218E-01	-.7111286E-02	.1426696E-01	-.7505132E-09
123	.3183810E-11	.5620925E-09	.2620345E-01	-.6841263E-02	.1426696E-01	-.1459990E-09
124	-.3684841E-10	.5612106E-09	.2803767E-01	-.6548293E-02	.1426696E-01	-.1463233E-09
125	-.7697794E-10	.5602585E-09	.2978852E-01	-.6232509E-02	.1426696E-01	-.1467112E-09
126	-.1172233E-09	.5592366E-09	.3144977E-01	-.5894046E-02	.1426696E-01	-.1471697E-09
127	-.1576047E-09	.5581448E-09	.3301522E-01	-.5533053E-02	.1426696E-01	-.1477066E-09
128	-.1981448E-09	.5569833E-09	.3447873E-01	-.5149681E-02	.1426696E-01	-.1483295E-09
129	-.2388682E-09	.5557523E-09	.3583419E-01	-.4744093E-02	.1426696E-01	-.1490468E-09
130	-.2798020E-09	.5544520E-09	.3707554E-01	-.4316455E-02	.1426696E-01	-.1498670E-09
132	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
134	-.2284577E-09	.5276818E-09	.4031818E-01	-.2937569E-02	.1426697E-01	.2652262E-09
135	-.5396837E-10	.5019401E-09	.4186841E-01	-.2036420E-02	.1426697E-01	.2938415E-09
136	.1379183E-09	.4758733E-09	.4286578E-01	-.1165814E-02	.1426697E-01	.3209719E-09
137	.3462400E-09	.4494982E-09	.4333008E-01	-.3281413E-03	.1426697E-01	.3465028E-09
138	.5699641E-09	.4228320E-09	.4328262E-01	.4741675E-03	.1426697E-01	.3703266E-09
139	.8079952E-09	.3958918E-09	.4274623E-01	.1238672E-02	.1426697E-01	.3923465E-09
140	.1059181E-08	.3686953E-09	.4174525E-01	.1962946E-02	.1426697E-01	.4124808E-09
141	.1322325E-08	.3412600E-09	.4030553E-01	.2644607E-02	.1426697E-01	.4306660E-09
142	.1596195E-08	.3136037E-09	.3845438E-01	.3281342E-02	.1426697E-01	.4468602E-09
143	.1409760E-08	.2857431E-09	.3622049E-01	.3870932E-02	.1426697E-01	-.1024539E-08
144	.1780853E-08	.2576943E-09	.3363415E-01	.4411267E-02	.1426696E-01	.2164444E-08
145	.2612887E-08	.2294880E-09	.3072638E-01	.4900382E-02	.1426697E-01	.5314321E-09
146	.2947166E-08	.2011281E-09	.2752993E-01	.5336461E-02	.1426697E-01	.5397516E-09
147	.3286071E-08	.1726380E-09	.2407837E-01	.5717861E-02	.1426697E-01	.5462812E-09
148	.3628528E-08	.1440361E-09	.2040629E-01	.6043126E-02	.1426697E-01	.5511639E-09
149	.3973563E-08	.1153410E-09	.1654910E-01	.6311005E-02	.1426697E-01	.5545794E-09
150	.4320328E-08	.8657107E-10	.1254293E-01	.6520453E-02	.1426697E-01	.5567447E-09
151	.4668118E-08	.5774523E-10	.8424542E-02	.6670651E-02	.1426697E-01	.5579146E-09
152	.5016403E-08	.2888197E-10	.4231076E-02	.6761008E-02	.1426697E-01	.5583824E-09
153	.5364847E-08	.0000000E+00	.0000000E+00	.6791167E-02	.1426697E-01	.5584798E-09
154	.0000000E+00	.0000000E+00	.0000000E+00	.1102541E-05	.8790533E-02	.0000000E+00
155	.0000000E+00	.0000000E+00	.0000000E+00	.1212281E-05	-.6826128E-02	-.8314723E-10
156	.0000000E+00	.0000000E+00	.0000000E+00	-.1412298E-05	.8790533E-02	.1497786E-12
157	-.1984692E-09	.2420613E-12	.0000000E+00	-.8685059E-06	-.6826128E-02	-.8246964E-10

MODE SHAPE NO. 2

NODE	X-DISPLACEMENT	Y-DISPLACEMENT	Z-DISPLACEMENT	X - ROTATION	Y - ROTATION	Z - ROTATION
1	.3521433E-11	.1039910E-11	-.4954303E-06	-.2571412E-06	.4768473E-02	.1462055E-11
2	.3622611E-09	.3846723E-11	-.5256915E-02	-.1448664E-03	.4720972E-02	.2371521E-11
3	.7202040E-09	.3538458E-11	-.1040881E-01	-.2894757E-03	.4579963E-02	-.4170885E-11
4	.1141889E-08	-.8161318E-11	-.1534393E-01	-.4340850E-03	.4328548E-02	-.1823467E-10
5	.1561063E-08	-.3956182E-10	-.1995021E-01	-.5786943E-03	.3986645E-02	-.3979888E-10
6	.1976803E-08	-.9897271E-10	-.2413244E-01	-.7233035E-03	.3563494E-02	-.6889374E-10
7	.2388198E-08	-.1947552E-09	-.2780695E-01	-.8679128E-03	.3070635E-02	-.1055847E-09
8	.2794340E-08	-.3353706E-09	-.3090400E-01	-.1012522E-02	.2521668E-02	-.1499917E-09
9	.3194339E-08	-.5294549E-09	-.3336986E-01	-.1157131E-02	.1931960E-02	-.2023136E-09
10	.3587314E-08	-.7859190E-09	-.3516868E-01	-.1301741E-02	.1318342E-02	-.2628563E-09
11	.3972405E-08	-.1114089E-08	-.3628384E-01	-.1446350E-02	.6987520E-03	-.3320666E-09
12	.4348763E-08	-.1523876E-08	-.3671902E-01	-.1590959E-02	.9190094E-04	-.4105696E-09
13	.4715564E-08	-.2026008E-08	-.3649886E-01	-.1735569E-02	-.4831026E-03	-.4992130E-09
14	.5072002E-08	-.2632287E-08	-.3566920E-01	-.1880178E-02	-.1007088E-02	-.5991152E-09
15	.5417297E-08	-.3355934E-08	-.3429696E-01	-.2024787E-02	-.1461162E-02	-.7117218E-09
16	.5750692E-08	-.4211977E-08	-.3246964E-01	-.2169397E-02	-.1827009E-02	-.8388678E-09
17	.6071456E-08	-.5217717E-08	-.3029458E-01	-.2314006E-02	-.2087148E-02	-.9828481E-09
18	.6378887E-08	-.6393288E-08	-.2789789E-01	-.2458615E-02	-.2225149E-02	-.1146498E-08
19	.6672314E-08	-.7762300E-08	-.2542320E-01	-.2603224E-02	-.2225775E-02	-.1333283E-08
20	.6906857E-08	-.9352108E-08	-.2302470E-01	-.2747834E-02	-.2087166E-02	-.1546584E-08
21	.7126243E-08	-.1119557E-07	-.2086256E-01	-.2892443E-02	-.1796189E-02	-.1793043E-08
22	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
24	.7401224E-08	-.1397725E-07	-.1877969E-01	-.3184274E-02	-.1431950E-02	-.2444666E-08
25	.7653814E-08	-.1744639E-07	-.1708157E-01	-.3476104E-02	-.1201386E-02	-.2853288E-08
26	.7927376E-08	-.2129847E-07	-.1561288E-01	-.3767935E-02	-.1078246E-02	-.3036613E-08
27	.8177047E-08	-.2525140E-07	-.1422873E-01	-.4059766E-02	-.1069101E-02	-.3011801E-08
28	.8402122E-08	-.2904852E-07	-.1278931E-01	-.4351597E-02	-.1161264E-02	-.2800908E-08
29	.8601972E-08	-.3246426E-07	-.1117052E-01	-.4643429E-02	-.1343249E-02	-.2429644E-08
30	.8776046E-08	-.3530872E-07	-.9262352E-02	-.4935260E-02	-.1604870E-02	-.1927117E-08
31	.8923870E-08	-.3743178E-07	-.6967109E-02	-.5227091E-02	-.1937438E-02	-.1325377E-08
32	.9045050E-08	-.3872660E-07	-.4197267E-02	-.5518921E-02	-.2334054E-02	-.6588089E-09
33	.9139274E-08	-.3913217E-07	-.8728727E-03	-.5810753E-02	-.2789973E-02	.3661810E-10
34	.9206310E-08	-.3863482E-07	.3081419E-02	-.6102583E-02	-.3303036E-02	.7241413E-09
35	.9246010E-08	-.3726872E-07	.7740190E-02	-.6394414E-02	-.3874187E-02	.1367085E-08
36	.9258308E-08	-.3511522E-07	.1318148E-01	-.6686245E-02	-.4508023E-02	.1929671E-08
37	.9243218E-08	-.3230115E-07	.1949210E-01	-.6978078E-02	-.5213444E-02	.2377830E-08
38	.9200839E-08	-.2899618E-07	.2677347E-01	-.7269908E-02	-.6004330E-02	.2679864E-08
39	.9131352E-08	-.2540928E-07	.3514892E-01	-.7561739E-02	-.6900362E-02	.2807016E-08
40	.9035019E-08	-.2178476E-07	.4477136E-01	-.7853569E-02	-.7927855E-02	.2733815E-08
41	.8912179E-08	-.1839774E-07	.5583299E-01	-.8145400E-02	-.9120796E-02	.2438236E-08
42	.8784265E-08	-.1554860E-07	.6850214E-01	-.8437231E-02	-.1040628E-01	.1903410E-08
43	.8630692E-08	-.1356084E-07	.8299683E-01	-.8729063E-02	-.1193978E-01	.1110208E-08
46	.8470939E-08	-.1255054E-07	.9685464E-01	-.8292650E-02	-.1299782E-01	.7311214E-09
47	.8293332E-08	-.1191333E-07	.1114886E+00	-.7856235E-02	-.1335227E-01	.4341319E-09
48	.8064182E-08	-.1156345E-07	.1261418E+00	-.7419821E-02	-.1303298E-01	.2104147E-09
49	.7818077E-08	-.1142287E-07	.1400811E+00	-.6983407E-02	-.1207233E-01	.5458716E-10
50	.7555556E-08	-.1142001E-07	.1526350E+00	-.6546993E-02	-.1054002E-01	-.3967820E-10
51	.7277196E-08	-.1149024E-07	.1632131E+00	-.6110577E-02	-.8512684E-02	-.7862018E-10
52	.6983608E-08	-.1157581E-07	.1713130E+00	-.5674165E-02	-.6073024E-02	-.6845149E-10
53	.6675431E-08	-.1162584E-07	.1765269E+00	-.5237749E-02	-.3308588E-02	-.1538952E-10
54	.6353339E-08	-.1159633E-07	.1785455E+00	-.4801333E-02	-.3104561E-03	.7434196E-10
55	.6018033E-08	-.1145017E-07	.1771617E+00	-.4364918E-02	.2828413E-02	.1945365E-09
56	.5670246E-08	-.1115705E-07	.1722715E+00	-.3928505E-02	.6014874E-02	.3390495E-09
57	.5310730E-08	-.1069344E-07	.1638730E+00	-.3492091E-02	.9157478E-02	.5018657E-09
58	.4940265E-08	-.1004232E-07	.1520638E+00	-.3055676E-02	.1216822E-01	.6771746E-09
59	.4559654E-08	-.9192956E-08	.1370359E+00	-.2619260E-02	.1496438E-01	.8594615E-09
60	.4169723E-08	-.8140510E-08	.1190696E+00	-.2182848E-02	.1747026E-01	.1043607E-08
61	.3771310E-08	-.6885515E-08	.9852348E-01	-.1746432E-02	.1961883E-01	.1224995E-08
62	.3365279E-08	-.5433320E-08	.7582554E-01	-.1310020E-02	.2135311E-01	.1399614E-08
63	.2952500E-08	-.3793281E-08	.5145999E-01	-.8736041E-03	.2262747E-01	.1564171E-08
64	.2598142E-08	-.1978432E-08	.2599589E-01	-.4371886E-03	.2334187E-01	.1715367E-08
65	.2238691E-08	-.4166883E-11	.2509352E-05	-.7760232E-06	.2358245E-01	.1852259E-08
67	-.2690371E-07	.0000000E+00	.0000000E+00	.4104375E-02	-.1796188E-02	.4465814E-08
68	-.2399363E-07	-.5878415E-09	-.2670485E-02	.4083459E-02	-.1796188E-02	.4463412E-08
69	-.2108762E-07	-.1175253E-08	-.5313723E-02	.4020829E-02	-.1796188E-02	.4451932E-08
70	-.1819425E-07	-.1761811E-08	-.7902650E-02	.3916838E-02	-.1796188E-02	.4423362E-08
71	-.1532699E-07	-.2347085E-08	-.1041047E-01	.3772073E-02	-.1796188E-02	.4370753E-08
72	-.1250348E-07	-.2930648E-08	-.1281086E-01	.3587345E-02	-.1796188E-02	.4288207E-08
73	-.9744868E-08	-.3512079E-08	-.1507811E-01	.3363681E-02	-.1796188E-02	.4170872E-08
74	-.7075143E-08	-.4090949E-08	-.1718723E-01	.3102319E-02	-.1796188E-02	.4014914E-08
75	-.4520436E-08	-.4666842E-08	-.1911411E-01	.2804686E-02	-.1796188E-02	.3817493E-08
76	-.2108454E-08	-.5239335E-08	-.2083561E-01	.2472393E-02	-.1796188E-02	.3576725E-08
77	.1321956E-09	-.5808012E-08	-.2232972E-01	.2107207E-02	-.1796188E-02	.3291631E-08
78	.2172530E-08	-.6372459E-08	-.2357563E-01	.1711043E-02	-.1796188E-02	.2962082E-08
79	.3983753E-08	-.6932265E-08	-.2455378E-01	.1285932E-02	-.1796188E-02	.2588728E-08

80	.5537715E-08	-.7487022E-08	-.2524601E-01	.8340076E-03	-.1796188E-02	.2172919E-08
81	.6807356E-08	-.8036326E-08	-.2563556E-01	.3574764E-03	-.1796188E-02	.1716616E-08
82	.7767064E-08	-.8579778E-08	-.2570713E-01	-.1414081E-03	-.1796188E-02	.1222287E-08
83	.8392970E-08	-.9116981E-08	-.2544688E-01	-.6603708E-03	-.1796188E-02	.6928006E-09
84	.8663176E-08	-.9647545E-08	-.2484246E-01	-.1197146E-02	-.1796188E-02	.1313063E-09
85	.8557891E-08	-.1017108E-07	-.2388301E-01	-.1749506E-02	-.1796188E-02	-.4588938E-09
86	.8059492E-08	-.1068722E-07	-.2255907E-01	-.2315291E-02	-.1796188E-02	-.1074480E-08
88	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
90	.6688576E-08	-.1121790E-07	-.2013598E-01	-.3095878E-02	-.1796188E-02	-.1815057E-08
91	.6248915E-08	-.1123910E-07	-.1936124E-01	-.3289480E-02	-.1796188E-02	-.1809694E-08
92	.5810434E-08	-.1125917E-07	-.1854073E-01	-.3473161E-02	-.1796188E-02	-.1805301E-08
93	.5372914E-08	-.1127811E-07	-.1767687E-01	-.3646833E-02	-.1796188E-02	-.1801758E-08
94	.4936162E-08	-.1129591E-07	-.1677210E-01	-.3810413E-02	-.1796188E-02	-.1798950E-08
95	.4500012E-08	-.1131256E-07	-.1582888E-01	-.3963823E-02	-.1796188E-02	-.1796771E-08
96	.4064326E-08	-.1132808E-07	-.1484968E-01	-.4106988E-02	-.1796188E-02	-.1795125E-08
97	.3628982E-08	-.1134245E-07	-.1383700E-01	-.4239838E-02	-.1796188E-02	-.1793920E-08
98	.3193886E-08	-.1135568E-07	-.1279335E-01	-.4362308E-02	-.1796188E-02	-.1793077E-08
99	.2758958E-08	-.1136776E-07	-.1172126E-01	-.4474336E-02	-.1796188E-02	-.1792520E-08
100	.2324137E-08	-.1137870E-07	-.1062325E-01	-.4575868E-02	-.1796188E-02	-.1792185E-08
101	.1889376E-08	-.1138848E-07	-.9501896E-02	-.4666851E-02	-.1796188E-02	-.1792012E-08
102	.1454643E-08	-.1139712E-07	-.8359753E-02	-.4747239E-02	-.1796188E-02	-.1791953E-08
103	.1019914E-08	-.1140461E-07	-.7199395E-02	-.4816993E-02	-.1796188E-02	-.1791966E-08
104	.5851776E-09	-.1141095E-07	-.6023410E-02	-.4876075E-02	-.1796188E-02	-.1792016E-08
105	.1504269E-09	-.1141613E-07	-.4834388E-02	-.4924457E-02	-.1796188E-02	-.1792077E-08
106	-.2843381E-09	-.1142017E-07	-.3634929E-02	-.4962113E-02	-.1796188E-02	-.1792131E-08
107	-.7191131E-09	-.1142305E-07	-.2427641E-02	-.4989024E-02	-.1796188E-02	-.1792168E-08
108	-.1153896E-08	-.1142478E-07	-.1215127E-02	-.5005177E-02	-.1796188E-02	-.1792186E-08
109	-.1588681E-08	-.1142536E-07	.0000000E+00	-.5010562E-02	-.1796188E-02	-.1792191E-08
111	.4469255E-08	-.1390284E-07	.0000000E+00	-.1840381E-01	-.1193979E-01	.7242116E-09
112	.4667619E-08	-.1390198E-07	.5038556E-02	-.1837909E-01	-.1193979E-01	.7242341E-09
113	.4866000E-08	-.1389941E-07	.1006356E-01	-.1830495E-01	-.1193979E-01	.7243504E-09
114	.5064436E-08	-.1389512E-07	.1506149E-01	-.1818144E-01	-.1193979E-01	.7246613E-09
115	.5262997E-08	-.1388911E-07	.2001886E-01	-.1800865E-01	-.1193979E-01	.7252747E-09
116	.5461780E-08	-.1388138E-07	.2492214E-01	-.1778668E-01	-.1193979E-01	.7263056E-09
117	.5660916E-08	-.1387195E-07	.2975792E-01	-.1751569E-01	-.1193979E-01	.7278764E-09
118	.5860572E-08	-.1386080E-07	.3451278E-01	-.1719585E-01	-.1193979E-01	.7301163E-09
119	.6060947E-08	-.1384793E-07	.3917337E-01	-.1682738E-01	-.1193979E-01	.7331616E-09
120	.6262284E-08	-.1383336E-07	.4372639E-01	-.1641051E-01	-.1193979E-01	.7371561E-09
121	.6657598E-08	-.1381707E-07	.4815870E-01	-.1594553E-01	-.1193978E-01	.2174222E-08
122	.6886178E-08	-.1379909E-07	.5245695E-01	-.1543273E-01	-.1193979E-01	-.5471845E-09
123	.6906772E-08	-.1377940E-07	.5660837E-01	-.1487245E-01	-.1193979E-01	.7154766E-09
124	.7103986E-08	-.1375801E-07	.6059982E-01	-.1426504E-01	-.1193979E-01	.7248487E-09
125	.7304006E-08	-.1373491E-07	.6441849E-01	-.1361089E-01	-.1193979E-01	.7359968E-09
126	.7507345E-08	-.1371012E-07	.6805164E-01	-.1291040E-01	-.1193979E-01	.7491083E-09
127	.7714565E-08	-.1368364E-07	.7148662E-01	-.1216402E-01	-.1193979E-01	.7643777E-09
128	.7926286E-08	-.1365547E-07	.7471094E-01	-.1137221E-01	-.1193979E-01	.7820074E-09
129	.8143183E-08	-.1362561E-07	.7771222E-01	-.1053544E-01	-.1193979E-01	.8022073E-09
130	.8365990E-08	-.1359406E-07	.8047820E-01	-.9654217E-02	-.1193979E-01	.8251950E-09
132	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
134	.9335366E-08	-.1293748E-07	.8781911E-01	-.6735004E-02	-.1193978E-01	.1149249E-08
135	.9894786E-08	-.1230583E-07	.9141039E-01	-.4784220E-02	-.1193978E-01	.6469859E-09
136	.1014690E-07	-.1166629E-07	.9379979E-01	-.2883678E-02	-.1193978E-01	.1647060E-09
137	.1010511E-07	-.1101927E-07	.9502088E-01	-.1040575E-02	-.1193978E-01	-.2945599E-09
138	.9784712E-08	-.1036518E-07	.9511180E-01	.7377444E-03	-.1193978E-01	-.7278729E-09
139	.9202765E-08	-.9704458E-08	.9411526E-01	.2443895E-02	-.1193978E-01	-.1132488E-08
140	.8377961E-08	-.9037514E-08	.9207860E-01	.4070518E-02	-.1193978E-01	-.1505945E-08
141	.7330411E-08	-.8364776E-08	.8905370E-01	.5610378E-02	-.1193978E-01	-.1846157E-08
142	.6081395E-08	-.7686679E-08	.8509692E-01	.7056432E-02	-.1193978E-01	-.2151491E-08
143	.3581771E-08	-.7003669E-08	.8026894E-01	.8401914E-02	-.1193978E-01	-.5811049E-08
144	.2186700E-08	-.6316143E-08	.7463438E-01	.9640390E-02	-.1193979E-01	.1237462E-08
145	.1695766E-08	-.5624586E-08	.6826216E-01	.1076584E-01	-.1193978E-01	-.2740156E-08
146	-.6601964E-10	-.4929422E-08	.6122438E-01	.1177272E-01	-.1193978E-01	-.2901224E-08
147	-.1917623E-08	-.4231100E-08	.5359668E-01	.1265599E-01	-.1193978E-01	-.3028390E-08
148	-.3838584E-08	-.3530068E-08	.4545762E-01	.1341117E-01	-.1193978E-01	-.3124011E-08
149	-.5810168E-08	-.2826772E-08	.3688832E-01	.1403444E-01	-.1193978E-01	-.3191242E-08
150	-.7815866E-08	-.2121664E-08	.2797212E-01	.1452258E-01	-.1193978E-01	-.3234070E-08
151	-.9841894E-08	-.1415199E-08	.1879421E-01	.1487307E-01	-.1193978E-01	-.3257315E-08
152	-.1187777E-07	-.7078263E-09	.9441034E-02	.1508410E-01	-.1193978E-01	-.3266651E-08
153	-.1391681E-07	.0000000E+00	.0000000E+00	.1515456E-01	-.1193978E-01	-.3268604E-08
154	.0000000E+00	.0000000E+00	.0000000E+00	.7478585E-06	.4768473E-02	.0000000E+00
155	.0000000E+00	.0000000E+00	.0000000E+00	-.2748679E-05	.2358245E-01	.1872234E-08
156	.0000000E+00	.0000000E+00	.0000000E+00	-.4907172E-06	.4768473E-02	-.5132818E-11
157	.4461402E-08	-.4166883E-11	.0000000E+00	.3524702E-05	.2358245E-01	.1852259E-08

SOLUTION TIME LOG (sec)

INPUT PHASE	3
ASSEMBLAGE OF THE STIFFNESS MATRIX	0
ASSEMBLAGE OF THE MASS MATRIX	1
DECOMPOSITION OF THE STIFFNESS MATRIX	0
EIGENVALUE SOLUTION	2
OUTPUT PHASE	2
TOTAL SOLUTION TIME	8

PUENTE 1502.8

INDICE

1º DEFINICION GEOMETRICA

2º CALCULO DEL TABLERO

3º CALCULO DE PILAS

4º CALCULO DE ESTRIBOS

5º PROYECTO DE PRUEBA DE CARGA

4.2.2 Puente 1502.8

PUENTE 1502.8

1º DEFINICION GEOMETRICA

```
NOMBRE del EJE : T0022
TRAMO donde se situa la estructura: 10
CASO en que se encuentra la estructura(0-1-2)
0   .... La seccion de la carretera tiene calzada unica
1   .... La estructura se situa en la calzada DERECHA
2   .... La estructura se situa en la calzada IZQUIERDA
CASO=  0
NUMERO de VANOS del tablero:  4
PK Estribo nº1 :     1502776.184
PK Pila  nº  1 :     1502795.184
PK Pila  nº  2 :     1502819.184
PK Pila  nº  3 :     1502843.184
PK Estribo nº2 :     1502862.184
Distancia eje REP.PLANTA al de la ESTRUCTURA:           .000
ESPESOR del pavimento (en metros):           .000
NUMERO puntos DE REPLANTEO:  7
PUNTO nº..  1 X=           .000 Y=          -.275
PUNTO nº..  2 X=         -7.000 Y=          -.135
PUNTO nº..  3 X=         -3.740 Y=          1.125
PUNTO nº..  4 X=          3.740 Y=          1.125
PUNTO nº..  5 X=          7.000 Y=          -.135
PUNTO nº..  6 X=         -2.400 Y=          1.225
PUNTO nº..  7 X=          2.400 Y=          1.225
NUMERO de puntos que acompañan a los bordes:  0
VANO nº..   1 NUMERO de secciones NORMALES: 10
VANO nº..   2 NUMERO de secciones NORMALES: 10
VANO nº..   3 NUMERO de secciones NORMALES: 10
VANO nº..   4 NUMERO de secciones NORMALES: 10
NUMERO de secciones ESVIADAS a calcular:  5
SECCION Nº..  1  PK=     1502843.184   AZIMUT(g)= 76.280
SECCION Nº..  2  PK=     1502845.412   AZIMUT(g)= 76.280
SECCION Nº..  3  PK=     1502851.971   AZIMUT(g)= 76.280
SECCION Nº..  4  PK=     1502855.581   AZIMUT(g)= 76.280
SECCION Nº..  5  PK=     1502862.502   AZIMUT(g)= 76.280
TIPO de tablero (1-2-3-4):  1
VANO..  1 PUNTO..  1  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  2  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  3  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  4  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  5  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  6  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  7  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  1  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  2  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  3  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  4  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  5  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  6  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  7  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  1  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  2  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  3  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  4  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  5  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  6  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  7  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  1  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  2  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  3  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  4  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  5  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  6  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  7  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  1  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  2  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  3  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  4  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  5  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  6  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  7  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  1  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  2  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  3  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  4  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  5  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  6  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  7  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  1  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  2  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  3  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  4  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  5  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  6  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  7  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  1  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  2  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  3  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  4  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  5  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  6  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  7  Variac. HORIZONTAL tipo:  1
```

```
NOMBRE del EJE : T0022
TRAMO donde se situa la estructura: 10
CASO en que se encuentra la estructura(0-1-2)
0   ....  La seccion de la carretera tiene calzada unica
1   ....  La estructura se situa en la calzada DERECHA
2   ....  La estructura se situa en la calzada IZQUIERDA
CASO=  0
NUMERO de VANOS del tablero:  4
PK Estribo nº1 :     1502776.184
PK Pila  nº  1 :     1502795.184
PK Pila  nº  2 :     1502819.184
PK Pila  nº  3 :     1502843.184
PK Estribo nº2 :     1502862.184
Distancia eje REP.PLANTA al de la ESTRUCTURA:           .000
ESPESOR del pavimento (en metros):           .000
NUMERO puntos DE REPLANTEO:  7
PUNTO nº..  1 X=           .000 Y=          -.275
PUNTO nº..  2 X=         -7.000 Y=          -.135
PUNTO nº..  3 X=         -3.740 Y=          1.125
PUNTO nº..  4 X=          3.740 Y=          1.125
PUNTO nº..  5 X=          7.000 Y=          -.135
PUNTO nº..  6 X=         -2.400 Y=          1.225
PUNTO nº..  7 X=          2.400 Y=          1.225
NUMERO de puntos que acompañan a los bordes:  0
VANO nº..   1 NUMERO de secciones NORMALES: 10
VANO nº..   2 NUMERO de secciones NORMALES: 10
VANO nº..   3 NUMERO de secciones NORMALES: 10
VANO nº..   4 NUMERO de secciones NORMALES: 10
NUMERO de secciones ESVIADAS a calcular:  5
SECCION Nº..  1  PK=     1502843.184   AZIMUT(g)= 76.280
SECCION Nº..  2  PK=     1502845.412   AZIMUT(g)= 76.280
SECCION Nº..  3  PK=     1502851.971   AZIMUT(g)= 76.280
SECCION Nº..  4  PK=     1502855.581   AZIMUT(g)= 76.280
SECCION Nº..  5  PK=     1502862.502   AZIMUT(g)= 76.280
TIPO de tablero (1-2-3-4):  1
VANO..  1 PUNTO..  1  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  2  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  3  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  4  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  5  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  6  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  7  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  1  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  2  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  3  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  4  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  5  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  6  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  7  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  1  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  2  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  3  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  4  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  5  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  6  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  7  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  1  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  2  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  3  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  4  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  5  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  6  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  7  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  1  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  2  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  3  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  4  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  5  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  6  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  7  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  1  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  2  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  3  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  4  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  5  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  6  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  7  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  1  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  2  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  3  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  4  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  5  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  6  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  7  Variacion VERTICAL tipo:  1
VANO..  4 PUNTO..  1  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  2  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  3  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  4  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  5  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  6  Variac. HORIZONTAL tipo:  1
VANO..  4 PUNTO..  7  Variac. HORIZONTAL tipo:  1
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VAN	SEC	PUNTO	P.K.	AZ(g)	X	Y	Z
1	1	1	1502776.184	225.137	666761.460	4610616.993	305.594
1	1	2	1502776.184	225.137	666764.153	4610623.454	305.454
1	1	3	1502776.184	225.137	666762.899	4610620.445	304.194
1	1	4	1502776.184	225.137	666760.022	4610613.541	304.194
1	1	5	1502776.184	225.137	666758.768	4610610.531	305.454
1	1	6	1502776.184	225.137	666762.384	4610619.208	304.094
1	1	7	1502776.184	225.137	666760.537	4610614.778	304.094
1	2	1	1502778.295	225.156	666763.409	4610616.180	305.568
1	2	2	1502778.295	225.156	666766.104	4610622.641	305.428
1	2	3	1502778.295	225.156	666764.849	4610619.632	304.168
1	2	4	1502778.295	225.156	666761.969	4610612.729	304.168
1	2	5	1502778.295	225.156	666760.715	4610609.720	305.428
1	2	6	1502778.295	225.156	666764.333	4610618.395	304.068
1	2	7	1502778.295	225.156	666762.485	4610613.965	304.068
1	3	1	1502780.406	225.174	666765.357	4610615.367	305.541
1	3	2	1502780.406	225.174	666768.054	4610621.827	305.401
1	3	3	1502780.406	225.174	666766.798	4610618.819	304.141
1	3	4	1502780.406	225.174	666763.917	4610611.916	304.141
1	3	5	1502780.406	225.174	666762.661	4610608.908	305.401
1	3	6	1502780.406	225.174	666766.282	4610617.582	304.041
1	3	7	1502780.406	225.174	666764.433	4610613.153	304.041
1	4	1	1502782.517	225.193	666767.305	4610614.554	305.514
1	4	2	1502782.517	225.193	666770.004	4610621.013	305.374
1	4	3	1502782.517	225.193	666768.747	4610618.005	304.114
1	4	4	1502782.517	225.193	666765.864	4610611.103	304.114
1	4	5	1502782.517	225.193	666764.607	4610608.095	305.374
1	4	6	1502782.517	225.193	666768.231	4610616.769	304.014
1	4	7	1502782.517	225.193	666766.380	4610612.339	304.014
1	5	1	1502784.628	225.211	666769.253	4610613.740	305.487
1	5	2	1502784.628	225.211	666771.953	4610620.198	305.347
1	5	3	1502784.628	225.211	666770.696	4610617.190	304.087
1	5	4	1502784.628	225.211	666767.811	4610610.289	304.087
1	5	5	1502784.628	225.211	666766.553	4610607.282	305.347
1	5	6	1502784.628	225.211	666770.179	4610615.954	303.987
1	5	7	1502784.628	225.211	666768.328	4610611.526	303.987
1	6	1	1502786.740	225.230	666771.201	4610612.925	305.460
1	6	2	1502786.740	225.230	666773.903	4610619.383	305.320
1	6	3	1502786.740	225.230	666772.644	4610616.375	304.060
1	6	4	1502786.740	225.230	666769.757	4610609.475	304.060
1	6	5	1502786.740	225.230	666768.499	4610606.468	305.320
1	6	6	1502786.740	225.230	666772.127	4610615.139	303.960
1	6	7	1502786.740	225.230	666770.274	4610610.711	303.960
1	7	1	1502788.851	225.248	666773.148	4610612.110	305.433
1	7	2	1502788.851	225.248	666775.852	4610618.567	305.293
1	7	3	1502788.851	225.248	666774.593	4610615.560	304.033
1	7	4	1502788.851	225.248	666771.704	4610608.660	304.033
1	7	5	1502788.851	225.248	666770.444	4610605.653	305.293
1	7	6	1502788.851	225.248	666774.075	4610614.324	303.933
1	7	7	1502788.851	225.248	666772.221	4610609.896	303.933
1	8	1	1502790.962	225.267	666775.095	4610611.294	305.406
1	8	2	1502790.962	225.267	666777.801	4610617.750	305.266
1	8	3	1502790.962	225.267	666776.541	4610614.744	304.006
1	8	4	1502790.962	225.267	666773.650	4610607.845	304.006
1	8	5	1502790.962	225.267	666772.389	4610604.838	305.266
1	8	6	1502790.962	225.267	666776.023	4610613.508	303.906
1	8	7	1502790.962	225.267	666774.168	4610609.081	303.906
1	9	1	1502793.073	225.285	666777.042	4610610.478	305.379
1	9	2	1502793.073	225.285	666779.750	4610616.933	305.239
1	9	3	1502793.073	225.285	666778.489	4610613.927	303.979
1	9	4	1502793.073	225.285	666775.596	4610607.029	303.979
1	9	5	1502793.073	225.285	666774.335	4610604.023	305.239
1	9	6	1502793.073	225.285	666777.971	4610612.691	303.879
1	9	7	1502793.073	225.285	666776.114	4610608.265	303.879
1	10	1	1502795.184	225.304	666778.989	4610609.661	305.351
1	10	2	1502795.184	225.304	666781.698	4610616.115	305.211
1	10	3	1502795.184	225.304	666780.437	4610613.110	303.951
1	10	4	1502795.184	225.304	666777.541	4610606.213	303.951
1	10	5	1502795.184	225.304	666776.279	4610603.207	305.211
1	10	6	1502795.184	225.304	666779.918	4610611.874	303.851
1	10	7	1502795.184	225.304	666778.060	4610607.448	303.851
2	1	1	1502795.184	225.304	666778.989	4610609.661	305.351
2	1	2	1502795.184	225.304	666781.698	4610616.115	305.211
2	1	3	1502795.184	225.304	666780.437	4610613.110	303.951
2	1	4	1502795.184	225.304	666777.541	4610606.213	303.951
2	1	5	1502795.184	225.304	666776.279	4610603.207	305.211
2	1	6	1502795.184	225.304	666779.918	4610611.874	303.851
2	1	7	1502795.184	225.304	666778.060	4610607.448	303.851
2	2	1	1502797.851	225.327	666781.448	4610608.628	305.316
2	2	2	1502797.851	225.327	666784.159	4610615.082	305.176
2	2	3	1502797.851	225.327	666782.896	4610612.076	303.916
2	2	4	1502797.851	225.327	666779.999	4610605.180	303.916
2	2	5	1502797.851	225.327	666778.736	4610602.175	305.176
2	2	6	1502797.851	225.327	666782.377	4610610.841	303.816
2	2	7	1502797.851	225.327	666780.518	4610606.416	303.816
2	3	1	1502800.517	225.351	666783.906	4610607.595	305.281
2	3	2	1502800.517	225.351	666786.620	4610614.047	305.141
2	3	3	1502800.517	225.351	666785.356	4610611.042	303.881
2	3	4	1502800.517	225.351	666782.456	4610604.147	303.881
2	3	5	1502800.517	225.351	666781.191	4610601.142	305.141
2	3	6	1502800.517	225.351	666784.836	4610609.807	303.781
2	3	7	1502800.517	225.351	666782.975	4610605.383	303.781
2	4	1	1502803.184	225.374	666786.364	4610606.560	305.245
2	4	2	1502803.184	225.374	666789.080	4610613.012	305.105
2	4	3	1502803.184	225.374	666787.815	4610610.007	303.845
2	4	4	1502803.184	225.374	666784.912	4610603.113	303.845
2	4	5	1502803.184	225.374	666783.647	4610600.109	305.105
2	4	6	1502803.184	225.374	666787.295	4610608.772	303.745
2	4	7	1502803.184	225.374	666785.432	4610604.348	303.745
2	5	1	1502805.851	225.397	666788.821	4610605.525	305.210
2	5	2	1502805.851	225.397	666791.540	4610611.975	305.070
2	5	3	1502805.851	225.397	666790.274	4610608.971	303.810
2	5	4	1502805.851	225.397	666787.368	4610602.079	303.810
2	5	5	1502805.851	225.397	666786.102	4610599.075	305.070
2	5	6	1502805.851	225.397	666789.753	4610607.736	303.710
2	5	7	1502805.851	225.397	666787.889	4610603.313	303.710
2	6	1	1502808.517	225.421	666791.278	4610604.489	305.174
2	6	2	1502808.517	225.421	666794.000	4610610.938	305.034
2	6	3	1502808.517	225.421	666792.732	4610607.934	303.774
2	6	4	1502808.517	225.421	666789.824	4610601.043	303.774
2	6	5	1502808.517	225.421	666788.557	4610598.039	305.034
2	6	6	1502808.517	225.421	666792.211	4610606.700	303.674
2	6	7	1502808.517	225.421	666790.345	4610602.277	303.674
2	7	1	1502811.184	225.444	666793.735	4610603.451	305.138
2	7	2	1502811.184	225.444	666796.459	4610609.900	304.998
2	7	3	1502811.184	225.444	666795.190	4610606.897	303.738
2	7	4	1502811.184	225.444	666792.279	4610600.006	303.738
2	7	5	1502811.184	225.444	666791.011	4610597.003	304.998
2	7	6	1502811.184	225.444	666794.669	4610605.662	303.638
2	7	7	1502811.184	225.444	666792.801	4610601.241	303.638
2	8	1	1502813.851	225.468	666796.191	4610602.413	305.101
2	8	2	1502813.851	225.468	666798.917	4610608.861	304.961
2	8	3	1502813.851	225.468	666797.648	4610605.858	303.701
2	8	4	1502813.851	225.468	666794.734	4610598.969	303.701
2	8	5	1502813.851	225.468	666793.465	4610595.966	304.961
2	8	6	1502813.851	225.468	666797.126	4610604.624	303.601
2	8	7	1502813.851	225.468	666795.256	4610600.203	303.601
2	9	1	1502816.517	225.491	666798.647	4610601.374	305.065
2	9	2	1502816.517	225.491	666801.376	4610607.821	304.925
2	9	3	1502816.517	225.491	666800.105	4610604.818	303.665
2	9	4	1502816.517	225.491	666797.189	4610597.930	303.665
2	9	5	1502816.517	225.491	666795.919	4610594.928	304.925
2	9	6	1502816.517	225.491	666799.583	4610603.584	303.565
2	9	7	1502816.517	225.491	666797.712	4610599.164	303.565
2	10	1	1502819.184	225.515	666801.103	4610600.334	305.028
2	10	2	1502819.184	225.515	666803.833	4610606.780	304.888
2	10	3	1502819.184	225.515	666802.562	4610603.778	303.628
2	10	4	1502819.184	225.515	666799.643	4610596.891	303.628
2	10	5	1502819.184	225.515	666798.372	4610593.889	304.888
2	10	6	1502819.184	225.515	666802.039	4610602.544	303.528
2	10	7	1502819.184	225.515	666800.166	4610598.125	303.528
3	1	1	1502819.184	225.515	666801.103	4610600.334	305.028

3	1	2	1502819.184	225.515	666803.833	4610606.780	304.888
3	1	3	1502819.184	225.515	666802.562	4610603.778	303.628
3	1	4	1502819.184	225.515	666799.643	4610596.891	303.628
3	1	5	1502819.184	225.515	666798.372	4610593.889	304.888
3	1	6	1502819.184	225.515	666802.039	4610602.544	303.528
3	1	7	1502819.184	225.515	666800.166	4610598.125	303.528
3	2	1	1502821.851	225.538	666803.558	4610599.294	304.991
3	2	2	1502821.851	225.538	666806.291	4610605.738	304.851
3	2	3	1502821.851	225.538	666805.018	4610602.737	303.591
3	2	4	1502821.851	225.538	666802.097	4610595.850	303.591
3	2	5	1502821.851	225.538	666800.824	4610592.849	304.851
3	2	6	1502821.851	225.538	666804.495	4610601.503	303.491
3	2	7	1502821.851	225.538	666802.621	4610597.084	303.491
3	3	1	1502824.517	225.561	666806.013	4610598.252	304.954
3	3	2	1502824.517	225.561	666808.748	4610604.695	304.814
3	3	3	1502824.517	225.561	666807.474	4610601.694	303.554
3	3	4	1502824.517	225.561	666804.551	4610594.809	303.554
3	3	5	1502824.517	225.561	666803.277	4610591.808	304.814
3	3	6	1502824.517	225.561	666806.951	4610600.461	303.454
3	3	7	1502824.517	225.561	666805.075	4610596.043	303.454
3	4	1	1502827.184	225.585	666808.467	4610597.209	304.916
3	4	2	1502827.184	225.585	666811.205	4610603.651	304.776
3	4	3	1502827.184	225.585	666809.930	4610600.651	303.516
3	4	4	1502827.184	225.585	666807.004	4610593.767	303.516
3	4	5	1502827.184	225.585	666805.729	4610590.767	304.776
3	4	6	1502827.184	225.585	666809.406	4610599.418	303.416
3	4	7	1502827.184	225.585	666807.528	4610595.000	303.416
3	5	1	1502829.851	225.608	666810.921	4610596.166	304.878
3	5	2	1502829.851	225.608	666813.661	4610602.607	304.738
3	5	3	1502829.851	225.608	666812.385	4610599.607	303.478
3	5	4	1502829.851	225.608	666809.457	4610592.724	303.478
3	5	5	1502829.851	225.608	666808.180	4610589.724	304.738
3	5	6	1502829.851	225.608	666811.860	4610598.374	303.378
3	5	7	1502829.851	225.608	666809.981	4610593.957	303.378
3	6	1	1502832.517	225.632	666813.375	4610595.121	304.841
3	6	2	1502832.517	225.632	666816.117	4610601.561	304.701
3	6	3	1502832.517	225.632	666814.840	4610598.562	303.441
3	6	4	1502832.517	225.632	666811.909	4610591.680	303.441
3	6	5	1502832.517	225.632	666810.632	4610588.681	304.701
3	6	6	1502832.517	225.632	666814.315	4610597.329	303.341
3	6	7	1502832.517	225.632	666812.434	4610592.913	303.341
3	7	1	1502835.184	225.655	666815.828	4610594.076	304.802
3	7	2	1502835.184	225.655	666818.573	4610600.515	304.662
3	7	3	1502835.184	225.655	666817.294	4610597.516	303.402
3	7	4	1502835.184	225.655	666814.361	4610590.635	303.402
3	7	5	1502835.184	225.655	666813.082	4610587.637	304.662
3	7	6	1502835.184	225.655	666816.769	4610596.284	303.302
3	7	7	1502835.184	225.655	666814.886	4610591.868	303.302
3	8	1	1502837.851	225.678	666818.281	4610593.030	304.764
3	8	2	1502837.851	225.678	666821.028	4610599.468	304.624
3	8	3	1502837.851	225.678	666819.749	4610596.469	303.364
3	8	4	1502837.851	225.678	666816.813	4610589.590	303.364
3	8	5	1502837.851	225.678	666815.533	4610586.591	304.624
3	8	6	1502837.851	225.678	666819.223	4610595.237	303.264
3	8	7	1502837.851	225.678	666817.339	4610590.822	303.264
3	9	1	1502840.517	225.702	666820.733	4610591.982	304.725
3	9	2	1502840.517	225.702	666823.483	4610598.420	304.585
3	9	3	1502840.517	225.702	666822.202	4610595.422	303.325
3	9	4	1502840.517	225.702	666819.264	4610588.543	303.325
3	9	5	1502840.517	225.702	666817.983	4610585.545	304.585
3	9	6	1502840.517	225.702	666821.676	4610594.189	303.225
3	9	7	1502840.517	225.702	666819.790	4610589.775	303.225
3	10	1	1502843.184	225.725	666823.185	4610590.934	304.687
3	10	2	1502843.184	225.725	666825.937	4610597.371	304.547
3	10	3	1502843.184	225.725	666824.656	4610594.373	303.287
3	10	4	1502843.184	225.725	666821.715	4610587.496	303.287
3	10	5	1502843.184	225.725	666820.433	4610584.498	304.547
3	10	6	1502843.184	225.725	666824.129	4610593.141	303.187
3	10	7	1502843.184	225.725	666822.241	4610588.728	303.187
4	1	1	1502843.184	225.725	666823.185	4610590.934	304.687
4	1	2	1502843.184	225.725	666825.937	4610597.371	304.547
4	1	3	1502843.184	225.725	666824.656	4610594.373	303.287
4	1	4	1502843.184	225.725	666821.715	4610587.496	303.287
4	1	5	1502843.184	225.725	666820.433	4610584.498	304.547
4	1	6	1502843.184	225.725	666824.129	4610593.141	303.187
4	1	7	1502843.184	225.725	666822.241	4610588.728	303.187
4	2	1	1502845.295	225.744	666825.126	4610590.104	304.656
4	2	2	1502845.295	225.744	666827.880	4610596.540	304.516
4	2	3	1502845.295	225.744	666826.598	4610593.542	303.256
4	2	4	1502845.295	225.744	666823.655	4610586.666	303.256
4	2	5	1502845.295	225.744	666822.372	4610583.669	304.516
4	2	6	1502845.295	225.744	666826.070	4610592.311	303.156
4	2	7	1502845.295	225.744	666824.182	4610587.898	303.156
4	3	1	1502847.406	225.762	666827.067	4610589.273	304.625
4	3	2	1502847.406	225.762	666829.823	4610595.708	304.485
4	3	3	1502847.406	225.762	666828.539	4610592.711	303.225
4	3	4	1502847.406	225.762	666825.594	4610585.835	303:225
4	3	5	1502847.406	225.762	666824.311	4610582.839	304.485
4	3	6	1502847.406	225.762	666828.012	4610591.479	303.125
4	3	7	1502847.406	225.762	666826.122	4610587.067	303.125
4	4	1	1502849.517	225.781	666829.007	4610588.442	304.594
4	4	2	1502849.517	225.781	666831.765	4610594.875	304.454
4	4	3	1502849.517	225.781	666830.481	4610591.879	303.194
4	4	4	1502849.517	225.781	666827.534	4610585.004	303.194
4	4	5	1502849.517	225.781	666826.250	4610582.008	304.454
4	4	6	1502849.517	225.781	666829.953	4610590.648	303.094
4	4	7	1502849.517	225.781	666828.062	4610586.236	303.094
4	5	1	1502851.628	225.799	666830.948	4610587.610	304.562
4	5	2	1502851.628	225.799	666833.707	4610594.043	304.422
4	5	3	1502851.628	225.799	666832.422	4610591.047	303.162
4	5	4	1502851.628	225.799	666829.473	4610584.173	303.162
4	5	5	1502851.628	225.799	666828.188	4610581.177	304.422
4	5	6	1502851.628	225.799	666831.894	4610589.815	303.062
4	5	7	1502851.628	225.799	666830.001	4610585.404	303.062
4	6	1	1502853.740	225.818	666832.888	4610586.777	304.531
4	6	2	1502853.740	225.818	666835.649	4610593.209	304.391
4	6	3	1502853.740	225.818	666834.363	4610590.214	303.131
4	6	4	1502853.740	225.818	666831.412	4610583.340	303.131
4	6	5	1502853.740	225.818	666830.126	4610580.345	304.391
4	6	6	1502853.740	225.818	666833.835	4610588.982	303.031
4	6	7	1502853.740	225.818	666831.941	4610584.572	303.031
4	7	1	1502855.851	225.837	666834.827	4610585.944	304.499
4	7	2	1502855.851	225.837	666837.591	4610592.375	304.359
4	7	3	1502855.851	225.837	666836.304	4610589.380	303.099
4	7	4	1502855.851	225.837	666833.351	4610582.508	303.099
4	7	5	1502855.851	225.837	666832.064	4610579.513	304.359
4	7	6	1502855.851	225.837	666835.775	4610588.149	302.999
4	7	7	1502855.851	225.837	666833.880	4610583.739	302.999
4	8	1	1502857.962	225.855	666836.767	4610585.110	304.468
4	8	2	1502857.962	225.855	666839.532	4610591.541	304.328
4	8	3	1502857.962	225.855	666838.244	4610588.546	303.068
4	8	4	1502857.962	225.855	666835.289	4610581.674	303.068
4	8	5	1502857.962	225.855	666834.002	4610578.680	304.328
4	8	6	1502857.962	225.855	666837.715	4610587.315	302.968
4	8	7	1502857.962	225.855	666835.819	4610582.905	302.968
4	9	1	1502860.073	225.874	666838.706	4610584.276	304.436
4	9	2	1502860.073	225.874	666841.473	4610590.706	304.296
4	9	3	1502860.073	225.874	666840.184	4610587.711	303.036
4	9	4	1502860.073	225.874	666837.227	4610580.841	303.036
4	9	5	1502860.073	225.874	666835.939	4610577.846	304.296
4	9	6	1502860.073	225.874	666839.655	4610586.480	302.936
4	9	7	1502860.073	225.874	666837.757	4610582.071	302.936
4	10	1	1502862.184	225.892	666840.645	4610583.441	304.404
4	10	2	1502862.184	225.892	666843.414	4610589.870	304.264
4	10	3	1502862.184	225.892	666842.125	4610586.876	303.004
4	10	4	1502862.184	225.892	666839.166	4610580.006	303.004
4	10	5	1502862.184	225.892	666837.876	4610577.012	304.264
4	10	6	1502862.184	225.892	666841.595	4610585.645	302.904
4	10	7	1502862.184	225.892	666839.696	4610581.237	302.904

SECCIONES ESVIADAS

5

SECC	PUNTO	PK	AZ	X	Y	Z
1	1	1502843.184	76.280	666823.185	4610590.934	304.687
1	2	1502850.297	76.280	666832.483	4610594.568	304.442
1	3	1502846.987	76.280	666828.153	4610592.876	303.231
1	4	1502839.374	76.280	666818.213	4610588.992	303.342
1	5	1502836.051	76.280	666813.879	4610587.297	304.650
1	6	1502845.626	76.280	666826.374	4610592.180	303.151
1	7	1502840.740	76.280	666819.995	4610589.688	303.222
2	1	1502845.412	76.280	666825.233	4610590.058	304.654
2	2	1502852.521	76.280	666834.528	4610593.691	304.409
2	3	1502849.212	76.280	666830.200	4610591.999	303.198
2	4	1502841.604	76.280	666820.263	4610588.116	303.310
2	5	1502838.283	76.280	666815.930	4610586.422	304.618
2	6	1502847.851	76.280	666828.421	4610591.304	303.118
2	7	1502842.970	76.280	666822.045	4610588.812	303.190
3	1	1502851.973	76.280	666831.264	4610587.474	304.557
3	2	1502859.066	76.280	666840.547	4610591.104	304.311
3	3	1502855.764	76.280	666836.224	4610589.414	303.101
3	4	1502848.172	76.280	666826.298	4610585.534	303.214
3	5	1502844.855	76.280	666821.968	4610583.842	304.522
3	6	1502854.405	76.280	666834.446	4610588.720	303.021
3	7	1502849.533	76.280	666828.076	4610586.230	303.093
4	1	1502855.582	76.280	666834.580	4610586.050	304.503
4	2	1502862.670	76.280	666843.861	4610589.677	304.256
4	3	1502859.371	76.280	666839.539	4610587.989	303.046
4	4	1502851.785	76.280	666829.617	4610584.111	303.160
4	5	1502848.470	76.280	666825.288	4610582.420	304.469
4	6	1502858.014	76.280	666837.763	4610587.294	302.967
4	7	1502853.144	76.280	666831.394	4610584.806	303.040
5	1	1502862.501	76.280	666840.936	4610583.316	304.399
5	2	1502869.576	76.280	666850.209	4610586.939	304.151
5	3	1502866.284	76.280	666845.891	4610585.252	302.941
5	4	1502858.714	76.280	666835.980	4610581.377	303.056
5	5	1502855.408	76.280	666831.657	4610579.687	304.366
5	6	1502864.929	76.280	666844.117	4610584.558	302.862
5	7	1502860.073	76.280	666837.757	4610582.071	302.936

PUENTE 1502.8

2º CALCULO DEL TABLERO

GINPROSA

ASUNTO

E- 1502 8.

CARGAS CONSIDERADAS.

1) Peso propio $\gamma = 2{,}5\ t/m^3$

2) Carga muerta.

Traviesas + carriles —— 1,28 t/m.

Balasto —— 9,60 x 0,60 x 1,60 = 9,20 t/m.

Cables + Conductos —— 0,30 x 2 = 0,60 t/m.

Barreras —— 0,75 x2 = 1,50 t/m.

Total carga muerta —— 12,60 t/m.

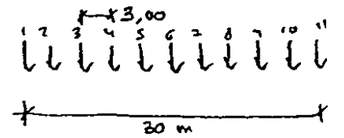
3º) Cargas en pasos 0,5 t/m² x 1,75x2 = 1,75 t/m.

4º) TREN TIPO B (IPF-75)

Se supone una carga de 10 t/m. aplicada como si fuese una sobrecarga de uso y los 2 t/m. de exceso de peso por locomotora. aplicada como una serie de cargas puntuales.

$q = 10 \times 2 = 20\ t/m.$

Excepto locomotora



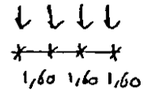
11 cargas puntuales de

$P = \frac{2 \times 30}{11} \times 2 = 10{,}9$ tm.

5º) TIPO LM71

Carga uniforme de $8 \times 2 = 16\ t/m.$

Cargas puntuales



4 cargas puntuales

P= 24,4 tm.

6º) TREN SW/0

Sobrecarga $2 \times 13{,}3 = 26{,}6\ t/m.$

7º) TREN SW/2

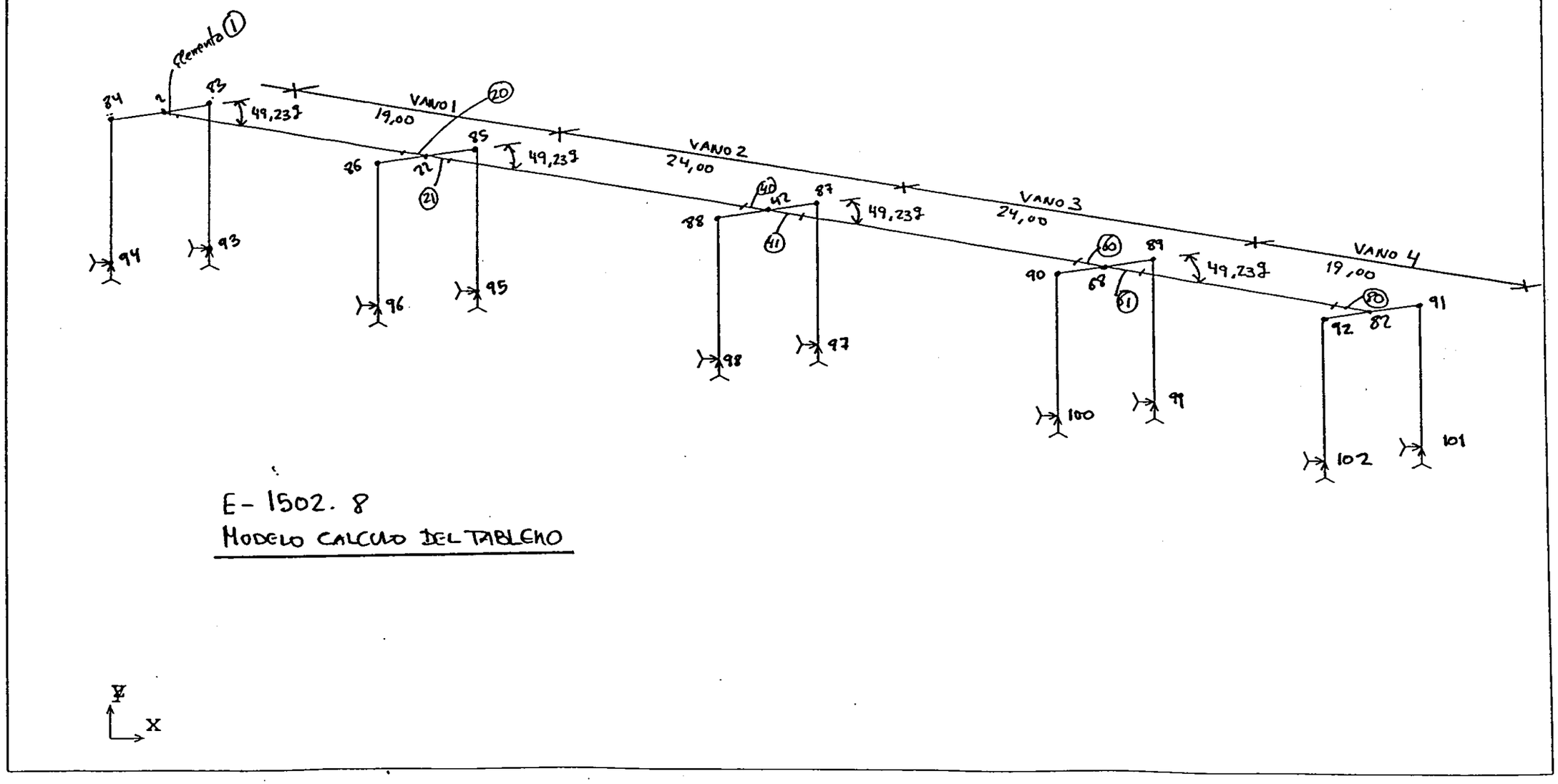
Sobrecarga $2 \times 15{,}0 = 30{,}0\ t/m.$

Vano	Seccion	Area A (m2)	Inercia I (m4)	Fibra sup. v (m.)	Fibra inf. v' (m.)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ancho Sup. bs (m.)	Ancho cort. bw (m.)	Perimetro u (m.)	Canto volad. hf (m.)	Nº Aliger. na -	Dist. cdg.Alig va (m.)	Separ.Alig sa (m.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Inercia tors. J (m4.)	Inercia eje vert. (m4.)	Coord.sec. X (m.)
1	1	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	0.000
1	2	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	0.950
1	3	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	1.900
1	4	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	2.850
1	5	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	3.800
1	6	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	4.750
1	7	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	5.700
1	8	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	6.650
1	9	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	7.600
1	10	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	8.550
1	11	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	9.500
1	12	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	10.450
1	13	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	11.400
1	14	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	12.350
1	15	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	13.300
1	16	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	14.250
1	17	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	15.200
1	18	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	16.150
1	19	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	17.100
1	20	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	18.050
1	21	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	19.000

Vano	Seccion	Area A (m2)	Inercia I (m4)	Fibra sup. v (m.)	Fibra inf. v' (m.)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ancho Sup. bs (m.)	Ancho cort. bw (m.)	Perimetro u (m.)	Canto volad. hf (m.)	Nº Aliger. na -	Dist. cdg.Alig va (m.)	Separ.Alig sa (m.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Inercia tors. J (m4.)	Inercia eje vert. (m4.)	Coord.sec. X (m.)
2	1	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	0.000
2	2	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	1.200
2	3	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	2.400
2	4	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	3.600
2	5	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	4.800
2	6	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	6.000
2	7	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	7.200
2	8	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	8.400
2	9	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	9.600
2	10	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	10.800
2	11	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	12.000
2	12	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	13.200
2	13	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	14.400
2	14	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	15.600
2	15	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	16.800
2	16	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	18.000
2	17	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	19.200
2	18	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	20.400
2	19	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	21.600
2	20	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	22.800
2	21	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	24.000

Vano	Seccion	Area A (m2)	Inercia I (m4)	Fibra sup. v (m.)	Fibra inf. v' (m.)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ancho Sup. bs (m.)	Ancho cort. bw (m.)	Perimetro u (m.)	Canto volad. hf (m.)	Nº Aliger. na -	Dist. cdg.Alig va (m.)	Separ.Alig sa (m.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Inercia tors. J (m4.)	Inercia eje vert. (m4.)	Coord.sec. X (m.)
3	1	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	0.000
3	2	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	1.200
3	3	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	2.400
3	4	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	3.600
3	5	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	4.800
3	6	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	6.000
3	7	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	7.200
3	8	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	8.400
3	9	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	9.600
3	10	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	10.800
3	11	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	12.000
3	12	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	13.200
3	13	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	14.400
3	14	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	15.600
3	15	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	16.800
3	16	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	18.000
3	17	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	19.200
3	18	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	20.400
3	19	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	21.600
3	20	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	22.800
3	21	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	24.000

Vano	Seccion	Area A (m2)	Inercia I (m4)	Fibra sup. v (m.)	Fibra inf. v' (m.)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ancho Sup. bs (m.)	Ancho cort. bw (m.)	Perimetro u (m.)	Canto volad. hf (m.)	N° Aliger. na -	Dist. cdg.Alig va (m.)	Separ.Alig sa (m.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Inercia tors. J (m4.)	Inercia eje vert. (m4.)	Coord.sec. X (m.)
4	1	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	0.000
4	2	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	0.950
4	3	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	1.900
4	4	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	2.850
4	5	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	3.800
4	6	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	4.750
4	7	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	5.700
4	8	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	6.650
4	9	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	7.600
4	10	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	8.550
4	11	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	9.500
4	12	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	10.450
4	13	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	11.400
4	14	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	12.350
4	15	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	13.300
4	16	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	14.250
4	17	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	15.200
4	18	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	16.150
4	19	9.544	1.735	0.614	-0.786	1.400	14.000	7.480	8.400	3.480	29.530	0.406	4	0.750	4.800	9.326	0.150	3.279	100.233	17.100
4	20	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	18.050
4	21	12.685	1.975	0.648	-0.752	1.400	14.000	7.480	8.400	7.480	29.530	0.406	0	0.000	0.000	8.888	0.233	3.834	100.233	19.000



E- 1502. 8

MODELO CALCULO DEL TABLERO

GINPROSA

ASUNTO
E- 1502.8
CALCULO DEL COEFICIENTE DE IMPACTO

PAG. 1

Puente vibrante :

peso propio $\gamma = 2,5\ t/m^3$

carga muerta $q = 12,00\ t/m.$

Adoptamos un peso específico ficticio $\gamma' = 2,5 + \frac{12,0}{area} = 3,75\ t/m^3$

El periodo mayor da $T = \frac{1}{4,97} = 0,20$ seg.

$$\mu = \frac{55,5 \cdot 0,20}{2 \times 24} = 0,23 \rightarrow I = 1,18$$

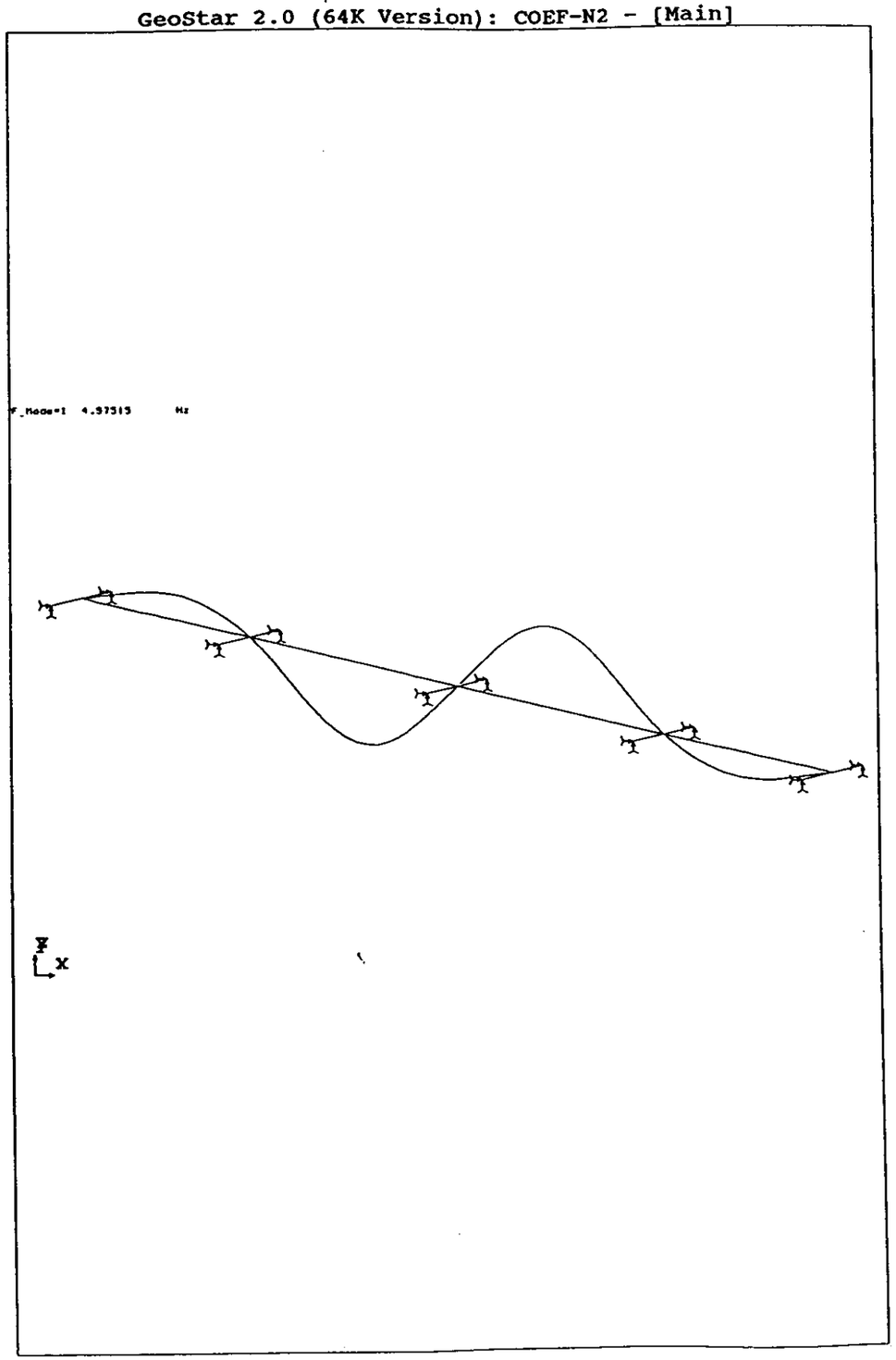
$$\mu = \frac{55,5 \cdot 0,20}{2 \times 19} = 0,29 \rightarrow I = 1,24$$

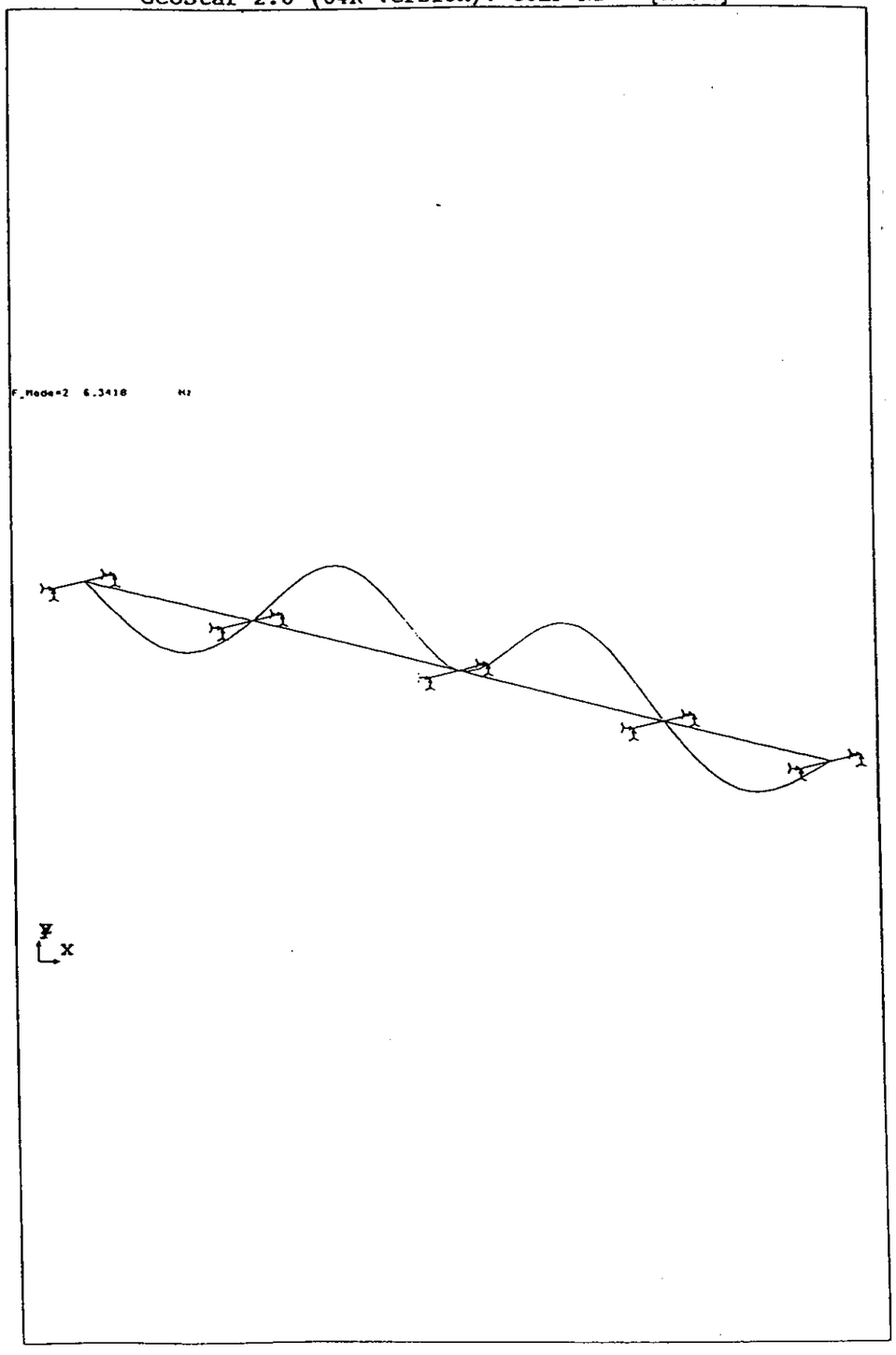
Coeficiente según EUROCODIGO

$$\phi_2 = \frac{1,44}{\sqrt{L_\phi} - 0,2} + 0,82$$

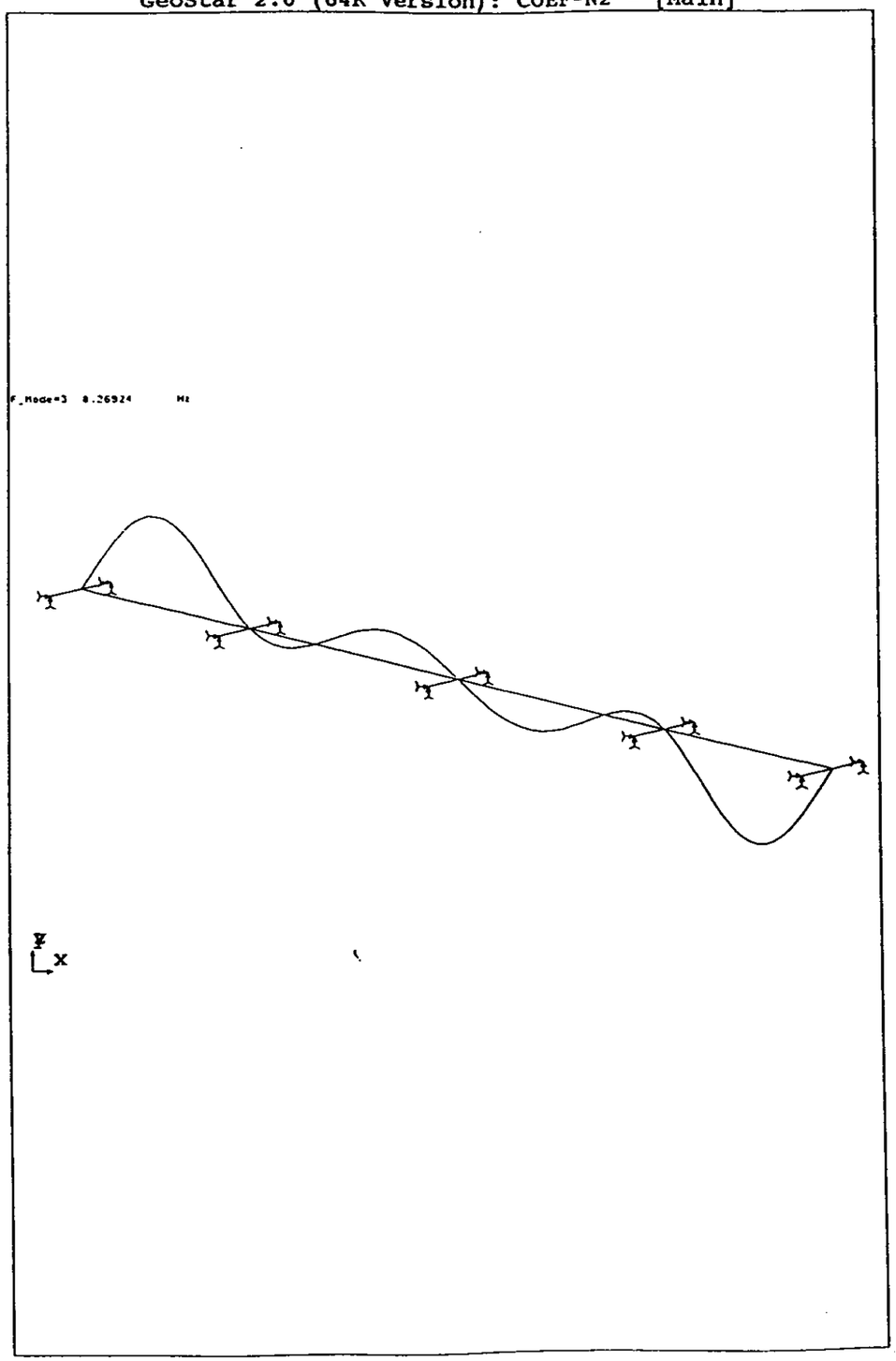
$$L_\phi = k \cdot L_m = 1,4 \times \frac{86}{4} = 30,1$$

$$\phi_2 = 1,09$$

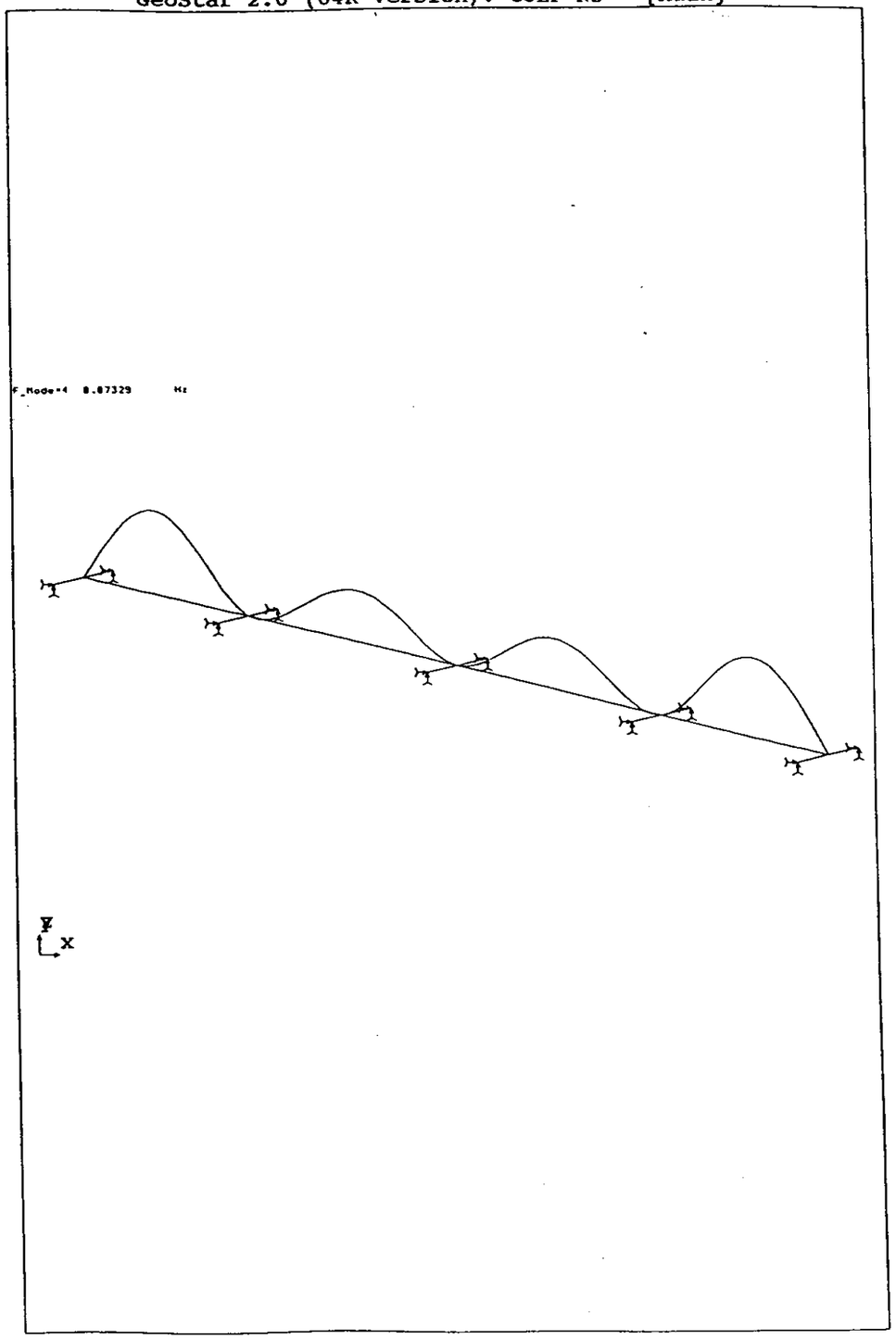

GeoStar 2.0 (64K Version): COEF-N2 - [Main]
F_Mode=1 4.97515 Hz
Y
X

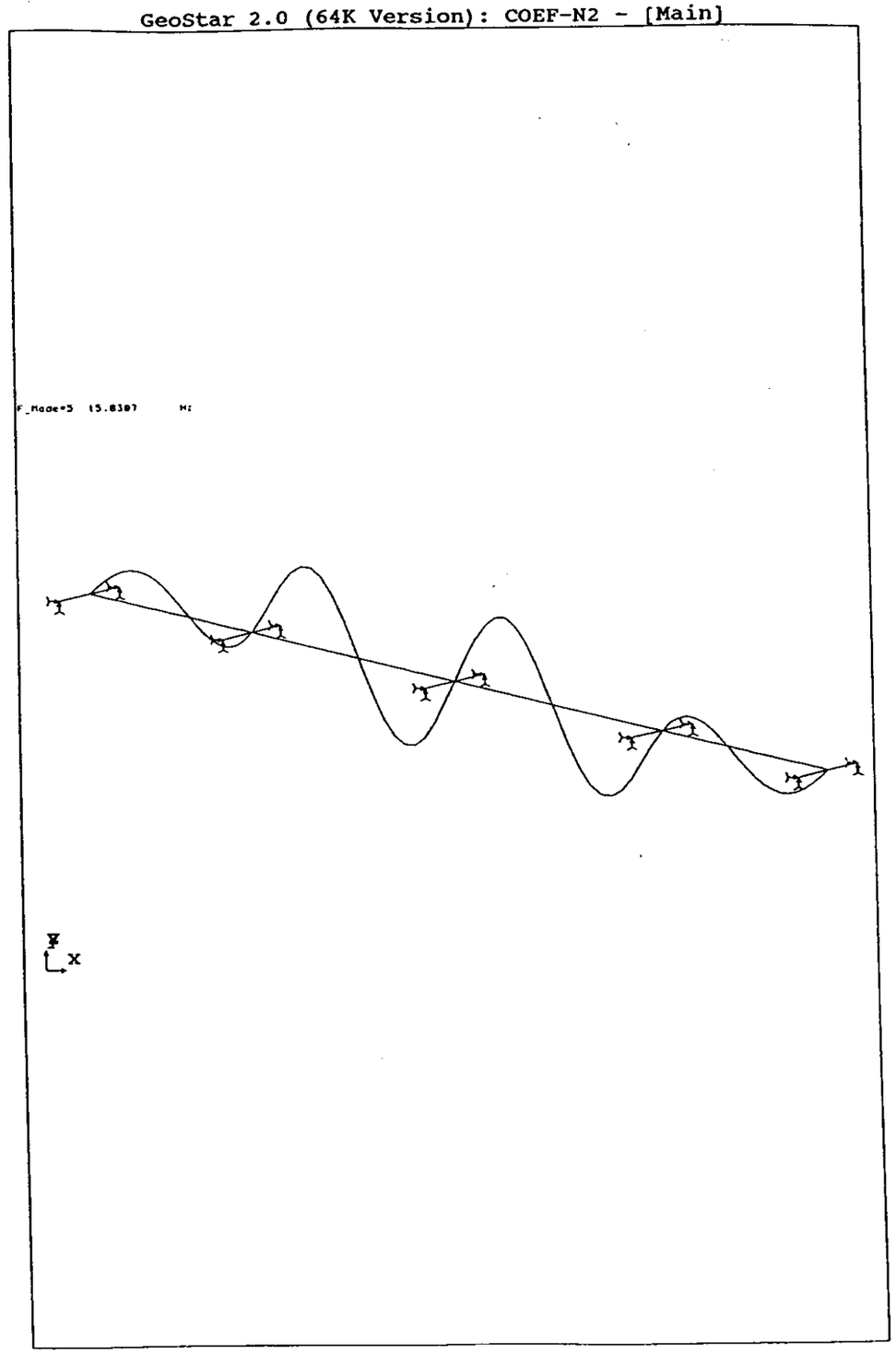

GeoStar 2.0 (64K Version): COEF-N2 - [Main]
F_Mode=2 6.3418 Hz
Y
X

GeoStar 2.0 (64K Version): COEF-N2 - [Main]



GeoStar 2.0 (64K Version): COEF-N2 - [Main]




GeoStar 2.0 (64K Version): COEF-N2 - [Main]
F_Mode=5 (5.8307 Hz
Y
X

```
**********************************************************
**********************************************************
**                                                      **
**                                                      **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS   / M    M  **
** C   O O S     MM  MM  O O S     / MM  MM  **
** C   O O SSSS  M M M M O O SSSS / M M M M  **
** C   O O     S M  M  M O O     S/  M  M  M  **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS/   M    M  **
**                                                      **
**                                                      **
**              VERSION: 2.00                 **
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**           TEL. NO.  (310) 207-2800               **
**           COPYRIGHT 1988  S. R. A. C.            **
**                                                      **
**********************************************************
**********************************************************
```

Problem name: COEF-N2
Date : 07/24/1998 Time: 12:55:32
Title :
Subtitle :

Element group data

Element group number= 1
Element name:
BEAM3D Three dimensional Elastic Beam elements
Type of beam element = ... 0
EQ. 0 ; Symmetric beam element
EQ. 1 ; Unsymmetric beam element
EQ. 2 ; Symmetric tapered beam element

Real constant data

Real constant set 1
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.685
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.9755
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.8344
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 2
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.115
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.8554
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5565
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 3
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 4
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 5
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 6
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 7
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 8
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 9
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 10
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0

Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 11
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 12
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 13
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 14
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 15
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 16
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 17
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 18
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 19
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.115
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.8554
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5565
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 20
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.685
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.9755
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.8344
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 21
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.685
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.9755
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.8344
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 22
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.115
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.8554
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5565
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 23
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 24
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 25
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 26
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 27
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0

End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000,
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 28
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 29
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 30
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 31
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 32
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 33
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 34
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 35
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 36
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 37
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 38
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 39
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.115
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.8554
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5565
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 40
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.685
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.9755
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.8344
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 41
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.685
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.9755
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.8344
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 42
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.115
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.8554
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5565
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 43
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 44
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 45
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 46
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 47
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 48
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 49
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 50
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 51
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 52
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 53
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 54
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 55
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 56
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 57
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 58
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 59
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.115
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.8554
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5565
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 60
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.685
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.9755
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.8344
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 61
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.685
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.9755
Depth of beam (y-axis) = 1.4000

Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.8344
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 62
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.115
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.8554
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5565
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 63
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 64
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 65
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 66
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 67
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 68
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 69
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 70
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 71
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 72
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 73
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 74
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 75
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 76
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 77
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 78
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.5438
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.7353

Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.2787
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 79
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.115
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.8554
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5565
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 80
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.685
Moment of Inertia about element Y-axis = 100.23
Moment of Inertia about element Z-axis = 1.9755
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.8344
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 81
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 1000.0
Moment of Inertia about element Y-axis = 1000.0
Moment of Inertia about element Z-axis = 1000.0
Depth of beam (y-axis) = 10.000
Width of beam (z-axis) = 10.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1000.0
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 82
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.000
Moment of Inertia about element Y-axis = .10000E-03
Moment of Inertia about element Z-axis = .10000E-03
Depth of beam (y-axis) = 1.0000
Width of beam (z-axis) = 1.0000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = .10000E-03
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000

Material propery data

Material property set 1

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0
ALPX : X thermal expansion	.10000E-04	0
DENS : Mass Density	.38340	0

Material property set 2

	Value	Temp curve no.
EX : X Elastic Modulus	1.0000	0
NUXY : Poisson Ratio	.20000	0

Material property set 3

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0

Nodal input data

NODE BOUNDARY CONDITION CODES (0 = FREE ; 1 = FIXED) NODAL POINT COORDINATES

	X	Y	Z	XX	YY	ZZ	X	Y	Z
1	1	1	1	1	1	1	.00000	.00000	.10000E+07
2	0	0	0	0	0	0	6761.5	10617.	.00000
3	0	0	0	0	0	0	6762.3	10617.	.00000
4	0	0	0	0	0	0	6763.2	10616.	.00000
5	0	0	0	0	0	0	6764.1	10616.	.00000
6	0	0	0	0	0	0	6765.0	10616.	.00000
7	0	0	0	0	0	0	6765.8	10615.	.00000
8	0	0	0	0	0	0	6766.7	10615.	.00000
9	0	0	0	0	0	0	6767.6	10614.	.00000
10	0	0	0	0	0	0	6768.5	10614.	.00000
11	0	0	0	0	0	0	6769.4	10614.	.00000
12	0	0	0	0	0	0	6770.2	10613.	.00000
13	0	0	0	0	0	0	6771.1	10613.	.00000
14	0	0	0	0	0	0	6772.0	10613.	.00000
15	0	0	0	0	0	0	6772.9	10612.	.00000
16	0	0	0	0	0	0	6773.7	10612.	.00000
17	0	0	0	0	0	0	6774.6	10611.	.00000
18	0	0	0	0	0	0	6775.5	10611.	.00000
19	0	0	0	0	0	0	6776.4	10611.	.00000
20	0	0	0	0	0	0	6777.2	10610.	.00000
21	0	0	0	0	0	0	6778.1	10610.	.00000
22	0	0	0	0	0	0	6779.0	10610.	.00000
23	0	0	0	0	0	0	6780.1	10609.	.00000
24	0	0	0	0	0	0	6781.2	10609.	.00000
25	0	0	0	0	0	0	6782.3	10608.	.00000
26	0	0	0	0	0	0	6783.4	10608.	.00000
27	0	0	0	0	0	0	6784.5	10607.	.00000
28	0	0	0	0	0	0	6785.6	10607.	.00000
29	0	0	0	0	0	0	6786.7	10606.	.00000
30	0	0	0	0	0	0	6787.8	10606.	.00000
31	0	0	0	0	0	0	6788.9	10605.	.00000
32	0	0	0	0	0	0	6790.0	10605.	.00000
33	0	0	0	0	0	0	6791.2	10605.	.00000
34	0	0	0	0	0	0	6792.3	10604.	.00000
35	0	0	0	0	0	0	6793.4	10604.	.00000
36	0	0	0	0	0	0	6794.5	10603.	.00000
37	0	0	0	0	0	0	6795.6	10603.	.00000
38	0	0	0	0	0	0	6796.7	10602.	.00000
39	0	0	0	0	0	0	6797.8	10602.	.00000
40	0	0	0	0	0	0	6798.9	10601.	.00000
41	0	0	0	0	0	0	6800.0	10601.	.00000
42	0	0	0	0	0	0	6801.1	10600.	.00000
43	0	0	0	0	0	0	6802.2	10600.	.00000
44	0	0	0	0	0	0	6803.3	10599.	.00000
45	0	0	0	0	0	0	6804.4	10599.	.00000
46	0	0	0	0	0	0	6805.5	10598.	.00000
47	0	0	0	0	0	0	6806.6	10598.	.00000
48	0	0	0	0	0	0	6807.7	10598.	.00000
49	0	0	0	0	0	0	6808.8	10597.	.00000
50	0	0	0	0	0	0	6809.9	10597.	.00000
51	0	0	0	0	0	0	6811.0	10596.	.00000
52	0	0	0	0	0	0	6812.1	10596.	.00000
53	0	0	0	0	0	0	6813.3	10595.	.00000
54	0	0	0	0	0	0	6814.4	10595.	.00000
55	0	0	0	0	0	0	6815.5	10594.	.00000
56	0	0	0	0	0	0	6816.6	10594.	.00000
57	0	0	0	0	0	0	6817.7	10593.	.00000
58	0	0	0	0	0	0	6818.8	10593.	.00000
59	0	0	0	0	0	0	6819.9	10592.	.00000
60	0	0	0	0	0	0	6821.0	10592.	.00000
61	0	0	0	0	0	0	6822.1	10591.	.00000
62	0	0	0	0	0	0	6823.2	10591.	.00000
63	0	0	0	0	0	0	6824.1	10591.	.00000
64	0	0	0	0	0	0	6824.9	10590.	.00000
65	0	0	0	0	0	0	6825.8	10590.	.00000
66	0	0	0	0	0	0	6826.7	10589.	.00000
67	0	0	0	0	0	0	6827.6	10589.	.00000
68	0	0	0	0	0	0	6828.4	10589.	.00000
69	0	0	0	0	0	0	6829.3	10588.	.00000
70	0	0	0	0	0	0	6830.2	10588.	.00000
71	0	0	0	0	0	0	6831.0	10588.	.00000
72	0	0	0	0	0	0	6831.9	10587.	.00000
73	0	0	0	0	0	0	6832.8	10587.	.00000
74	0	0	0	0	0	0	6833.7	10586.	.00000
75	0	0	0	0	0	0	6834.5	10586.	.00000
76	0	0	0	0	0	0	6835.4	10586.	.00000
77	0	0	0	0	0	0	6836.3	10585.	.00000
78	0	0	0	0	0	0	6837.2	10585.	.00000
79	0	0	0	0	0	0	6838.0	10585.	.00000
80	0	0	0	0	0	0	6838.9	10584.	.00000
81	0	0	0	0	0	0	6839.8	10584.	.00000
82	0	0	0	0	0	0	6840.6	10583.	.00000
83	1	1	1	0	0	0	6764.7	10618.	.00000
84	1	1	1	0	0	0	6758.2	10616.	.00000
85	1	1	1	0	0	0	6782.2	10611.	.00000
86	1	1	1	0	0	0	6775.8	10608.	.00000
87	1	1	1	0	0	0	6804.3	10602.	.00000
88	1	1	1	0	0	0	6797.9	10599.	.00000
89	1	1	1	0	0	0	6826.4	10592.	.00000
90	1	1	1	0	0	0	6820.0	10590.	.00000
91	1	1	1	0	0	0	6843.8	10585.	.00000
92	1	1	1	0	0	0	6837.5	10582.	.00000

Element input data

ELEM EGRP MP REAL ECS NODE 1 NODE 2 NODE 3 NODE 4 NODE 5 NODE 6
NODE 7 NODE 8 NODE 9 NODE10 NODE11 NODE12
NODE13 NODE14 NODE15 NODE16 NODE17 NODE18
NODE19 NODE20

1	1	1	1	-1	2	3	1					
2	1	1	2	-1	3	4	1					
3	1	1	3	-1	4	5	1					
4	1	1	4	-1	5	6	1					
5	1	1	5	-1	6	7	1					
6	1	1	6	-1	7	8	1					
7	1	1	7	-1	8	9	1					
8	1	1	8	-1	9	10	1					
9	1	1	9	-1	10	11	1					
10	1	1	10	-1	11	12	1					
11	1	1	11	-1	12	13	1					
12	1	1	12	-1	13	14	1					
13	1	1	13	-1	14	15	1					
14	1	1	14	-1	15	16	1					
15	1	1	15	-1	16	17	1					
16	1	1	16	-1	17	18	1					
17	1	1	17	-1	18	19	1					
18	1	1	18	-1	19	20	1					
19	1	1	19	-1	20	21	1					
20	1	1	20	-1	21	22	1					
21	1	1	21	-1	22	23	1					
22	1	1	22	-1	23	24	1					
23	1	1	23	-1	24	25	1					
24	1	1	24	-1	25	26	1					
25	1	1	25	-1	26	27	1					
26	1	1	26	-1	27	28	1					
27	1	1	27	-1	28	29	1					
28	1	1	28	-1	29	30	1					
29	1	1	29	-1	30	31	1					
30	1	1	30	-1	31	32	1					
31	1	1	31	-1	32	33	1					
32	1	1	32	-1	33	34	1					
33	1	1	33	-1	34	35	1					
34	1	1	34	-1	35	36	1					
35	1	1	35	-1	36	37	1					
36	1	1	36	-1	37	38	1					
37	1	1	37	-1	38	39	1					
38	1	1	38	-1	39	40	1					
39	1	1	39	-1	40	41	1					
40	1	1	40	-1	41	42	1					
41	1	1	41	-1	42	43	1					
42	1	1	42	-1	43	44	1					
43	1	1	43	-1	44	45	1					
44	1	1	44	-1	45	46	1					
45	1	1	45	-1	46	47	1					
46	1	1	46	-1	47	48	1					
47	1	1	47	-1	48	49	1					
48	1	1	48	-1	49	50	1					
49	1	1	49	-1	50	51	1					
50	1	1	50	-1	51	52	1					
51	1	1	51	-1	52	53	1					
52	1	1	52	-1	53	54	1					
53	1	1	53	-1	54	55	1					
54	1	1	54	-1	55	56	1					
55	1	1	55	-1	56	57	1					
56	1	1	56	-1	57	58	1					
57	1	1	57	-1	58	59	1					
58	1	1	58	-1	59	60	1					
59	1	1	59	-1	60	61	1					
60	1	1	60	-1	61	62	1					
61	1	1	61	-1	62	63	1					
62	1	1	62	-1	63	64	1					
63	1	1	63	-1	64	65	1					
64	1	1	64	-1	65	66	1					
65	1	1	65	-1	66	67	1					
66	1	1	66	-1	67	68	1					
67	1	1	67	-1	68	69	1					
68	1	1	68	-1	69	70	1					
69	1	1	69	-1	70	71	1					
70	1	1	70	-1	71	72	1					
71	1	1	71	-1	72	73	1					
72	1	1	72	-1	73	74	1					
73	1	1	73	-1	74	75	1					
74	1	1	74	-1	75	76	1					
75	1	1	75	-1	76	77	1					
76	1	1	76	-1	77	78	1					
77	1	1	77	-1	78	79	1					
78	1	1	78	-1	79	80	1					
79	1	1	79	-1	80	81	1					
80	1	1	80	-1	81	82	1					

```
  81   1 3  81  -1    83    2    1
  82   1 3  81  -1     2   84    1
  83   1 3  81  -1    85   22    1
  84   1 3  81  -1    22   86    1
  85   1 3  81  -1    87   42    1
  86   1 3  81  -1    42   88    1
  87   1 3  81  -1    89   62    1
  88   1 3  81  -1    62   90    1
  89   1 3  81  -1    91   82    1
  90   1 3  81  -1    82   92    1

CONTROL INFORMATION
 NUMBER OF LOAD CASES .....(NLCASE) =     1
 SOLUTION MODE .....(MODEX) =     2
   EQ. 0, STATIC ANALYSIS
   EQ. 1, BUCKLING ANALYSIS
   EQ. 2, DYNAMIC ANALYSIS
 THERMAL LOADING FLAG .....(ITHERM) =     0
   EQ. 0, NO THERMAL EFFECTS CONSIDERED
   EQ. 1, ADD TEMPERATURE EFFECT
 GRAVITY LOADING FLAG .....(IGRAV) =     0
   EQ. 0, NO GRAVITY LOADING CONSIDERED
   EQ. 1, ADD GRAVITY LOADING EFFECT
 CENTRIFUGAL LOADING FLAG .....(ICNTRF) =     0
   EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
   EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
 IN-PLANE STIFFENING FLAG .....(INPLN) =     0
   EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
   EQ. 1, IN-PLANE EFFECTS CONSIDERED
 SOFT SPRING ADDITION FLAG .....(ISOFT) =     0
   EQ. 0, NO SOFT SPRING OPTION
   EQ. 1, SOFT SPRING ADDED

 SAVE DECOMPOSED STIFFNESS MATRIX FLAG ...(ISAVK) =
0
   EQ. 0, DO NOT SAVE DECOMPOSED K
   EQ. 1, SAVE DECOMPOSED K
 FORM STIFFNESS MATRIX FLAG .....(IFORMK) =     0
   EQ. 0, FORM STIFFNESS MATRIX
   EQ. 1, USE EXISTING DECOMPOSED STIFFNESS MATRIX

 SPIN SOFTENING FLAG .....(ISPIN) =     0
   EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
   EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
 INERTIA RELIEF FLAG .....(IFORMK) =     0
   EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
   EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
 RIGID CONNECTIONS FLAG .....(IRIGID) =     0
   EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS & SHELLS
   EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS & SHELLS

TOTAL SYSTEM DATA
 NUMBER OF EQUATIONS .....(NEQ) =    516
 NUMBER OF MATRIX ELEMENTS .....(NWK) =   4821
 MAXIMUM HALF BANDWIDTH .....(MK) =     18
 MEAN HALF BANDWIDTH .....(MM) =      9
 NUMBER OF ELEMENTS. .....(NUME) =     90
 NUMBER OF NODAL POINTS. .....(NUMNP)=     92
 ADJUSTED BLOCK SIZE .....(MTBLK)=   4822
 EXTRA MEMORY AVAILABLE (in 8-byte words) . .(XMTBLK)=
4524930
 NUMBER OF STIFFNESS BLOCKS. ..... (NBLK) =     1


 MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE =
.108231E+11 (   390)
 MINIMUM DIAGONAL STIFFNESS MATRIX VALUE =
.129152E+08 (   154)
1

 ------------------------------------------------------
 |     MASS MOMENT INFORMATION                        |
 |----------------------------------------------------|
 |MASS    .330223E+03 |VOLUME  .352181E+05 |WEIGHT
.000000E+00 |
 |----------------------------------------------------|
 | MASS MOMENT OF INERTIA W.R.T. C.G.                 |
 |----------------------------------------------------|
 |IX     .417714E+05 |IY     .172695E+06 |IZ     .196823E+06 |
 |----------------------------------------------------|
 | MASS PRODUCT OF INERTIA W.R.T. C.G.                |
 |----------------------------------------------------|
 |PXY    -.697533E+05 |PXZ    .000000E+00 |PYZ    .000000E+00 |
 |----------------------------------------------------|
 | RADII OF GYRATION W.R.T. C.G.                      |
 |----------------------------------------------------|
 |RX     .112470E+02 |RY     .228684E+02 |RZ     .244137E+02 |
 |----------------------------------------------------|
 | CENTER OF GRAVITY                                  |
 |----------------------------------------------------|
 |CGx    .680109E+04 |CGy    .106003E+05 |CGz    .000000E+00 |
 |----------------------------------------------------|
 | PRINCIPAL MASS MOMENT OF INERTIA                   |
 |----------------------------------------------------|
 |P1     .202892E+06 |P2     .196823E+06 |P3     .115735E+05 |
 |----------------------------------------------------|
 | PRINCIPAL RADII OF GYRATION                        |
 |----------------------------------------------------|
 |R1     .247873E+02 |R2     .244137E+02 |R3     .592010E+01 |
 |----------------------------------------------------|
 | PRINCIPAL AXES (DIRECTION COSINES IN ROWS W.R.T C.G)
|
 |----------------------------------------------------|
 |N_11   .397291E+00 |N_12   .917693E+00 |N_13   .000000E+00 |
 |----------------------------------------------------|
 |N_21   .326903E+00 |N_22   .945058E+00 |N_23   .000000E+00 |
 |----------------------------------------------------|
 |N_31   .000000E+00 |N_32   .000000E+00 |N_33   .754667E-01 |
 ------------------------------------------------------

Note: In the above table, WEIGHT is computed based on the user
      defined acceleration for the first active Load Case

SOLUTION PARAMETERS
 NUMBER OF EIGENVALUES. .....(NFR)=
 MASS TYPE: 1-LUMPED,2-CONSISTENT. . . .(MASS)=     1
 MODE SHAPE PRINT FLAG. .....(MPRNT)=     1
 INTERMEDIATE SOLUTION PRINT FLAG . . . .(IFPR)=     0
 STURM SEQUENCE CHECK FLAG. .....(IFSS)=     0
 MAXIMUM NUMBER OF ITERATIONS . . . . .(ITMAX)=    30
 FREQUENCY SHIFT FLAG . . . . . .(IFRSH)=     0
 FREQUENCY SHIFT. . . . . .(FRSH)= .0000000E+00
 CONVERGENCE TOLERANCE. . . . . .(RTOL)= .1000000E-04
 COMPOSITE MODAL DAMPING CALC. FLAG . . .(IMDC)=     0
 MODAL ACCELERATION FLAG. . . . . .(IMAM)=     0

SUBSPACE ITERATION

 ITERATION NUMBER   1

 ITERATION NUMBER   2

 ITERATION NUMBER   3

 ITERATION NUMBER   4

 ITERATION NUMBER   5

 ITERATION NUMBER   6

 ITERATION NUMBER   7

CONVERGENCE REACHED FOR RTOL .1000E-04

FREQUENCY ANALYSIS
      by
SUBSPACE ALGORITHM

 FREQUENCY     FREQUENCY      FREQUENCY      PERIOD
 NUMBER      (RAD/SEC)    (CYCLES/SEC)   (SECONDS)

    1     .3125976E+02   .4975145E+01   .2009992E+00
    2     .3984669E+02   .6341797E+01   .1576840E+00
    3     .5195718E+02   .8269242E+01   .1209301E+00
    4     .5575253E+02   .8873290E+01   .1126978E+00
    5     .9946744E+02   .1583073E+02   .6316826E-01
    6     .1216830E+03   .1936646E+02   .5163567E-01
    7     .1604627E+03   .2553844E+02   .3915666E-01
    8     .1657761E+03   .2638408E+02   .3790164E-01
    9     .2232390E+03   .3552959E+02   .2814556E-01
   10     .2540165E+03   .4042798E+02   .2473535E-01


SOLUTION TIME LOG (sec)
 INPUT PHASE .....      1
 ASSEMBLAGE OF THE STIFFNESS MATRIX .....      0
 ASSEMBLAGE OF THE MASS MATRIX .....      0
 DECOMPOSITION OF THE STIFFNESS MATRIX .....      0
 EIGENVALUE SOLUTION .....  .      1
 OUTPUT PHASE .....      1
 TOTAL SOLUTION TIME .....  .      3
```

E-1502.8

VALORES CON COEFICIENTES DE IMPACTO Y COEFICIENTES DE EXCENTRICIDAD.

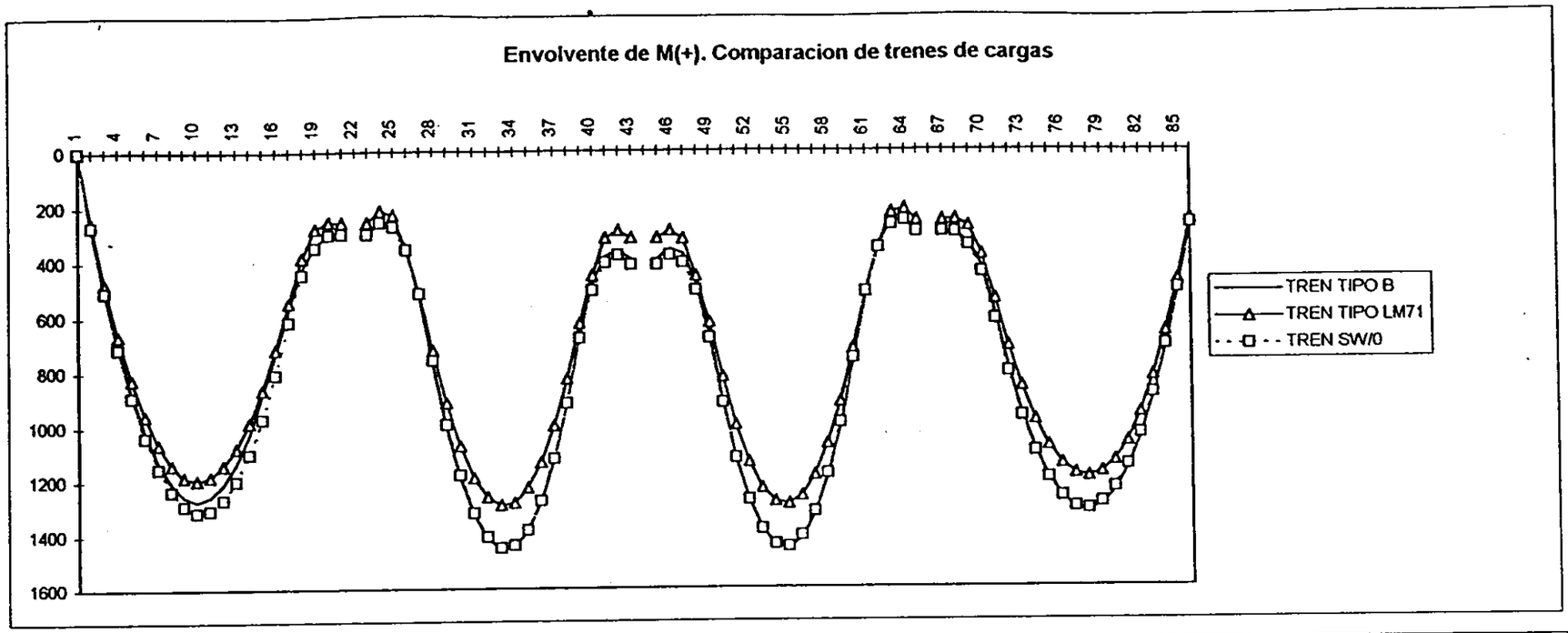
		TREN TIPO 8								TREN TIPO LM71								TREN TIPO SW/0								TREN TIPO SW/2							
		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc	
VANO	SECC.	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)
1	1	0	261	0	-53	0	305	0	-61	0	187	0	-38	0	286	0	-51	0	299	0	-61	0	299	0	-61	0	335	0	-68	0	335	0	-68
1	2	270	271	-58	-61	258	272	-45	-62	255	258	-49	-51	246	259	-40	-52	268.77	267	-58	-61	254	268	-43	-62	301	299	-65	-68	285	300	-49	-69
1	3	504	237	-115	-61	457	241	-69	-64	477	231	-97	-51	443	233	-63	-54	506.87	234	-116	-61	453	238	-62	-65	567.65	263	-130	-68	507	267	-69	-73
1	4	705	205	-173	-61	607	213	-75	-69	665	203	-146	-51	595	209	-75	-57	714.28	202	-174	-61	602	211	-61	-70	799.94	226	-194	-68	674	237	-69	-78
1	5	880	171	-231	-61	719	185	-70	-75	825	154	-194	-51	706	186	-79	-61	891.01	170	-231	-61	706	186	-47	-77	997.87	190	-259	-68	791	208	-53	-86
1	6	1018	138	-289	-61	761	160	-58	-83	957	104	-243	-51	779	164	-77	-67	1037.1	138	-289	-61	772	163	-25	-86	1161.5	154	-324	-68	865	182	-27	-96
1	7	1129	106	-346	-61	784	138	-43	-92	1064	77	-291	-51	820	144	177	-79	1152.5	105	-347	-61	805	141	0	-97	1290.7	118	-389	-68	901	158	1	-108
1	8	1206	72	-404	-61	778	117	-31	-103	1139	49	-340	-51	831	125	241	-94	1237.2	73	-405	-61	809	122	23	-110	1385.5	82	-454	-68	906	136	26	-123
1	9	1254	29	-462	-61	748	98	-25	-116	1183	52	-388	-51	817	108	286	-111	1291.2	41	-463	-61	791	104	37	-124	1446	46	-518	-68	886	117	42	-139
1	10	1272	6	-520	-61	699	82	153	-135	1195	25	-437	-51	782	92	310	-129	1314.5	8	-521	-61	755	88	39	-141	1472.2	9	-583	-68	845	99	44	-158
1	11	1258	-37	-577	-61	636	67	124	-156	1182	-25	-486	-51	730	77	310	-147	1307.2	-24	-579	-61	705	74	23	-159	1464	-27	-648	-68	790	83	26	-178
1	12	1209	-65	-635	-61	587	56	70	-178	1142	-74	-534	-51	665	64	285	-167	1269.2	-56	-636	-61	647	62	-14	-179	1421.4	-63	-713	-68	725	69	-16	-200
1	13	1134	-93	-693	-61	534	47	10	-202	1077	-101	-583	-51	590	52	232	-187	1200.5	-88	-694	-61	584	51	-78	-201	1344.5	-99	-778	-68	654	57	-87	-225
1	14	1027	-136	-750	-61	480	39	-101	-227	983	-127	-631	-51	509	41	150	-208	1101.2	-121	-752	-61	521	42	-172	-224	1233.2	-135	-842	-68	583	47	-192	-251
1	15	885	-164	-808	-61	429	32	-245	-254	863	-153	-680	-51	426	32	37	-230	971.12	-153	-810	-61	460	35	-299	-248	1087.6	-171	-907	-68	515	39	-334	-278
1	16	737	-160	-866	-61	383	27	-407	-282	717	-179	-728	-51	344	24	-107	-253	810.4	-185	-868	-61	405	28	-462	-275	907.6	-208	-972	-68	453	32	-518	-308
1	17	572	-188	-924	-61	345	23	-626	-311	546	-175	-777	-51	278	18	-282	-276	619.01	-218	-926	-61	358	24	-665	-302	693.24	-244	-1037	-68	401	26	-745	-338
1	18	424	-113	-1026	-164	316	20	-886	-340	382	-126	-857	-125	260	16	-490	-299	447.75	-132	-1034	-179	323	20	-910	-331	501.45	-148	-1159	-200	362	22	-1019	-370
1	19	339	-58	-1235	-288	298	17	-1170	-372	278	-39	-1002	-185	249	15	-730	-323	347.65	-68	-1245	-275	301	18	-1198	-361	389.34	-77	-1394	-308	337	20	-1342	-404
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2	2	255	-23	-1402	387	-1380	429	244	-57	213	-24	-1069	250	-935	363	205	-48	256.74	-18	-1406	382	-1393	421	244	-57	287.53	-20	-1574	428	-1560	472	273	-64
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2	4	341	125	-694	208	-541	352	185	-62	353	128	-619	130	-259	306	146	-52	356.22	92	-729	190	-570	345	197	-63	398.94	103	-816	213	-638	387	221	-70
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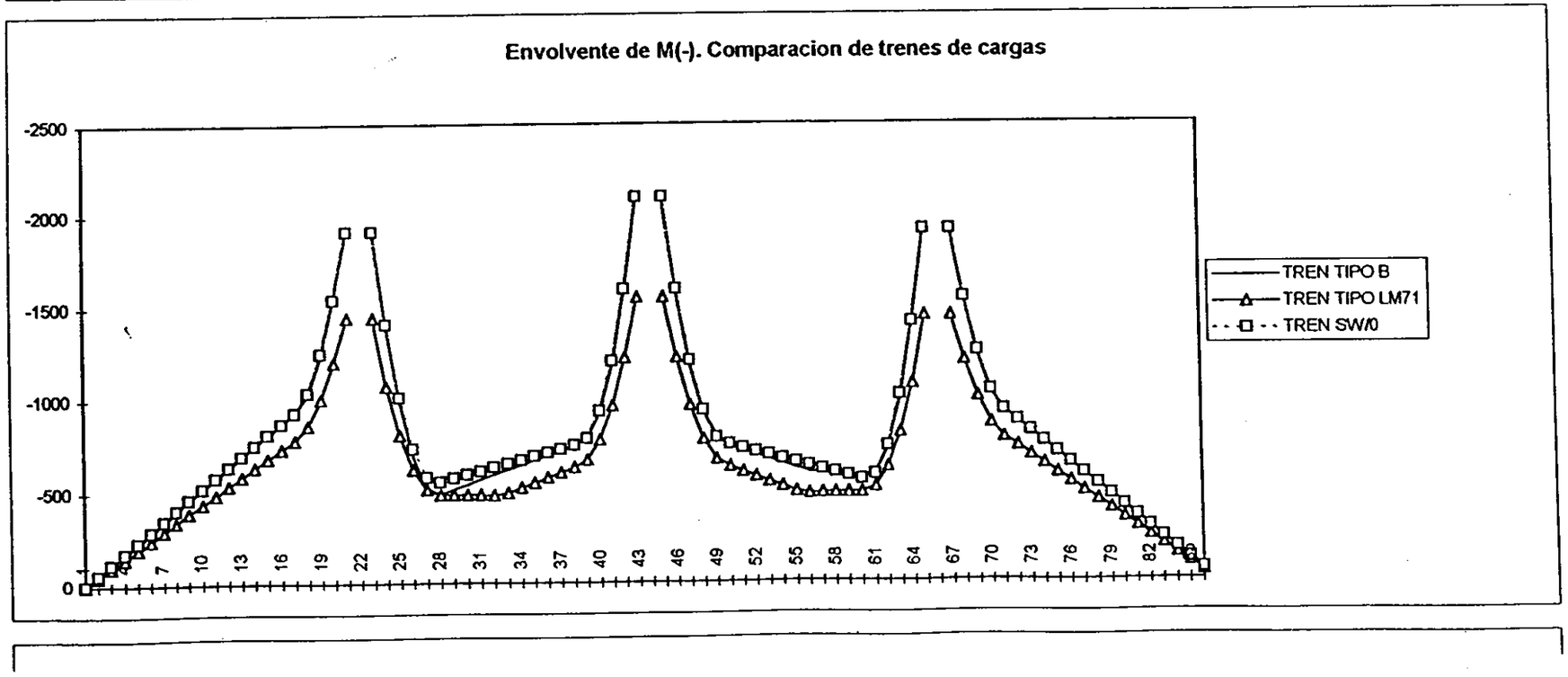
E-1502.8

VALORES CON COEFICIENTES DE IMPACTO Y COEFICIENTES DE EXCENTRICIDAD.

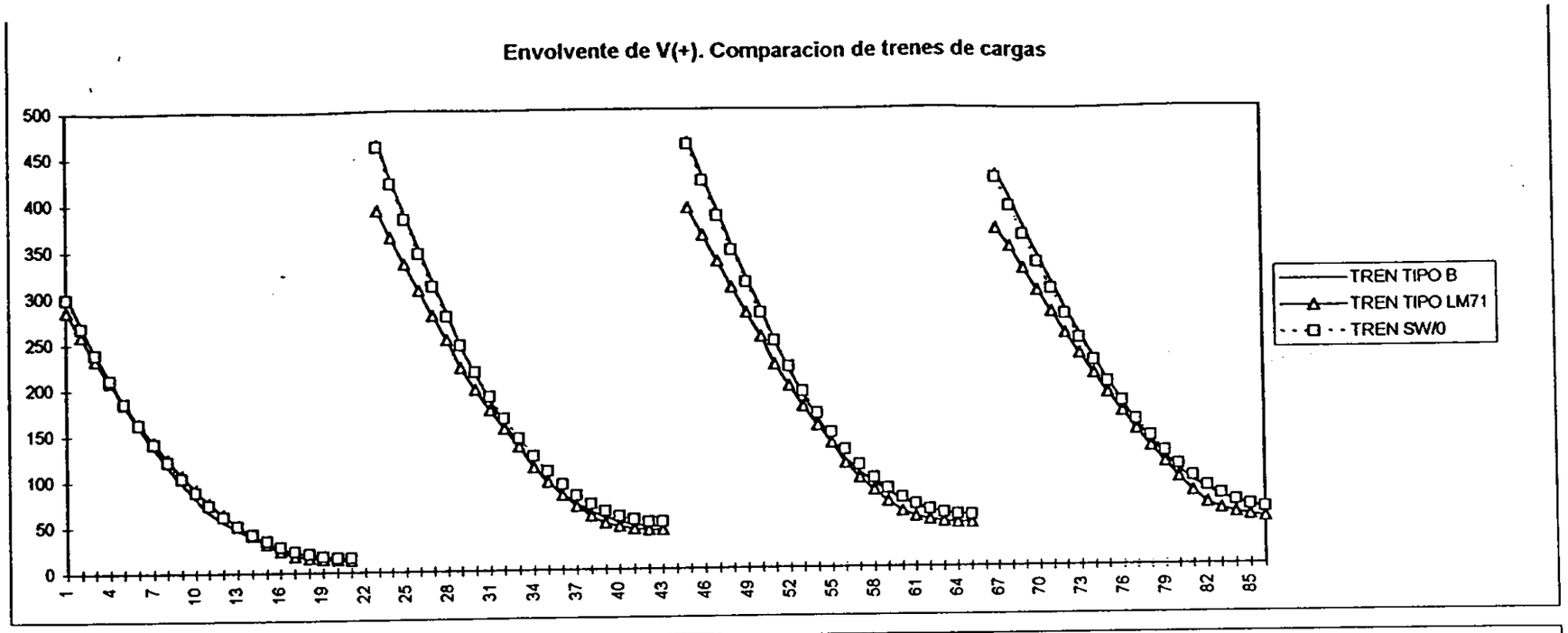
		TREN TIPO B								TREN TIPO LM71								TREN TIPO SW/0								TREN TIPO SW/2							
		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc	
VANO	SECC.	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)
3	19	259	-33	-892	-291	206	59	-818	-390	226	-78	-807	-184	169	50	-579	-333	271.47	-47	-1008	-277	211	59	-947	-382	304.02	-52	-1129	-310	236	66	-1060	-428
3	20	255	23	-1402	-387	244	57	-1380	-429	213	24	-1059	-250	205	48	-906	-367	256.74	18	-1406	-382	244	57	-1393	-421	287.53	20	-1574	-428	273	64	-1560	-472
3	21	301	56	-1914	-463	301	56	-1909	-468	255	48	-1442	-361	255	48	-1315	-396	299.26	56	-1910	-461	299	56	-1910	-461	335.15	63	-2139	-516	335	63	-2139	-516
4	1	301	-16	-1914	430	-1906	431	301	-16	255	-13	-1442	278	-1329	368	255	-13	299.26	-16	-1910	423	-1910	423	299	-16	335.15	-18	-2139	474	-2139	474	335	-18
4	2	301	11	-1539	363	-1516	404	293	-16	253	6	-1199	239	-994	348	247	-14	301.97	15	-1541	361	-1531	392	292	-16	338.18	16	-1725	404	-1715	439	327	-18
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4	18	721	-200	-173	61	-75	69	623	-218	663	-180	-146	51	-75	57	591	-207	714.28	-202	-174	61	-61	70	602	-211	799.94	-226	-194	68	-69	78	674	-237
4	19	516	-243	-115	61	-69	64	469	-247	474	-229	-97	51	-63	54	440	-232	506.87	-234	-116	61	-62	65	453	-238	567.65	-263	-130	68	-69	73	507	-267
4	20	276	-276	-58	61	-45	62	263	-277	254	-257	-49	51	-40	52	245	-257	268.77	-267	-58	61	-43	62	254	-268	301	-299	-65	68	-49	69	285	-300
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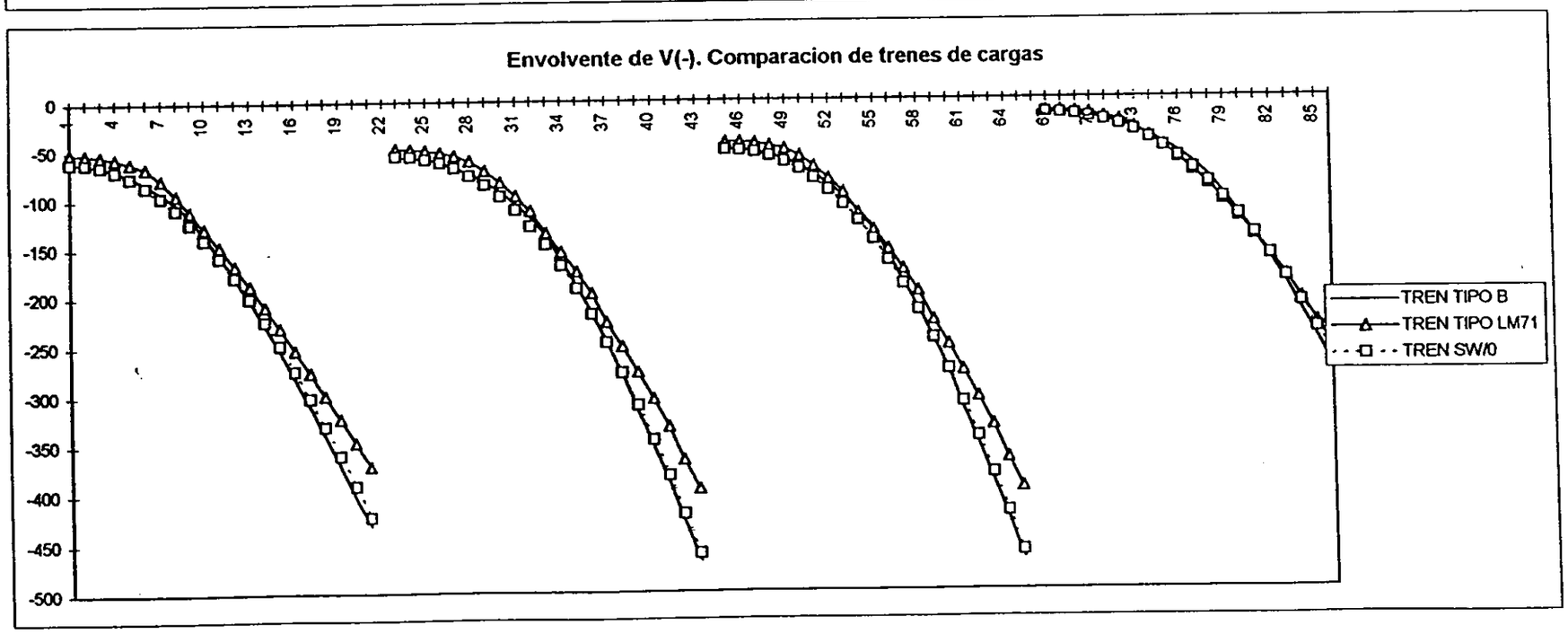
Graficos


Envolvente de M(+). Comparacion de trenes de cargas
0
200
400
600
800
1000
1200
1400
1600
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85
TREN TIPO B
TREN TIPO LM71
TREN SW/0


Envolvente de M(-). Comparacion de trenes de cargas
-2500
-2000
-1500
-1000
-500
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82
TREN TIPO B
TREN TIPO LM71
TREN SW/0

Graficos


Envolvente de V(+). Comparacion de trenes de cargas
500
450
400
350
300
250
200
150
100
50
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85
TREN TIPO B
TREN TIPO LM71
TREN SW/0


Envolvente de V(-). Comparacion de trenes de cargas
0
-50
-100
-150
-200
-250
-300
-350
-400
-450
-500
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85
TREN TIPO B
TREN TIPO LM71
TREN SW/0

GINPROSA

ASUNTO	FECHA
VERIFICACIÓN DEL PRETENSADO	PAG. 1

Se realizarán las siguientes comprobaciones:

a) Durante las fases constructivas

Combinacion: $PP + \begin{pmatrix}0,9\\1,1\end{pmatrix} Pret + SC_{,construcción}$

Condiciones $\sigma_{max} = f_{ck}/1,60 = 2500\ t/m^2$

$\sigma_{min} = f_{ctk} = -244\ t/m^2$

b) En las fases finales:

Combinacion frecuente:

$$PP + CM + \begin{pmatrix}0,9\\1,1\end{pmatrix} Pret + 0,60\ SC + 0,5\ \sigma_{rel}$$

Condicion: $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = 0$

Combinacion rara:

$$PP + CM + \begin{pmatrix}0,9\\1,1\end{pmatrix} \times Pret + SC + 0,6\ \sigma_{rel}.$$

Condicione $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = f_{ctk}$

GINPROSA

ASUNTO	
E-1502.8 CALCULO DE TENDONES DE ANCLAJE AL ESTRIBO	PAG. 1

Peso del tablero + carga muerta = 3532 tm.

Fuerza de coaccion sobre punto fijo = 0,003 x 3532 = 106 tm.

Carga de frenado = $\frac{(10 \times 90 + 30 \times 2) \times (1+0,90)}{8} = 228$ tm.

Fuerza total en punto fijo = 334 tm. Se toma con dos tendones

Las fuerzas de dicho anclaje son:

En servicio $H_s = \frac{334}{2} = 167$ tm.

En rotura $H_L = 167 \times 1,50 = 251$ tm.

Se disponen tendones de 19.0,6" con una carga de rotura

$P_u = 505$ tm > 251 tm.

Se tesan al 40 % de Su carga de rotura $P_o = 0,4 \times 505 = 202$ tm.

Se disponen 2 neoprenos: 400 x 500 x 81 (33)

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-1.LIS

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 4

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=1
Parametros del tramo:
S0= 0.000 S1= 8.000 S2= 0.000 S3= 8.000 S4= 3.000 SR= 0.000
N1= 0.600 N2= 0.900 N3= 0.900 N4= 0.500

Tipo de cableado(1-2-3-4) para tramo nº2 TIPO=3
Parametros del tramo:
S1= 3.000 S2= 9.000 S3= 0.000 S4= 9.000 S5= 3.000
N1= 0.500 N2= 1.000 N3= 1.000 N5= 0.400

Tipo de cableado(1-2-3-4) para tramo nº3 TIPO=3
Parametros del tramo:
S1= 3.000 S2= 9.000 S3= 0.000 S4= 9.000 S5= 3.000
N1= 0.400 N2= 1.000 N3= 1.000 N5= 0.500

Tipo de cableado(1-2-3-4) para tramo nº4 TIPO=2
Parametros del tramo:
S0= 0.000 S1= 8.000 S2= 0.000 S3= 8.000 S4= 3.000 SR= 0.000
N1= 0.600 N2= 0.900 N3= 0.900 N4= 0.500

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...1
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1
Anclaje desde el que se tesa primero..(1=IZDO.)(2=DCHO.)...1

Fuerza de tesado inicial P0(ton)= 7908.0
Fuerza de tesado final P1(ton)= 7416.0
Area del cable (cm2)=520.799988
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=14

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	8.000000	-0.004687	0.075000	0.600000
2	8.000000	16.000000	-0.004545	0.072727	0.609091
3	16.000000	19.000000	0.012121	-0.460606	4.875757
4	19.000000	22.000000	0.013889	-0.527778	5.513889
5	22.000000	31.000000	-0.004630	0.287037	-3.449074
6	31.000000	40.000000	-0.005556	0.344444	-4.338889
7	40.000000	43.000000	0.016667	-1.433333	31.216665
8	43.000000	46.000000	0.016667	-1.433333	31.216665
9	46.000000	55.000000	-0.005556	0.611111	-15.805554
10	55.000000	64.000000	-0.004630	0.509259	-13.004631
11	64.000000	67.000000	0.013889	-1.861111	62.847225
12	67.000000	70.000000	0.012121	-1.624242	54.912125
13	70.000000	78.000000	-0.004545	0.709091	-26.754545
14	78.000000	86.000000	-0.004687	0.731250	-27.618744

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	8.000000	0.000000	0.074860
2	8.000000	16.000000	0.074860	0.147459
3	16.000000	19.000000	0.147459	0.220059
4	19.000000	22.000000	0.220059	0.303200
5	22.000000	31.000000	0.303200	0.386341
6	31.000000	40.000000	0.386341	0.486010
7	40.000000	43.000000	0.486010	0.585679
8	43.000000	46.000000	0.585679	0.685347
9	46.000000	55.000000	0.685347	0.785016
10	55.000000	64.000000	0.785016	0.868157
11	64.000000	67.000000	0.868157	0.951298
12	67.000000	70.000000	0.951298	1.023898
13	70.000000	78.000000	1.023898	1.096497
14	78.000000	86.000000	1.096497	1.171357

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	8.000000	1.171357	1.096497
2	8.000000	16.000000	1.096497	1.023898
3	16.000000	19.000000	1.023898	0.951298
4	19.000000	22.000000	0.951298	0.868157
5	22.000000	31.000000	0.868157	0.785016
6	31.000000	40.000000	0.785016	0.685347
7	40.000000	43.000000	0.685347	0.585679
8	43.000000	46.000000	0.585679	0.486010
9	46.000000	55.000000	0.486010	0.386341
10	55.000000	64.000000	0.386341	0.303200
11	64.000000	67.000000	0.303200	0.220059
12	67.000000	70.000000	0.220059	0.147459
13	70.000000	78.000000	0.147459	0.074860
14	78.000000	86.000000	0.074860	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por izda. a_izda= 5.000(mm.)
Penetracion por retesado por izda. retesado _izda= 2.433(mm.)
Penetracion de cuñas ficticia por izda. a_ficticia_izda= 7.433(mm.)

Alcance de penetracion de cuñas+retesado por izda. x= 16.724(m.) perdidas= 5.416%

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 2.433(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 7.433(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 69.276(m.) perdidas= 5.416%

Punto de interseccion de curvas de perdidas x= 43.000(m.) perdidas= 16.236%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	8.000000	11.9	9.3	6968.9	7170.3
2	8.000000	16.000000	9.3	6.9	7170.3	7363.1
3	16.000000	16.723763	6.9	6.5	7363.1	7397.2
4	16.723763	19.000000	6.5	7.8	7397.2	7289.8
5	19.000000	22.000000	7.8	9.8	7289.8	7134.9
6	22.000000	31.000000	9.8	12.4	7134.9	6930.0
7	31.000000	40.000000	12.4	15.2	6930.0	6707.3
8	40.000000	43.000000	15.2	17.3	6707.3	6541.6
9	43.000000	46.000000	17.3	15.2	6541.6	6707.3
10	46.000000	55.000000	15.2	12.4	6707.3	6930.0
11	55.000000	64.000000	12.4	9.8	6930.0	7134.9
12	64.000000	67.000000	9.8	7.8	7134.9	7289.8
13	67.000000	69.276237	7.8	6.5	7289.8	7397.2
14	69.276237	70.000000	6.5	6.9	7397.2	7363.1
15	70.000000	78.000000	6.9	9.3	7363.1	7170.3
16	78.000000	86.000000	9.3	11.9	7170.3	6968.9

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 579.103
Alargamiento por la dcha.(mm.)= 55.180
ALARGAMIENTO TOTAL(mm.)= 634.283

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	q1	q2
1	0.000000	8.000000	64.786	67.222
2	8.000000	16.000000	65.185	66.409
3	16.000000	16.723763	-177.092	-178.511
4	16.723763	19.000000	-178.511	-176.722
5	19.000000	22.000000	-202.494	-196.144
6	22.000000	31.000000	65.381	64.166
7	31.000000	40.000000	77.000	73.421
8	40.000000	43.000000	-220.264	-218.052
9	43.000000	46.000000	-218.052	-220.264
10	46.000000	55.000000	73.421	77.000
11	55.000000	64.000000	64.166	65.381
12	64.000000	67.000000	-196.144	-202.494
13	67.000000	69.276237	-176.722	-178.511
14	69.276237	70.000000	-178.511	-177.092
15	70.000000	78.000000	66.409	65.185
16	78.000000	86.000000	67.222	64.786

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	-521.205	6949.403
x= 86.000	-521.205	-6949.403

CÁLCULO DE TENSIONES EN PUENTES	Fase nº: 0 PUENTE EN VACIO
PROYECTO : L.A.V. MADRID-ZARAGOZA	
ESTRUCTURA: E-1502.8	

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	1106	-16
2	Σ pp(i) + 1.1 x Σ pret(i)	1410	-93
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	1091	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1395	-73

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	-95.3	182.2	0.0	-8.3	10.3	6969.0	544.2	-464.5	0.0	-95.3	182.2	6969.0	544.2	-464.5	623.8	344.2	769.3	412.6	621.0	347.3	766.6	415.8
1	2	0.0	63.6	152.1	0.0	0.9	9.0	6969.0	132.3	-402.5	0.0	63.6	152.1	6969.0	132.3	-402.5	554.3	424.9	672.9	524.7	554.6	424.5	673.1	524.3
1	3	0.0	195.5	125.7	0.0	8.8	7.7	6969.0	-337.9	-340.4	0.0	195.5	125.7	6969.0	-337.9	-340.4	618.8	706.4	740.9	883.1	621.9	702.4	744.0	879.1
1	4	0.0	304.1	103.0	0.0	15.4	6.3	6969.0	-749.3	-278.3	0.0	304.1	103.0	6969.0	-749.3	-278.3	526.2	824.9	619.2	1038.9	531.7	817.9	624.7	1031.9
1	5	0.0	391.4	80.4	0.0	20.8	5.0	6969.0	-984.5	-216.3	0.0	391.4	80.4	6969.0	-984.5	-216.3	482.2	881.3	558.6	1116.5	489.6	871.8	566.0	1107.1
1	6	0.0	457.0	57.7	0.0	25.0	3.7	6969.0	-1160.0	-154.2	0.0	457.0	57.7	6969.0	-1160.0	-154.2	449.5	923.1	513.5	1174.3	458.4	911.8	522.4	1162.9
1	7	0.0	501.0	35.0	0.0	27.8	2.4	6969.0	-1277.0	-92.1	0.0	501.0	35.0	6969.0	-1277.0	-92.1	427.9	950.9	483.6	1212.6	437.7	938.3	493.4	1200.0
1	8	0.0	523.5	12.4	0.0	29.4	1.0	6969.0	-1336.0	-30.0	0.0	523.5	12.4	6969.0	-1336.0	-30.0	417.0	964.7	468.6	1231.8	427.5	951.4	479.0	1218.5
1	9	0.0	524.5	-10.3	0.0	29.8	-0.3	6969.0	-1335.0	32.0	0.0	524.5	-10.3	6969.0	-1335.0	32.0	417.7	963.9	469.3	1230.9	428.2	950.4	479.8	1217.4
1	10	0.0	504.1	-33.0	0.0	28.9	-1.6	7170.0	-1332.0	94.1	0.0	504.1	-33.0	7170.0	-1332.0	94.1	430.4	990.9	486.4	1261.8	440.6	977.8	496.6	1248.7
1	11	0.0	462.0	-55.6	0.0	26.7	-3.0	7170.0	-1214.0	155.9	0.0	462.0	-55.6	7170.0	-1214.0	155.9	453.1	961.8	517.4	1222.1	462.5	949.7	526.9	1210.0
1	12	0.0	398.4	-78.3	0.0	23.2	-4.3	7170.0	-1036.0	217.8	0.0	398.4	-78.3	7170.0	-1036.0	217.8	487.3	918.1	564.2	1162.2	495.5	907.5	572.4	1151.7
1	13	0.0	313.3	-101.0	0.0	18.5	-5.6	7170.0	-800.0	279.8	0.0	313.3	-101.0	7170.0	-800.0	279.8	532.3	860.4	625.9	1083.1	538.8	852.0	632.5	1074.7
1	14	0.0	206.6	-123.6	0.0	12.5	-7.0	7170.0	-504.8	341.6	0.0	206.6	-123.6	7170.0	-504.8	341.6	588.5	788.4	703.1	984.4	592.9	782.7	707.5	978.7
1	15	0.0	78.5	-146.3	0.0	5.3	-8.3	7170.0	-151.1	403.5	0.0	78.5	-146.3	7170.0	-151.1	403.5	655.8	702.2	795.4	866.1	657.7	699.8	797.2	863.7
1	16	0.0	-71.4	-168.9	0.0	-3.2	-9.6	7170.0	262.1	465.5	0.0	-71.4	-168.9	7170.0	262.1	465.5	734.3	601.6	903.1	728.1	733.2	603.1	902.0	729.6
1	17	0.0	-242.6	-191.6	0.0	-13.0	-11.0	7170.0	733.6	527.4	0.0	-242.6	-191.6	7170.0	733.6	527.4	823.9	486.9	1026.0	570.7	819.3	492.8	1021.4	576.6
1	18	0.0	-435.3	-214.3	0.0	-24.0	-12.3	7170.0	1262.0	584.7	0.0	-435.3	-214.3	7170.0	1262.0	584.7	923.9	358.8	1163.5	394.7	915.4	369.7	1155.0	405.6
1	19	0.0	-649.6	-236.9	0.0	-36.3	-13.6	7363.0	1723.0	397.4	0.0	-649.6	-236.9	7363.0	1723.0	397.4	1013.1	286.1	1289.3	284.3	1000.3	302.6	1276.4	300.8
1	20	0.0	-887.2	-263.3	0.0	-49.9	-14.9	7397.0	2149.0	228.7	0.0	-887.2	-263.3	7397.0	2149.0	228.7	868.0	126.1	1125.5	79.0	851.6	145.1	1109.1	98.0
1	21	0.0	-1152.0	-293.5	0.0	-64.7	-16.3	7397.0	2409.0	55.6	0.0	-1152.0	-293.5	7397.0	2409.0	55.6	857.9	137.8	1132.4	70.9	836.7	162.4	1111.2	95.5
2	1	0.0	-1078.0	294.3	0.0	-63.8	16.6	7290.0	2238.0	-9.8	0.0	-1078.0	294.3	7290.0	2238.0	-9.8	824.1	160.6	1085.8	105.1	803.2	184.9	1064.8	129.4
2	2	0.0	-747.7	256.3	0.0	-45.0	14.9	7290.0	2080.0	-252.8	0.0	-747.7	256.3	7290.0	2080.0	-252.8	885.8	89.0	1137.1	45.5	871.0	106.1	1122.3	62.6
2	3	0.0	-460.0	222.9	0.0	-28.1	13.2	7290.0	1508.0	-495.9	0.0	-460.0	222.9	7290.0	1508.0	-495.9	1004.8	281.0	1264.3	297.1	994.9	293.7	1254.3	309.9
2	4	0.0	-209.6	194.3	0.0	-13.3	11.5	7135.0	703.8	-605.6	0.0	-209.6	194.3	7135.0	703.8	-605.6	822.8	480.8	1022.1	566.6	818.1	486.9	1017.4	572.6
2	5	0.0	6.3	165.7	0.0	-0.5	9.8	7135.0	74.0	-485.4	0.0	6.3	165.7	7135.0	74.0	-485.4	698.6	639.9	853.4	782.7	698.4	640.1	853.2	782.9
2	6	0.0	187.9	137.0	0.0	10.3	8.2	7135.0	-461.0	-406.1	0.0	187.9	137.0	7135.0	-461.0	-406.1	592.5	775.7	709.5	967.0	596.2	771.0	713.1	962.3
2	7	0.0	335.1	108.4	0.0	19.1	6.5	7135.0	-900.6	-326.9	0.0	335.1	108.4	7135.0	-900.6	-326.9	504.7	888.2	590.5	1119.4	511.4	879.6	597.2	1110.7
2	8	0.0	448.1	79.8	0.0	25.9	4.8	7135.0	-1245.0	-247.6	0.0	448.1	79.8	7135.0	-1245.0	-247.6	435.0	977.5	496.4	1239.8	444.1	965.7	505.6	1228.1
2	9	0.0	526.6	51.2	0.0	30.6	3.1	7135.0	-1495.0	-168.3	0.0	526.6	51.2	7135.0	-1495.0	-168.3	383.2	1043.8	426.9	1328.8	394.0	1029.9	437.8	1314.9
2	10	0.0	570.9	22.5	0.0	33.4	1.4	7135.0	-1649.0	-89.0	0.0	570.9	22.5	7135.0	-1649.0	-89.0	349.8	1086.5	382.7	1385.5	361.6	1071.4	394.5	1370.4
2	11	0.0	580.7	-6.1	0.0	34.1	-0.2	7135.0	-1708.0	-9.7	0.0	580.7	-6.1	7135.0	-1708.0	-9.7	334.5	1106.2	363.2	1410.4	346.6	1090.7	375.2	1395.0
2	12	0.0	556.2	-34.7	0.0	32.8	-1.9	6930.0	-1585.0	82.7	0.0	556.2	-34.7	6930.0	-1585.0	82.7	345.7	1047.8	378.7	1336.6	357.3	1032.9	390.3	1321.8
2	13	0.0	497.3	-63.4	0.0	29.5	-3.6	6930.0	-1430.0	175.2	0.0	497.3	-63.4	6930.0	-1430.0	175.2	374.2	1011.3	418.2	1286.1	384.6	997.9	428.7	1272.7
2	14	0.0	404.1	-92.0	0.0	24.2	-5.3	6930.0	-1165.0	267.5	0.0	404.1	-92.0	6930.0	-1165.0	267.5	425.6	945.4	488.4	1196.2	434.1	934.5	496.9	1185.3
2	15	0.0	276.5	-120.6	0.0	16.8	-7.0	6930.0	-788.0	360.0	0.0	276.5	-120.6	6930.0	-788.0	360.0	500.5	849.5	589.9	1066.2	506.4	841.9	595.9	1058.5
2	16	0.0	114.6	-149.3	0.0	7.5	-8.6	6930.0	-300.8	452.4	0.0	114.6	-149.3	6930.0	-300.8	452.4	598.3	724.2	722.2	896.7	600.9	720.9	724.9	893.3

Fase-1

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t)	V (m.t)	N (t.)	M (m.t)	V (m.t)	N (t.)	M (m.t)	V (m.t)	N (t.)	M (m.t)	V (m.t)	N (t.)	M (m.t)	V (m.t)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
2	17	0.0	-81.6	-177.9	0.0	-3.9	-10.3	6930.0	297.3	544.7	0.0	-81.6	-177.9	6930.0	297.3	544.7	719.3	569.3	885.6	687.6	717.9	571.0	884.2	689.3
2	18	0.0	-312.2	-206.5	0.0	-17.3	-12.0	6930.0	1006.0	637.1	0.0	-312.2	-206.5	6930.0	1006.0	637.1	863.4	384.8	1079.7	438.9	857.2	392.6	1073.6	446.7
2	19	0.0	-577.5	-235.2	0.0	-32.7	-13.7	6707.0	1736.0	578.1	0.0	-577.5	-235.2	6707.0	1736.0	578.1	980.9	186.3	1244.3	169.6	969.3	201.1	1232.7	184.4
2	20	0.0	-879.6	-268.5	0.0	-50.1	-15.4	6707.0	2320.0	258.2	0.0	-879.6	-268.5	6707.0	2320.0	258.2	872.0	15.6	1129.8	-55.4	855.5	34.7	1113.4	-36.3
2	21	0.0	-1225.0	-306.6	0.0	-69.6	-17.0	6707.0	2582.0	-10.1	0.0	-1225.0	-306.6	6707.0	2582.0	-10.1	836.0	57.3	1111.1	-33.6	813.2	83.8	1088.2	-7.1
3	1	0.0	-1224.0	306.4	0.0	-72.5	17.3	6542.0	2521.0	9.6	0.0	-1224.0	306.4	6542.0	2521.0	9.6	806.7	66.2	1075.1	-22.7	782.9	93.8	1051.3	4.9
3	2	0.0	-879.0	268.4	0.0	-52.8	15.6	6542.0	2376.0	-251.9	0.0	-879.0	268.4	6542.0	2376.0	-251.9	877.0	-15.5	1135.9	-93.4	859.7	4.6	1118.6	-73.3
3	3	0.0	-577.0	235.0	0.0	-35.1	13.9	6542.0	1806.0	-513.5	0.0	-577.0	235.0	6542.0	1806.0	-513.5	987.8	142.0	1252.6	115.4	975.4	157.9	1240.2	131.3
3	4	0.0	-312.0	206.4	0.0	-19.4	12.2	6707.0	986.9	-669.6	0.0	-312.0	206.4	6707.0	986.9	-669.6	836.3	371.4	1046.7	422.6	829.5	380.2	1039.8	431.4
3	5	0.0	-81.6	177.8	0.0	-5.7	10.5	6707.0	301.9	-526.4	0.0	-81.6	177.8	6707.0	301.9	-526.4	699.7	546.3	861.7	659.5	697.7	548.9	859.6	662.1
3	6	0.0	114.6	149.1	0.0	5.9	8.9	6707.0	-276.2	-437.0	0.0	114.6	149.1	6707.0	-276.2	-437.0	585.1	693.2	706.1	858.8	587.2	690.5	708.2	856.1
3	7	0.0	276.5	120.5	0.0	15.6	7.2	6707.0	-747.1	-347.5	0.0	276.5	120.5	6707.0	-747.1	-347.5	492.4	811.8	580.1	1020.1	497.9	804.8	585.6	1013.0
3	8	0.0	403.9	91.9	0.0	23.2	5.5	6707.0	-1110.0	-258.1	0.0	403.9	91.9	6707.0	-1110.0	-258.1	422.0	902.1	484.0	1143.2	430.2	891.6	492.2	1132.7
3	9	0.0	497.0	63.3	0.0	28.8	3.8	6707.0	-1366.0	-168.7	0.0	497.0	63.3	6707.0	-1366.0	-168.7	373.4	964.3	417.3	1228.6	383.6	951.3	427.5	1215.6
3	10	0.0	555.7	34.6	0.0	32.3	2.1	6707.0	-1515.0	-79.2	0.0	555.7	34.6	6707.0	-1515.0	-79.2	346.7	998.4	380.1	1276.3	358.2	983.8	391.5	1261.6
3	11	0.0	580.1	6.0	0.0	33.9	0.5	6708.0	-1558.0	6.7	0.0	580.1	6.0	6708.0	-1558.0	6.7	341.8	1005.0	372.1	1286.7	353.8	989.7	384.1	1271.4
3	12	0.0	570.1	-22.6	0.0	33.4	-1.2	6930.0	-1585.0	87.2	0.0	570.1	-22.6	6930.0	-1585.0	87.2	350.6	1041.5	383.7	1330.3	362.4	1026.3	395.5	1315.2
3	13	0.0	525.8	-51.3	0.0	31.0	-2.9	6930.0	-1434.0	164.2	0.0	525.8	-51.3	6930.0	-1434.0	164.2	383.0	1000.0	426.7	1275.1	393.9	986.0	437.7	1261.1
3	14	0.0	447.1	-79.9	0.0	26.5	-4.6	6930.0	-1191.0	241.2	0.0	447.1	-79.9	6930.0	-1191.0	241.2	432.5	936.6	493.5	1189.7	441.9	924.6	502.8	1177.7
3	15	0.0	334.0	-108.5	0.0	20.0	-6.3	6930.0	-855.5	318.2	0.0	334.0	-108.5	6930.0	-855.5	318.2	499.3	851.0	584.0	1073.7	506.4	842.0	591.1	1064.7
3	16	0.0	186.7	-137.1	0.0	11.5	-7.9	6930.0	-427.7	395.2	0.0	186.7	-137.1	6930.0	-427.7	395.2	583.4	743.3	698.4	927.3	587.4	738.1	702.4	922.1
3	17	0.0	4.9	-165.8	0.0	0.9	-9.6	6930.0	92.9	472.2	0.0	4.9	-165.8	6930.0	92.9	472.2	684.8	613.4	836.6	750.2	685.2	613.0	837.0	749.8
3	18	0.0	-211.3	-194.4	0.0	-11.6	-11.3	6930.0	706.0	549.3	0.0	-211.3	-194.4	6930.0	706.0	549.3	803.5	461.4	998.7	542.6	799.4	466.7	994.6	547.9
3	19	0.0	-461.6	-223.0	0.0	-26.2	-13.0	7135.0	1357.0	536.8	0.0	-461.6	-223.0	7135.0	1357.0	536.8	941.6	328.7	1187.1	355.3	932.3	340.5	1177.8	367.1
3	20	0.0	-749.4	-256.4	0.0	-42.8	-14.7	7135.0	1918.0	247.6	0.0	-749.4	-256.4	7135.0	1918.0	247.6	826.4	134.2	1064.6	100.6	812.4	150.5	1050.6	116.8
3	21	0.0	-1080.0	-294.4	0.0	-61.4	-16.3	7135.0	2203.0	35.2	0.0	-1080.0	-294.4	7135.0	2203.0	35.2	802.1	162.4	1059.0	107.1	782.0	185.8	1038.9	130.4
4	1	0.0	-1153.0	293.7	0.0	-69.0	16.8	7290.0	2412.0	-57.7	0.0	-1153.0	293.7	7290.0	2412.0	-57.7	850.8	129.5	1123.9	60.7	828.2	155.8	1101.3	87.0
4	2	0.0	-887.8	263.5	0.0	-53.6	15.5	7290.0	2277.0	-225.6	0.0	-887.8	263.5	7290.0	2277.0	-225.6	898.0	74.8	1162.2	16.3	880.4	95.2	1144.6	36.7
4	3	0.0	-649.9	237.2	0.0	-39.6	14.1	7290.0	1860.0	-393.4	0.0	-649.9	237.2	7290.0	1860.0	-393.4	1049.7	223.5	1334.1	207.8	1035.7	241.5	1320.1	225.7
4	4	0.0	-435.6	214.5	0.0	-26.8	12.8	7397.0	1286.0	-568.6	0.0	-435.6	214.5	7397.0	1286.0	-568.6	952.9	370.6	1198.9	409.1	943.4	382.7	1189.4	421.2
4	5	0.0	-242.4	191.8	0.0	-15.2	11.5	7363.0	720.3	-518.0	0.0	-242.4	191.8	7363.0	720.3	-518.0	837.9	510.5	1043.2	599.5	832.5	517.4	1037.8	606.4
4	6	0.0	-71.0	169.2	0.0	-5.0	10.2	7363.0	237.6	-476.5	0.0	-71.0	169.2	7363.0	237.6	-476.5	744.9	629.6	916.0	762.4	743.1	631.9	914.2	764.7
4	7	0.0	78.9	146.5	0.0	4.0	8.8	7363.0	-184.8	-413.0	0.0	78.9	146.5	7363.0	-184.8	-413.0	663.4	733.9	804.7	905.0	664.9	732.1	806.1	903.2
4	8	0.0	207.3	123.9	0.0	11.8	7.5	7363.0	-546.8	-349.4	0.0	207.3	123.9	7363.0	-546.8	-349.4	593.6	823.4	709.2	1027.2	597.8	818.0	713.4	1021.9
4	9	0.0	314.3	101.2	0.0	18.3	6.2	7363.0	-848.6	-285.8	0.0	314.3	101.2	7363.0	-848.6	-285.8	535.4	898.0	629.6	1129.1	541.8	889.7	636.1	1120.9
4	10	0.0	399.7	78.5	0.0	23.5	4.8	7363.0	-1090.0	-222.2	0.0	399.7	78.5	7363.0	-1090.0	-222.2	488.7	957.7	565.9	1210.7	497.0	947.1	574.2	1200.1
4	11	0.0	463.5	55.8	0.0	27.4	3.5	7363.0	-1271.0	-158.6	0.0	463.5	55.8	7363.0	-1271.0	-158.6	453.7	1002.6	518.0	1272.0	463.4	990.2	527.7	1259.6
4	12	0.0	505.8	33.2	0.0	30.1	2.2	7363.0	-1391.0	-95.1	0.0	505.8	33.2	7363.0	-1391.0	-95.1	430.4	1032.3	486.3	1312.7	441.1	1018.7	497.0	1299.0
4	13	0.0	526.6	10.5	0.0	31.6	0.8	7363.0	-1453.0	-37.4	0.0	526.6	10.5	7363.0	-1453.0	-37.4	418.0	1048.2	469.5	1334.2	429.2	1033.9	480.7	1319.9
4	14	0.0	525.8	-12.1	0.0	31.7	-0.5	7170.0	-1397.0	32.5	0.0	525.8	-12.1	7170.0	-1397.0	32.5	417.4	1007.5	468.8	1284.4	428.6	993.2	480.0	1270.0
4	15	0.0	503.5	-34.8	0.0	30.6	-1.8	7170.0	-1336.0	96.3	0.0	503.5	-34.8	7170.0	-1336.0	96.3	428.9	992.8	484.7	1264.1	439.7	978.9	495.5	1250.2
4	16	0.0	459.7	-57.5	0.0	28.3	-3.2	7170.0	-1214.0	160.2	0.0	459.7	-57.5	7170.0	-1214.0	160.2	452.3	962.9	516.6	1223.1	462.3	950.1	526.6	1210.3
4	17	0.0	394.4	-80.1	0.0	24.6	-4.5	7170.0	-1032.0	224.1	0.0	394.4	-80.1	7170.0	-1032.0	224.1	487.1	918.2	564.4	1162.0	495.8	907.1	573.1	1150.8
4	18	0.0	307.5	-102.8	0.0	19.7	-5.8	7170.0	-788.9	287.9	0.0	307.5	-102.8	7170.0	-788.9	287.9	533.8	858.5	628.2	1080.2	540.7	849.6	635.2	1071.3
4	19	0.0	199.1	-125.5	0.0	13.6	-7.1	7170.0	-485.0	351.7	0.0	199.1	-125.5	7170.0	-485.0	351.7	592.2	783.7	708.1	977.9	597.0	777.5	712.9	971.7
4	20	0.0	67.3	-151.9	0.0	6.2	-8.5	7170.0	0.7	415.6	0.0	67.3	-151.9	7170.0	0.7	415.6	530.9	482.9	644.0	595.9	533.0	480.5	646.0	593.5
4	21	0.0	-91.2	-182.0	0.0	-2.5	-9.8	7170.0	546.2	479.4	0.0	-91.2	-182.0	7170.0	546.2	479.4	640.0	356.2	788.8	427.6	639.1	357.1	788.0	428.6

CÁLCULO DE TENSIONES EN PUENTES

Fase : PUENTE COMPLETO EN TIEMPO INICIAL

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1502.8

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	PP,inicial + CM + 0.9 x Pret,inicial + 0.6 x SC(+) + 0.5 x GRAD	1043	44
2	PP,inicial + CM + 1.1 x Pret,inicial + 0.6 x SC(+) + 0.5 x GRAD	1327	-34
3	PP,inicial + CM + 0.9 x Pret,inicial + 0.6 x SC(-) + 0.5 x GRAD	1134	182
4	PP,inicial + CM + 1.1 x Pret,inicial + 0.6 x SC(-) + 0.5 x GRAD	1438	342
5	PP,inicial + CM + 0.9 x Pret,inicial + 1.0* SC(+) + 0.6 x GRAD	1100	-19
6	PP,inicial + CM + 1.1 x Pret,inicial + 1.0* SC(+) + 0.6 x GRAD	1384	-96
7	PP,inicial + CM + 0.9 x Pret,inicial + 1.0* SC(-) + 0.6 x GRAD	1245	-92
8	PP,inicial + CM + 1.1 x Pret,inicial + 1.0* SC(-) + 0.6 x GRAD	1549	177

PP,inicial= Peso propio en tiempo inicial
Pret,inicial = Pretensado en tiempo inicial
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INICIAL																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	-95.3	182.2	6969.0	544.2	-464.5	0.0	-74.9	93.0	0.0	261.0		0.0	-53.2		0.0	44.4	13	606	364	752	433	599	373	745	441	608	363	753	431	599	373	745	441
1	2	0.0	63.6	152.1	6969.0	132.3	-402.5	0.0	7.8	81.0	270.5	270.6		-57.7	-60.8		0.0	56.7	13	619	349	738	449	546	435	664	535	657	306	775	406	538	444	656	544
1	3	0.0	195.5	125.7	6969.0	-337.9	-340.4	0.0	79.0	69.1	503.9	237.0		-115.5	-60.8		0.0	69.1	13	766	518	888	695	622	702	744	879	840	424	962	600	606	723	728	900
1	4	0.0	304.1	103.0	6969.0	-749.3	-278.3	0.0	139.0	57.1	705.3	205.2		-173.2	-60.8		0.0	81.4	13	739	552	833	766	539	809	632	1023	842	420	935	634	514	840	607	1054
1	5	0.0	391.4	80.4	6969.0	-984.5	-216.3	0.0	187.6	45.1	879.7	171.2		-230.9	-60.8		0.0	93.7	13	752	536	828	771	500	859	576	1094	880	372	956	608	467	901	543	1136
1	6	0.0	457.0	57.7	6969.0	-1160.0	-154.2	0.0	224.7	33.1	1018.1	137.6		-288.6	-60.8		0.0	106.1	13	764	521	828	772	468	900	532	1151	912	331	976	582	427	952	491	1203
1	7	0.0	501.0	35.0	6969.0	-1277.0	-92.1	0.0	250.5	21.2	1129.4	105.8		-346.4	-60.8		0.0	118.4	13	777	504	833	765	443	932	499	1193	941	294	997	555	394	994	450	1256
1	8	0.0	523.5	12.4	6969.0	-1336.0	-30.0	0.0	264.9	9.2	1207.7	71.8		-404.1	-60.8		0.0	130.8	13	790	487	842	754	425	955	477	1222	966	262	1017	529	368	1028	419	1295
1	9	0.0	524.5	-10.3	6969.0	-1335.0	32.0	0.0	268.0	-2.8	1253.6	28.7		-461.8	-60.8		0.0	143.1	13	804	469	855	736	414	968	466	1235	988	236	1038	503	349	1052	401	1319
1	10	0.0	504.1	-33.0	7170.0	-1332.0	94.1	0.0	259.7	-14.8	1272.4	6.3		-519.5	-60.8		0.0	155.4	13	820	492	876	763	412	1014	468	1285	1005	255	1061	525	338	1109	395	1380
1	11	0.0	462.0	-55.6	7170.0	-1214.0	155.9	0.0	240.0	-26.7	1257.6	-36.7		-577.3	-60.8		0.0	167.8	13	835	473	899	733	415	1010	480	1270	1018	238	1083	498	334	1115	398	1375
1	12	0.0	398.4	-78.3	7170.0	-1036.0	217.8	0.0	208.9	-38.7	1209.4	-64.9		-635.0	-60.8		0.0	180.1	13	850	454	927	698	426	996	503	1240	1027	227	1104	471	337	1111	413	1355
1	13	0.0	313.3	-101.0	7170.0	-800.0	279.8	0.0	166.5	-50.7	1134.3	-93.1		-692.7	-60.8		0.0	192.5	13	866	433	960	656	444	973	538	1196	1033	219	1127	441	346	1099	440	1322
1	14	0.0	206.6	-123.6	7170.0	-504.8	341.6	0.0	112.7	-62.6	1027.3	-136.1		-750.5	-60.8		0.0	204.8	13	883	412	997	608	469	941	584	1137	1035	216	1150	412	363	1077	477	1273
1	15	0.0	78.5	-146.3	7170.0	-151.1	403.5	0.0	47.6	-74.6	884.6	-164.3		-808.2	-60.8		0.0	217.1	13	899	391	1038	555	501	900	641	1064	1032	221	1171	385	387	1047	526	1211
1	16	0.0	-71.4	-168.9	7170.0	262.1	465.5	0.0	-29.0	-86.6	737.0	-159.7		-865.9	-60.8		0.0	229.5	13	921	362	1090	489	540	850	709	977	1033	218	1202	345	418	1007	587	1134
1	17	0.0	-242.6	-191.6	7170.0	733.6	527.4	0.0	-116.9	-98.5	572.0	-187.8		-923.6	-60.8		0.0	241.8	13	947	330	1149	413	586	791	789	875	1036	215	1238	299	456	958	658	1042
1	18	0.0	-435.3	-214.3	7170.0	1262.0	584.7	0.0	-216.2	-110.5	424.5	-113.0		-1025.7	-163.8		0.0	254.2	13	983	284	1222	320	630	736	869	771	1052	195	1291	231	485	921	724	957
1	19	0.0	-649.6	-236.9	7363.0	1723.0	397.4	0.0	-326.9	-122.5	339.1	-57.7		-1235.0	-288.4		0.0	266.5	13	1017	282	1293	280	635	770	912	768	1074	208	1350	206	461	994	737	992
1	20	0.0	-887.2	-263.3	7397.0	2149.0	228.7	0.0	-448.9	-134.4	301.2	-10.7		-1539.2	-363.5		0.0	278.9	13	826	175	1083	128	418	649	676	602	874	119	1132	71	216	883	474	836
1	21	0.0	-1152.0	-293.5	7397.0	2409.0	55.6	0.0	-582.2	-146.4	300.8	15.8		-1913.9	-429.5		0.0	291.2	13	774	235	1046	168	291	797	565	730	823	178	1097	112	40	1088	314	1022
2	1	0.0	-1078.0	294.3	7290.0	2238.0	-9.8	0.0	-574.5	149.0	300.8	-56.4		-1913.9	462.6	0.0	242.1	-1.318	735	265	996	209	259	817	521	761	782	210	1044	154	8	1108	270	1053
2	2	0.0	-747.7	256.3	7290.0	2080.0	-252.8	0.0	-404.8	133.9	254.8	-23.2		-1401.8	387.0	0.0	240.5	-1.318	843	139	1094	96	477	564	729	520	884	91	1135	48	294	777	545	734
2	3	0.0	-460.0	222.9	7290.0	1508.0	-495.9	0.0	-253.1	118.8	258.7	33.2		-992.5	291.1	0.0	238.9	-1.318	1012	271	1272	287	705	665	964	682	1058	214	1317	230	564	845	824	881
2	4	0.0	-209.6	194.3	7135.0	703.8	-605.6	0.0	-119.5	103.7	340.9	124.9		-694.2	208.1	0.0	237.3	-1.318	895	389	1094	474	633	724	832	809	951	316	1151	402	535	849	734	935
2	5	0.0	6.3	165.7	7135.0	74.0	-485.4	0.0	-4.2	88.6	525.1	178.8		-515.0	104.4	0.0	235.8	-1.318	850	446	1005	588	588	782	743	925	933	340	1088	483	515	875	670	1018
2	6	0.0	187.9	137.0	7135.0	-461.0	-406.1	0.0	93.0	73.5	771.5	224.6		-484.8	-21.5	0.0	234.2	-1.318	831	471	948	662	523	865	639	1057	948	320	1065	512	454	953	571	1144
2	7	0.0	335.1	108.4	7135.0	-900.6	-326.9	0.0	172.0	58.3	1006.4	168.5		-510.5	-21.5	0.0	232.6	-1.318	820	484	906	715	457	949	543	1180	971	291	1057	522	385	1042	471	1273
2	8	0.0	448.1	79.8	7135.0	-1245.0	-247.6	0.0	233.0	43.2	1189.8	129.4		-536.3	-21.5	0.0	231.0	-1.318	811	496	872	758	404	1018	465	1280	987	270	1049	532	328	1115	389	1377
2	9	0.0	526.6	51.2	7135.0	-1495.0	-168.3	0.0	275.7	28.1	1326.0	99.5		-562.1	-21.5	0.0	229.4	-1.318	803	507	846	792	361	1072	405	1357	998	256	1042	541	282	1174	326	1459
2	10	0.0	570.9	22.5	7135.0	-1649.0	-89.0	0.0	300.4	13.0	1414.9	58.2		-587.8	-21.5	0.0	227.9	-1.318	797	514	830	813	331	1110	364	1409	1005	248	1038	546	248	1217	281	1516
2	11	0.0	580.7	-6.1	7135.0	-1708.0	-9.7	0.0	306.9	-2.2	1455.1	19.2		-613.6	-21.5	0.0	226.3	-1.318	792	520	821	825	313	1134	342	1438	1006	248	1034	551	226	1245	255	1549
2	12	0.0	556.2	-34.7	6930.0	-1585.0	82.7	0.0	295.2	-17.3	1443.9	-34.6		-639.3	-21.5	0.0	224.7	-1.318	796	471	829	760	314	1088	347	1377	1009	199	1042	488	224	1204	257	1493
2	13	0.0	497.3	-63.4	6930.0	-1430.0	175.2	0.0	265.4	-32.4	1383.1	-73.8		-665.1	-21.5	0.0	223.1	-1.318	801	465	845	739	327	1072	371	1347	1005	204	1049	479	233	1192	277	1467
2	14	0.0	404.1	-92.0	6930.0	-1165.0	267.5	0.0	217.5	-47.5	1275.4	-105.8		-690.9	-21.5	0.0	221.5	-1.318	812	450	875	701	356	1035	419	1285	1001	209	1063	460	258	1160	321	1411
2	15	0.0	276.5	-120.6	6930.0	-788.0	360.0	0.0	151.4	-62.6	1120.5	-145.0		-716.6	-21.5	0.0	219.9	-1.318	831	427	920	643	402	976	491	1192	997	214	1087	430	301	1106	390	1322
2	16	0.0	114.6	-149.3	6930.0	-300.8	452.4	0.0	67.2	-77.8	913.8	-186.2		-742.4	-21.5	0.0	218.4	-1.318	855	396	979	568	484	896	588	1068	992	220	1116	393	359	1030	483	1203
2	17	0.0	-81.6	-177.9	6930.0	297.3	544.7	0.0	-35.2	-92.9	674.6	-188.4		-785.2	-73.6	0.0	216.8	-1.318	888	353	1055	471	540	799	706	917	991	221	1158	339	429	941	595	1059
2	18	0.0	-312.2	-206.5	6930.0	1006.0	637.1	0.0	-155.7	-108.0	477.9	-148.4		-922.1	-154.7	0.0	215.2	-1.318	948	277	1164	331	613	706	829	760	1023	180	1239	234	482	873	698	927
2	19	0.0	-577.5	-235.2	6707.0	1736.0	578.1	0.0	-294.5	-123.1	382.6	-42.7		-1177.3	-289.4	0.0	213.6	-1.318	996	167	1259	151	627	640	890	623	1057	88	1321	72	460	853	724	836
2	20	0.0	-879.6	-268.5	6707.0	2320.0	258.2	0.0	-451.3	-138.2	361.0	13.2		-1580.2	-388.6	0.0	212.0	-1.318	830	65	1088	-6	413	549	671	478	884	2	1142	-69	206	789	464	718
2	21	0.0	-1225.0	-306.6	6707.0	2582.0	-10.1	0.0	-626.2	-153.4	393.4	46.3		-2088.2	-468.0	0.0	210.5	-1.318	743	166	1018	75	220	773	495	682	801	98	1076	7	-54	1091	221	1000
3	1	0.0	-1224.0	306.4	6542.0	2521.0	9.6	0.0	-652.0	155.4	393.4	-50.5		-2088.2	461.0	0.0	209.6	1.413	705	185	973	96	182	792	451	703	763	117	1032	28	-92	1110	177	1021
3	2	0.0	-879.0	268.4	6542.0	2376.0	-251.9	0.0	-474.8	140.2	355.9	-17.5		-1580.2	388.6	0.0	211.2	1.413	826	44	1085	-34	411	526	669	449	880	-19	1138	-96	203	767	462	889
3	3	0.0	-577.0	235.0	6542.0	1806.0	-513.5	0.0	-315.6	125.1	372.5	38.5		-1177.3	289.4	0.0	212.9	1.413	993	135	1258	109	626	605	891	578	1053	58	1318	32	460	818	725	792
3	4	0.0	-312.0	206.4	6707.0	986.9	-669.6	0.0	-174.4	110.0	477.9	148.4		-922.1	154.7	0.0	214.6	1.413	914	272	1124	323	579	701	789	752	989	176	1200	227	448	868	659	919
3	5	0.0	-81.6	177.8	6707.0	301.9	-526.4	0.0	-51.6	94.9	674.6	188.4		-785.2	73.6	0.0	216.3	1.413	863	337	1025	451	515	783	677	896	966	205	1128	319	404	925	566	1039
3	6	0.0	114.6	149.1	6707.0	-276.2	-437.0	0.0	53.3	79.8	913.8	201.1		-742.4	21.5	0.0	218.0	1.413	836	371	957	537	446	871	567	1036	973	196	1094	361	341	1005	462	1171
3	7	0.0	276.5	120.5	6707.0	-747.1	-347.5	0.0	139.9	64.6	1120.5	145.0		-716.6	21.5	0.0	219.7	1.413	819	394	906	602	390	943	478	1151	985	181	1073	389	288	1073	376	1281
3	8	0.0	403.9	91.9	6707.0	-1110.0	-258.1	0.0	208.4	49.5	1275.4	105.8		-690.9	21.5	0.0	221.4	1.413	806	411	868	652	349	995	411	1237	994	170	1056	411	251	1121	313	1362

Vano	Seccion	TIEMPO INICIAL						Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			TENSIONES EN FIBRAS SUPERIOR E INFERIOR															
		Peso Propio			Pretensado															Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
		N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	9	0.0	497.0	63.3	6707.0	-1366.0	-168.7	0.0	258.8	34.4	1383.1	73.8		-665.1	21.5	0.0	223.1	1.413	798	421	842	685	324	1028	368	1292	1002	160	1045	424	230	1148	274	1413
3	10	0.0	555.7	34.6	6707.0	-1515.0	-79.2	0.0	291.0	19.3	1443.9	34.6		-639.3	21.5	0.0	224.8	1.413	796	423	829	701	314	1040	347	1318	1008	151	1042	429	224	1156	257	1434
3	11	0.0	580.1	6.0	6708.0	-1558.0	6.7	0.0	305.0	4.2	1455.1	-4.4		-613.6	21.5	0.0	226.5	1.413	799	420	829	702	319	1034	350	1315	1012	146	1043	428	233	1145	263	1427
3	12	0.0	570.1	-22.6	6930.0	-1585.0	87.2	0.0	301.0	-11.0	1414.9	-58.2		-594.3	8.2	0.0	228.2	1.413	798	469	831	758	331	1067	364	1355	1006	202	1039	491	247	1174	280	1463
3	13	0.0	525.8	-51.3	6930.0	-1434.0	164.2	0.0	278.7	-26.1	1326.0	-99.5		-584.5	8.2	0.0	229.9	1.413	804	461	847	736	358	1033	401	1308	999	211	1043	486	275	1139	319	1414
3	14	0.0	447.1	-79.9	6930.0	-1191.0	241.2	0.0	238.4	-41.2	1189.8	-129.4		-574.7	8.2	0.0	231.6	1.413	810	453	871	706	395	985	456	1238	987	227	1048	480	314	1089	374	1342
3	15	0.0	334.0	-108.5	6930.0	-855.5	318.2	0.0	179.9	-56.3	1006.4	-168.5		-564.9	8.2	0.0	233.3	1.413	818	443	902	666	443	923	528	1146	968	250	1053	473	363	1025	448	1248
3	16	0.0	186.7	-137.1	6930.0	-427.7	395.2	0.0	103.3	-71.4	771.5	-209.7		-555.1	8.2	0.0	235.0	1.413	825	434	940	618	502	847	617	1031	943	283	1058	467	424	948	539	1132
3	17	0.0	4.9	-165.8	6930.0	92.9	472.2	0.0	8.4	-86.6	525.1	-178.8		-583.3	-77.0	0.0	236.7	1.413	841	413	993	550	564	768	716	905	924	307	1076	444	481	874	633	1011
3	18	0.0	-211.3	-194.4	6930.0	706.0	549.3	0.0	-104.5	-101.7	340.9	-124.9		-725.5	-172.0	0.0	238.4	1.413	881	362	1076	443	613	706	808	787	938	289	1133	371	510	837	705	919
3	19	0.0	-461.6	-223.0	7135.0	1357.0	536.8	0.0	-235.6	-116.8	258.8	-33.2		-992.5	-291.1	0.0	240.1	1.413	956	311	1201	337	648	705	893	732	1001	253	1246	280	507	885	753	912
3	20	0.0	-749.4	-256.4	7135.0	1918.0	247.6	0.0	-384.8	-131.9	254.8	23.2		-1401.8	-387.0	0.0	241.8	1.413	790	176	1028	143	425	601	663	567	831	128	1070	95	241	815	479	781
3	21	0.0	-1080.0	-294.4	7135.0	2203.0	35.2	0.0	-552.2	-147.0	300.8	56.4		-1913.9	-462.6	0.0	243.5	1.413	720	258	977	202	245	810	502	755	768	202	1025	147	-6	1102	251	1046
4	1	0.0	-1153.0	293.7	7290.0	2412.0	-57.7	0.0	-620.7	151.2	300.8	-15.8		-1913.9	429.5	0.0	290.6	-13	754	242	1027	173	271	803	544	735	803	185	1076	116	20	1095	293	1026
4	2	0.0	-887.8	263.5	7290.0	2277.0	-225.6	0.0	-482.8	139.2	301.2	10.7		-1539.2	363.5	0.0	278.2	-13	845	137	1109	78	437	810	701	552	893	80	1157	22	235	845	499	788
4	3	0.0	-649.9	237.2	7290.0	1860.0	-393.4	0.0	-356.2	127.2	339.1	57.7		-1235.0	288.4	0.0	265.8	-13	1043	233	1327	217	662	721	946	705	1100	159	1384	143	487	944	771	929
4	4	0.0	-435.6	214.5	7397.0	1286.0	-568.6	0.0	-241.1	115.3	424.5	113.0		-1025.7	163.8	0.0	253.5	-13	1003	307	1249	345	650	759	896	797	1072	219	1318	257	505	944	751	983
4	5	0.0	-242.4	191.8	7363.0	720.3	-518.0	0.0	-137.2	103.3	568.4	230.1		-923.6	60.8	0.0	241.1	-13	959	355	1164	444	593	824	799	913	1052	236	1257	325	463	991	668	1080
4	6	0.0	-71.0	169.2	7363.0	237.6	-476.5	0.0	-44.8	91.3	795.3	197.3		-865.9	60.8	0.0	228.8	-13	938	382	1109	515	545	885	716	1018	1059	227	1230	360	423	1042	594	1175
4	7	0.0	78.9	146.5	7363.0	-184.8	-413.0	0.0	36.3	79.4	959.1	164.3		-808.2	60.8	0.0	216.4	-13	918	408	1059	579	505	937	646	1108	1061	224	1203	395	390	1084	532	1255
4	8	0.0	207.3	123.9	7363.0	-546.8	-349.4	0.0	105.9	67.4	1094.4	130.7		-750.5	60.8	0.0	204.1	-13	899	432	1015	636	472	979	587	1183	1061	224	1177	428	366	1115	481	1319
4	9	0.0	314.3	101.2	7363.0	-648.6	-285.6	0.0	164.3	55.4	1198.5	97.9		-692.7	60.8	0.0	191.8	-13	882	454	976	685	446	1012	541	1243	1058	228	1152	460	348	1137	443	1389
4	10	0.0	399.7	78.5	7363.0	-1090.0	-222.2	0.0	211.3	43.5	1269.9	54.8		-635.0	60.8	0.0	179.3	-13	865	476	942	729	429	1035	506	1288	1051	238	1128	491	339	1150	416	1403
4	11	0.0	463.5	55.8	7363.0	-1271.0	-158.6	0.0	246.9	31.5	1309.8	21.8		-577.3	60.8	0.0	167.0	-13	849	497	913	766	418	1048	483	1317	1040	252	1104	521	337	1152	401	1422
4	12	0.0	505.8	33.2	7363.0	-1391.0	-95.1	0.0	271.1	19.5	1320.5	-1.5		-519.5	60.8	0.0	154.7	-13	834	516	890	796	416	1051	472	1331	1026	269	1082	550	343	1145	398	1425
4	13	0.0	526.6	10.5	7363.0	-1453.0	-37.4	0.0	284.0	7.5	1299.7	-44.6		-461.8	60.8	0.0	142.3	-13	820	534	871	820	420	1045	472	1331	1008	292	1060	578	355	1129	407	1415
4	14	0.0	525.8	-12.1	7170.0	-1397.0	32.5	0.0	285.4	-4.4	1246.3	-77.6		-404.1	60.8	0.0	130.0	-13	806	510	857	787	433	988	484	1265	987	278	1038	555	375	1061	427	1338
4	15	0.0	503.5	-34.8	7170.0	-1336.0	96.3	0.0	275.5	-16.4	1161.5	-101.0		-346.4	60.8	0.0	117.6	-13	794	526	849	797	453	962	509	1233	962	310	1018	581	404	1025	460	1296
4	16	0.0	459.7	-57.5	7170.0	-1214.0	160.2	0.0	254.3	-28.4	1048.5	-144.0		-288.6	60.8	0.0	105.3	-13	783	539	848	799	481	926	545	1186	935	344	1000	604	440	978	504	1239
4	17	0.0	394.4	-80.1	7170.0	-1032.0	224.1	0.0	221.7	-40.4	901.7	-177.0		-230.9	60.8	0.0	92.9	-13	773	552	851	795	517	881	594	1124	904	384	981	628	484	922	561	1166
4	18	0.0	307.5	-102.8	7170.0	-788.9	287.9	0.0	177.6	-52.3	721.3	-200.4		-173.2	60.8	0.0	80.5	-13	764	564	858	785	560	825	654	1047	869	429	963	651	535	856	630	1078
4	19	0.0	199.1	-125.5	7170.0	-485.0	351.7	0.0	122.3	-64.3	516.1	-243.4		-115.5	60.8	0.0	68.2	-13	757	573	873	767	611	760	727	954	832	476	948	670	595	781	711	975
4	20	0.0	67.3	-151.9	7170.0	0.7	415.6	0.0	55.4	-76.3	276.0	-276.4		-57.7	60.8	0.0	55.9	-13	613	388	726	501	538	475	651	588	651	344	764	457	530	484	643	597
4	21	0.0	-91.2	-182.0	7170.0	546.2	479.4	0.0	-22.6	-88.2	0.0	-290.1		0.0	30.2	0.0	43.5	-13	640	357	789	428	633	365	781	436	841	355	790	426	633	365	781	436

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INFINITO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1502.8

Resumen de combinaciones:

		Tension máxima (t/m2)	Tension mínima (t/m2)
1	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	876	89
2	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	1124	22
3	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	956	25
4	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	1221	259
5	PP,final + CM + 0.9 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	1006	-19
6	PP,final + CM + 1.1 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	1181	-41
7	PP,final + CM + 0.9 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	1162	-249
8	PP,final + CM + 1.1 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	1332	-15

PP,final= Peso propio en tiempo final
Pret,final = Pretensado en tiempo final
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR											
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	-95.3	182.2	6063.0	473.5	-404.1	0.0	-74.9	93.0	0.0	261.0		0.0	-53.2		0.0	44.4	13	521	324	648	384	514	333	641	392	523	323	649	382	514	333	641	392
1	2	0.0	63.6	152.1	6063.0	115.1	-350.1	0.0	7.8	81.0	270.5	270.6		-57.7	-60.8		0.0	56.7	13	550	291	653	378	476	377	579	464	587	248	690	334	469	385	572	472
1	3	0.0	195.5	125.7	6063.0	-294.0	-296.1	0.0	79.0	69.1	503.9	237.0		-115.5	-60.8		0.0	69.1	13	694	415	801	568	551	599	657	752	768	320	874	474	534	620	641	773
1	4	0.0	304.1	103.0	6063.0	-651.9	-242.2	0.0	139.0	57.1	705.3	205.2		-173.2	-60.8		0.0	81.4	13	685	427	766	613	484	684	565	870	788	295	869	481	460	715	541	901
1	5	0.0	391.4	80.4	6063.0	-856.5	-188.1	0.0	187.6	45.1	879.7	171.2		-230.9	-60.8		0.0	93.7	13	707	398	774	603	455	721	521	926	835	235	901	439	422	763	489	968
1	6	0.0	457.0	57.7	6063.0	-1010.0	-134.2	0.0	224.7	33.1	1018.1	137.6		-288.6	-60.8		0.0	106.1	13	726	374	782	593	430	753	486	972	874	185	930	403	389	805	445	1024
1	7	0.0	501.0	35.0	6063.0	-1111.0	-80.2	0.0	250.5	21.2	1129.4	105.8		-346.4	-60.8		0.0	118.4	13	745	350	793	578	410	778	459	1006	909	140	957	368	361	841	410	1069
1	8	0.0	523.5	12.4	6063.0	-1162.0	-26.1	0.0	264.9	9.2	1207.7	71.8		-404.1	-60.8		0.0	130.8	13	760	330	805	563	395	798	440	1031	936	106	981	338	338	871	383	1104
1	9	0.0	524.5	-10.3	6063.0	-1161.0	27.8	0.0	268.0	-2.8	1253.6	28.7		-461.8	-60.8		0.0	143.1	13	774	313	819	545	384	812	429	1044	956	79	1001	312	319	895	364	1128
1	10	0.0	504.1	-33.0	6236.0	-1159.0	81.9	0.0	259.7	-14.8	1272.4	6.3		-519.5	-60.8		0.0	155.4	13	787	334	836	569	379	856	428	1092	973	96	1021	332	306	950	354	1186
1	11	0.0	462.0	-55.6	6238.0	-1056.0	135.6	0.0	240.0	-26.7	1257.6	-36.7		-577.3	-60.8		0.0	167.8	13	797	321	853	547	378	858	434	1084	981	85	1037	312	298	962	352	1189
1	12	0.0	398.4	-78.3	6238.0	-901.5	189.5	0.0	206.9	-38.7	1209.4	-64.9		-635.0	-60.8		0.0	180.1	13	805	311	872	524	381	853	448	1066	982	84	1049	296	291	968	358	1181
1	13	0.0	313.3	-101.0	6238.0	-696.0	243.4	0.0	166.5	-50.7	1134.3	-93.1		-692.7	-60.8		0.0	192.5	13	811	303	893	497	389	843	471	1037	979	88	1060	282	291	968	373	1162
1	14	0.0	206.6	-123.6	6238.0	-439.2	297.2	0.0	112.7	-62.6	1027.3	-136.1		-750.5	-60.8		0.0	204.8	13	816	297	915	468	402	827	502	997	968	102	1068	272	296	963	396	1133
1	15	0.0	78.5	-146.3	6238.0	-131.5	351.1	0.0	47.6	-74.6	884.6	-164.3		-808.2	-60.8		0.0	217.1	13	817	295	939	438	419	804	541	947	950	125	1071	268	305	951	427	1094
1	16	0.0	-71.4	-168.9	6238.0	228.0	405.0	0.0	-29.0	-86.6	737.0	-159.7		-865.9	-60.8		0.0	229.5	13	822	288	969	399	442	776	588	886	935	145	1082	255	319	933	466	1043
1	17	0.0	-242.6	-191.6	6238.0	636.2	458.9	0.0	-116.9	-98.5	572.0	-187.8		-923.6	-60.8		0.0	241.8	13	828	281	1004	354	468	742	644	815	918	166	1094	239	338	909	513	982
1	18	0.0	-435.3	-214.3	6236.0	1098.0	508.7	0.0	-216.2	-110.5	424.5	-113.0		-1025.7	-163.8		0.0	254.2	13	842	263	1051	294	490	715	698	746	911	174	1120	206	345	900	553	932
1	19	0.0	-649.6	-236.9	6406.0	1499.0	345.7	0.0	-326.9	-122.5	339.1	-57.7		-1235.0	-288.4		0.0	266.5	13	855	283	1095	281	474	771	714	769	912	209	1153	208	299	995	539	993
1	20	0.0	-887.2	-263.3	6436.0	1869.0	198.9	0.0	-448.9	-134.4	301.2	-10.7		-1539.2	-363.5		0.0	278.9	13	875	203	899	162	267	877	491	636	724	146	948	105	65	911	289	870
1	21	0.0	-1152.0	-293.5	6436.0	2095.0	48.4	0.0	-582.2	-146.4	300.8	15.8		-1913.9	-429.5		0.0	291.2	13	813	275	852	217	130	836	369	778	662	218	901	160	-121	1128	118	1070
2	1	0.0	-1078.0	294.3	6342.0	1947.0	-8.5	0.0	-574.5	149.0	300.8	-56.4		-1913.9	462.6	0.0	242.1	-1.318	582	297	809	249	106	849	334	801	629	242	857	194	-145	1141	83	1093
2	2	0.0	-747.7	256.3	6342.0	1810.0	-219.9	0.0	-404.8	133.9	254.8	-23.2		-1401.8	387.0	0.0	240.5	-1.318	696	164	914	127	330	589	549	551	737	116	956	79	147	802	365	764
2	3	0.0	-460.0	222.9	6342.0	1312.0	-431.4	0.0	-253.1	118.8	258.7	33.2		-992.5	291.1	0.0	238.9	-1.318	861	262	1086	276	553	656	779	670	906	204	1131	218	412	836	638	850
2	4	0.0	-209.6	194.3	6207.0	612.3	-526.9	0.0	-119.5	103.7	340.9	124.9		-684.2	208.1	0.0	237.3	-1.318	778	338	952	413	517	673	690	748	835	266	1008	340	418	799	592	874
2	5	0.0	6.3	165.7	6207.0	64.3	-422.3	0.0	-4.2	88.6	525.1	178.8		-515.0	104.4	0.0	235.8	-1.318	760	362	894	486	497	698	632	822	842	256	977	380	424	792	559	916
2	6	0.0	187.9	137.0	6207.0	-401.1	-353.3	0.0	93.0	73.5	771.5	224.6		-484.8	-21.5	0.0	234.2	-1.318	762	359	864	525	454	753	556	920	880	208	981	375	386	841	487	1008
2	7	0.0	335.1	108.4	6207.0	-783.5	-284.4	0.0	172.0	58.3	1006.4	168.5		-510.5	-21.5	0.0	232.6	-1.318	770	349	845	550	407	814	482	1015	921	156	995	357	335	906	409	1107
2	8	0.0	448.1	79.8	6207.0	-1083.0	-215.4	0.0	233.0	43.2	1169.8	129.4		-536.3	-21.5	0.0	231.0	-1.318	775	343	828	571	368	864	421	1092	951	117	1005	345	292	961	345	1190
2	9	0.0	526.6	51.2	6207.0	-1301.0	-146.4	0.0	275.7	28.1	1326.0	99.5		-562.1	-21.5	0.0	229.4	-1.318	777	340	815	588	336	905	374	1153	973	89	1011	337	256	1007	294	1255
2	10	0.0	570.9	22.5	6207.0	-1435.0	-77.4	0.0	300.4	13.0	1414.9	58.2		-587.8	-21.5	0.0	227.9	-1.318	777	339	806	600	312	935	340	1196	986	73	1014	333	229	1042	257	1302
2	11	0.0	580.7	-6.1	6207.0	-1486.0	-8.4	0.0	306.9	-2.2	1455.1	19.2		-613.6	-21.5	0.0	226.3	-1.318	775	342	800	607	296	956	321	1221	989	68	1014	333	209	1067	234	1332
2	12	0.0	556.2	-34.7	6029.0	-1379.0	72.0	0.0	295.2	-17.3	1443.9	-34.6		-639.3	-21.5	0.0	224.7	-1.318	777	302	806	553	295	919	324	1170	989	30	1018	281	205	1035	233	1286
2	13	0.0	497.3	-63.4	6029.0	-1244.0	152.4	0.0	265.4	-32.4	1383.1	-73.8		-665.1	-21.5	0.0	223.1	-1.318	775	304	814	543	301	911	339	1150	979	43	1017	282	207	1032	245	1271
2	14	0.0	404.1	-92.0	6029.0	-1013.0	232.8	0.0	217.5	-47.5	1275.4	-105.8		-690.9	-21.5	0.0	221.5	-1.318	776	303	830	521	319	888	374	1106	964	62	1019	280	222	1013	276	1231
2	15	0.0	276.5	-120.6	6029.0	-685.6	313.2	0.0	151.4	-62.6	1120.5	-145.0		-716.6	-21.5	0.0	219.9	-1.318	778	300	856	488	350	849	427	1037	945	87	1023	275	248	979	326	1167
2	16	0.0	114.6	-149.3	6029.0	-261.7	393.6	0.0	67.2	-77.8	913.8	-186.2		-742.4	-21.5	0.0	218.4	-1.318	782	295	890	445	392	795	500	945	919	120	1027	270	287	929	395	1079
2	17	0.0	-81.6	-177.9	6029.0	258.6	473.9	0.0	-35.2	-92.9	674.6	-188.4		-785.2	-73.6	0.0	216.8	-1.318	791	284	936	386	443	729	588	832	894	151	1039	254	332	872	476	975
2	18	0.0	-312.2	-206.5	6029.0	875.5	554.3	0.0	-155.7	-108.0	477.9	-148.4		-922.1	-154.7	0.0	215.2	-1.318	821	245	1010	292	486	674	674	721	896	149	1085	196	356	841	544	888
2	19	0.0	-577.5	-235.2	5835.0	1511.0	502.9	0.0	-294.5	-123.1	382.6	-42.7		-1177.3	-269.4	0.0	213.6	-1.318	842	177	1071	162	473	649	702	635	904	98	1133	83	306	863	536	848
2	20	0.0	-879.6	-268.5	5835.0	2019.0	224.6	0.0	-451.3	-138.2	361.0	13.2		-1580.2	-388.6	0.0	212.0	-1.318	879	106	903	44	263	590	487	528	733	43	958	-19	55	831	280	769
2	21	0.0	-1225.0	-306.6	5835.0	2246.0	-8.8	0.0	-626.2	-153.4	393.4	46.3		-2068.2	-468.0	0.0	210.5	-1.318	582	219	821	140	59	826	298	747	640	151	879	72	-215	1145	24	1065
3	1	0.0	-1224.0	306.4	5691.0	2193.0	6.3	0.0	-652.0	155.4	393.4	-50.5		-2068.2	461.0	0.0	209.6	1.413	548	237	781	159	25	844	259	766	606	169	839	91	-249	1162	-15	1085
3	2	0.0	-879.0	268.4	5691.0	2067.0	-219.1	0.0	-474.8	140.2	355.9	-17.5		-1580.2	368.6	0.0	211.2	1.413	674	89	900	22	259	572	484	504	728	27	953	-41	52	813	277	745
3	3	0.0	-577.0	235.0	5691.0	1572.0	-446.8	0.0	-315.6	125.1	372.5	38.5		-1177.3	269.4	0.0	212.9	1.413	838	151	1069	127	472	820	702	597	898	74	1129	50	305	833	535	810
3	4	0.0	-312.0	206.4	5835.0	858.6	-582.5	0.0	-174.4	110.0	477.9	148.4		-922.1	154.7	0.0	214.6	1.413	791	242	974	287	456	671	639	716	866	146	1049	190	325	838	508	883
3	5	0.0	-81.6	177.8	5835.0	262.7	-458.0	0.0	-51.6	94.9	674.6	188.4		-785.2	73.6	0.0	216.3	1.413	768	271	909	370	420	717	561	815	871	139	1012	238	309	859	450	958
3	6	0.0	114.6	149.1	5835.0	-240.3	-380.2	0.0	53.3	79.8	913.8	201.1		-742.4	21.5	0.0	218.0	1.413	766	274	871	418	376	774	481	918	903	99	1008	243	271	909	376	1053
3	7	0.0	276.5	120.5	5835.0	-649.9	-302.3	0.0	139.9	64.6	1120.5	145.0		-716.6	21.5	0.0	219.7	1.413	767	272	844	453	339	821	415	1003	934	59	1010	240	237	951	313	1132
3	8	0.0	403.9	91.9	5835.0	-966.1	-224.5	0.0	208.4	49.5	1275.4	105.8		-690.9	21.5	0.0	221.4	1.413	769	270	823	480	313	855	367	1064	957	29	1011	239	215	980	269	1190

Vano	Seccion	TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR															
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
		N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	9	0.0	497.0	63.3	5835.0	-1189.0	-146.7	0.0	258.8	34.4	1383.1	73.8	-665.1	21.5	0.0	223.1	1.413	772	266	810	496	298	873	336	1103	976	5	1014	235	204	994	242	1224
3	10	0.0	555.7	34.6	5836.0	-1318.0	-68.9	0.0	291.0	19.3	1443.9	34.6	-639.3	21.5	0.0	224.8	1.413	776	261	806	502	295	878	324	1120	989	-11	1018	231	204	994	233	1236
3	11	0.0	580.1	6.0	5836.0	-1355.0	5.8	0.0	305.0	4.2	1455.1	-4.4	-613.6	21.5	0.0	226.5	1.413	781	255	807	500	302	869	328	1114	995	-19	1021	226	215	980	241	1225
3	12	0.0	570.1	-22.6	6029.0	-1379.0	75.9	0.0	301.0	-11.0	1414.9	-56.2	-594.3	8.2	0.0	228.2	1.413	778	300	807	551	312	898	340	1149	987	33	1015	264	227	1005	256	1257
3	13	0.0	525.8	-51.3	6029.0	-1248.0	142.9	0.0	278.7	-26.1	1326.0	-99.5	-584.5	8.2	0.0	229.9	1.413	778	300	816	540	332	872	370	1111	974	50	1012	289	249	978	287	1217
3	14	0.0	447.1	-79.9	6029.0	-1036.0	209.8	0.0	238.4	-41.2	1189.8	-129.4	-574.7	8.2	0.0	231.6	1.413	775	305	828	525	359	837	412	1057	951	78	1004	299	278	941	331	1161
3	15	0.0	334.0	-108.5	6029.0	-744.3	276.9	0.0	179.9	-56.3	1006.4	-168.5	-564.9	8.2	0.0	233.3	1.413	768	313	842	507	393	793	467	987	919	120	993	314	314	895	387	1089
3	16	0.0	186.7	-137.1	6029.0	-372.1	343.8	0.0	103.3	-71.4	771.5	-209.7	-555.1	8.2	0.0	235.0	1.413	758	326	858	486	435	740	535	900	875	175	975	336	356	840	456	1000
3	17	0.0	4.9	-165.8	6029.0	80.8	410.8	0.0	8.4	-86.6	525.1	-178.8	-583.3	-77.0	0.0	236.7	1.413	752	333	884	452	475	688	607	807	835	227	967	346	393	794	525	913
3	18	0.0	-211.3	-194.4	6029.0	614.2	477.9	0.0	-104.5	-101.7	340.9	-124.9	-725.5	-172.0	0.0	238.4	1.413	767	315	937	385	498	658	668	729	824	242	993	313	396	790	566	861
3	19	0.0	-461.6	-223.0	6207.0	1181.0	467.0	0.0	-235.6	-116.8	258.8	-33.2	-892.5	-291.1	0.0	240.1	1.413	812	295	1026	318	504	689	718	712	857	237	1071	260	364	869	577	892
3	20	0.0	-749.4	-256.4	6207.0	1668.0	215.4	0.0	-384.8	-131.9	254.8	23.2	-1401.8	-387.0	0.0	241.8	1.413	650	196	858	167	285	621	492	592	692	148	899	119	101	835	308	805
3	21	0.0	-1080.0	-294.4	6207.0	1916.0	30.6	0.0	-552.2	-147.0	300.8	56.4	-1913.9	-462.6	0.0	243.5	1.413	570	290	793	242	94	843	318	795	617	235	841	187	-157	1134	67	1086
4	1	0.0	-1153.0	293.7	6342.0	2098.0	-50.2	0.0	-620.7	151.2	300.8	-15.8	-1913.9	429.5	0.0	290.6	-13	594	282	832	222	111	844	349	784	643	225	881	166	-140	1135	98	1075
4	2	0.0	-887.8	263.5	6342.0	1981.0	-196.3	0.0	-482.6	139.2	301.2	10.7	-1539.2	363.5	0.0	278.2	-13	690	171	920	120	282	645	512	594	739	115	968	64	81	879	310	828
4	3	0.0	-649.9	237.2	6342.0	1818.0	-342.3	0.0	-356.2	127.2	339.1	57.7	-1235.0	298.4	0.0	265.8	-13	876	242	1124	228	495	730	743	716	934	168	1181	155	320	954	568	940
4	4	0.0	-435.8	214.5	6436.0	1119.0	-494.7	0.0	-241.1	115.3	424.5	113.0	-1025.7	163.8	0.0	253.5	-13	859	284	1073	318	506	736	720	770	928	196	1142	230	361	922	575	955
4	5	0.0	-242.4	191.8	6406.0	626.7	-450.6	0.0	-137.2	103.3	598.4	230.1	-923.6	60.8	0.0	241.1	-13	839	303	1018	381	473	772	652	849	932	164	1111	261	343	939	521	1016
4	6	0.0	-71.0	169.2	6406.0	206.7	-414.6	0.0	-44.8	91.3	795.3	197.3	-865.9	60.8	0.0	228.8	-13	838	304	987	420	445	808	594	923	959	150	1108	265	323	965	472	1080
4	7	0.0	78.9	146.5	6406.0	-160.7	-359.3	0.0	36.3	79.4	959.1	164.3	-808.2	60.8	0.0	216.4	-13	836	308	958	457	422	837	545	986	979	124	1102	273	308	984	431	1132
4	8	0.0	207.3	123.9	6406.0	-475.7	-304.0	0.0	105.9	67.4	1094.4	130.7	-750.5	60.8	0.0	204.1	-13	832	312	932	490	404	860	505	1037	994	105	1094	282	298	996	399	1173
4	9	0.0	314.3	101.2	6406.0	-738.3	-248.6	0.0	164.3	55.4	1198.5	97.9	-692.7	60.8	0.0	191.8	-13	827	319	909	520	391	877	473	1078	1003	93	1085	294	293	1002	375	1203
4	10	0.0	399.7	78.5	6406.0	-948.4	-193.3	0.0	211.3	43.5	1269.9	54.8	-635.0	60.8	0.0	179.3	-13	820	328	887	548	384	887	451	1107	1006	90	1073	310	294	1002	361	1222
4	11	0.0	463.5	55.8	6406.0	-1106.0	-138.0	0.0	246.9	31.5	1309.8	21.8	-577.3	60.8	0.0	167.0	-13	811	339	867	574	381	890	437	1125	1002	94	1058	329	299	995	355	1229
4	12	0.0	505.8	33.2	6406.0	-1210.0	-82.7	0.0	271.1	19.5	1320.5	-1.5	-519.5	60.8	0.0	154.7	-13	801	352	850	595	383	887	432	1131	994	105	1042	349	310	981	359	1225
4	13	0.0	526.6	10.5	6406.0	-1265.0	-32.6	0.0	284.0	7.5	1299.7	-44.6	-461.8	60.8	0.0	142.3	-13	789	367	834	616	390	878	435	1127	978	125	1023	374	325	962	369	1211
4	14	0.0	525.8	-12.1	6238.0	-1216.0	28.3	0.0	285.4	-4.4	1246.3	-77.6	-404.1	60.8	0.0	130.0	-13	776	348	820	589	402	826	447	1067	957	117	1001	358	345	900	390	1141
4	15	0.0	503.5	-34.8	6238.0	-1162.0	83.8	0.0	275.5	-16.4	1161.5	-101.0	-346.4	60.8	0.0	117.6	-13	761	367	810	603	420	803	469	1039	930	151	978	387	371	868	420	1102
4	16	0.0	459.7	-57.5	6238.0	-1056.0	139.4	0.0	254.3	-28.4	1048.5	-144.0	-288.6	60.8	0.0	105.3	-13	746	387	802	613	443	774	499	1000	898	192	954	418	403	826	459	1053
4	17	0.0	394.4	-80.1	6238.0	-897.9	194.9	0.0	221.7	-40.4	901.7	-177.0	-230.9	60.8	0.0	92.9	-13	728	409	795	621	471	738	539	950	859	242	926	454	439	780	506	992
4	18	0.0	307.5	-102.6	6238.0	-686.3	250.4	0.0	177.6	-52.3	721.3	-200.4	-173.2	60.8	0.0	80.5	-13	709	434	791	627	505	695	587	888	814	300	896	493	480	727	562	920
4	19	0.0	199.1	-125.5	6238.0	-422.0	306.0	0.0	122.3	-64.3	516.1	-243.4	-115.5	60.8	0.0	68.2	-13	689	459	790	628	543	646	644	815	765	362	865	531	527	667	628	836
4	20	0.0	67.3	-151.9	6238.0	0.6	361.6	0.0	55.4	-76.3	276.0	-276.4	-57.7	60.8	0.0	55.9	-13	546	322	645	420	472	409	570	507	584	278	683	378	484	418	562	516
4	21	0.0	-91.2	-182.0	6238.0	475.2	417.1	0.0	-22.6	-88.2	0.0	-290.1	0.0	30.2	0.0	43.5	-13	553	315	682	377	545	323	675	385	554	313	684	375	545	323	675	385

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.8

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
1	1	66.5	0.0	12.685	1.400	14.000	7.480	520.800	0.600	0.800	1.14	0.00	29.530	6.44
1	2	839.8	122.8	12.685	1.400	14.000	7.480	520.800	0.667	0.733	0.00	0.00	29.530	6.44
1	3	1500.2	211.2	9.544	1.400	14.000	7.480	520.800	0.726	0.674	0.00	0.00	29.530	4.85
1	4	2060.3	268.4	9.544	1.400	14.000	7.480	520.800	0.776	0.624	0.00	0.00	29.530	4.85
1	5	2530.7	296.0	9.544	1.400	14.000	7.480	520.800	0.817	0.583	0.00	0.00	29.530	4.85
1	6	2897.8	294.0	9.544	1.400	14.000	7.480	520.800	0.850	0.550	0.00	0.00	29.530	4.85
1	7	3174.8	262.3	9.544	1.400	14.000	7.480	520.800	0.875	0.525	0.00	0.00	29.530	4.85
1	8	3353.1	201.1	9.544	1.400	14.000	7.480	520.800	0.891	0.509	0.00	0.00	29.530	4.85
1	9	3433.3	110.2	9.544	1.400	14.000	7.480	520.800	0.899	0.501	0.00	0.00	29.530	4.85
1	10	3423.4	-10.3	9.544	1.400	14.000	7.480	520.800	0.899	0.501	0.00	0.00	29.530	4.85
1	11	3314.0	-160.4	9.544	1.400	14.000	7.480	520.800	0.890	0.510	0.00	0.00	29.530	4.85
1	12	3104.8	-340.1	9.544	1.400	14.000	7.480	520.800	0.873	0.527	0.00	0.00	29.530	4.85
1	13	2806.3	-549.5	9.544	1.400	14.000	7.480	520.800	0.848	0.552	0.00	0.00	29.530	4.85
1	14	2410.3	-788.4	9.544	1.400	14.000	7.480	520.800	0.814	0.586	0.00	0.00	29.530	4.85
1	15	1911.4	-1057.0	9.544	1.400	14.000	7.480	520.800	0.772	0.628	0.00	0.00	29.530	4.85
1	16	1393.5	-1392.7	9.544	1.400	14.000	7.480	520.800	0.723	0.677	0.00	0.00	29.530	4.85
1	17	923.2	-1881.2	9.544	1.400	14.000	7.480	520.800	0.664	0.736	0.00	0.00	29.530	4.85
1	18	449.8	-2485.7	9.544	1.400	14.000	7.480	520.800	0.598	0.802	0.00	0.00	29.530	4.85
1	19	39.7	-3300.3	9.544	1.400	14.000	7.480	520.800	0.544	0.856	0.00	0.00	29.530	4.85
1	20	-330.2	-4309.4	12.685	1.400	14.000	7.480	520.800	0.511	0.889	0.00	0.00	29.530	6.44
1	21	-678.3	-5481.5	12.685	1.400	14.000	7.480	520.800	0.500	0.900	0.00	0.00	29.530	6.44

VANO	SECCION	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
2	1	-752.0	-5481.5	12.685	1.400	14.000	7.480	520.800	0.500	0.900	0.00	0.00	29.530	6.44
2	2	-367.6	-3953.7	12.685	1.400	14.000	7.480	520.800	0.520	0.880	0.00	0.00	29.530	6.44
2	3	36.7	-2671.6	9.544	1.400	14.000	7.480	520.800	0.580	0.820	0.00	0.00	29.530	4.85
2	4	508.7	-1639.0	9.544	1.400	14.000	7.480	520.800	0.673	0.727	0.00	0.00	29.530	4.85
2	5	1086.6	-863.9	9.544	1.400	14.000	7.480	520.800	0.760	0.640	0.00	0.00	29.530	4.85
2	6	1845.0	-525.4	9.544	1.400	14.000	7.480	520.800	0.833	0.567	0.00	0.00	29.530	4.85
2	7	2543.7	-354.7	9.544	1.400	14.000	7.480	520.800	0.893	0.507	0.00	0.00	29.530	4.85
2	8	3086.7	-231.2	9.544	1.400	14.000	7.480	520.800	0.940	0.460	0.00	0.16	29.530	4.85
2	9	3479.9	-155.0	9.544	1.400	14.000	7.480	520.800	0.973	0.427	0.00	1.32	29.530	4.85
2	10	3723.6	-126.1	9.544	1.400	14.000	7.480	520.800	0.993	0.407	0.00	2.03	29.530	4.85
2	11	3815.3	-144.4	9.544	1.400	14.000	7.480	520.800	1.000	0.400	0.00	2.27	29.530	4.85
2	12	3751.3	-210.0	9.544	1.400	14.000	7.480	520.800	0.992	0.408	0.00	1.99	29.530	4.85
2	13	3534.1	-322.8	9.544	1.400	14.000	7.480	520.800	0.967	0.433	0.00	1.11	29.530	4.85
2	14	3167.8	-482.8	9.544	1.400	14.000	7.480	520.800	0.927	0.473	0.00	0.00	29.530	4.85
2	15	2651.9	-690.2	9.544	1.400	14.000	7.480	520.800	0.871	0.529	0.00	0.00	29.530	4.85
2	16	1979.7	-944.7	9.544	1.400	14.000	7.480	520.800	0.799	0.601	0.00	0.00	29.530	4.85
2	17	1242.7	-1335.1	9.544	1.400	14.000	7.480	520.800	0.711	0.689	0.00	0.00	29.530	4.85
2	18	634.8	-2057.8	9.544	1.400	14.000	7.480	520.800	0.607	0.793	0.00	0.00	29.530	4.85
2	19	131.9	-3036.8	9.544	1.400	14.000	7.480	520.800	0.497	0.903	0.00	0.00	29.530	4.85
2	20	-310.5	-4320.2	12.685	1.400	14.000	7.480	520.800	0.425	0.975	0.00	0.00	29.530	6.44
2	21	-726.4	-5852.8	12.685	1.400	14.000	7.480	520.800	0.401	0.999	0.00	0.00	29.530	6.44

VANO	SECCION	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
3	1	-727.8	-5852.8	12.685	1.400	14.000	7.480	520.800	0.401	0.999	0.00	0.00	29.530	6.44
3	2	-319.3	-4320.2	12.685	1.400	14.000	7.480	520.800	0.425	0.975	0.00	0.00	29.530	6.44
3	3	115.6	-3036.8	9.544	1.400	14.000	7.480	520.800	0.497	0.903	0.00	0.00	29.530	4.85
3	4	633.9	-2057.8	9.544	1.400	14.000	7.480	520.800	0.607	0.793	0.00	0.00	29.530	4.85

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.8

3	5	1242.0	-1335.1	9.544	1.400	14.000	7.480	520.800	0.711	0.689	0.00	0.00	29.530	4.85
3	6	1979.1	-944.7	9.544	1.400	14.000	7.480	520.800	0.799	0.601	0.00	0.00	29.530	4.85
3	7	2651.6	-690.2	9.544	1.400	14.000	7.480	520.800	0.871	0.529	0.00	0.00	29.530	4.85
3	8	3167.7	-482.8	9.544	1.400	14.000	7.480	520.800	0.927	0.473	0.00	0.00	29.530	4.85
3	9	3534.1	-322.8	9.544	1.400	14.000	7.480	520.800	0.967	0.433	0.00	1.11	29.530	4.85
3	10	3751.5	-210.0	9.544	1.400	14.000	7.480	520.800	0.991	0.409	0.00	1.96	29.530	4.85
3	11	3815.6	-144.4	9.544	1.400	14.000	7.480	520.800	0.999	0.401	0.00	2.24	29.530	4.85
3	12	3724.0	-135.8	9.544	1.400	14.000	7.480	520.800	0.992	0.408	0.00	1.99	29.530	4.85
3	13	3480.7	-188.7	9.544	1.400	14.000	7.480	520.800	0.972	0.428	0.00	1.29	29.530	4.85
3	14	3087.6	-288.8	9.544	1.400	14.000	7.480	520.800	0.939	0.461	0.00	0.12	29.530	4.85
3	15	2544.7	-436.2	9.544	1.400	14.000	7.480	520.800	0.892	0.508	0.00	0.00	29.530	4.85
3	16	1846.2	-630.9	9.544	1.400	14.000	7.480	520.800	0.832	0.568	0.00	0.00	29.530	4.85
3	17	1088.0	-966.3	9.544	1.400	14.000	7.480	520.800	0.759	0.641	0.00	0.00	29.530	4.85
3	18	510.4	-1685.9	9.544	1.400	14.000	7.480	520.800	0.672	0.728	0.00	0.00	29.530	4.85
3	19	38.6	-2671.6	9.544	1.400	14.000	7.480	520.800	0.580	0.820	0.00	0.00	29.530	4.85
3	20	-365.7	-3953.7	12.685	1.400	14.000	7.480	520.800	0.520	0.880	0.00	0.00	29.530	6.44
3	21	-749.9	-5481.5	12.685	1.400	14.000	7.480	520.800	0.499	0.901	0.00	0.00	29.530	6.44

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As mín. (cm2/m.)
4	1	-679.2	-5481.5	12.685	1.400	14.000	7.480	520.800	0.499	0.901	0.00	0.00	29.530	6.44
4	2	-331.2	-4309.4	12.685	1.400	14.000	7.480	520.800	0.510	0.890	0.00	0.00	29.530	6.44
4	3	38.7	-3300.3	9.544	1.400	14.000	7.480	520.800	0.543	0.857	0.00	0.00	29.530	4.85
4	4	448.7	-2485.7	9.544	1.400	14.000	7.480	520.800	0.597	0.803	0.00	0.00	29.530	4.85
4	5	961.8	-1881.2	9.544	1.400	14.000	7.480	520.800	0.667	0.733	0.00	0.00	29.530	4.85
4	6	1480.0	-1392.7	9.544	1.400	14.000	7.480	520.800	0.725	0.675	0.00	0.00	29.530	4.85
4	7	2022.1	-1057.0	9.544	1.400	14.000	7.480	520.800	0.775	0.625	0.00	0.00	29.530	4.85
4	8	2509.8	-788.4	9.544	1.400	14.000	7.480	520.800	0.816	0.584	0.00	0.00	29.530	4.85
4	9	2901.5	-549.5	9.544	1.400	14.000	7.480	520.800	0.850	0.550	0.00	0.00	29.530	4.85
4	10	3194.5	-340.1	9.544	1.400	14.000	7.480	520.800	0.875	0.525	0.00	0.00	29.530	4.85
4	11	3391.0	-160.4	9.544	1.400	14.000	7.480	520.800	0.892	0.508	0.00	0.00	29.530	4.85
4	12	3494.6	-10.3	9.544	1.400	14.000	7.480	520.800	0.901	0.499	0.00	0.00	29.530	4.85
4	13	3501.3	110.2	9.544	1.400	14.000	7.480	520.800	0.902	0.498	0.00	0.00	29.530	4.85
4	14	3409.8	201.1	9.544	1.400	14.000	7.480	520.800	0.895	0.505	0.00	0.00	29.530	4.85
4	15	3221.7	262.3	9.544	1.400	14.000	7.480	520.800	0.878	0.522	0.00	0.00	29.530	4.85
4	16	2942.2	294.0	9.544	1.400	14.000	7.480	520.800	0.854	0.546	0.00	0.00	29.530	4.85
4	17	2562.4	296.0	9.544	1.400	14.000	7.480	520.800	0.821	0.579	0.00	0.00	29.530	4.85
4	18	2083.1	268.4	9.544	1.400	14.000	7.480	520.800	0.779	0.621	0.00	0.00	29.530	4.85
4	19	1517.0	211.2	9.544	1.400	14.000	7.480	520.800	0.729	0.671	0.00	0.00	29.530	4.85
4	20	846.8	122.8	12.685	1.400	14.000	7.480	520.800	0.671	0.729	0.00	0.00	29.530	6.44
4	21	65.2	0.0	12.685	1.400	14.000	7.480	520.800	0.604	0.796	0.88	0.00	29.530	6.44

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.8

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	523	323	0.000	0.00	0.00	0.00	0.00	0.000	7	514	333	0.000	0.00	0.000	0.00	6.44	6.44	6.44	6.44	6.44
0.00	0.000	5	587	248	0.000	0.00	0.00	0.00	0.00	0.000	7	469	385	0.000	0.00	0.000	0.00	6.44	6.44	6.44	6.44	6.44
0.00	0.000	5	768	320	0.000	0.00	0.00	0.00	0.00	0.000	7	534	620	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	788	295	0.000	0.00	0.00	0.00	0.00	0.000	7	460	715	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	835	235	0.000	0.00	0.00	0.00	0.00	0.000	7	422	763	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	874	185	0.000	0.00	0.00	0.00	0.00	0.000	7	389	805	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	909	140	0.000	0.00	0.00	0.00	0.00	0.000	7	361	841	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	936	106	0.000	0.00	0.00	0.00	0.00	0.000	7	338	871	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	956	79	0.000	0.00	0.00	0.00	0.00	0.000	7	319	895	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	973	96	0.000	0.00	0.00	0.00	0.00	0.000	7	306	950	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	981	85	0.000	0.00	0.00	0.00	0.00	0.000	7	296	962	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	982	84	0.000	0.00	0.00	0.00	0.00	0.000	7	291	968	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	979	88	0.000	0.00	0.00	0.00	0.00	0.000	7	291	968	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	968	102	0.000	0.00	0.00	0.00	0.00	0.000	7	296	963	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	950	125	0.000	0.00	0.00	0.00	0.00	0.000	7	305	951	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	935	145	0.000	0.00	0.00	0.00	0.00	0.000	7	319	933	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	918	166	0.000	0.00	0.00	0.00	0.00	0.000	7	338	909	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	911	174	0.000	0.00	0.00	0.00	0.00	0.000	7	345	900	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	912	209	0.000	0.00	0.00	0.00	0.00	0.000	7	299	995	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	724	146	0.000	0.00	0.00	0.00	0.00	0.000	7	65	911	0.000	0.00	0.000	0.00	6.44	6.44	6.44	6.44	6.44
0.00	0.000	5	662	218	0.000	0.00	0.00	0.00	0.00	0.000	7	-121	1128	0.136	0.00	1.901	6.79	6.79	6.79	6.44	6.44	6.44

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	629	242	0.000	0.00	0.00	0.00	0.00	0.000	7	-145	1141	0.158	0.00	2.206	7.88	7.88	7.88	6.44	6.44	6.44
0.00	0.000	5	737	116	0.000	0.00	0.00	0.00	0.00	0.000	7	147	802	0.000	0.00	0.000	0.00	6.44	6.44	6.44	6.44	6.44
0.00	0.000	5	906	204	0.000	0.00	0.00	0.00	0.00	0.000	7	412	836	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	835	266	0.000	0.00	0.00	0.00	0.00	0.000	7	418	799	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	842	256	0.000	0.00	0.00	0.00	0.00	0.000	7	424	792	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	880	208	0.000	0.00	0.00	0.00	0.00	0.000	7	386	841	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	921	156	0.000	0.00	0.00	0.00	0.00	0.000	7	335	906	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	951	117	0.000	0.00	0.00	0.00	0.00	0.000	7	292	961	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	973	89	0.000	0.00	0.00	0.00	0.00	0.000	7	256	1007	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	986	73	0.000	0.00	0.00	0.00	0.00	0.000	7	229	1042	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	989	68	0.000	0.00	0.00	0.00	0.00	0.000	7	209	1067	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	989	30	0.000	0.00	0.00	0.00	0.00	0.000	7	205	1035	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	979	43	0.000	0.00	0.00	0.00	0.00	0.000	7	207	1032	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	964	62	0.000	0.00	0.00	0.00	0.00	0.000	7	222	1013	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	945	87	0.000	0.00	0.00	0.00	0.00	0.000	7	248	979	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	919	120	0.000	0.00	0.00	0.00	0.00	0.000	7	287	929	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	894	151	0.000	0.00	0.00	0.00	0.00	0.000	7	332	872	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	896	149	0.000	0.00	0.00	0.00	0.00	0.000	7	356	841	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	904	98	0.000	0.00	0.00	0.00	0.00	0.000	7	306	863	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	733	43	0.000	0.00	0.00	0.00	0.00	0.000	7	55	831	0.000	0.00	0.000	0.00	6.44	6.44	6.44	6.44	6.44
0.00	0.000	5	640	151	0.000	0.00	0.00	0.00	0.00	0.000	7	-215	1145	0.221	0.00	3.097	11.06	11.06	11.06	6.44	6.44	6.44

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	606	169	0.000	0.00	0.00	0.00	0.00	0.000	7	-249	1162	0.247	0.00	3.456	12.34	12.34	12.34	6.44	6.44	6.44
0.00	0.000	5	728	27	0.000	0.00	0.00	0.00	0.00	0.000	7	52	813	0.000	0.00	0.000	0.00	6.44	6.44	6.44	6.44	6.44
0.00	0.000	5	898	74	0.000	0.00	0.00	0.00	0.00	0.000	7	305	833	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	866	146	0.000	0.00	0.00	0.00	0.00	0.000	7	325	838	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	871	139	0.000	0.00	0.00	0.00	0.00	0.000	7	309	859	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	903	99	0.000	0.00	0.00	0.00	0.00	0.000	7	271	909	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	934	59	0.000	0.00	0.00	0.00	0.00	0.000	7	237	951	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	957	29	0.000	0.00	0.00	0.00	0.00	0.000	7	215	980	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	976	5	0.000	0.00	0.00	0.00	0.00	0.000	7	204	994	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	989	-11	1.384	0.00	0.12	0.78	0.00	0.000	7	204	994	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	995	-19	1.374	0.00	0.20	1.31	0.00	0.000	7	215	980	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	987	33	0.000	0.00	0.00	0.00	0.00	0.000	7	227	1005	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	974	50	0.000	0.00	0.00	0.00	0.00	0.000	7	249	978	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	951	78	0.000	0.00	0.00	0.00	0.00	0.000	7	278	941	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	919	120	0.000	0.00	0.00	0.00	0.00	0.000	7	314	895	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	875	175	0.000	0.00	0.00	0.00	0.00	0.000	7	356	840	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.8

Pretensado preteso Inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	835	227	0.000	0.00	0.00	0.00	0.00	0.000	7	393	794	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	824	242	0.000	0.00	0.00	0.00	0.00	0.000	7	396	790	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	857	237	0.000	0.00	0.00	0.00	0.00	0.000	7	364	869	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	692	148	0.000	0.00	0.00	0.00	0.00	0.000	7	101	835	0.000	0.00	0.000	0.00	6.44	6.44	6.44	6.44	6.44
0.00	0.000	5	617	235	0.000	0.00	0.00	0.00	0.00	0.000	7	-157	1134	0.170	0.00	2.380	8.50	8.50	8.50	6.44	6.44	6.44
0.00	0.000	5	643	225	0.000	0.00	0.00	0.00	0.00	0.000	7	-140	1135	0.154	0.00	2.150	7.68	7.68	7.68	6.44	6.44	6.44
0.00	0.000	5	739	115	0.000	0.00	0.00	0.00	0.00	0.000	7	81	879	0.000	0.00	0.000	0.00	6.44	6.44	6.44	6.44	6.44
0.00	0.000	5	934	168	0.000	0.00	0.00	0.00	0.00	0.000	7	320	954	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	928	196	0.000	0.00	0.00	0.00	0.00	0.000	7	361	922	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	932	184	0.000	0.00	0.00	0.00	0.00	0.000	7	343	939	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	959	150	0.000	0.00	0.00	0.00	0.00	0.000	7	323	965	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	979	124	0.000	0.00	0.00	0.00	0.00	0.000	7	308	984	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	994	105	0.000	0.00	0.00	0.00	0.00	0.000	7	298	996	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	1003	93	0.000	0.00	0.00	0.00	0.00	0.000	7	293	1002	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	1006	90	0.000	0.00	0.00	0.00	0.00	0.000	7	294	1002	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	1002	94	0.000	0.00	0.00	0.00	0.00	0.000	7	299	995	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	994	105	0.000	0.00	0.00	0.00	0.00	0.000	7	310	981	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	978	125	0.000	0.00	0.00	0.00	0.00	0.000	7	325	962	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	957	117	0.000	0.00	0.00	0.00	0.00	0.000	7	345	900	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	930	151	0.000	0.00	0.00	0.00	0.00	0.000	7	371	866	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	898	192	0.000	0.00	0.00	0.00	0.00	0.000	7	403	826	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	859	242	0.000	0.00	0.00	0.00	0.00	0.000	7	439	780	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	814	300	0.000	0.00	0.00	0.00	0.00	0.000	7	480	727	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	765	362	0.000	0.00	0.00	0.00	0.00	0.000	7	527	667	0.000	0.00	0.000	0.00	4.85	4.85	4.85	4.85	4.85
0.00	0.000	5	584	278	0.000	0.00	0.00	0.00	0.00	0.000	7	464	418	0.000	0.00	0.000	0.00	6.44	6.44	6.44	6.44	6.44
0.00	0.000	5	554	313	0.000	0.00	0.00	0.00	0.00	0.000	7	545	323	0.000	0.00	0.000	0.00	6.44	6.44	6.44	6.44	6.44

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.8

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 19.00 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
1	1	12.685	1.975	0.648	-0.752	0.000	121.5	7.480	7.480	1.400	135.0	90
1	2	12.685	1.975	0.648	-0.752	0.000	121.5	7.480	7.480	1.400	135.0	90
1	3	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	4	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	5	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	6	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	7	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	8	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	9	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	10	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	11	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	12	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	13	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	14	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	15	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	16	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	17	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	18	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	19	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
1	20	12.685	1.975	0.648	-0.752	0.000	121.5	7.480	7.480	1.400	135.0	90
1	21	12.685	1.975	0.648	-0.752	0.000	121.5	7.480	7.480	1.400	135.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
1	1	0.0	177.7	0.0	88.3	305	0	-61	0	44.4	13	0.00	0.00	473.5	-404.1	6063
1	2	154.5	147.6	78.2	76.3	272	258	-62	-45	56.7	13	0.00	0.00	115.1	-350.1	6063
1	3	282.1	121.2	145.0	64.3	241	457	-64	-69	69.1	13	0.00	0.00	-294	-296.1	6063
1	4	386.5	98.5	200.4	52.4	213	607	-69	-75	81.4	13	0.00	0.00	-651.9	-242.2	6063
1	5	469.3	75.8	244.5	40.4	185	719	-75	-70	93.7	13	0.00	0.00	-856.5	-188.1	6063
1	6	530.5	53.2	277.2	28.4	160	761	-83	-58	106.1	13	0.00	0.00	-1010	-134.2	6063
1	7	570.2	30.5	298.5	16.5	138	784	-92	-43	118.4	13	0.00	0.00	-1111	-80.15	6063
1	8	588.4	7.8	308.5	4.5	117	778	-103	-31	130.8	13	0.00	0.00	-1162	-26.13	6063
1	9	585.1	-14.9	307.0	-7.5	98	748	-116	-25	143.1	13	0.00	0.00	-1161	27.81	6063
1	10	560.2	-37.5	294.2	-19.5	82	699	-135	153	155.4	13	0.00	0.00	-1159	81.9	6238
1	11	513.8	-60.2	270.1	-31.4	67	636	-156	124	167.8	13	0.00	0.00	-1056	135.6	6238
1	12	445.9	-82.9	234.5	-43.4	56	587	-178	70	180.1	13	0.00	0.00	-901.5	189.5	6238
1	13	356.4	-105.5	187.6	-55.4	47	534	-202	10	192.5	13	0.00	0.00	-696	243.4	6238
1	14	245.4	-128.2	129.4	-67.3	39	480	-227	-101	204.8	13	0.00	0.00	-439.2	297.2	6238
1	15	112.9	-150.9	59.7	-79.3	32	429	-254	-245	217.1	13	0.00	0.00	-131.5	351.1	6238
1	16	-41.2	-173.5	-21.3	-91.3	27	383	-282	-407	229.5	13	0.00	0.00	228	405	6238
1	17	-216.8	-196.2	-113.7	-103.2	23	345	-311	-626	241.8	13	0.00	0.00	638.2	458.9	6238
1	18	-413.9	-218.9	-217.5	-115.2	20	316	-340	-886	254.2	13	0.00	0.00	1098	508.7	6238
1	19	-632.6	-241.5	-332.6	-127.2	17	298	-372	-1170	266.5	13	0.00	0.00	1499	345.7	6406
1	20	-874.6	-267.9	-459.1	-139.2	16	293	-404	-1516	278.9	13	0.00	0.00	1869	198.9	6436
1	21	-1143.4	-296.0	-597.0	-151.1	16	301	-431	-1906	291.2	13	0.00	0.00	2095	48.41	6436

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 24.00 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
2	1	12.685	1.975	0.648	-0.752	0.000	121.5	7.480	7.480	1.400	135.0	90
2	2	12.685	1.975	0.648	-0.752	0.000	121.5	7.480	7.480	1.400	135.0	90
2	3	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	4	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	5	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	6	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	7	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	8	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	9	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	10	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	11	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	12	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	13	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	14	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	15	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	16	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	17	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	18	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	19	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
2	20	12.685	1.975	0.648	-0.752	0.000	121.5	7.480	7.480	1.400	135.0	90
2	21	12.685	1.975	0.648	-0.752	0.000	121.5	7.480	7.480	1.400	135.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
2	1	-1143.4	298.5	-597.0	150.2	468	-1909	-56	301	242.1	-1.318	0.00	0.00	1947	-8.535	6342
2	2	-808.1	260.4	-425.9	135.0	429	-1380	-57	244	240.5	-1.318	0.00	0.00	1810	-219.9	6342
2	3	-515.7	227.1	-272.9	119.9	390	-918	-59	206	238.9	-1.318	0.00	0.00	1312	-431.4	6342
2	4	-260.4	196.4	-138.1	104.8	352	-541	-62	185	237.3	-1.318	0.00	0.00	612.3	-526.9	6207
2	5	-39.5	169.8	-21.4	89.7	317	-212	-67	180	235.8	-1.318	0.00	0.00	64.34	-422.3	6207
2	6	147.1	141.2	77.1	74.6	283	56	-74	186	234.2	-1.318	0.00	0.00	-401.1	-353.3	6207
2	7	299.3	112.5	157.5	59.4	246	250	-82	200	232.6	-1.318	0.00	0.00	-783.5	-284.4	6207
2	8	417.2	83.9	219.8	44.3	216	407	-92	216	231.0	-1.318	0.00	0.00	-1083	-215.4	6207
2	9	500.7	55.3	263.9	29.2	187	502	-105	229	229.4	-1.318	0.00	0.00	-1301	-146.4	6207
2	10	549.8	26.6	289.8	14.1	161	572	-119	233	227.9	-1.318	0.00	0.00	-1435	-77.4	6207
2	11	564.6	-2.0	297.6	-1.1	137	606	-137	342	226.3	-1.318	0.00	0.00	-1486	-8.427	6207
2	12	545.0	-30.6	287.3	-16.2	113	468	-164	410	224.7	-1.318	0.00	0.00	-1379	71.96	6029
2	13	491.0	-59.3	258.8	-31.3	96	432	-190	337	223.1	-1.318	0.00	0.00	-1244	152.4	6029
2	14	402.7	-87.9	212.2	-46.4	83	399	-217	223	221.5	-1.318	0.00	0.00	-1013	232.8	6029
2	15	280.1	-116.5	147.5	-61.5	73	371	-247	84	219.9	-1.318	0.00	0.00	-685.6	313.2	6029
2	16	123.1	-145.2	64.6	-76.7	64	344	-279	-127	218.4	-1.318	0.00	0.00	-261.7	393.6	6029
2	17	-68.3	-173.8	-36.5	-91.8	57	325	-316	-377	216.8	-1.318	0.00	0.00	258.6	473.9	6029
2	18	-294.1	-202.4	-155.7	-106.9	52	317	-353	-707	215.2	-1.318	0.00	0.00	875.5	554.3	6029
2	19	-554.2	-231.1	-293.0	-122.0	49	324	-390	-1102	213.6	-1.318	0.00	0.00	1511	502.9	5835
2	20	-851.4	-264.4	-448.5	-137.1	47	349	-429	-1543	212.0	-1.318	0.00	0.00	2019	224.6	5835
2	21	-1191.6	-302.5	-622.1	-152.3	46	393	-469	-2075	210.5	-1.318	0.00	0.00	2246	-6.801	5835

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 24.00 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
3	1	12.685	1.975	0.648	-0.752	0.000	121.5	7.480	7.480	1.400	135.0	90
3	2	12.685	1.975	0.648	-0.752	0.000	121.5	7.480	7.480	1.400	135.0	90
3	3	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
3	4	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
3	5	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
3	6	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
3	7	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
3	8	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
3	9	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
3	10	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
3	11	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
3	12	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
3	13	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90
3	14	9.544	1.735	0.614	-0.786	0.000	121.5	3.480	7.480	1.400	135.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
3	1	-1191.6	302.5	-622.1	152.3	469	-2075	-51	393	209.6	1.413	0.00	0.00	2193	8.316	5691
3	2	-851.4	264.4	-448.5	137.1	429	-1543	-51	344	211.2	1.413	0.00	0.00	2067	-219.1	5691
3	3	-554.2	231.1	-293.0	122.0	390	-1102	-53	314	212.9	1.413	0.00	0.00	1572	-446.8	5691
3	4	-294.1	202.4	-155.7	106.9	353	-707	-56	301	214.6	1.413	0.00	0.00	858.6	-582.5	5835
3	5	-68.3	173.8	-36.5	91.8	318	-377	-62	304	216.3	1.413	0.00	0.00	262.7	-458	5835
3	6	123.1	145.2	64.6	76.7	284	-129	-68	319	218.0	1.413	0.00	0.00	-240.3	-380.2	5835
3	7	280.1	116.5	147.5	61.5	247	84	-77	340	219.7	1.413	0.00	0.00	-649.9	-302.3	5835
3	8	402.7	87.9	212.2	46.4	217	223	-88	364	221.4	1.413	0.00	0.00	-966.1	-224.5	5835
3	9	491.0	59.3	258.8	31.3	190	337	-100	383	223.1	1.413	0.00	0.00	-1189	-146.7	5835
3	10	545.0	30.6	287.3	16.2	164	410	-115	394	224.8	1.413	0.00	0.00	-1318	-68.89	5836
3	11	564.6	2.0	297.6	1.1	140	428	-133	485	226.5	1.413	0.00	0.00	-1355	5.804	5836
3	12	549.8	-26.6	289.8	-14.1	119	233	-161	572	228.2	1.413	0.00	0.00	-1379	75.66	6029
3	13	500.7	-55.3	263.9	-29.2	105	229	-187	502	229.9	1.413	0.00	0.00	-1248	142.9	6029
3	14	417.2	-83.9	219.8	-44.3	92	216	-216	407	231.6	1.413	0.00	0.00	-1036	209.8	6029

30/06/96

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 19.00 kg/(ft)	z=d*0,9 (cm.)	Ancho corl. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	e (°)
3	15	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
3	16	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
3	17	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
3	18	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
3	19	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
3	20	12.685	1.975	0.648	-0.752	0.000	121.5	7.460	7.460	1.400	135.0	90
3	21	12.685	1.975	0.648	-0.752	0.000	121.5	7.460	7.460	1.400	135.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
3	15	299.3	-112.5	157.5	-59.4	82	200	-246	250	233.3	1.413	0.00	0.00	-744.3	276.9	6029
3	16	147.1	-141.2	77.1	-74.6	74	186	-278	40	235.0	1.413	0.00	0.00	-372.1	343.8	6029
3	17	-39.5	-169.8	-21.4	-89.7	67	180	-317	-212	236.7	1.413	0.00	0.00	80.8	410.8	6029
3	18	-260.4	-198.4	-138.1	-104.8	62	185	-352	-541	238.4	1.413	0.00	0.00	614.2	477.9	6029
3	19	-515.7	-227.1	-272.9	-119.9	59	206	-390	-918	240.1	1.413	0.00	0.00	1181	467	6207
3	20	-806.1	-260.4	-425.9	-135.0	57	244	-429	-1380	241.8	1.413	0.00	0.00	1668	215.4	6207
3	21	-1143.4	-298.5	-597.0	-150.2	56	301	-468	-1909	243.5	1.413	0.00	0.00	1916	30.64	6207

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 19.00 kg/(ft)	z=d*0,9 (cm.)	Ancho corl. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	e (°)
4	1	12.685	1.975	0.648	-0.752	0.000	121.5	7.460	7.460	1.400	135.0	90
4	2	12.685	1.975	0.648	-0.752	0.000	121.5	7.460	7.460	1.400	135.0	90
4	3	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	4	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	5	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	6	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	7	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	8	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	9	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	10	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	11	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	12	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	13	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	14	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	15	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	16	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	17	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	18	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	19	9.544	1.735	0.614	-0.786	0.000	121.5	3.460	7.460	1.400	135.0	90
4	20	12.685	1.975	0.648	-0.752	0.000	121.5	7.460	7.460	1.400	135.0	90
4	21	12.685	1.975	0.648	-0.752	0.000	121.5	7.460	7.460	1.400	135.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
4	1	-1143.4	298.0	-597.0	151.1	431	-1906	-16	301	290.6	-13	0.00	0.00	2098	-50.16	6342
4	2	-874.6	267.9	-459.1	139.2	404	-1516	-16	293	278.2	-13	0.00	0.00	1981	-196.3	6342
4	3	-632.6	241.5	-332.6	127.2	372	-1170	-17	298	265.8	-13	0.00	0.00	1618	-342.3	6342
4	4	-413.9	218.9	-217.5	115.2	340	-886	-20	316	253.5	-13	0.00	0.00	1119	-494.7	6436
4	5	-216.8	196.2	-113.7	103.2	311	-626	-23	345	241.1	-13	0.00	0.00	626.7	-450.6	6406
4	6	-41.2	173.5	-21.3	91.3	282	-407	-27	383	228.8	-13	0.00	0.00	206.7	-414.6	6406
4	7	112.9	150.9	59.7	79.3	254	-245	-32	429	216.4	-13	0.00	0.00	-160.7	-359.3	6406
4	8	245.4	128.2	129.4	67.3	227	-101	-39	480	204.1	-13	0.00	0.00	-475.7	-304	6406
4	9	356.4	105.5	187.6	55.4	202	10	-47	534	191.8	-13	0.00	0.00	-738.3	-248.6	6406
4	10	445.9	82.9	234.5	43.4	178	70	-56	587	179.3	-13	0.00	0.00	-948.4	-193.3	6406
4	11	513.8	60.2	270.1	31.4	156	124	-67	636	167.0	-13	0.00	0.00	-1106	-138	6406
4	12	560.2	37.5	294.2	19.5	137	135	-82	699	154.7	-13	0.00	0.00	-1210	-82.71	6406
4	13	585.1	14.9	307.0	7.5	120	124	-100	863	142.3	-13	0.00	0.00	-1265	-32.55	6406
4	14	588.4	-7.8	308.5	-4.5	104	96	-120	873	130.0	-13	0.00	0.00	-1216	26.25	6238
4	15	570.2	-30.5	298.5	-16.5	92	-43	-143	857	117.6	-13	0.00	0.00	-1162	83.81	6238
4	16	530.5	-53.2	277.2	-28.4	83	-58	-166	817	105.3	-13	0.00	0.00	-1056	139.4	6238
4	17	469.3	-75.8	244.5	-40.4	75	-70	-191	741	92.9	-13	0.00	0.00	-897.9	194.9	6238
4	18	386.5	-98.5	200.4	-52.4	69	-75	-218	623	80.5	-13	0.00	0.00	-686.3	250.4	6238
4	19	282.1	-121.2	145.0	-64.3	64	-69	-247	469	68.2	-13	0.00	0.00	-422	306	6238
4	20	154.5	-147.6	78.2	-76.3	62	-45	-277	263	55.9	-13	0.00	0.00	0.5665	361.6	6238
4	21	0.0	-177.7	0.0	-88.3	61	0	-305	0	43.5	-13	0.00	0.00	475.2	417.1	6238

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO: L.A.V. MADRID - ZARAGOZA
ESTRUCTURA: E-1507.8

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
1	1	0.0	0.0	471.2	-255.9	540.0	473.5	471.2	540.0	655.0	272.3	-244.3	A-B
1	2	0.0	0.0	412.4	-241.1	936.1	256.7	412.4	936.1	784.8	121.4	-244.3	A-B
1	3	0.0	0.0	362.5	-225.6	1135.8	-12.5	362.5	1135.8	1037.1	120.7	-244.3	A-B
1	4	0.0	0.0	323.2	-209.4	1261.4	-236.5	323.2	1261.4	1081.5	63.8	-244.3	A-B
1	5	0.0	0.0	283.5	-195.6	1432.7	-319.0	283.5	1432.7	1142.1	-13.7	-244.3	A-B
1	6	0.0	0.0	248.0	-184.6	1502.4	-369.4	248.0	1502.4	1166.7	-45.3	-244.3	A-B
1	7	0.0	0.0	216.2	-176.0	1546.3	-393.6	216.2	1546.3	1182.3	-65.3	-244.3	A-B
1	8	0.0	0.0	187.4	-169.9	1546.8	-400.9	187.4	1546.8	1182.4	-65.5	-244.3	A-B
1	9	0.0	0.0	174.9	-179.8	978.6	139.3	179.8	139.3	684.5	572.2	-244.3	A-B
1	10	0.0	0.0	172.8	-206.1	891.7	351.7	206.1	351.7	778.0	494.3	-244.3	A-B
1	11	0.0	0.0	173.1	-235.9	855.6	305.7	235.9	305.7	761.8	515.1	-244.3	A-B
1	12	0.0	0.0	179.6	-267.1	860.8	224.5	267.1	224.5	733.0	551.9	-244.3	A-B
1	13	0.0	0.0	188.3	-301.1	882.9	134.7	301.1	134.7	701.3	592.6	-244.3	A-B
1	14	0.0	0.0	199.1	-337.3	925.4	-28.0	337.3	-28.0	643.7	666.3	-244.3	A-B
1	15	0.0	0.0	211.9	-374.7	992.9	-240.1	374.7	-240.1	568.7	762.4	-244.3	A-B
1	16	0.0	0.0	226.5	-414.6	1090.5	-475.6	414.6	-475.6	485.4	869.1	-244.3	A-B
1	17	0.0	0.0	242.9	-456.2	1220.3	-796.6	456.2	-796.6	371.8	1014.5	-244.3	A-B
1	18	0.0	0.0	256.9	-503.0	1384.6	-1177.5	503.0	-1177.5	237.1	1187.1	-244.3	A-B
1	19	0.0	0.0	59.5	-764.8	1477.1	-1703.3	764.8	-1703.3	68.7	1442.9	-244.3	A-B
1	20	0.0	0.0	-123.6	-1017.2	1526.2	-2406.0	1017.2	-2406.0	-281.3	1423.8	-244.3	C
1	21	0.0	0.0	-312.6	-1272.5	1416.7	-3374.3	1272.5	-3374.3	-598.7	1792.6	-244.3	C

VANO	SECCIÓN	Pdf. (Ton.)	σ sd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
1	1	6063.0	478.0	1.72	30.18	90	VERIFICA	748.0	135.0	0.267	7021.6	471.2	VERIFICA
1	2	6063.0	478.0	1.72	30.18	90	VERIFICA	748.0	135.0	0.267	7021.6	412.4	VERIFICA
1	3	6063.0	635.3	1.90	27.79	90	VERIFICA	348.0	135.0	0.267	3100.4	362.5	VERIFICA
1	4	6063.0	635.3	1.90	27.79	90	VERIFICA	348.0	135.0	0.267	3100.4	323.2	VERIFICA
1	5	6063.0	635.3	1.90	27.79	90	VERIFICA	348.0	135.0	0.267	3100.4	283.5	VERIFICA
1	6	6063.0	635.3	1.90	27.79	90	VERIFICA	348.0	135.0	0.267	3100.4	248.0	VERIFICA
1	7	6063.0	635.3	1.90	27.79	90	VERIFICA	348.0	135.0	0.267	3100.4	216.2	VERIFICA
1	8	6063.0	635.3	1.90	27.79	90	VERIFICA	348.0	135.0	0.267	3100.4	187.4	VERIFICA
1	9	6063.0	635.3	1.90	27.79	90	VERIFICA	348.0	135.0	0.267	3100.4	179.8	VERIFICA
1	10	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	206.1	VERIFICA
1	11	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	235.9	VERIFICA
1	12	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	267.1	VERIFICA
1	13	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	301.1	VERIFICA
1	14	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	337.3	VERIFICA
1	15	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	374.7	VERIFICA
1	16	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	414.6	VERIFICA
1	17	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	456.2	VERIFICA
1	18	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	503.0	VERIFICA
1	19	6406.0	671.2	1.94	27.32	90	VERIFICA	348.0	135.0	0.267	3065.0	764.8	VERIFICA
1	20	6436.0	507.4	1.75	29.69	90	VERIFICA	748.0	135.0	0.267	6951.6	1017.2	VERIFICA
1	21	6436.0	507.4	1.75	29.69	90	VERIFICA	748.0	135.0	0.267	6951.6	1272.5	VERIFICA

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ χ1;δ superior (t/m2.)	σ χ1;δ inferior (t/m2.)	f ct,k (t/m2.)	ZONA
2	1	0.0	0.0	1367.0	308.6	-3527.6	1195.0	1367.0	-3527.6	-656.4	1843.5	-244.3	C
2	2	0.0	0.0	1016.1	48.5	-2110.7	1425.5	1016.1	-2110.7	-191.9	1303.9	-244.3	A-B
2	3	0.0	0.0	673.6	-209.4	-1248.2	1269.0	673.6	-1248.2	223.0	1230.0	-244.3	A-B
2	4	0.0	0.0	456.7	-349.2	-797.1	887.4	456.7	-797.1	368.4	1011.5	-244.3	A-B
2	5	0.0	0.0	442.2	-291.2	-345.4	633.0	442.2	-345.4	528.2	806.9	-244.3	A-B
2	6	0.0	0.0	394.4	-271.5	18.7	431.2	394.4	18.7	657.0	641.9	-244.3	A-B
2	7	0.0	0.0	342.3	-254.7	276.0	276.0	342.3	276.0	748.0	525.3	-244.3	A-B
2	8	0.0	0.0	300.3	-240.6	483.0	160.3	300.3	483.0	821.2	431.6	-244.3	A-B
2	9	0.0	0.0	261.5	-229.6	598.3	74.3	261.5	598.3	862.0	379.3	-244.3	A-B
2	10	0.0	0.0	225.9	-221.7	682.3	12.2	225.9	682.3	891.7	341.3	-244.3	A-B
2	11	0.0	0.0	194.9	-220.7	199.7	660.2	220.7	660.2	883.9	351.3	-244.3	A-B
2	12	0.0	0.0	199.9	-245.7	71.7	821.6	245.7	821.6	922.3	259.5	-244.3	A-B
2	13	0.0	0.0	215.3	-269.7	78.4	720.9	269.7	720.9	886.7	305.1	-244.3	A-B
2	14	0.0	0.0	237.0	-296.5	139.2	576.1	296.5	576.1	835.5	370.7	-244.3	A-B
2	15	0.0	0.0	262.0	-326.8	255.3	412.0	326.8	412.0	777.5	445.1	-244.3	A-B
2	16	0.0	0.0	290.0	-359.9	423.6	156.8	359.9	156.8	687.2	560.7	-244.3	A-B
2	17	0.0	0.0	320.8	-403.2	651.5	-139.1	403.2	-139.1	582.5	694.7	-244.3	A-B
2	18	0.0	0.0	354.3	-441.8	945.9	-537.2	441.8	-537.2	441.7	875.1	-244.3	A-B
2	19	0.0	0.0	258.4	-514.4	1234.2	-1091.7	514.4	-1091.7	225.2	1106.0	-244.3	A-B
2	20	0.0	0.0	-66.4	-1023.5	1372.0	-1927.8	1023.5	-1927.8	-172.0	1194.2	-244.3	A-B
2	21	0.0	0.0	-348.6	-1396.6	1203.8	-3272.0	1396.6	-3272.0	-612.6	1706.2	-244.3	C

VANO	SECCIÓN	Pdf. (Ton.)	σ ξδ (T/m2.)	cot q	θ	α	VERIFIC. cot a >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
2	1	6342.0	499.9	1.75	29.81	90	VERIFICA	748.0	135.0	0.267	6969.1	1367.0	VERIFICA
2	2	6342.0	499.9	1.75	29.81	90	VERIFICA	748.0	135.0	0.267	6969.1	1016.1	VERIFICA
2	3	6342.0	664.5	1.93	27.41	90	VERIFICA	348.0	135.0	0.267	3071.6	673.6	VERIFICA
2	4	6207.0	650.4	1.91	27.59	90	VERIFICA	348.0	135.0	0.267	3085.4	456.7	VERIFICA
2	5	6207.0	650.4	1.91	27.59	90	VERIFICA	348.0	135.0	0.267	3085.4	442.2	VERIFICA
2	6	6207.0	650.4	1.91	27.59	90	VERIFICA	348.0	135.0	0.267	3085.4	394.4	VERIFICA
2	7	6207.0	650.4	1.91	27.59	90	VERIFICA	348.0	135.0	0.267	3085.4	342.3	VERIFICA
2	8	6207.0	650.4	1.91	27.59	90	VERIFICA	348.0	135.0	0.267	3085.4	300.3	VERIFICA
2	9	6207.0	650.4	1.91	27.59	90	VERIFICA	348.0	135.0	0.267	3085.4	261.5	VERIFICA
2	10	6207.0	650.4	1.91	27.59	90	VERIFICA	348.0	135.0	0.267	3085.4	225.9	VERIFICA
2	11	6207.0	650.4	1.91	27.59	90	VERIFICA	348.0	135.0	0.267	3085.4	220.7	VERIFICA
2	12	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	245.7	VERIFICA
2	13	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	269.7	VERIFICA
2	14	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	296.5	VERIFICA
2	15	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	326.8	VERIFICA
2	16	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	359.9	VERIFICA
2	17	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	403.2	VERIFICA
2	18	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	441.8	VERIFICA
2	19	5835.0	611.4	1.87	28.12	90	VERIFICA	348.0	135.0	0.267	3124.4	614.4	VERIFICA
2	20	5835.0	460.0	1.70	30.50	90	VERIFICA	748.0	135.0	0.267	7065.1	1023.5	VERIFICA
2	21	5835.0	460.0	1.70	30.50	90	VERIFICA	748.0	135.0	0.267	7065.1	1396.6	VERIFICA

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ χ1;δ superior (t/m2.)	σ χ1;δ inferior (t/m2.)	f ct,k (t/m2.)	ZONA
3	1	0.0	0.0	1396.3	341.8	-3326.3	1150.8	1396.3	-3326.3	-641.7	1715.6	-244.3	C
3	2	0.0	0.0	1029.1	65.6	-1881.0	1412.4	1029.1	-1881.0	-168.0	1165.1	-244.3	A-B
3	3	0.0	0.0	670.6	-208.6	-1031.8	1279.9	670.6	-1031.8	231.3	1063.7	-244.3	A-B
3	4	0.0	0.0	413.8	-388.8	-555.0	906.0	413.8	-555.0	415.1	862.8	-244.3	A-B
3	5	0.0	0.0	419.3	-311.2	-135.8	625.1	419.3	-135.8	563.4	672.9	-244.3	A-B
3	6	0.0	0.0	380.7	-283.0	174.6	406.8	380.7	174.6	673.1	532.3	-244.3	A-B
3	7	0.0	0.0	337.8	-257.5	447.4	245.2	337.8	447.4	769.6	408.7	-244.3	A-B
3	8	0.0	0.0	305.0	-235.0	622.8	132.6	305.0	622.8	831.7	329.2	-244.3	A-B
3	9	0.0	0.0	275.5	-215.6	775.9	60.8	275.5	775.9	885.9	259.9	-244.3	A-B
3	10	0.0	0.0	248.9	-199.3	882.7	21.5	248.9	882.7	923.7	211.6	-244.3	A-B
3	11	0.0	0.0	222.4	-190.7	920.0	148.9	222.4	920.0	936.9	194.7	-244.3	A-B

VANO	SECCIÓN	Pdf. (Ton.)	σ ξδ (T/m2.)	cot q	θ	α	VERIFIC. cot a >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
3	1	5691.0	448.6	1.68	30.70	90	VERIFICA	748.0	135.0	0.267	7092.8	1396.3	VERIFICA
3	2	5691.0	448.6	1.68	30.70	90	VERIFICA	748.0	135.0	0.267	7092.8	1029.1	VERIFICA
3	3	5691.0	596.3	1.85	28.33	90	VERIFICA	348.0	135.0	0.267	3139.8	670.6	VERIFICA
3	4	5835.0	611.4	1.87	28.12	90	VERIFICA	348.0	135.0	0.267	3124.4	413.8	VERIFICA
3	5	5835.0	611.4	1.87	28.12	90	VERIFICA	348.0	135.0	0.267	3124.4	419.3	VERIFICA
3	6	5835.0	611.4	1.87	28.12	90	VERIFICA	348.0	135.0	0.267	3124.4	380.7	VERIFICA
3	7	5835.0	611.4	1.87	28.12	90	VERIFICA	348.0	135.0	0.267	3124.4	337.8	VERIFICA
3	8	5835.0	611.4	1.87	28.12	90	VERIFICA	348.0	135.0	0.267	3124.4	305.0	VERIFICA
3	9	5835.0	611.4	1.87	28.12	90	VERIFICA	348.0	135.0	0.267	3124.4	275.5	VERIFICA
3	10	5836.0	611.5	1.87	28.12	90	VERIFICA	348.0	135.0	0.267	3124.3	248.9	VERIFICA
3	11	5836.0	611.5	1.87	28.12	90	VERIFICA	348.0	135.0	0.267	3124.3	222.4	VERIFICA

3	12	0.0	0.0	220.4	-227.4	68.7	738.3	227.4	738.3	892.9	297.2	-244.3	A-B
3	13	0.0	0.0	226.3	-265.0	128.1	651.3	265.0	651.3	862.1	336.7	-244.3	A-B
3	14	0.0	0.0	235.2	-305.9	208.2	530.0	305.9	530.0	819.2	391.6	-244.3	A-B
3	15	0.0	0.0	247.3	-349.8	316.3	315.2	349.8	315.2	743.2	488.9	-244.3	A-B
3	16	0.0	0.0	262.2	-396.6	461.4	23.8	396.6	23.8	640.2	620.9	-244.3	A-B
3	17	0.0	0.0	279.9	-453.7	650.9	-329.0	453.7	-329.0	515.3	780.8	-244.3	A-B
3	18	0.0	0.0	300.3	-505.7	891.0	-795.2	505.7	-795.2	350.4	992.0	-244.3	A-B
3	19	0.0	0.0	245.1	-638.0	1139.8	-1379.2	638.0	-1379.2	162.5	1275.2	-244.3	A-B
3	20	0.0	0.0	-52.9	-1020.6	1285.4	-2252.7	1020.6	-2252.7	-249.1	1347.3	-244.3	C
3	21	0.0	0.0	-286.4	-1344.9	1166.1	-3558.6	1344.9	-3558.6	-677.2	1844.7	-244.3	C

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd.(+) (t.)	CORT. Vrd.(-) (t.)	MOMEN. Md.(+) (t x m.)	MOMEN. Md.(-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ χ1;δ superior (t/m2.)	σ χ1;δ inferior (t/m2.)	f ct,k (t/m2.)	ZONA
4	1	0.0	0.0	1270.7	310.8	-3371.3	1418.8	1270.7	-3371.3	-605.2	1784.0	-244.3	C
4	2	0.0	0.0	1019.8	126.2	-2294.0	1637.2	1019.8	-2294.0	-252.0	1373.7	-244.3	C
4	3	0.0	0.0	768.2	-56.1	-1584.3	1595.1	768.2	-1584.3	104.1	1382.3	-244.3	A-B
4	4	0.0	0.0	517.0	-242.9	-1156.5	1404.5	517.0	-1156.5	265.3	1198.3	-244.3	A-B
4	5	0.0	0.0	464.5	-234.6	-808.1	1207.8	464.5	-808.1	385.4	1037.3	-244.3	A-B
4	6	0.0	0.0	405.0	-236.1	-496.9	1068.1	405.0	-496.9	495.4	896.3	-244.3	A-B
4	7	0.0	0.0	366.5	-220.1	-269.3	962.7	366.5	-269.3	575.9	793.2	-244.3	A-B
4	8	0.0	0.0	330.5	-205.9	-64.5	887.9	330.5	-64.5	648.4	700.4	-244.3	A-B
4	9	0.0	0.0	295.9	-193.5	92.4	839.5	295.9	92.4	703.9	629.4	-244.3	A-B
4	10	0.0	0.0	263.3	-183.4	177.6	812.7	263.3	177.6	734.0	590.8	-244.3	A-B
4	11	0.0	0.0	233.5	-175.5	255.7	804.4	233.5	255.7	761.7	555.4	-244.3	A-B
4	12	0.0	0.0	208.4	-173.6	274.2	839.6	208.4	274.2	768.2	547.0	-244.3	A-B
4	13	0.0	0.0	180.8	-181.8	258.7	1046.2	181.8	1046.2	1041.3	197.3	-244.3	A-B
4	14	0.0	0.0	173.6	-189.8	-264.5	1633.7	189.8	1633.7	1231.5	-86.5	-244.3	A-B
4	15	0.0	0.0	179.7	-219.9	-444.6	1602.9	219.9	1602.9	1220.6	-72.5	-244.3	A-B
4	16	0.0	0.0	189.8	-251.2	-415.4	1539.6	251.2	1539.6	1198.2	-43.8	-244.3	A-B
4	17	0.0	0.0	202.4	-285.4	-360.4	1423.0	285.4	1423.0	1157.0	9.0	-244.3	A-B
4	18	0.0	0.0	217.6	-323.1	-270.9	1248.9	323.1	1248.9	1095.4	87.8	-244.3	A-B
4	19	0.0	0.0	235.5	-362.2	-140.5	1024.7	362.2	1024.7	1016.1	189.4	-244.3	A-B
4	20	0.0	0.0	252.6	-409.6	142.2	828.5	409.6	828.5	763.3	176.2	-244.3	A-B
4	21	0.0	0.0	268.9	-458.3	475.2	540.4	458.3	540.4	668.9	285.9	-244.3	A-B

VANO	SECCIÓN	Pdf. (Ton.)	σ ξδ (T/m2.)	cot q	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
3	12	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	227.4	VERIFICA
3	13	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	265.0	VERIFICA
3	14	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	305.9	VERIFICA
3	15	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	349.8	VERIFICA
3	16	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	396.6	VERIFICA
3	17	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	453.7	VERIFICA
3	18	6029.0	631.7	1.89	27.84	90	VERIFICA	348.0	135.0	0.267	3103.9	505.7	VERIFICA
3	19	6207.0	650.4	1.91	27.59	90	VERIFICA	348.0	135.0	0.267	3085.4	638.0	VERIFICA
3	20	6207.0	489.3	1.73	29.99	90	VERIFICA	748.0	135.0	0.267	6994.4	1020.6	VERIFICA
3	21	6207.0	489.3	1.73	29.99	90	VERIFICA	748.0	135.0	0.267	6994.4	1344.9	VERIFICA

VANO	SECCIÓN	Pdf. (Ton.)	σ ξδ (T/m2.)	cot q	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
4	1	6342.0	499.9	1.75	29.81	90	VERIFICA	748.0	135.0	0.267	6969.1	1270.7	VERIFICA
4	2	6342.0	499.9	1.75	29.81	90	VERIFICA	748.0	135.0	0.267	6969.1	1019.8	VERIFICA
4	3	6342.0	664.5	1.93	27.41	90	VERIFICA	348.0	135.0	0.267	3071.6	768.2	VERIFICA
4	4	6436.0	674.4	1.94	27.28	90	VERIFICA	348.0	135.0	0.267	3062.0	517.0	VERIFICA
4	5	6406.0	671.2	1.94	27.32	90	VERIFICA	348.0	135.0	0.267	3065.0	464.5	VERIFICA
4	6	6406.0	671.2	1.94	27.32	90	VERIFICA	348.0	135.0	0.267	3065.0	405.0	VERIFICA
4	7	6406.0	671.2	1.94	27.32	90	VERIFICA	348.0	135.0	0.267	3065.0	366.5	VERIFICA
4	8	6406.0	671.2	1.94	27.32	90	VERIFICA	348.0	135.0	0.267	3065.0	330.5	VERIFICA
4	9	6406.0	671.2	1.94	27.32	90	VERIFICA	348.0	135.0	0.267	3065.0	295.9	VERIFICA
4	10	6406.0	671.2	1.94	27.32	90	VERIFICA	348.0	135.0	0.267	3065.0	263.3	VERIFICA
4	11	6406.0	671.2	1.94	27.32	90	VERIFICA	348.0	135.0	0.267	3065.0	233.5	VERIFICA
4	12	6406.0	671.2	1.94	27.32	90	VERIFICA	348.0	135.0	0.267	3065.0	208.4	VERIFICA
4	13	6406.0	671.2	1.94	27.32	90	VERIFICA	348.0	135.0	0.267	3065.0	181.8	VERIFICA
4	14	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	189.8	VERIFICA
4	15	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	219.9	VERIFICA
4	16	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	251.2	VERIFICA
4	17	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	285.4	VERIFICA
4	18	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	323.1	VERIFICA
4	19	6238.0	653.6	1.92	27.55	90	VERIFICA	348.0	135.0	0.267	3082.2	362.2	VERIFICA
4	20	6238.0	491.7	1.74	29.95	90	VERIFICA	748.0	135.0	0.267	6988.6	409.6	VERIFICA
4	21	6238.0	491.7	1.74	29.95	90	VERIFICA	748.0	135.0	0.267	6988.6	458.3	VERIFICA

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1502.8

VANO	SECCIÓN	$f_{ya,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
1	1	4.2	824.50	-1931.6	-	-	824.50	0.0	95.0	95.0
1	2	4.2	824.50	-1573.2	-	-	824.50	0.0	95.0	95.0
1	3	4.2	383.59	1696.3	-	-	383.59	0.0	95.0	95.0
1	4	4.2	383.59	2054.2	-	-	383.59	0.0	95.0	95.0
1	5	4.2	383.59	2258.8	-	-	383.59	0.0	95.0	95.0
1	6	4.2	383.59	2412.3	-	-	383.59	0.0	95.0	95.0
1	7	4.2	383.59	2513.3	-	-	383.59	0.0	95.0	95.0
1	8	4.2	383.59	2564.3	-	-	383.59	0.0	95.0	95.0
1	9	4.2	383.59	2563.3	-	-	383.59	0.0	95.0	95.0
1	10	4.2	383.59	2601.8	-	-	383.59	0.0	95.0	95.0
1	11	4.2	383.59	2498.8	-	-	383.59	0.0	95.0	95.0
1	12	4.2	383.59	2344.3	-	-	383.59	0.0	95.0	95.0
1	13	4.2	383.59	2138.8	-	-	383.59	0.0	95.0	95.0
1	14	4.2	383.59	1882.0	-	-	383.59	0.0	95.0	95.0
1	15	4.2	383.59	1574.3	-	-	383.59	0.0	95.0	95.0
1	16	4.2	383.59	-2075.7	-	-	383.59	3.2	95.0	95.0
1	17	4.2	383.59	-2485.9	-	-	383.59	7.4	95.0	95.0
1	18	4.2	383.59	-2945.7	-	-	383.59	12.2	95.0	95.0
1	19	4.2	383.59	-3396.5	-	-	383.59	38.6	95.0	95.0
1	20	4.2	824.50	-3416.8	1.349	0.690	767.47	27.9	95.0	95.0
1	21	4.2	824.50	-3642.8	1.265	0.612	638.63	70.8	95.0	95.0

VANO	SECCIÓN	$f_{ya,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg q) / Md] no mayor que 2.	[1-Vrdx(cotg q-1)/3xVcuo]	Vcu (Ton.)	Aa. calculada (cm2/m.)	Aa. minima (cm2/m.)	Aa. necesaria (cm2/m.)
2	1	4.2	824.50	-3472.1	1.251	0.588	606.32	85.4	95.0	95.0
2	2	4.2	824.50	-3335.1	-	-	824.50	21.5	95.0	95.0
2	3	4.2	383.59	-3190.6	-	-	383.59	29.5	95.0	95.0
2	4	4.2	383.59	-2450.9	-	-	383.59	7.5	95.0	95.0
2	5	4.2	383.59	-1902.9	-	-	383.59	6.0	95.0	95.0
2	6	4.2	383.59	1836.7	-	-	383.59	1.1	95.0	95.0
2	7	4.2	383.59	2219.1	-	-	383.59	0.0	95.0	95.0
2	8	4.2	383.59	2518.6	-	-	383.59	0.0	95.0	95.0
2	9	4.2	383.59	2736.6	-	-	383.59	0.0	95.0	95.0
2	10	4.2	383.59	2870.6	-	-	383.59	0.0	95.0	95.0
2	11	4.2	383.59	2921.6	-	-	383.59	0.0	95.0	95.0
2	12	4.2	383.59	2773.4	-	-	383.59	0.0	95.0	95.0
2	13	4.2	383.59	2638.4	-	-	383.59	0.0	95.0	95.0
2	14	4.2	383.59	2407.4	-	-	383.59	0.0	95.0	95.0
2	15	4.2	383.59	2080.0	-	-	383.59	0.0	95.0	95.0
2	16	4.2	383.59	1656.1	-	-	383.59	0.0	95.0	95.0
2	17	4.2	383.59	-2044.4	-	-	383.59	2.0	95.0	95.0
2	18	4.2	383.59	-2661.3	-	-	383.59	6.0	95.0	95.0
2	19	4.2	383.59	-3239.4	-	-	383.59	24.2	95.0	95.0
2	20	4.2	824.50	-3422.2	-	-	824.50	23.0	95.0	95.0

30/06/98

2	21	4.2	824.50	-3649.2	1.337	0.606	667.93	84.1	95.0	95.0

VANO	SECCIÓN	fya,d (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg q) / Md] no mayor que 2.	[1-Vrdx(cotg q-1)/3xVcuo]	Vcu (Ton.)	Aa. calculada (cm2/m.)	Aa. minima (cm2/m.)	Aa. necesaria (cm2/m.)
3	1	4.2	824.50	-3561.6	1.338	0.614	677.22	83.7	95.0	95.0
3	2	4.2	824.50	-3435.6	-	-	824.50	23.8	95.0	95.0
3	3	4.2	383.59	-3257.7	-	-	383.59	30.3	95.0	95.0
3	4	4.2	383.59	-2587.0	-	-	383.59	3.2	95.0	95.0
3	5	4.2	383.59	-1991.1	-	-	383.59	3.7	95.0	95.0
3	6	4.2	383.59	1589.9	-	-	383.59	0.0	95.0	95.0
3	7	4.2	383.59	1999.5	-	-	383.59	0.0	95.0	95.0
3	8	4.2	383.59	2315.7	-	-	383.59	0.0	95.0	95.0
3	9	4.2	383.59	2538.6	-	-	383.59	0.0	95.0	95.0
3	10	4.2	383.59	2667.8	-	-	383.59	0.0	95.0	95.0
3	11	4.2	383.59	2704.8	-	-	383.59	0.0	95.0	95.0
3	12	4.2	383.59	2773.4	-	-	383.59	0.0	95.0	95.0
3	13	4.2	383.59	2642.4	-	-	383.59	0.0	95.0	95.0
3	14	4.2	383.59	2430.4	-	-	383.59	0.0	95.0	95.0
3	15	4.2	383.59	2138.7	-	-	383.59	0.0	95.0	95.0
3	16	4.2	383.59	1766.5	-	-	383.59	1.3	95.0	95.0
3	17	4.2	383.59	-1866.6	-	-	383.59	7.3	95.0	95.0
3	18	4.2	383.59	-2400.0	-	-	383.59	12.6	95.0	95.0
3	19	4.2	383.59	-3019.6	-	-	383.59	26.1	95.0	95.0
3	20	4.2	824.50	-3160.7	1.375	0.698	790.74	26.0	95.0	95.0
3	21	4.2	824.50	-3408.7	1.256	0.602	622.83	81.7	95.0	95.0

VANO	SECCIÓN	fya,d (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg q) / Md] no mayor que 2.	[1-Vrdx(cotg q-1)/3xVcuo]	Vcu (Ton.)	Aa. calculada (cm2/m.)	Aa. minima (cm2/m.)	Aa. necesaria (cm2/m.)
4	1	4.2	824.50	-3623.1	1.274	0.617	647.96	69.9	95.0	95.0
4	2	4.2	824.50	-3506.1	1.389	0.693	793.34	25.4	95.0	95.0
4	3	4.2	383.59	-3496.6	-	-	383.59	39.1	95.0	95.0
4	4	4.2	383.59	-3025.4	-	-	383.59	13.5	95.0	95.0
4	5	4.2	383.59	-2524.2	-	-	383.59	8.2	95.0	95.0
4	6	4.2	383.59	-2104.2	-	-	383.59	2.2	95.0	95.0
4	7	4.2	383.59	1642.3	-	-	383.59	0.0	95.0	95.0
4	8	4.2	383.59	1957.3	-	-	383.59	0.0	95.0	95.0
4	9	4.2	383.59	2219.9	-	-	383.59	0.0	95.0	95.0
4	10	4.2	383.59	2430.0	-	-	383.59	0.0	95.0	95.0
4	11	4.2	383.59	2587.6	-	-	383.59	0.0	95.0	95.0
4	12	4.2	383.59	2691.6	-	-	383.59	0.0	95.0	95.0
4	13	4.2	383.59	2746.6	-	-	383.59	0.0	95.0	95.0
4	14	4.2	383.59	2658.8	-	-	383.59	0.0	95.0	95.0
4	15	4.2	383.59	2604.8	-	-	383.59	0.0	95.0	95.0
4	16	4.2	383.59	2498.8	-	-	383.59	0.0	95.0	95.0
4	17	4.2	383.59	2340.7	-	-	383.59	0.0	95.0	95.0
4	18	4.2	383.59	2129.1	-	-	383.59	0.0	95.0	95.0
4	19	4.2	383.59	1864.8	-	-	824.50	0.0	95.0	95.0
4	20	4.2	824.50	-1500.7	-	-	824.50	0.0	95.0	95.0
4	21	4.2	824.50	-1975.3	-	-				

ARMADURA DE RASANTE

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV

ESTRUCTURA : E-1502.8

VANO	SECCION	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
1	1	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	471.2	-255.9	540.0	473.5
1	2	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	412.4	-241.1	936.1	256.7
1	3	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	362.5	-225.6	1135.8	-12.5
1	4	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	323.2	-209.4	1261.4	-236.5
1	5	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	283.5	-195.6	1432.7	-319.0
1	6	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	248.0	-184.6	1502.4	-369.4
1	7	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	216.2	-176.0	1546.3	-393.6
1	8	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	187.4	-169.9	1546.8	-400.9
1	9	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	174.9	-179.8	978.6	139.3
1	10	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	172.8	-206.1	891.7	351.7
1	11	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	173.1	-235.9	855.6	305.7
1	12	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	179.6	-267.1	860.8	224.5
1	13	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	188.3	-301.1	882.9	134.7
1	14	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	199.1	-337.3	925.4	-28.0
1	15	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	211.9	-374.7	992.9	-240.1
1	16	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	226.5	-414.6	1090.5	-475.6
1	17	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	242.9	-456.2	1220.3	-796.6
1	18	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	256.9	-503.0	1384.6	-1177.5
1	19	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	59.5	-764.8	1477.1	-1703.3
1	20	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	-123.6	-1017.2	1526.2	-2406.0
1	21	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	-312.6	-1272.5	1416.7	-3374.3

VANO	SECCION	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
2	1	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	1367.0	308.6	-3527.6	1195.0
2	2	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	1016.1	48.5	-2110.7	1425.5
2	3	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	673.6	-209.4	-1248.2	1269.0
2	4	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	456.7	-349.2	-797.1	887.4
2	5	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	442.2	-291.2	-345.4	633.0
2	6	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	394.4	-271.5	18.7	431.2
2	7	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	342.3	-254.7	276.0	276.0
2	8	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	300.3	-240.6	483.0	160.3
2	9	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	261.5	-229.6	598.3	74.3
2	10	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	225.9	-221.7	682.3	12.2
2	11	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	194.9	-220.7	199.7	660.2
2	12	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	199.9	-245.7	71.7	821.6
2	13	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	215.3	-269.7	78.4	720.9
2	14	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	237.0	-296.5	139.2	576.1
2	15	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	262.0	-326.8	255.3	412.0
2	16	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	290.0	-359.9	423.6	156.8
2	17	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	320.8	-403.2	651.5	-139.1
2	18	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	354.3	-441.8	945.9	-537.2
2	19	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	258.4	-614.4	1234.2	-1091.7
2	20	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	-66.4	-1023.5	1372.0	-1927.8

Calculo-rasante
ARMADURA DE RASANTE

2	21	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	520.8	4435	4200	15455	-348.6	-1396.6	1203.8	-3272.0

VANO	SECCION	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
3	1	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	520.8	4435	4200	15455	1396.3	341.8	-3326.3	1150.8
3	2	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	1029.1	65.6	-1881.0	1412.4
3	3	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	670.6	-208.6	-1031.8	1279.9
3	4	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	413.8	-388.8	-555.0	906.0
3	5	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	419.3	-311.2	-135.8	625.1
3	6	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	380.7	-283.0	174.6	406.8
3	7	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	337.8	-257.5	447.4	245.2
3	8	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	305.0	-235.0	622.8	132.6
3	9	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	275.5	-215.6	775.9	60.8
3	10	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	248.9	-199.3	882.7	21.5
3	11	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	222.4	-190.7	920.0	148.9
3	12	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	220.4	-227.4	68.7	738.3
3	13	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	226.3	-265.0	128.1	651.3
3	14	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	235.2	-305.9	208.2	530.0
3	15	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	247.3	-349.8	316.3	315.2
3	16	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	262.2	-396.6	461.4	23.8
3	17	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	279.9	-453.7	650.9	-329.0
3	18	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	300.3	-505.7	891.0	-795.2
3	19	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	245.1	-638.0	1139.8	-1379.2
3	20	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	-52.9	-1020.6	1285.4	-2252.7
3	21	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	-286.4	-1344.9	1166.1	-3558.6

VANO	SECCION	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
4	1	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	1270.7	310.8	-3371.3	1418.8
4	2	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	1019.8	126.2	-2294.0	1637.2
4	3	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	768.2	-56.1	-1584.3	1595.1
4	4	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	517.0	-242.9	-1156.5	1404.5
4	5	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	464.5	-234.6	-808.1	1207.8
4	6	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	405.0	-236.1	-496.9	1068.1
4	7	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	366.5	-220.1	-269.3	962.7
4	8	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	330.5	-205.9	-64.5	887.9
4	9	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	295.9	-193.5	92.4	839.5
4	10	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	263.3	-183.4	177.6	812.7
4	11	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	233.5	-175.5	255.7	804.4
4	12	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	208.4	-173.6	274.2	839.6
4	13	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	180.8	-181.8	258.7	1046.2
4	14	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	173.6	-189.8	-264.5	1633.7
4	15	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	179.7	-219.9	-444.6	1602.9
4	16	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	189.8	-251.2	-415.4	1539.6
4	17	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	202.4	-285.4	-360.4	1423.0
4	18	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	217.6	-323.1	-270.9	1248.9
4	19	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	235.5	-362.2	-140.5	1024.7
4	20	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	252.6	-409.6	142.2	828.5
4	21	14.000	8.400	1.400	0.406	90	5.65	13.4	15.8	112.6	0	4435	4200	15455	268.9	-458.3	475.2	540.4

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1502-8

VANO	SECCIÓN	A (cm2)	τd ala comp. (Kp/cm2.)	τd ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	τd ala comp. (Kp/cm2.)	τd ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
1	1	-	20.7	-	30.0	11.57	ALA COMPRIMIDA	-	11.3	-	30.0	6.28	ALA COMPRIMIDA	11.57
1	2	-	18.1	-	30.0	10.12	ALA COMPRIMIDA	-	10.6	-	30.0	5.92	ALA COMPRIMIDA	10.12
1	3	-	15.9	-	30.0	8.90	ALA COMPRIMIDA	144.20	-	5.4	45.0	5.26	ALA TRACCIONADA	8.90
1	4	-	14.2	-	30.0	7.93	ALA COMPRIMIDA	144.20	-	5.1	45.0	4.88	ALA TRACCIONADA	7.93
1	5	-	12.5	-	30.0	6.96	ALA COMPRIMIDA	144.20	-	4.7	45.0	4.56	ALA TRACCIONADA	6.96
1	6	-	10.9	-	30.0	6.09	ALA COMPRIMIDA	144.20	-	4.5	45.0	4.31	ALA TRACCIONADA	6.09
1	7	-	9.5	-	30.0	5.31	ALA COMPRIMIDA	144.20	-	4.2	45.0	4.11	ALA TRACCIONADA	5.31
1	8	-	8.2	-	30.0	4.60	ALA COMPRIMIDA	144.20	-	4.1	45.0	3.96	ALA TRACCIONADA	4.60
1	9	-	7.7	-	30.0	4.29	ALA COMPRIMIDA	-	7.9	-	30.0	4.41	ALA COMPRIMIDA	4.41
1	10	-	7.6	-	30.0	4.24	ALA COMPRIMIDA	-	9.1	-	30.0	5.06	ALA COMPRIMIDA	5.06
1	11	-	7.6	-	30.0	4.25	ALA COMPRIMIDA	-	10.4	-	30.0	5.79	ALA COMPRIMIDA	5.79
1	12	-	7.9	-	30.0	4.41	ALA COMPRIMIDA	-	11.7	-	30.0	6.56	ALA COMPRIMIDA	6.56
1	13	-	8.3	-	30.0	4.62	ALA COMPRIMIDA	-	13.2	-	30.0	7.39	ALA COMPRIMIDA	7.39
1	14	-	8.8	-	30.0	4.89	ALA COMPRIMIDA	144.20	-	8.1	45.0	7.87	ALA TRACCIONADA	7.87
1	15	-	9.3	-	30.0	5.20	ALA COMPRIMIDA	144.20	-	9.0	45.0	8.74	ALA TRACCIONADA	8.74
1	16	-	10.0	-	30.0	5.56	ALA COMPRIMIDA	144.20	-	10.0	45.0	9.67	ALA TRACCIONADA	9.67
1	17	-	10.7	-	30.0	5.96	ALA COMPRIMIDA	144.20	-	11.0	45.0	10.64	ALA TRACCIONADA	10.64
1	18	-	11.3	-	30.0	6.31	ALA COMPRIMIDA	144.20	-	12.1	45.0	11.73	ALA TRACCIONADA	11.73
1	19	-	2.6	-	30.0	1.46	ALA COMPRIMIDA	144.20	-	18.5	45.0	17.84	ALA TRACCIONADA	17.84
1	20	-	5.4	-	30.0	3.03	ALA COMPRIMIDA	144.20	-	24.5	45.0	23.72	ALA TRACCIONADA	23.72
1	21	-	13.7	-	30.0	7.67	ALA COMPRIMIDA	144.20	-	30.7	45.0	29.68	ALA TRACCIONADA	29.68

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm.)	armadura superior Aα,sup (cm2/m.)	armadura inferior Aα,inf (cm2/m.)
1	1	30	20.7	69.28	0.14	1.73	9.84
1	2	30	18.1	69.28	0.15	1.33	8.80
1	3	30	15.9	69.28	0.16	1.02	7.87
1	4	30	14.2	69.28	0.16	0.81	7.12
1	5	30	12.5	69.28	0.17	0.63	6.33
1	6	30	10.9	69.28	0.17	0.48	5.61
1	7	30	9.5	69.28	0.18	0.36	4.94
1	8	30	8.2	69.28	0.18	0.27	4.33
1	9	30	7.9	69.28	0.18	0.25	4.16
1	10	30	9.1	69.28	0.18	0.33	4.73
1	11	30	10.4	69.28	0.17	0.43	5.36
1	12	30	11.7	69.28	0.17	0.56	6.00
1	13	30	13.2	69.28	0.16	0.71	6.69
1	14	45	8.1	80.00	0.18	0.40	7.47
1	15	45	9.0	80.00	0.18	0.49	8.25
1	16	45	10.0	80.00	0.18	0.60	9.07
1	17	45	11.0	80.00	0.18	0.73	9.91
1	18	45	12.1	80.00	0.17	0.89	10.84
1	19	45	18.5	80.00	0.16	2.06	15.78
1	20	45	24.5	80.00	0.14	3.64	20.08
1	21	45	30.7	80.00	0.13	5.69	23.98

VANO	SECCIÓN	A (cm2)	τd ala comp. (Kp/cm2.)	τd ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	τd ala comp. (Kp/cm2.)	τd ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
2	1	144.20	-	33.0	45.0	31.88	ALA TRACCIONADA	-	13.6	-	30.0	7.58	ALA COMPRIMIDA	31.88
2	2	144.20	-	24.5	45.0	23.70	ALA TRACCIONADA	-	2.1	-	30.0	1.19	ALA COMPRIMIDA	23.70
2	3	144.20	-	16.3	45.0	15.71	ALA TRACCIONADA	-	9.2	-	30.0	5.14	ALA COMPRIMIDA	15.71
2	4	144.20	-	11.0	45.0	10.65	ALA TRACCIONADA	-	15.4	-	30.0	8.57	ALA COMPRIMIDA	10.65
2	5	144.20	-	10.7	45.0	10.31	ALA TRACCIONADA	-	12.8	-	30.0	7.15	ALA COMPRIMIDA	10.31
2	6	-	17.3	-	30.0	9.68	ALA COMPRIMIDA	-	11.9	-	30.0	6.67	ALA COMPRIMIDA	9.68
2	7	-	15.1	-	30.0	8.40	ALA COMPRIMIDA	-	11.2	-	30.0	6.25	ALA COMPRIMIDA	8.40
2	8	-	13.2	-	30.0	7.37	ALA COMPRIMIDA	-	10.6	-	30.0	5.91	ALA COMPRIMIDA	7.37
2	9	-	11.5	-	30.0	6.42	ALA COMPRIMIDA	-	10.1	-	30.0	5.64	ALA COMPRIMIDA	6.42
2	10	-	9.9	-	30.0	5.55	ALA COMPRIMIDA	-	9.8	-	30.0	5.44	ALA COMPRIMIDA	5.55
2	11	-	8.6	-	30.0	4.79	ALA COMPRIMIDA	-	9.7	-	30.0	5.42	ALA COMPRIMIDA	5.42
2	12	-	8.8	-	30.0	4.91	ALA COMPRIMIDA	-	10.8	-	30.0	6.03	ALA COMPRIMIDA	6.03
2	13	-	9.5	-	30.0	5.28	ALA COMPRIMIDA	-	11.9	-	30.0	6.62	ALA COMPRIMIDA	6.62
2	14	-	10.4	-	30.0	5.82	ALA COMPRIMIDA	-	13.0	-	30.0	7.28	ALA COMPRIMIDA	7.28
2	15	-	11.5	-	30.0	6.43	ALA COMPRIMIDA	-	14.4	-	30.0	8.02	ALA COMPRIMIDA	8.02
2	16	-	12.8	-	30.0	7.12	ALA COMPRIMIDA	-	15.8	-	30.0	8.84	ALA COMPRIMIDA	8.84
2	17	-	14.1	-	30.0	7.87	ALA COMPRIMIDA	144.20	-	9.7	45.0	9.40	ALA TRACCIONADA	9.40
2	18	-	15.6	-	30.0	8.70	ALA COMPRIMIDA	144.20	-	10.7	45.0	10.30	ALA TRACCIONADA	10.30
2	19	-	11.4	-	30.0	6.34	ALA COMPRIMIDA	144.20	-	14.8	45.0	14.33	ALA TRACCIONADA	14.33
2	20	-	2.9	-	30.0	1.63	ALA COMPRIMIDA	144.20	-	24.7	45.0	23.87	ALA TRACCIONADA	23.87
2	21	-	15.3	-	30.0	8.56	ALA COMPRIMIDA	1959.11	-	2.5	45.0	2.40	ALA TRACCIONADA	8.56

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm.)	armadura superior Aα,sup (cm2/m.)	armadura inferior Aα,inf (cm2/m.)
2	1	45	33.0	80.00	0.12	6.57	25.31
2	2	45	24.5	80.00	0.14	3.63	20.07
2	3	45	16.3	80.00	0.16	1.60	14.11
2	4	45	11.0	80.00	0.18	0.73	9.92
2	5	45	10.7	80.00	0.18	0.69	9.63
2	6	30	17.3	69.28	0.15	1.21	8.47
2	7	30	15.1	69.28	0.16	0.91	7.49
2	8	30	13.2	69.28	0.16	0.70	6.67
2	9	30	11.5	69.28	0.17	0.53	5.89
2	10	30	9.9	69.28	0.17	0.40	5.15
2	11	30	9.7	69.28	0.17	0.38	5.04
2	12	30	10.8	69.28	0.17	0.47	5.56
2	13	30	11.9	69.28	0.17	0.57	6.05
2	14	30	13.0	69.28	0.16	0.69	6.59
2	15	30	14.4	69.28	0.16	0.83	7.19
2	16	30	15.8	69.28	0.16	1.01	7.83
2	17	45	9.7	80.00	0.18	0.57	8.83
2	18	45	10.7	80.00	0.18	0.69	9.62
2	19	45	14.8	80.00	0.17	1.33	13.00
2	20	45	24.7	80.00	0.14	3.68	20.19
2	21	30	15.3	69.28	0.16	0.95	7.61

VANO	SECCIÓN	A (cm2)	τd ala comp. (Kp/cm2.)	τd ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	τd ala comp. (Kp/cm2.)	τd ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
3	1	1959.11	-	2.5	45.0	2.40	ALA TRACCIONADA	-	15.0	-	30.0	8.39	ALA COMPRIMIDA	8.39
3	2	144.20	-	24.8	45.0	24.00	ALA TRACCIONADA	-	2.9	-	30.0	1.61	ALA COMPRIMIDA	24.00
3	3	144.20	-	16.2	45.0	15.64	ALA TRACCIONADA	-	9.2	-	30.0	5.12	ALA COMPRIMIDA	15.64
3	4	144.20	-	10.0	45.0	9.65	ALA TRACCIONADA	-	17.1	-	30.0	9.54	ALA COMPRIMIDA	9.65
3	5	144.20	-	10.1	45.0	9.78	ALA TRACCIONADA	-	13.7	-	30.0	7.64	ALA COMPRIMIDA	9.78
3	6	-	16.7	-	30.0	9.34	ALA COMPRIMIDA	-	12.4	-	30.0	6.95	ALA COMPRIMIDA	9.34
3	7	-	14.9	-	30.0	8.29	ALA COMPRIMIDA	-	11.3	-	30.0	6.32	ALA COMPRIMIDA	8.29
3	8	-	13.4	-	30.0	7.49	ALA COMPRIMIDA	-	10.3	-	30.0	5.77	ALA COMPRIMIDA	7.49
3	9	-	12.1	-	30.0	6.76	ALA COMPRIMIDA	-	9.5	-	30.0	5.29	ALA COMPRIMIDA	6.76
3	10	-	10.9	-	30.0	6.11	ALA COMPRIMIDA	-	8.8	-	30.0	4.89	ALA COMPRIMIDA	6.11

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm.)	armadura superior Aα,sup (cm2/m.)	armadura inferior Aα,inf (cm2/m.)
3	1	30	15.0	69.28	0.16	0.91	7.48
3	2	45	24.8	80.00	0.14	3.72	20.28
3	3	45	16.2	80.00	0.16	1.58	14.06
3	4	45	10.0	80.00	0.18	0.60	9.05
3	5	45	10.1	80.00	0.18	0.62	9.16
3	6	30	16.7	69.28	0.15	1.13	8.22
3	7	30	14.9	69.28	0.16	0.89	7.40
3	8	30	13.4	69.28	0.16	0.72	6.76
3	9	30	12.1	69.28	0.17	0.59	6.17
3	10	30	10.9	69.28	0.17	0.48	5.63

3	11	-	9.8	-	30.0	5.46	ALA COMPRIMIDA	-	8.4	-	30.0	4.68	ALA COMPRIMIDA	5.46	3	11	30	9.8	69.28	0.17	0.39	5.07
3	12	-	9.7	-	30.0	5.41	ALA COMPRIMIDA	-	10.0	-	30.0	5.58	ALA COMPRIMIDA	5.58	3	12	30	10.0	69.28	0.17	0.40	5.18
3	13	-	10.0	-	30.0	5.55	ALA COMPRIMIDA	-	11.7	-	30.0	6.50	ALA COMPRIMIDA	6.50	3	13	30	11.7	69.28	0.17	0.55	5.96
3	14	-	10.3	-	30.0	5.77	ALA COMPRIMIDA	-	13.5	-	30.0	7.51	ALA COMPRIMIDA	7.51	3	14	30	13.5	69.28	0.16	0.73	6.78
3	15	-	10.9	-	30.0	6.07	ALA COMPRIMIDA	-	15.4	-	30.0	8.59	ALA COMPRIMIDA	8.59	3	15	30	15.4	69.28	0.16	0.95	7.63
3	16	-	11.5	-	30.0	6.44	ALA COMPRIMIDA	-	17.4	-	30.0	9.74	ALA COMPRIMIDA	9.74	3	16	30	17.4	69.28	0.15	1.23	8.51
3	17	-	12.3	-	30.0	6.87	ALA COMPRIMIDA	144.20	-	10.9	45.0	10.58	ALA TRACCIONADA	10.58	3	17	45	10.9	80.00	0.18	0.72	9.86
3	18	-	13.2	-	30.0	7.37	ALA COMPRIMIDA	144.20	-	12.2	45.0	11.79	ALA TRACCIONADA	11.79	3	18	45	12.2	80.00	0.17	0.90	10.89
3	19	-	10.8	-	30.0	6.02	ALA COMPRIMIDA	144.20	-	15.4	45.0	14.88	ALA TRACCIONADA	14.88	3	19	45	15.4	80.00	0.16	1.43	13.45
3	20	-	2.3	-	30.0	1.30	ALA COMPRIMIDA	144.20	-	24.6	45.0	23.80	ALA TRACCIONADA	23.80	3	20	45	24.6	80.00	0.14	3.66	20.14
3	21	-	12.6	-	30.0	7.03	ALA COMPRIMIDA	144.20	-	32.4	45.0	31.37	ALA TRACCIONADA	31.37	3	21	45	32.4	80.00	0.12	6.36	25.01

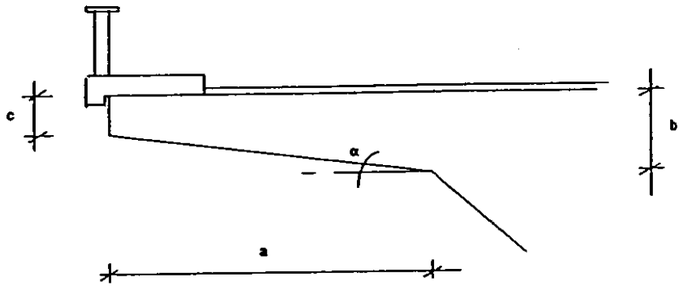
VANO	SECCIÓN	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
4	1	144.20	-	30.7	45.0	29.64	ALA TRACCIONADA	-	13.7	-	30.0	7.63	ALA COMPRIMIDA	29.64
4	2	144.20	-	24.6	45.0	23.78	ALA TRACCIONADA	-	5.6	-	30.0	3.10	ALA COMPRIMIDA	23.78
4	3	144.20	-	18.5	45.0	17.92	ALA TRACCIONADA	-	2.5	-	30.0	1.38	ALA COMPRIMIDA	17.92
4	4	144.20	-	12.5	45.0	12.06	ALA TRACCIONADA	-	10.7	-	30.0	5.96	ALA COMPRIMIDA	12.06
4	5	144.20	-	11.2	45.0	10.83	ALA TRACCIONADA	-	10.3	-	30.0	5.76	ALA COMPRIMIDA	10.83
4	6	144.20	-	9.8	45.0	9.45	ALA TRACCIONADA	-	10.4	-	30.0	5.80	ALA COMPRIMIDA	9.45
4	7	144.20	-	8.8	45.0	8.55	ALA TRACCIONADA	-	9.7	-	30.0	5.40	ALA COMPRIMIDA	8.55
4	8	144.20	-	8.0	45.0	7.71	ALA TRACCIONADA	-	9.1	-	30.0	5.05	ALA COMPRIMIDA	7.71
4	9	-	13.0	-	30.0	7.26	ALA COMPRIMIDA	-	8.5	-	30.0	4.75	ALA COMPRIMIDA	7.26
4	10	-	11.6	-	30.0	6.46	ALA COMPRIMIDA	-	8.1	-	30.0	4.50	ALA COMPRIMIDA	6.46
4	11	-	10.3	-	30.0	5.73	ALA COMPRIMIDA	-	7.7	-	30.0	4.31	ALA COMPRIMIDA	5.73
4	12	-	9.2	-	30.0	5.12	ALA COMPRIMIDA	-	7.6	-	30.0	4.26	ALA COMPRIMIDA	5.12
4	13	-	8.0	-	30.0	4.44	ALA COMPRIMIDA	-	8.0	-	30.0	4.46	ALA COMPRIMIDA	4.46
4	14	144.20	-	4.2	45.0	4.05	ALA TRACCIONADA	-	8.3	-	30.0	4.66	ALA COMPRIMIDA	4.66
4	15	144.20	-	4.3	45.0	4.19	ALA TRACCIONADA	-	9.7	-	30.0	5.40	ALA COMPRIMIDA	5.40
4	16	144.20	-	4.6	45.0	4.43	ALA TRACCIONADA	-	11.0	-	30.0	6.17	ALA COMPRIMIDA	6.17
4	17	144.20	-	4.9	45.0	4.72	ALA TRACCIONADA	-	12.6	-	30.0	7.01	ALA COMPRIMIDA	7.01
4	18	144.20	-	5.2	45.0	5.07	ALA TRACCIONADA	-	14.2	-	30.0	7.93	ALA COMPRIMIDA	7.93
4	19	144.20	-	5.7	45.0	5.49	ALA TRACCIONADA	-	15.9	-	30.0	8.89	ALA COMPRIMIDA	8.89
4	20	-	11.1	-	30.0	6.20	ALA COMPRIMIDA	-	18.0	-	30.0	10.06	ALA COMPRIMIDA	10.06
4	21	-	11.8	-	30.0	6.60	ALA COMPRIMIDA	-	20.2	-	30.0	11.25	ALA COMPRIMIDA	11.25

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm.)	armadura superior Aα,sup (cm2/m.)	armadura inferior Aα,inf (cm2/m.)
4	1	45	30.7	80.00	0.13	5.68	23.96
4	2	45	24.6	80.00	0.14	3.66	20.13
4	3	45	18.5	80.00	0.16	2.08	15.84
4	4	45	12.5	80.00	0.17	0.94	11.12
4	5	45	11.2	80.00	0.17	0.76	10.07
4	6	45	9.8	80.00	0.18	0.58	8.87
4	7	45	8.8	80.00	0.18	0.47	8.08
4	8	45	8.0	80.00	0.18	0.38	7.32
4	9	30	13.0	69.28	0.16	0.68	6.58
4	10	30	11.6	69.28	0.17	0.54	5.92
4	11	30	10.3	69.28	0.17	0.42	5.31
4	12	30	9.2	69.28	0.18	0.34	4.78
4	13	30	8.0	69.28	0.18	0.26	4.20
4	14	30	8.3	69.28	0.18	0.28	4.38
4	15	30	9.7	69.28	0.17	0.38	5.02
4	16	30	11.0	69.28	0.17	0.49	5.67
4	17	30	12.6	69.28	0.17	0.63	6.37
4	18	30	14.2	69.28	0.16	0.81	7.12
4	19	30	15.9	69.28	0.16	1.02	7.87
4	20	30	18.0	69.28	0.15	1.31	8.75
4	21	30	20.2	69.28	0.14	1.64	9.61

CALCULO DE ARMADURA DE VOLADIZO

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1502.8

DATOS GEOMETRIA

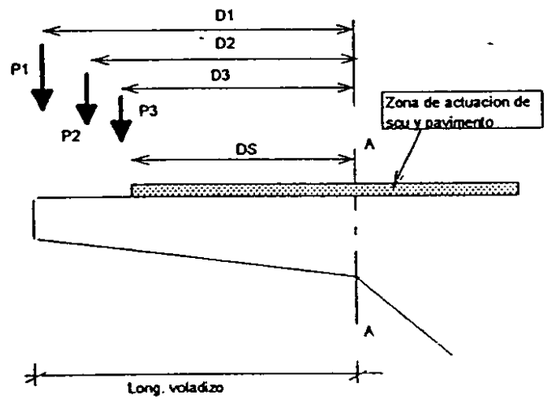


a (longitud voladizo) (m.) =	2.8
b (canto en base del voladizo) (m.) =	0.406
c (canto en extremo del voladizo) (m.) =	0.200
α (angulo cara inferior voladizo) (rad) =	0.073
Recubrimiento (c.d.g. armadura) (m.) =	0.050

DATOS MATERIALES

HORMIGONES		
	Fck(kp/cm2)	γc
Tablero	400	1.5
ACEROS		
	Fk(kp/cm2)	γs
Acero pasivo	5100	1.15

DATOS CARGAS (P1, P2, P3 son cargas permanentes).



Cargas actuantes (valores caracteristicos)

Peso propio hormigón (t/m3) =	2.50

P1(t/m)=	0.75	D1(m.)=	2.80
P2(t/m)=	0.00	D2(m.)=	0.00
P3(t/m)=	0.00	D3(m)=	0.00

Peso pavimento (t/m2)=	0.00
Valor s.c.u. (t/m2)=	0.50

Distancia actuacion s.c. DS(m.)=	2.80

Esfuerzos debidos al carro en Seccion A-A

Momento Mk(m.t/m)=	0.00
Cortante Vk(m.t/m)=	0.00

Coeficientes de ponderacion de acciones

ESTADOS LIMITES ULTIMOS	
	γf
Acciones permanentes desfav.	1.5
Acciones variables desfavorables	1.5

CALCULO

ESFUERZOS (DE SERVICIO) DEBIDOS A LAS CARGAS:

Carga		Momento(mT/	ortante (T/m)
Peso propio		-2.63	2.12
P1		-2.10	0.75
P2		0.00	0.00
P3		0.00	0.00
Pavimento		0.00	0.00
Sobrecarga repartida (s.c.u.)		-1.96	1.40
Carro		0.00	0.00
	TOTAL	-6.69	4.27

ESFUERZOS DE DISEÑO PARA EL DIMENSIONAMIENTO

Carga		Momento(mT/	ortante (T/m	V.reducido (T/
Peso propio		-3.95	3.18	2.37
P1		-3.15	1.13	0.47
P2		0.00	0.00	0.00
P3		0.00	0.00	0.00
Pavimento		0.00	0.00	0.00
Sobrecarga repartida (s.c.u.)		-2.94	2.10	1.49
Carro		0.00	0.00	0.00
	TOTAL	-10.04	6.41	4.33

ARMADO FLEXION (por metro)

As sup.(cm²)	omprobació	Def.sup.(o/oo	Def.inf.(o/oo)	ef. acero(o/oo)
6.56	Vale	-11.541	0.972	-10.000

ARMADO CORTANTE (como viga, por metro)

As 90°(cm²/m)	omprobació	Vu1 (T)	Vcu (T)	Vsu (T)
0.00	Vale	284.80	29.07	0.00

CÁLCULO DE ARMADURA DE TORSION . ART. 48.2 EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA . SUBTRAMO XV
ESTRUCTURA : E-1502.8

En la tabla figuran los valores de los momentos torsores pésimos en cada vano (en m.t.) y para las distintas hipotesis de carga, obtenidas con el modelo de viga continua con apoyos esviados.

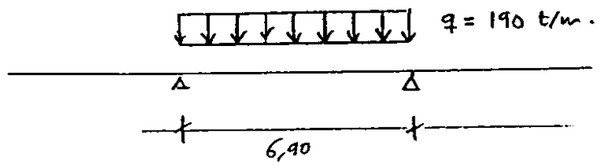
	VANO							
Hipotesis	1		2		3		4	
PP	92	92	20	20	20	20	92	92
CM	46	46	11	11	11	11	50	50
PRET	-179	-179	-52	-52	-36	-36	-198	-198
GRAD	-43	-43	45	45	46	45	-43	-43
SC1	-243	576	-23	-23	3	3	-1	-1
SC2	552	-267	-84	-84	10	10	-3	-3
SC3	-170	-170	-406	627	-35	-35	6	6
SC4	-48	-48	690	-344	-132	-132	21	21
SC5	20	20	-131	-131	-397	638	-45	-45
SC6	6	6	-34	-34	682	-353	-168	-168
SC7	-1	-1	10	10	-83	-83	-305	557
SC8	0	0	4	4	-23	-23	621	-242
SCMAX	578	602	704	641	694	650	649	585
SCMIN	-462	-486	-678	-616	-670	-626	-522	-459

Td(+)	896	931	1119	1024	1121	1054	988	892
Td(-)	-813	-849	-1041	-948	-1014	-947	-917	-823
Ae	9.326	9.326	9.326	9.326	9.326	9.326	9.326	9.326
he	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Tu1	1259	1259	1259	1259	1259	1259	1259	1259
Td/Tu1	0.71	0.74	0.89	0.81	0.89	0.84	0.79	0.71
At(cm2/m)	**11.43**	**11.89**	**14.28**	**13.08**	**14.31**	**13.45**	**12.62**	**11.39**
Al(cm2/m)	**10.83**	**11.26**	**13.53**	**12.38**	**13.55**	**12.74**	**11.95**	**10.78**

La reacción máxima considerada en apoyos de estribos es

$$R_{d,max} = 624 \times 2 = 1248 \text{ tn.}$$

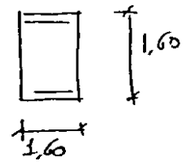
Para el calculo de la armadura inferior se supone la reacción concentrada entre apoyos



$M_d = 190 \times \frac{6,90^2}{8} = 1077 \text{ mt}$

$V_d = 624 \text{ tn.}$

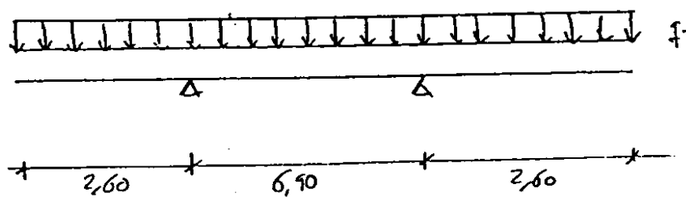
Sección



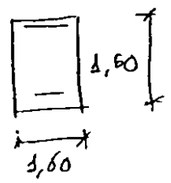
$A_{s,inf} = 170 \text{ cm}^2 \longrightarrow$ 2 capas 11 ϕ32

$A_{90,calculo} = 72 \text{ cm}^2/\text{m} \longrightarrow$ 4 c ϕ16/0,20

Para el calculo de la armadura superior se supone la reacción extendida hasta el empotramiento de las voladizos



$M_d = \frac{103,2 \cdot 2,6^2}{2} = 350 \text{ mt}$

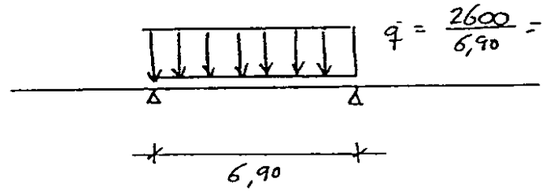


$A_{s,sup} = 56 \text{ cm}^2 \longrightarrow$ 7ϕ32

La reacción máxima en apoyo de pilas es

$$R_{d,max} = 1300 \text{ t} \times 2 = 2600 \text{ ton.}$$

Para el calculo de la armadura inferior supondremos concentrada la reacción entre los apoyos



$M_d = 376,8 \times \frac{6,90^2}{8} = 2243 \text{ mt} \longrightarrow m_d = \frac{M_d}{5,00} = 449 \text{ mt/m.}$

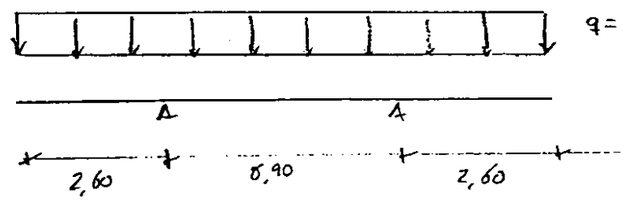
$\downarrow$ 85 cm^2/m.

$V_d = \frac{1300}{5} = 260 \text{ t/m.} \longrightarrow V_{cu} = 110 \text{ t/m.}$ 2 capas ϕ32/0,15

$A_{90} = \frac{260-110}{4,2 \times 0,9 \cdot 1,30} = 30,5 \text{ cm}^2/\text{m.}$

3c ϕ12/0,20 por metro ancho

Para el calculo de la armadura superior se supondrá la reacción extendida hasta el empotramiento de los voladizos



$M_d = 215 \times \frac{2,60^2}{2} = 726 \text{ mt} \longrightarrow m_d = 146 \text{ mt/m} \longrightarrow 30 \text{ cm}^2/\text{m}$

ϕ 32/0,20

DISTRIBUCIÓN CONJUNTA DE ARMADURA DE RASANTE Y FLEXIÓN EN VOLADIZOS

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1502.8

ARMADURA SUPERIOR DISPUESTA=	**20.91**	CM2/M
ARMADURA INFERIOR DISPUESTA=	**10.05**	CM2/M

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
1	1	11.57	1.73	9.84	6.56	0.00	8.29	9.84	0.00	12.62	0.00	0.00
1	2	10.12	1.33	8.80	6.56	0.00	7.89	8.80	0.00	13.02	0.00	0.00
1	3	8.90	1.02	7.87	6.56	0.00	7.59	7.87	0.00	13.33	0.00	0.00
1	4	7.93	0.81	7.12	6.56	0.00	7.38	7.12	0.00	13.54	0.00	0.00
1	5	6.96	0.63	6.33	6.56	0.00	7.19	6.33	0.00	13.72	0.00	0.00
1	6	6.09	0.48	5.61	6.56	0.00	7.04	5.61	0.00	13.87	0.00	0.00
1	7	5.31	0.36	4.94	6.56	0.00	6.93	4.94	0.00	13.99	0.00	0.00
1	8	4.60	0.27	4.33	6.56	0.00	6.84	4.33	0.00	14.08	0.00	0.00
1	9	4.41	0.25	4.16	6.56	0.00	6.81	4.16	0.00	14.10	0.00	0.00
1	10	5.06	0.33	4.73	6.56	0.00	6.89	4.73	0.00	14.02	0.00	0.00
1	11	5.79	0.43	5.36	6.56	0.00	7.00	5.36	0.00	13.92	0.00	0.00
1	12	6.56	0.56	6.00	6.56	0.00	7.12	6.00	0.00	13.79	0.00	0.00
1	13	7.39	0.71	6.69	6.56	0.00	7.27	6.69	0.00	13.64	0.00	0.00
1	14	7.87	0.40	7.47	6.56	0.00	6.96	7.47	0.00	13.95	0.00	0.00
1	15	8.74	0.49	8.25	6.56	0.00	7.06	8.25	0.00	13.86	0.00	0.00
1	16	9.67	0.60	9.07	6.56	0.00	7.17	9.07	0.00	13.75	0.00	0.00
1	17	10.64	0.73	9.91	6.56	0.00	7.29	9.91	0.00	13.62	0.00	0.00
1	18	11.73	0.89	10.84	6.56	0.00	7.45	10.84	0.00	13.46	0.00	0.00
1	19	17.84	2.06	15.78	6.56	0.00	8.62	15.78	0.00	12.29	3.49	0.00
1	20	23.72	3.64	20.08	6.56	0.00	10.20	20.08	0.00	10.71	9.37	0.00
1	21	29.68	5.69	23.98	6.56	0.00	12.26	23.98	0.00	8.66	15.33	5.28

VANO	SECCION	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
2	1	31.88	6.57	25.31	6.56	0.00	13.13	25.31	0.00	7.78	17.53	7.48
2	2	23.70	3.63	20.07	6.56	0.00	10.19	20.07	0.00	10.72	9.35	0.00
2	3	15.71	1.60	14.11	6.56	0.00	8.16	14.11	0.00	12.75	1.36	0.00
2	4	10.65	0.73	9.92	6.56	0.00	7.30	9.92	0.00	13.62	0.00	0.00
2	5	10.31	0.69	9.63	6.56	0.00	7.25	9.63	0.00	13.66	0.00	0.00
2	6	9.68	1.21	8.47	6.56	0.00	7.77	8.47	0.00	13.14	0.00	0.00
2	7	8.40	0.91	7.49	6.56	0.00	7.48	7.49	0.00	13.44	0.00	0.00
2	8	7.37	0.70	6.67	6.56	0.00	7.26	6.67	0.00	13.65	0.00	0.00
2	9	6.42	0.53	5.89	6.56	0.00	7.09	5.89	0.00	13.82	0.00	0.00
2	10	5.55	0.40	5.15	6.56	0.00	6.96	5.15	0.00	13.95	0.00	0.00
2	11	5.42	0.38	5.04	6.56	0.00	6.94	5.04	0.00	13.97	0.00	0.00
2	12	6.03	0.47	5.56	6.56	0.00	7.03	5.56	0.00	13.88	0.00	0.00
2	13	6.62	0.57	6.05	6.56	0.00	7.13	6.05	0.00	13.78	0.00	0.00
2	14	7.28	0.69	6.59	6.56	0.00	7.25	6.59	0.00	13.67	0.00	0.00
2	15	8.02	0.83	7.19	6.56	0.00	7.39	7.19	0.00	13.52	0.00	0.00
2	16	8.84	1.01	7.83	6.56	0.00	7.57	7.83	0.00	13.34	0.00	0.00
2	17	9.40	0.57	8.83	6.56	0.00	7.13	8.83	0.00	13.78	0.00	0.00
2	18	10.30	0.69	9.62	6.56	0.00	7.25	9.62	0.00	13.66	0.00	0.00

Calculos

2	19	14.33	1.33	13.00	6.56	0.00	7.89	13.00	0.00	13.02	0.00	0.00
2	20	23.87	3.68	20.19	6.56	0.00	10.25	20.19	0.00	10.67	9.52	0.00
2	21	8.56	0.95	7.61	6.56	0.00	7.51	7.61	0.00	13.40	0.00	0.00

VANO	SECCION	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
3	1	8.39	0.91	7.48	6.56	0.00	7.47	7.48	0.00	13.44	0.00	0.00
3	2	24.00	3.72	20.28	6.56	0.00	10.29	20.28	0.00	10.63	9.65	0.00
3	3	15.64	1.58	14.06	6.56	0.00	8.14	14.06	0.00	12.77	1.29	0.00
3	4	9.65	0.60	9.05	6.56	0.00	7.16	9.05	0.00	13.75	0.00	0.00
3	5	9.78	0.62	9.16	6.56	0.00	7.18	9.16	0.00	13.73	0.00	0.00
3	6	9.34	1.13	8.22	6.56	0.00	7.69	8.22	0.00	13.22	0.00	0.00
3	7	8.29	0.89	7.40	6.56	0.00	7.45	7.40	0.00	13.46	0.00	0.00
3	8	7.49	0.72	6.76	6.56	0.00	7.29	6.76	0.00	13.63	0.00	0.00
3	9	6.76	0.59	6.17	6.56	0.00	7.15	6.17	0.00	13.76	0.00	0.00
3	10	6.11	0.48	5.63	6.56	0.00	7.04	5.63	0.00	13.87	0.00	0.00
3	11	5.46	0.39	5.07	6.56	0.00	6.95	5.07	0.00	13.97	0.00	0.00
3	12	5.58	0.40	5.18	6.56	0.00	6.96	5.18	0.00	13.95	0.00	0.00
3	13	6.50	0.55	5.96	6.56	0.00	7.11	5.96	0.00	13.80	0.00	0.00
3	14	7.51	0.73	6.78	6.56	0.00	7.29	6.78	0.00	13.62	0.00	0.00
3	15	8.59	0.95	7.63	6.56	0.00	7.52	7.63	0.00	13.40	0.00	0.00
3	16	9.74	1.23	8.51	6.56	0.00	7.79	8.51	0.00	13.12	0.00	0.00
3	17	10.58	0.72	9.86	6.56	0.00	7.29	9.86	0.00	13.63	0.00	0.00
3	18	11.79	0.90	10.89	6.56	0.00	7.46	10.89	0.00	13.45	0.00	0.00
3	19	14.88	1.43	13.45	6.56	0.00	7.99	13.45	0.00	12.92	0.53	0.00
3	20	23.80	3.66	20.14	6.56	0.00	10.23	20.14	0.00	10.69	9.45	0.00
3	21	31.37	6.36	25.01	6.56	0.00	12.92	25.01	0.00	7.99	17.02	6.97

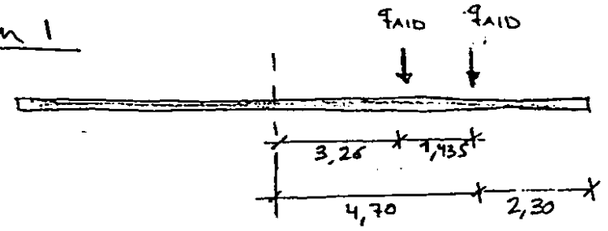
VANO	SECCION	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
4	1	29.64	5.68	23.96	6.56	0.00	12.24	23.96	0.00	8.67	15.29	5.24
4	2	23.78	3.66	20.13	6.56	0.00	10.22	20.13	0.00	10.69	9.43	0.00
4	3	17.92	2.08	15.84	6.56	0.00	8.64	15.84	0.00	12.28	3.57	0.00
4	4	12.06	0.94	11.12	6.56	0.00	7.50	11.12	0.00	13.41	0.00	0.00
4	5	10.83	0.76	10.07	6.56	0.00	7.32	10.07	0.00	13.59	0.00	0.00
4	6	9.45	0.58	8.87	6.56	0.00	7.14	8.87	0.00	13.77	0.00	0.00
4	7	8.55	0.47	8.08	6.56	0.00	7.03	8.08	0.00	13.88	0.00	0.00
4	8	7.71	0.38	7.32	6.56	0.00	6.95	7.32	0.00	13.97	0.00	0.00
4	9	7.26	0.68	6.58	6.56	0.00	7.24	6.58	0.00	13.67	0.00	0.00
4	10	6.46	0.54	5.92	6.56	0.00	7.10	5.92	0.00	13.81	0.00	0.00
4	11	5.73	0.42	5.31	6.56	0.00	6.99	5.31	0.00	13.93	0.00	0.00
4	12	5.12	0.34	4.78	6.56	0.00	6.90	4.78	0.00	14.01	0.00	0.00
4	13	4.46	0.26	4.20	6.56	0.00	6.82	4.20	0.00	14.09	0.00	0.00
4	14	4.66	0.28	4.38	6.56	0.00	6.84	4.38	0.00	14.07	0.00	0.00
4	15	5.40	0.38	5.02	6.56	0.00	6.94	5.02	0.00	13.97	0.00	0.00
4	16	6.17	0.49	5.67	6.56	0.00	7.05	5.67	0.00	13.86	0.00	0.00
4	17	7.01	0.63	6.37	6.56	0.00	7.20	6.37	0.00	13.72	0.00	0.00
4	18	7.93	0.81	7.12	6.56	0.00	7.38	7.12	0.00	13.54	0.00	0.00
4	19	8.89	1.02	7.87	6.56	0.00	7.58	7.87	0.00	13.33	0.00	0.00
4	20	10.06	1.31	8.75	6.56	0.00	7.87	8.75	0.00	13.04	0.00	0.00
4	21	11.25	1.64	9.61	6.56	0.00	8.20	9.61	0.00	12.71	0.00	0.00

GINPROSA

ASUNTO: COMPROBACIONES FRENTE AL DESCANTILAMIENTO SEGÚN EUROCODIGO

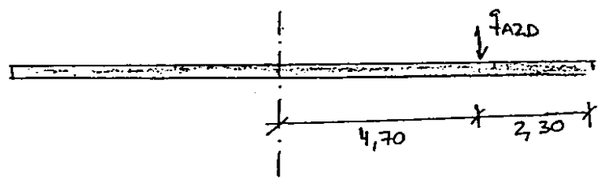
FECHA

SITUACION 1



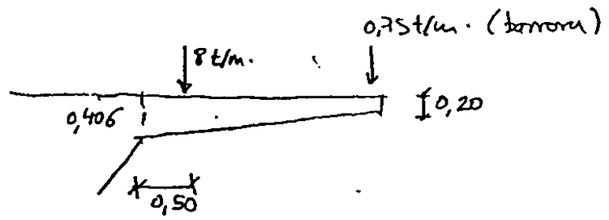
q_{AID} = 50 KN/m y 6,40 m de longitud.

SITUACIÓN DE DISEÑO 2:



q_{A2D} = 80 KN/m. y 20 m de longitud.

COMPROBACIÓN DEL VOLADIZO



$V_\perp = \left(0,20 + \frac{0,206}{2}\right) 2,8 \cdot 2,5 + 0,75 + 8,0 = 10,9$ t/m

$M_\perp = \left(0,20 \cdot \frac{2,8}{2} + \frac{0,206}{2} \cdot \frac{2,8}{3}\right) \times 2,8 \times 2,5 + 0,75 \times 2,8 + 8 \times 0,50 = 8,73$

$V_{cu} = 25,0$ ton $> V_\perp$ OK

$H_\perp < H_u = 30,5$ mt

GINPROSA

ASUNTO: COMPROBACIONES FRENTE AL DESCANTILAMIENTO SEGÚN EUROCODIGO

ESTABILIDAD (13.1)

El forjar que solicita es:

$t = 10$ t/m $\times \left(4,70 - \frac{1,435}{2}\right) = 40$ mt/m.

Esta carga se introduce en el modelo de viga continua con apoyos elásticos con las siguientes reacciones:

Reacciones en apoyos

-56	154
85	-35,3
-59	291
301	-64,1
-66	319
311	-76
-53	312
282	-68,2
-29,5	92,1
144,2	-65,8
Tensor +	Tensor -

Momento volcador = 40 x (86 + 4) = 3600 mt

" estabilizador = (pp + cm) x 2,40 = 3531 x 2,40 = 8474 mt

$M_{volcador} < M_{estabilizador}$ ⇒ NO HAY VUELCO

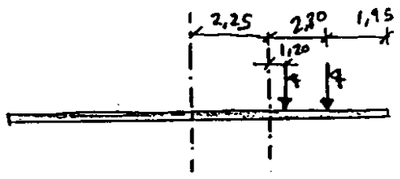
GINPROSA

ASUNTO
COMPROBACIONES FRENTE AL DESCARRILAMIENTO
SEGUN UIC - 776-1

FECHA

PAG. 1 /

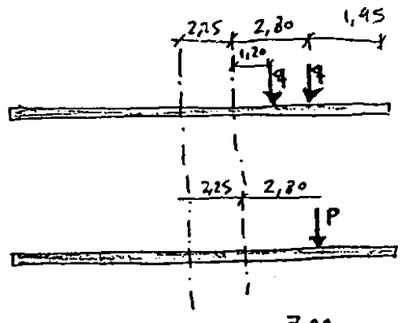
CASO A



q = 1,50 t/m.

P = 10 t

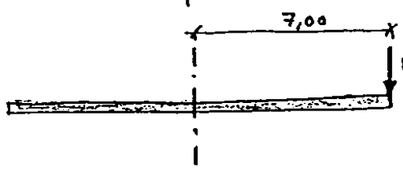
CASO B



q = 5,0 t/m.

P = 22 t

CASO C



COMPROBACIONES

ESTABILIDAD DEL CONJUNTO CASO C

Se aplica la carga de 12 t/m y el torsor de t = 12 x 7 = 84 mt/m a una longitud de 30 m.

Momento volcador = 84 x 30 = 2520 mt

Momento estabilizador = (ppt cm) x 2,40 = 8474 mt

⇒ NO HAY VUELCO.

GINPROSA

ASUNTO
COMPROBACIONES FRENTE A DESCARRILAMIENTO
SEGÚN UIC - 776 - 1

PAG. 2 /

COMPROBACION DE VOLADIZO CASO B

Carga uniforme

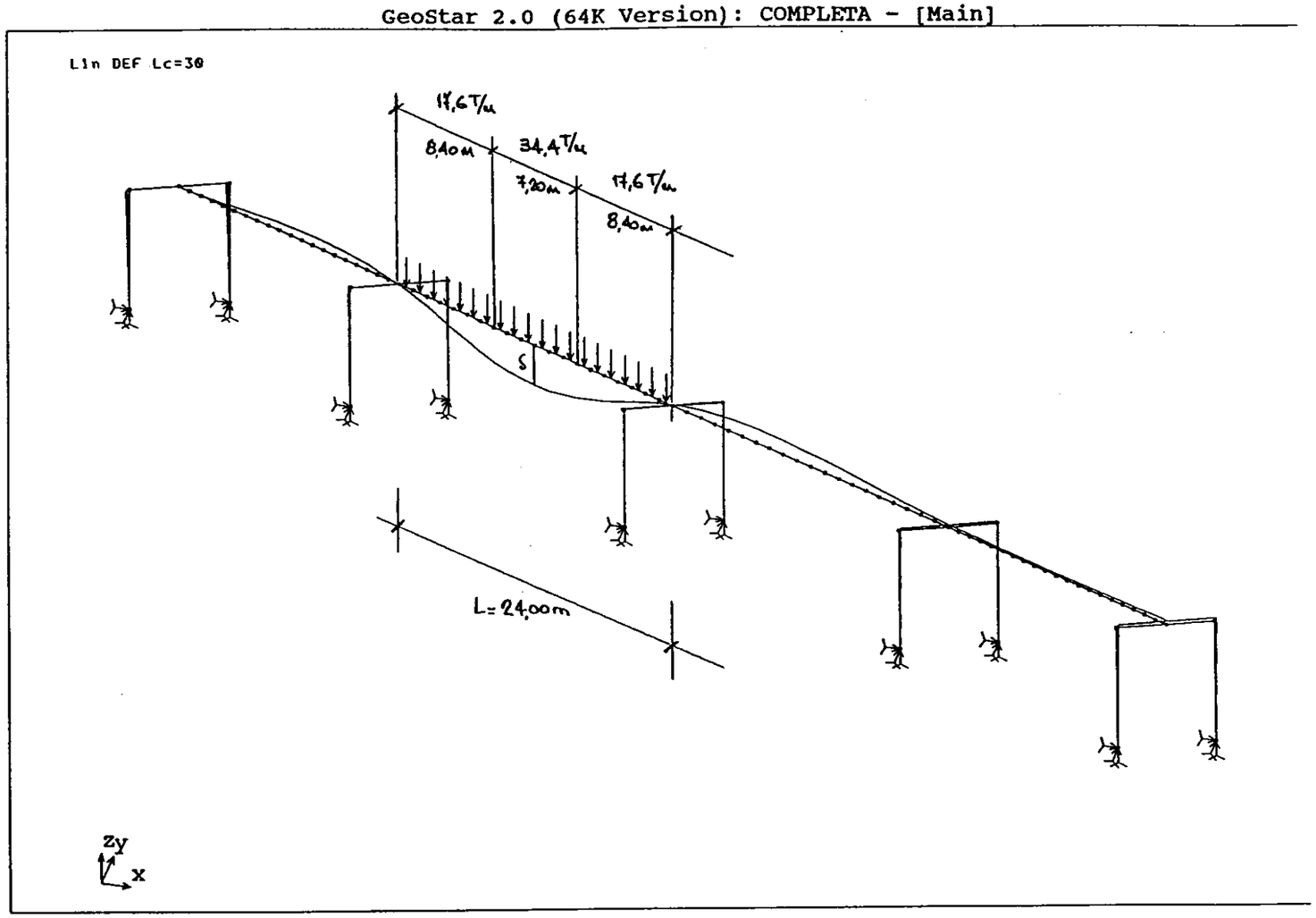
M_d = 6,69 (carga permanente) + q x (2,80 - 1,95) = 10,94 mt < M_u = 30,5 mt

Carga puntual 22 t

M_d = 6,69 + 0,375 · 22 = 14,94 mt < M_u = 30,5 mt.

0,375 Calculado según Tablas de Homberg.

E-1502.8 ESTADO LIMITE DE DEFORMACIONES



$$\frac{S}{L} = \frac{6{,}93\ mm}{24000\ mm} = \frac{1}{3463} < \frac{1}{1454}$$ Verifica

Load case 30

Node	UX	UY	UZ	RX	RY	RZ
1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	-0.000338	-0.000154	0.000006	-0.000166	-0.000068	0.000011
3	-0.000334	-0.000145	0.000136	-0.000148	-0.000098	0.000011
4	-0.000330	-0.000136	0.000285	-0.000127	-0.000125	0.000010
5	-0.000326	-0.000127	0.000447	-0.000101	-0.000149	0.000010
6	-0.000323	-0.000118	0.000618	-0.000073	-0.000167	0.000010
7	-0.000319	-0.000109	0.000791	-0.000043	-0.000180	0.000010
8	-0.000315	-0.000100	0.000963	-0.000011	-0.000187	0.000010
9	-0.000311	-0.000091	0.001125	0.000024	-0.000189	0.000010
10	-0.000308	-0.000082	0.001274	0.000061	-0.000186	0.000011
11	-0.000304	-0.000072	0.001404	0.000100	-0.000177	0.000011
12	-0.000300	-0.000063	0.001508	0.000142	-0.000162	0.000011
13	-0.000295	-0.000053	0.001582	0.000186	-0.000142	0.000012
14	-0.000291	-0.000042	0.001620	0.000232	-0.000117	0.000012
15	-0.000286	-0.000031	0.001615	0.000280	-0.000086	0.000013
16	-0.000282	-0.000020	0.001564	0.000331	-0.000050	0.000013
17	-0.000277	-0.000008	0.001459	0.000384	-0.000009	0.000014
18	-0.000271	0.000005	0.001295	0.000439	0.000038	0.000015
19	-0.000266	0.000018	0.001067	0.000496	0.000091	0.000016
20	-0.000260	0.000032	0.000770	0.000556	0.000149	0.000017
21	-0.000254	0.000047	0.000399	0.000613	0.000208	0.000018
22	-0.000247	0.000063	-0.000045	0.000669	0.000269	0.000019
23	-0.000238	0.000085	-0.000744	0.000681	0.000418	0.000020
24	-0.000228	0.000108	-0.001585	0.000671	0.000525	0.000021
25	-0.000218	0.000132	-0.002512	0.000638	0.000589	0.000022
26	-0.000208	0.000156	-0.003462	0.000586	0.000607	0.000022
27	-0.000198	0.000180	-0.004381	0.000516	0.000583	0.000021
28	-0.000188	0.000203	-0.005216	0.000431	0.000522	0.000020
29	-0.000179	0.000225	-0.005923	0.000332	0.000429	0.000019
30	-0.000171	0.000245	-0.006463	0.000222	0.000309	0.000017
31	-0.000163	0.000262	-0.006805	0.000103	0.000170	0.000015
32	-0.000157	0.000277	-0.006932	-0.000019	0.000022	0.000013
33	-0.000151	0.000290	-0.006835	-0.000141	-0.000128	0.000010
34	-0.000147	0.000300	-0.006521	-0.000261	-0.000269	0.000008
35	-0.000144	0.000308	-0.006006	-0.000372	-0.000392	0.000006
36	-0.000141	0.000314	-0.005317	-0.000473	-0.000490	0.000005
37	-0.000140	0.000318	-0.004494	-0.000561	-0.000557	0.000003
38	-0.000138	0.000321	-0.003578	-0.000634	-0.000589	0.000003
39	-0.000137	0.000324	-0.002618	-0.000689	-0.000580	0.000003
40	-0.000136	0.000327	-0.001669	-0.000726	-0.000526	0.000003
41	-0.000134	0.000331	-0.000793	-0.000740	-0.000430	0.000004
42	-0.000132	0.000336	-0.000043	-0.000733	-0.000293	0.000006
43	-0.000129	0.000343	0.000568	-0.000672	-0.000219	0.000007
44	-0.000126	0.000351	0.001069	-0.000609	-0.000148	0.000008
45	-0.000122	0.000360	0.001464	-0.000545	-0.000078	0.000009
46	-0.000117	0.000371	0.001756	-0.000484	-0.000016	0.000010
47	-0.000112	0.000382	0.001955	-0.000426	0.000040	0.000011
48	-0.000107	0.000395	0.002070	-0.000370	0.000088	0.000012
49	-0.000102	0.000408	0.002111	-0.000318	0.000130	0.000012
50	-0.000096	0.000422	0.002086	-0.000269	0.000164	0.000013
51	-0.000089	0.000436	0.002005	-0.000223	0.000191	0.000013
52	-0.000083	0.000451	0.001876	-0.000179	0.000211	0.000014
53	-0.000076	0.000467	0.001710	-0.000139	0.000225	0.000014
54	-0.000070	0.000483	0.001514	-0.000102	0.000231	0.000014
55	-0.000063	0.000499	0.001299	-0.000068	0.000230	0.000015
56	-0.000056	0.000515	0.001073	-0.000036	0.000222	0.000015
57	-0.000049	0.000531	0.000847	-0.000008	0.000207	0.000015
58	-0.000042	0.000547	0.000627	0.000017	0.000185	0.000015
59	-0.000035	0.000563	0.000425	0.000040	0.000156	0.000014
60	-0.000029	0.000579	0.000249	0.000059	0.000120	0.000014
61	-0.000022	0.000594	0.000107	0.000074	0.000080	0.000014
62	-0.000016	0.000609	0.000005	0.000085	0.000036	0.000013
63	-0.000011	0.000620	-0.000053	0.000077	0.000028	0.000013
64	-0.000006	0.000631	-0.000101	0.000070	0.000020	0.000013
65	-0.000001	0.000643	-0.000140	0.000062	0.000013	0.000013
66	0.000004	0.000654	-0.000170	0.000055	0.000006	0.000013
67	0.000008	0.000665	-0.000192	0.000048	0.000000	0.000013
68	0.000013	0.000676	-0.000206	0.000041	-0.000006	0.000012
69	0.000018	0.000687	-0.000213	0.000034	-0.000010	0.000012
70	0.000022	0.000697	-0.000214	0.000028	-0.000014	0.000012
71	0.000027	0.000708	-0.000209	0.000022	-0.000018	0.000012
72	0.000031	0.000719	-0.000200	0.000016	-0.000020	0.000012
73	0.000036	0.000729	-0.000186	0.000011	-0.000022	0.000012
74	0.000041	0.000740	-0.000170	0.000006	-0.000024	0.000012
75	0.000045	0.000751	-0.000150	0.000001	-0.000024	0.000012
76	0.000050	0.000761	-0.000129	-0.000003	-0.000024	0.000012
77	0.000054	0.000772	-0.000106	-0.000007	-0.000023	0.000012
78	0.000059	0.000782	-0.000083	-0.000011	-0.000022	0.000012
79	0.000063	0.000793	-0.000061	-0.000015	-0.000019	0.000012
80	0.000068	0.000803	-0.000039	-0.000018	-0.000016	0.000012
81	0.000072	0.000814	-0.000019	-0.000021	-0.000013	0.000012
82	0.000077	0.000824	-0.000001	-0.000023	-0.000009	0.000012

E-1502.8. PASO SOBRE N-II
REACCIONES EN APOYOS

																E.L.Servicio		E.L.Ultimo	
Node	PP	PP,rios	CM	PRET	GRAD	SC1	SC2	SC3	SC4	SC5	SC6	SC7	SC8	SC,max	SC,min	Rmax	Rmin	Rmax	Rmin
93	110	74	62	-12	-2	4	166	-41	-10	6	3	-1	-1	178	-52	412	177	624	125
94	72	74	31	62	15	78	-23	10	1	-2	-1	0	0	90	-26	354	214	496	183
95	279	0	146	-2	3	-19	99	47	217	-39	-10	3	1	368	-68	793	354	1191	278
96	309	0	149	-57	-17	188	19	121	-32	9	1	-1	0	338	-33	740	343	1138	272
97	306	0	160	12	2	3	8	-27	125	37	210	-23	-6	383	-56	864	422	1290	348
98	307	0	149	5	1	-8	-26	207	34	122	-30	5	0	369	-64	832	397	1244	319
99	309	0	163	-63	-17	0	-1	4	11	-27	126	26	194	362	-28	771	356	1188	286
100	279	0	135	4	2	1	3	-12	-41	213	43	95	-24	354	-77	775	341	1160	261
101	72	74	39	67	15	0	0	0	-1	5	14	-19	83	101	-20	378	231	529	203
102	110	74	49	-16	-2	0	0	1	5	-15	-46	159	-3	165	-65	381	146	579	90
SUMA	2153	295	1083	0	0	245	245	310	310	310	310	245	245						

Para las sobrecargas se ha tomado:

q= -12.9 t/m
mt= 36 mt/m

PUENTE 1502.8

3º CALCULO DE PILAS

Se calcula la pila central por resultar la mas desfavorable:

Coacción

$$F_c = (PP + cm) \times 0{,}03 = 939 \times 0{,}03 = 28{,}2\ t.$$

Viento

$$p_w = 150 \times (2 - 0{,}7\lambda) = 195\ Kp/m^2 \text{ con } \lambda = 1$$

$$A = (1{,}40 + 0{,}70 + 3{,}50 + 1{,}50) = 7{,}10\ m.$$

$$W = 0{,}195 \times 7{,}1 = 1{,}40\ t/m.$$

$$F_W = 1{,}40 \times 24 = 33{,}60\ tm.$$

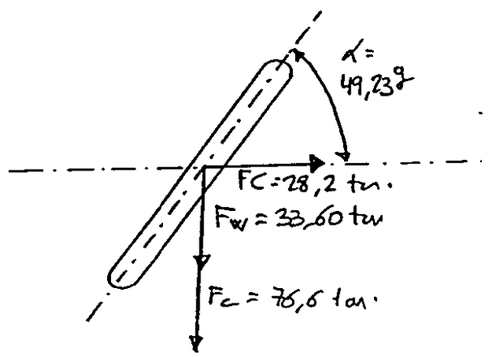
Centrifuga

$$F_c = Q \frac{v^2}{127\, r} \qquad r = 7250\ m.$$

$$v = 350\ Km/h$$

$$Q = 12{,}00 \times 24 \times 2 = 576\ tm.$$

$$F_c = 576 \cdot \frac{350^2}{127 \cdot 7250} = 76{,}6\ tm.$$



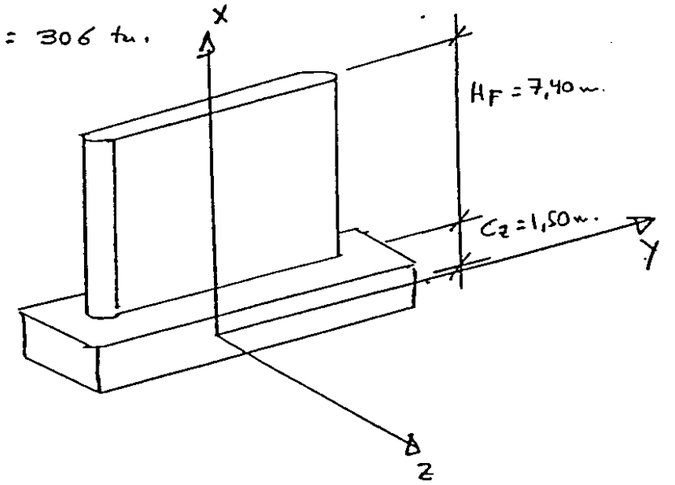
Las fuerzas actuantes en cabeza de pila se descomponen según los ejes principales de la misma.

Fuerza normal $F_z = 28{,}6 \operatorname{sen}\alpha + (33{,}6 + 76{,}6)\cos\alpha = 99\ tm.$

" paralela $F_y = -28{,}6 \cos\alpha + (33{,}6 + 76{,}6) \operatorname{sen}\alpha = 56{,}5\ tm.$

$F_{x,max} = 306 + 679 = 985\ tm.$

$F_{x,min} = 306\ tm.$



Esfuerzos a nivel de cara superior de zapata:

Peso fuste

$F_{x,max} = 216 + 985 = 1201\ tm.$

$F_{x,min} = 216 + 306 = 522\ tm.$

$F_y = 56{,}5\ tm.$

$F_z = 99{,}0\ tm.$

$M_y = 7{,}40 \times 99 = 733\ mt$

$M_z = 7{,}40 \times 56{,}5 = 418\ mt$

Esfuerzo a nivel de cara inferior de zapata:

La zapata tiene 11,50 x 5,70 x 1,50

Peso zapata = 245,8 ton.

$F_{x,max} = 1447$ ton.

$F_{y,min} = 768$ ton.

$F_y = 56,5$ ton.

$F_z = 99,0$ ton.

$M_y = 881,1$ mt

$M_z = 502,8$ mt.

Para $F_{x,max}$ tenemos qe:

$e_z = \frac{M_y}{F_x} = 0,61$ $\quad e_y = \frac{M_z}{F_x} = 0,35$

$\sigma_{cob} = \frac{F_x}{(11,50 - 2 \cdot e_y)(5,70 - 2 \cdot e_z)} = 30$ t/m² ok

Para $F_{y,min}$ tenemos

$e_z = 1,15$ m. $\quad e_y = 0,65$ m.

$\sigma_{cob} = 22$ t/m² ok

CALCULO DE ARMADURAS

ARMADURAS EN FUSTE

Hipotesis I ($F_{x,max}$)	Hipotesis II ($F_{x,min}$)
$F_{x,d} = 1802$ ton	$F_{x,d} = 469$
$M_{y,d} = 1098$ m·t	$M_{y,d} = 1093$ mt
$M_{z,d} = 627$ mt	$M_{z,d} = 627$ mt.

Introduciendo estos esfuerzos en el programa FAGUS se obtiene una armadura de ϕ 25/0,20 en el perimetro del fuste.

ARMADURA EN ZAPATAS

$\sigma_{cob} = 30$ t/m².

$vuelo = \frac{5,70}{2} - 0,60 + 0,15 \times 1,70 = 2,43$ m.

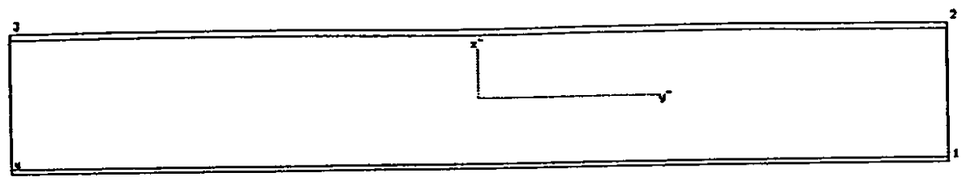
$M_d = 1,50 \times 30 \times \frac{2,43^2}{2} = 133$ mt/m. $\longrightarrow$ $A_s = 21,45$ cm²/m

ϕ 25/0,20.

$V_d = 1,50 \cdot 30 \cdot (2,75 - 1,40/2) = 59,8$ t/m.

$V_{cu} = 93$ t/m $\longrightarrow$ no necesita armadura de cortante.

Mstb. 1 : 50.0



Sección :"FUSTE" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H300PIL"

Ancho = 800.00 cm Canto = 120.00 cm

Características mecánicas de la sección:
Area : Ax= 9.600 [m2]
Momentos de inercia : Iy= 1.152 [m4] Iz= 51.200 [m4]
Inercia a torsión : Ix= 4.173 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.600000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.000	-12.800	1.333
dch.	Iz	4.000	12.800	-1.333
abajo	Iy	-0.600	-1.920	0.200
arriba	Iy	0.600	1.920	-0.200

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	1.00	-400.00	5.00	400.00	5.00
2	AEH500	(2)	1.00	-400.00	115.00	400.00	115.00
	Total:		2.00	Cuantía de armadura: 0.002 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H300PIL")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	800.00 [cm]	116.00 [cm]	0.00
Vy	0.00 [cm2/m]	120.00 [cm]	796.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H300PIL"	210000.0	-153.000	-2.000	0.0	10.000	300.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero

eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Dimensionamiento : Viga "FUSTE"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
-1802.000				1098.000	627.000	45.0

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-400.0	5.0	400.0	5.0	1.00	37.52	37.52
2 "AEH500"	-400.0	115.0	400.0	115.0	1.00	-	1.00

Cuantía arm. 0.04 [o/o] Suma 38.52

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	400.00	120.00	-2.748	-153.000	"H300PIL"
Armadura-Min	400.00	115.00	-2.228	-4434.700	"AEH500"
Hormigón-Max	-400.00	0.00	10.519	0.000	"H300PIL"
Armadura-Max	-400.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 97.41 cm yn 0.36 cm Angulo -0.55

Dimensionamiento : Viga "FUSTE"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
-469.000				1098.000	627.000	45.0

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-400.0	5.0	400.0	5.0	1.00	175.81	175.81
2 "AEH500"	-400.0	115.0	400.0	115.0	1.00	-	1.00

Cuantía arm. 0.18 [o/o] Suma 176.81

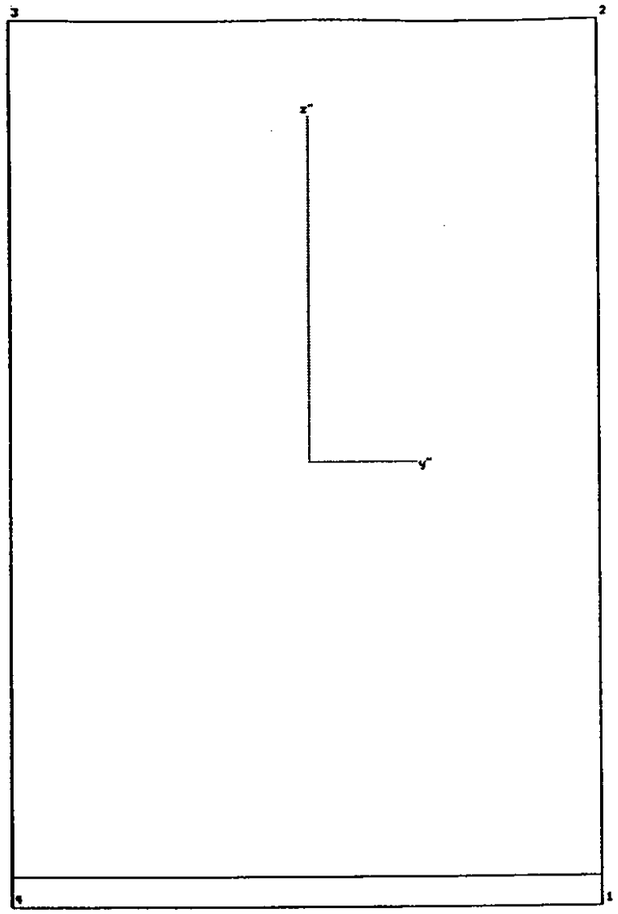
Programa F A G U S - 2 V.1.32
GINPROSA Ingenieros Consultores 01.07.98

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	400.00	120.00	-2.051	-153.000	"H300PIL"
Armadura-Min	400.00	115.00	-1.561	-3278.505	"AEH500"
Hormigón-Max	-400.00	-0.00	10.490	0.000	"H300PIL"
Armadura-Max	-400.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 103.06 cm yn 0.43 cm Angulo -0.57

Nstb. 1 : 10.0



Sección :"ZAPATA" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 150.00 cm

Características mecánicas de la sección:
Area : Ax= 1.500 [m2]
Momentos de inercia : Iy= 0.281250 [m4] Iz= 0.125000 [m4]
Inercia a torsión : Ix= 0.293424 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.750000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.500	-0.250000	0.167
dch.	Iz	0.500	0.250000	-0.167
abajo	Iy	-0.750	-0.375000	0.250
arriba	Iy	0.750	0.375000	-0.250

Programa F A G U S - 2 V.1.32
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Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	1.00	-50.00	5.00	50.00	5.00

Total: 1.00 Cuantía de armadura: 0.007 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	146.00 [cm]	0.00
Vy	0.00 [cm2/m]	150.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,min [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Dimensionamiento : Viga "ZAPATA"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
				133.000		45.0

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. As-nuevo [cm2]	[cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	1.00	21.45	21.45

Cuantía arm. 0.14 [o/o] Suma 21.45

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	150.00	-1.127	-114.612	"H250"
Hormigón-Max	50.00	0.00	10.384	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 135.32 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 14.68 cm Zona comprimida/Canto útil 0.10

PUENTE 1502.8

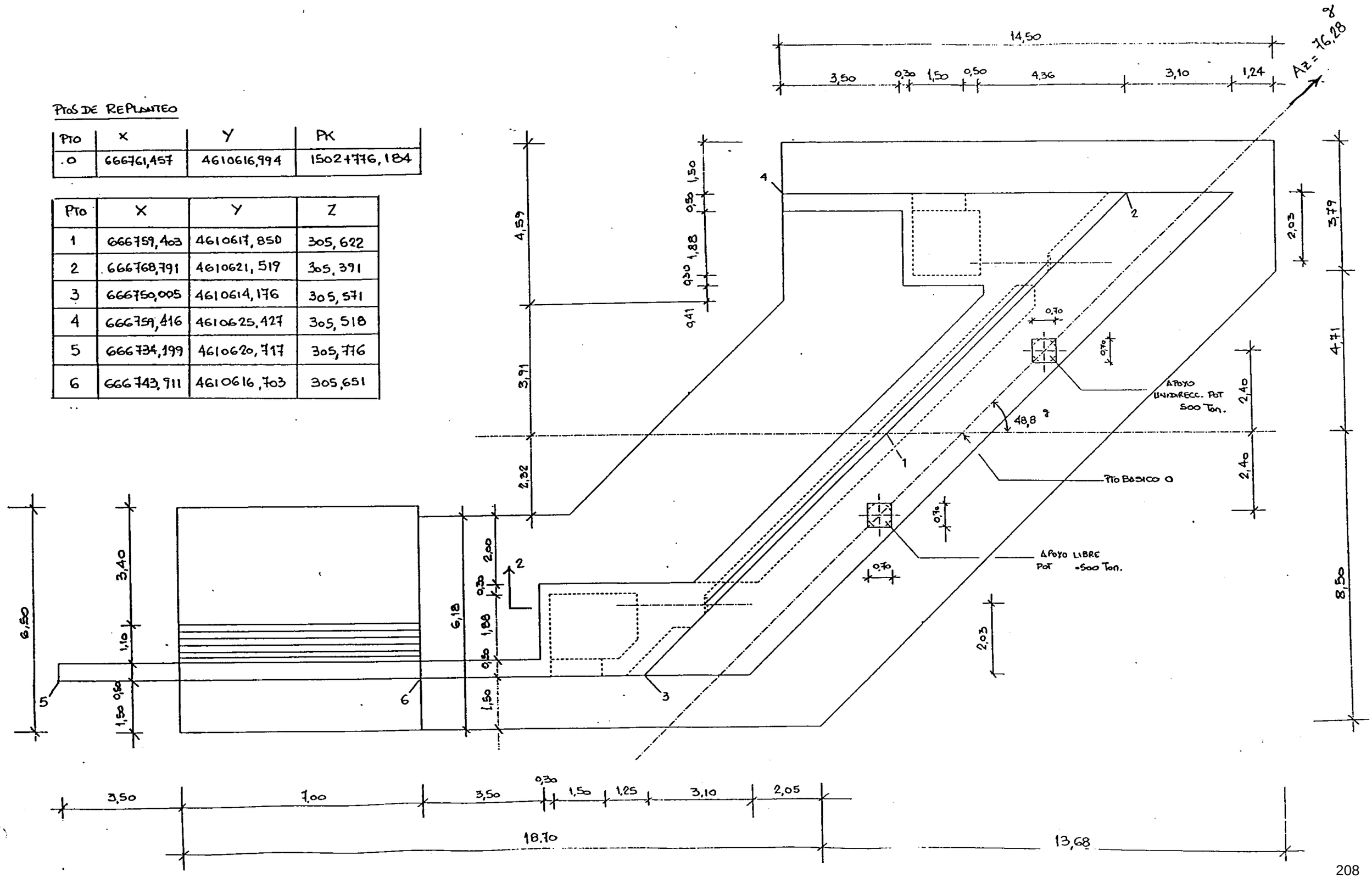
4º CALCULO DE ESTRIBOS

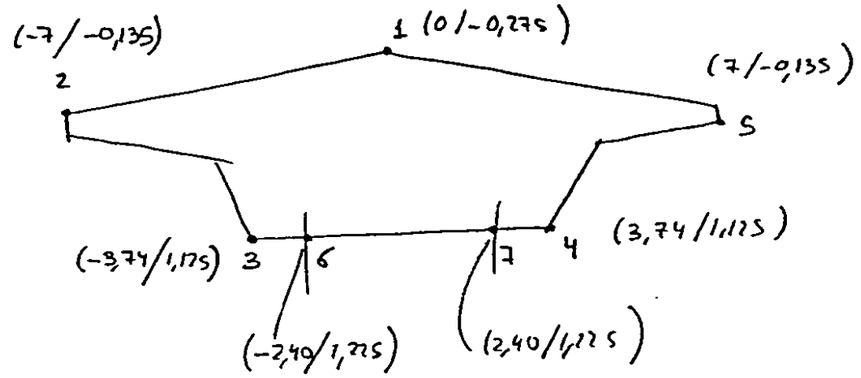
E_1502,8 ESTRIBO 1

PTOS DE REPLANTEO

PTO	X	Y	PK
.0	666761,457	4610616,994	15021776,184

PTO	X	Y	Z
1	666759,403	4610617,850	305,622
2	666768,791	4610621,519	305,391
3	666750,005	4610614,176	305,571
4	666759,416	4610625,427	305,518
5	666734,199	4610620,717	305,776
6	666743,911	4610616,703	305,651



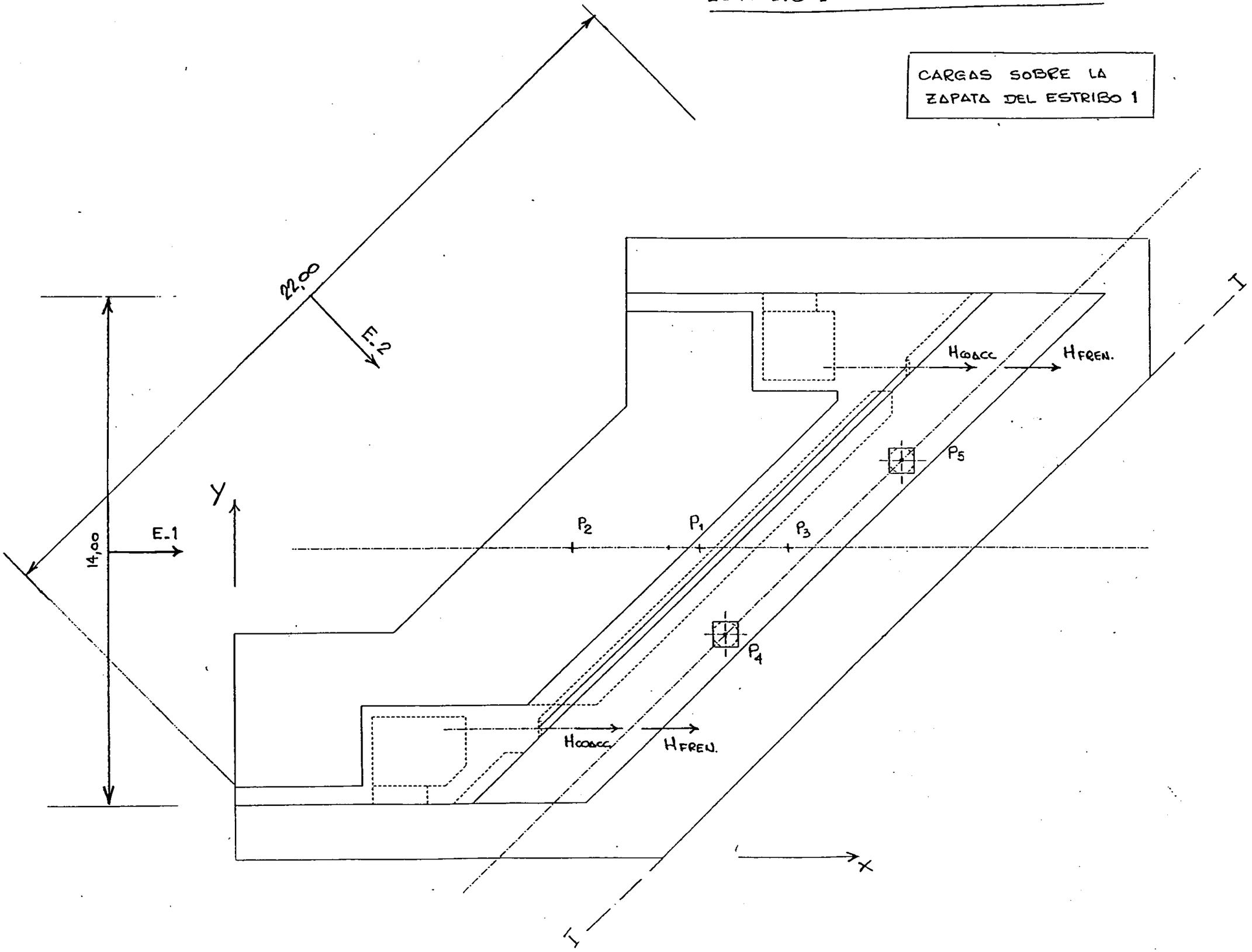


6

SECC	PUNTO	PK	AZ	X	Y	Z	
1	1	1502756.866	76.280	666743.619	4610624.400	305.830	
1	2	1502764.149	76.280	666753.029	4610628.079	305.602	
1	3	1502760.760	76.280	666748.649	4610626.366	304.383	
1	4	1502752.965	76.280	666738.587	4610622.433	304.476	
1	5	1502749.561	76.280	666734.199	4610620.717	305.776	← 5
1	6	1502759.366	76.280	666746.847	4610625.662	304.300	
1	7	1502754.364	76.280	666740.390	4610623.138	304.359	
2	1	1502767.366	76.280	666753.319	4610620.380	305.703	
2	2	1502774.628	76.280	666762.716	4610624.053	305.474	
2	3	1502771.249	76.280	666758.341	4610622.343	304.255	
2	4	1502763.476	76.280	666748.293	4610618.416	304.350	
2	5	1502760.081	76.280	666743.911	4610616.703	305.651	← 6
2	6	1502769.859	76.280	666756.542	4610621.640	304.173	
2	7	1502764.871	76.280	666750.095	4610619.120	304.234	
3	1	1502763.788	76.280	666750.014	4610621.751	305.747	
3	2	1502771.057	76.280	666759.416	4610625.427	305.518	← 4
3	3	1502767.673	76.280	666755.037	4610623.716	304.299	
3	4	1502759.894	76.280	666744.986	4610619.787	304.394	
3	5	1502756.494	76.280	666740.600	4610618.074	305.694	
3	6	1502766.283	76.280	666753.239	4610623.012	304.216	
3	7	1502761.288	76.280	666746.787	4610620.491	304.277	
5	1	1502773.956	76.280	666759.403	4610617.850	305.622	← 1
5	2	1502781.205	76.280	666768.791	4610621.519	305.391	← 2
5	3	1502777.832	76.280	666764.421	4610619.811	304.173	
5	4	1502770.075	76.280	666754.385	4610615.887	304.270	
5	5	1502766.684	76.280	666750.005	4610614.176	305.571	← 3
5	6	1502776.444	76.280	666762.624	4610619.108	304.091	
5	7	1502771.465	76.280	666756.182	4610616.591	304.153	
6	1	1502776.183	76.280	666761.460	4610616.993	305.594	← 0
6	2	1502783.428	76.280	666770.845	4610620.662	305.363	
6	3	1502780.057	76.280	666766.476	4610618.953	304.146	
6	4	1502772.303	76.280	666756.441	4610615.032	304.242	
6	5	1502768.916	76.280	666752.064	4610613.321	305.544	
6	6	1502778.670	76.280	666764.679	4610618.251	304.063	
6	7	1502773.695	76.280	666758.240	4610615.734	304.125	

E-1502.8 - CALCULO ESTRIBO 1

CARGAS SOBRE LA ZAPATA DEL ESTRIBO 1



ESTADOS LIMITES DE EQUILIBRIO

CARGAS VERTICALES

	Permanentes ton.	Variables ton.	X m.	Y m.
P-1	1095		12.85	8.50
P-2	1971	314	9.37	8.45
P-3	606		15.36	8.50
P-4	177	177	13.55	6.10
P-5	246	166	18.52	10.90
TOTAL =	4096	657		

CARGAS HORIZONTALES

	H coacc ton.	H frenado ton.
H-4	53	114
H-5	53	114

Empuje de tierras

E-1	0.5	7.478	11.33	14.00	593 ton.
	1.0	0.990	11.33	14.00	157 ton.
					750 ton.
E-2	0.5	7.478	11.33	22.00	932 ton.
	1.0	0.990	11.33	22.00	247 ton.
					1179 ton.

SEGURIDAD AL DESLIZAMIENTO

En Construcción v_D máx = 1.35

Cargas Deslizantes	750		1179
Cargas Resistentes	2363		2363
v_D =	3.15	v_D =	2.00

En Servicio sin Frenado v_D máx = 1.5

			1179
			74
		H normal	1252
	750		
	106	H paralelo	76
Cargas Deslizantes	856		1255
Cargas Resistentes	2544		2544
v_D =	2.97	v_D =	2.03

En Servicio con Frenado v_D máx = 1.35

			1179
			232
		H normal	1411
	750		
	334	H paralelo	240
Cargas Deslizantes	1084		1431
Cargas Resistentes	2544		2544
v_D =	2.35	v_D =	1.78

SEGURIDAD AL VOLCAMIENTO

	Totales ton.	X m.	Y m.	mT.	mT.
P-1	1095	12.85	8.50	14073	9311
P-2	2285	9.37	8.45	21405	19299
P-3	606	15.36	8.50	9312	5154
P-4	354	13.55	6.10	4796	2159
P-5	412	18.52	10.90	7628	4491
TOTAL =	4753	12.04	8.50	57215	40414

Distancia de la Resultante Vertical respecto a I - I = 5.95 m.

En Servicio con Frenado v D máx = 1.35

. Momento de Vuelco

932	3.78	3520
247	5.67	1398
		4918 Tm.

Momento Resistente

4753	5.95	28279
		28279 Tm.

v V = 5.75

SEGURIDAD AL HUNDIMIENTO

Ancho = 9.50
Largo = 22.00

V = 4753 Ton.
v = 216 Ton / m
Distancia a I - I = 5.95 m.

M tierras =	932	3.78	3520
	247	5.67	1398
			4918 Tm.

m tierras = 224 Tm / m

M frenado+coacción =	232	10.20	2367
			2367 Tm.

m frenado+coacción = 108 Tm / m

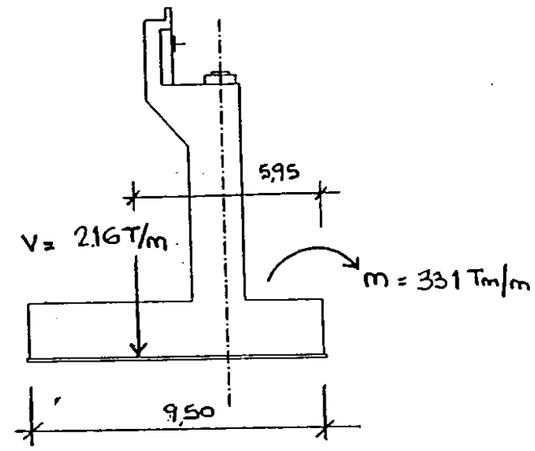
m = 331 Tm / m

Distancia de la Resultante a I - I =	Ton.	m.	Tm.
	216	5.95	1285
			-331
	216	4.42	954

v = 216 Ton / m

Area Cobaricéntrica = 8.335 m2 / m

Tensión cobaricéntrica = 25.9 T / cm2



NOMBRE PROYECTO : LINEA DE ALTA VELOCIDAD MADRID - BARCELONA - FRONT. FRANCESA

DESIGNACION ESTRIBO: E-1502.8 ESTRIBO 1 - MURO FRONTAL

CALCULO ESTRIBOS CERRADOS

DATOS REQUERIDOS:

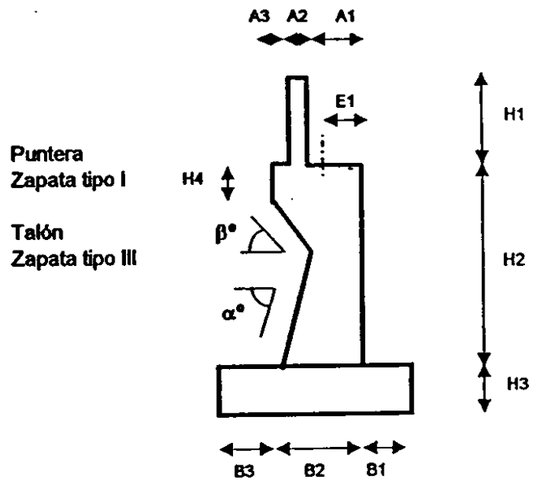
DIMENSIONES(en metros)

H1= 2.10
H2= 7.00
H3= 1.80
Htierras= 9.10
B1= 2.50
B2= 1.70
B3= 5.30

A1= 2.52
A2= 0.5
A3= 0.01

H4= 0.5
α(grados)= 90
β(grados)= 45
E1= 0.6

Longitud= 1
Recubrim.= 0.05



Puntera
Zapata tipo I

Talón
Zapata tipo III

CARACTERISTICAS DE TERRENO

Peso tierras(T/m3)	γ= 2
Angulo rozamiento interno	φ= 30
Coef.rozamiento zapata-terreno	μ= 0.58
Angulo. rozamiento tierras muro	δ= 0
Tension admisible.(T/m2)	σ= 32

COEFICIENTES DE SEGURIDAD

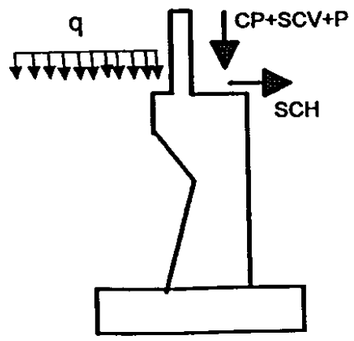
Mayoracion de cargas	γf= 1.5
Seguridad al deslizamiento	Csd= 1.5
Seguridad al vuelco	Csv= 1.5
Minoracion acero	gs= 1.15
Minoracion hormigon	gc= 1.5

CARACTERISTICAS DE LOS MATERIALES

Peso especifico hgon(T/m3)	γη= 2.5
Resistencia acero (T/m2)	Fyk= 51000
Resistencia hgon. ciment. (T/m2)	Fck1= 2500
Resistencia hgon. alzado (T/m2)	Fck2= 2500

CARGAS TRANSMITIDAS POR LA ESTRUCTURA(valores sin mayorar)

Cargas verticales(ton/m)	
Cargas permanentes	CP= 21.15
Sobrecargas	SCV= 17.15
Pretensado	P= 0.00
Cargas horizontales(ton/m)	
Sobrecargas horizontales	SCH= 19.87
Sobrecarga(ton/m2)	q= 3.00

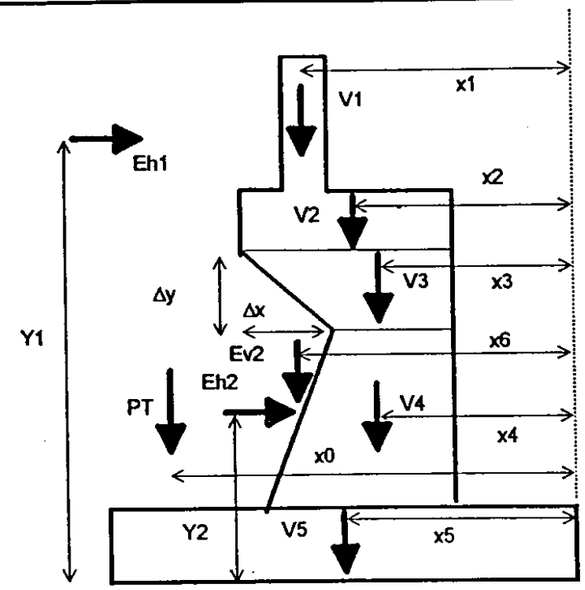


NOMBRE PROYECTO : LINEA DE ALTA VELOCIDAD MADRID - BARCELONA - FRONT. FRANCESA

DESIGNACION ESTRIBO: E-1502.8 ESTRIBO 1 - MURO FRONTAL

CALCULO ESTRIBOS CERRADOS

CARGAS DE PESO PROPIO Y EMPUJES DE TIERRAS SOBRE ESTRIBO(ton/m. sin mayorar)



Resultados intermedios:

Δx= 1.330
Δy= 1.330

COEFICIENTES EMPUJE ACTIVO ALZADO MURO

Coef. empuje activo λh= 0.333
Coef. empuje activo λv= 0.000

COEFICIENTES EMPUJE ACTIVO MURETE

Coef. empuje activo λh= 0.333
Coef. empuje activo λv= 0.000

PESO TIERRAS TRASDOS

PT=	87.818	x0=	7.050

PESO PROPIO

V1=	2.625	x1=	5.270
V2=	3.788	x2=	4.015
V3=	7.864	x3=	3.714
V4=	21.973	x4=	3.350
V5=	42.750	x5=	4.750
TOTAL PP=	78.999		4.239

EMPUJES

Eh1=	9.078	Y1=	8.564
Eh2=	27.625	Y2=	4.107
Eh3=	13.800	Y3=	0.877
Empuje hor.	50.503		4.025
Ev2=	0.000	x6=	4.200

NOMBRE PROYECTO : LINEA DE ALTA VELOCIDAD MADRID - BARCELONA - FRONT. FRANCESA

DESIGNACION ESTRIBO: E-1502.8 ESTRIBO 1 - MURO FRONTAL

CALCULO ESTRIBOS CERRADOS

COMPROBACIONES

1) SEGURIDAD AL DESLIZAMIENTO

$$C_{SD} = \frac{\sum_i \text{Fuerzas} - \text{opuestas}}{\sum_i \text{Fuerzas} - \text{deslizantes}}$$

1,A) En construccion:

Fuerzas opuestas		
Peso propio	45.819	
Peso tierras	50.935	
Ev2	0.000	
TOTAL		96.754
Fuerzas deslizantes		
Empuje horizontal	50.503	
TOTAL		50.503

Csd= 1.92

1,B) En Servicio:

Fuerzas opuestas		
Peso propio	45.819	
Peso tierras	50.935	
Ev2	0.000	
Carga perma	12.267	
TOTAL		109.021
Fuerzas deslizantes		
Empuje horiz	50.503	
Sobrecarga h	19.873	
TOTAL		70.376

Csd= 1.55

2) SEGURIDAD AL VUELCO

$$C_{SV} = \frac{\sum_i \text{Momentos} - \text{estabilizadores}}{\sum_i \text{Momentos} - \text{volcadores}}$$

2,A) En construccion:

Mom.estabilizadores		
Peso propio	334.914	
Peso tierras	619.128	
M Ev2	0.000	
TOTAL		954.042
Mom. volcadores		
Empuje horizontal	203.297	
TOTAL		203.297

Csv= 4.69

2,B.) En Servicio:

Mom.estabilizadores		
Peso propio	334.914	
Peso tierras	619.128	
M Ev2	0.000	
Carga perma	65.565	
TOTAL		1019.607
Mom. volcadores		
Empuje horiz	203.297	
Sobrecarga h	174.882	
TOTAL		378.180

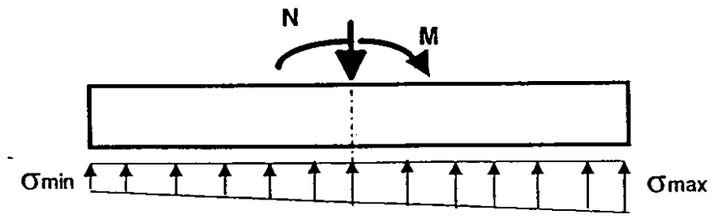
Csv= 2.70

NOMBRE PROYECTO : LINEA DE ALTA VELOCIDAD MADRID - BARCELONA - FRONT. FRANCESA

DESIGNACION ESTRIBO: E-1502.8 ESTRIBO 1 - MURO FRONTAL

CALCULO ESTRIBOS CERRADOS

3) TENSIONES MAXIMAS Y MINIMAS EN CIMENTACION



3,A) En construccion:

Carga vertical N. (t/m)		
Peso propio	78.999	
Peso tierras	87.818	
Ev2	0.000	
TOTAL		166.817
Momento M. (m.t/m)		
Peso propio	40.330	
Peso tierras	-201.991	
M Ev2	0.000	
Empuje horizontal	203.297	
TOTAL		41.636

Ancho zapata=	9.50
σmax=	20.33 (ton/m2)
σmin=	14.79 (ton/m2)
σcob=	18.53 (ton/m2)
σmed=	17.56 (ton/m2)

3,B) En Servicio:

Carga vertical N. (t/m)		
Peso propio	78.999	
Peso tierras	87.818	
Ev2	0.000	
Carga perma	21.150	
Sc. vertical	17.150	
Pretensado	0.000	
TOTAL		205.117
Momento M. (m.t/m)		
Peso propio	40.330	
Peso tierras	-201.991	
M Ev2	0.000	
Carga perma	34.898	
Sc. vertical	28.298	
Pretensado	0.000	
Empuje horiz	203.297	
Sobrecarga h	174.882	
TOTAL		279.713

Ancho zapata (m)=	9.50
σmax=	40.19 (ton/m2)
σmin=	3.00 (ton/m2)
σcob=	30.29 (ton/m2)
σmed=	21.59 (ton/m2)

NOMBRE PROYECTO : LINEA DE ALTA VELOCIDAD MADRID - BARCELONA - FRONT. FRANCESA

DESIGNACION ESTRIBO: E-1502.8 ESTRIBO 1 - MURO FRONTAL

CALCULO ESTRIBOS CERRADOS

CALCULOS

4) ESFUERZOS DE DISEÑO

4,A) Esfuerzos en el muro.

Seccion	Base	1/3 H2
h(m)	0	2.33
Canto (m.)	1.7	1.7
M cargas verti	9.575	9.575
M cargas horiz	139.111	92.741
M peso propio	-10.418	-10.418
M empuje hori	125.135	57.320
M empuje vert	0.000	0.000
Md (mt/m)	**395.104**	**223.825**
V cargas horiz	19.873	19.873
V empuje hori	50.503	22.029
Vd (t/m)	**105.565**	**62.853**
Ndmax(t/m)	111.82	96.95
Ndmin(t/m)	32.62	23.70

4,B) Esfuerzos en el murete.

Seccion	Base murete
h(m)	7.00
Canto (m.)	0.5
M empuje horizontal	3.234
Md (mt/m)	**4.851**
V empuje horizontal	3.570
Vd (t/m)	**5.355**
Nd (t/m)	2.63

4,C) Esfuerzos en la puntera.

(momentos (+) implica tracciones en cara inferior)

Seccion	Cara intrados
Distancia a vuelco	2.5
M peso propio	-14.063
M tens.terreno	115.390
Md puntera(mt/m)	**151.991**
Posicion seccion S2 cortante	1.625
Canto util seccion S2	1.750
V peso propio	-7.313
V tens.terreno	60.135
Vd en puntera(t/m)	**79.234**

4,D) Esfuerzos en el talon

(momentos (+) implica tracciones en cara superior)

Seccion	Cara trasdos
Distancia a vuelco	4.2
M tierras	250.29
M peso propio	63.20
M tens.terreno	-139.210
Md talon(mt/m)	**261.425**
Posicion seccion S2 cortant	5.950
Canto util seccion S2	1.750
V tierras	58.82
V peso propio	15.98
V tens.terreno	-35.302
Vd en talon(t/m)	**59.241**
Cortante base	105.565
Area comp.cim.talon/total	0.519
Traccion superior d. (t/m)	54.789

NOMBRE PROYECTO : LINEA DE ALTA VELOCIDAD MADRID - BARCELONA - FRONT. FRANCESA

DESIGNACION ESTRIBO: E-1502.8 ESTRIBO 1 - MURO FRONTAL

CALCULO ESTRIBOS CERRADOS

5) CALCULO DE SECCIONES

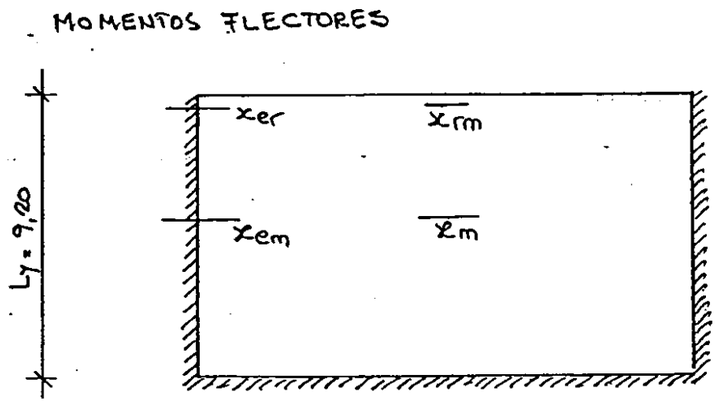
Elementos	Seccion Designacion	b(m.)	d(m.)	Esfuerzos de diseño Md(m.ton)	Nd(ton.)	Vd(ton.)
MURO	0-0	1.00	1.70	395.10	-	105.56
	1-1	1.00	1.70	223.83	-	62.85
PUNTERA	2-2	1.00	1.80	151.99	-	79.23
TALÓN	3-3	1.00	1.80	261.42	-	59.24
MURETE	4-4	1.00	0.50	4.85	-	5.36

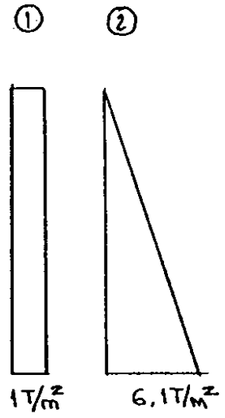
Elementos	Designacion armaduras	Nombre Seccion	ARMADURA(cm2/m) Necesaria	Minima	Adoptada
MURO	Asv1	0-0	49.64	10.20	49.64
	Asv1	1-1	27.42	10.20	27.42
	Asv3	-	0.00	5.10	5.10
	Ash1	-	0.00	13.60	13.60
	Ash2	-	0.00	13.60	13.60
	Cortante	0-0	0.00	0.00	0.00
PUNTERA	As inf L.	2-2	3.47	13.02	13.02
	As inf T.	-	17.34	13.02	17.34
	Cortante	S2	0.00	0.00	0.00
TALÓN	As sup L.	3-3	8.19	13.02	13.02
	As sup T.	-	40.97	13.02	40.97
	Cortante	S2	0.00	0.00	0.00
MURETE	Asv2	4-4	2.13	2.25	2.25
	Asv4	-	0.00	2.25	2.25
	Ash3	-	0.00	4.00	4.00
	Ash4	-	0.00	4.00	4.00

NOTA: las armaduras longitudinales en talón y puntera que aparecen en las casillas de armadura "necesaria" han sido obtenidas multiplicando la armadura transversal por el coeficiente de poisson.

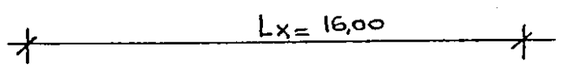
MURO FRONTAL

MOMENTOS FLECTORES





$\frac{Ly}{Lx} = 0,60$



$K_1 = 1T/m^2 \cdot 9,2m \cdot 16,0m = 147,2T$

$K_2 = \frac{6,1T/m^2 \cdot 9,2m \cdot 16,0m}{2} = 449,0T$

$m_{xer} = -\frac{147,2}{7,42} - \frac{449,0}{17,0} = -49,9\ Tm/m$

$m_{xem} = -\frac{147,2}{14,6} - \frac{449,0}{18,3} = -34,6\ Tm/m$

$m_{xrm} = \frac{147,2}{19,8} + \frac{449,0}{36,6} = 12,3\ Tm/m$

$m_{xm} = \frac{147,2}{38,6} + \frac{449,0}{59,2} = 11,4\ Tm/m$

ARMAD. HORIZONTAL INTERIOR

$M_d = 1,5 \cdot 49,9\ Tm/m = 74,9\ Tm/m$

$n_d = 1,5 \cdot 44,5\ T/m = 66,8\ T/m$ (TRACCION)

SECC. 100 × 170

$a_s = \phi 20/0,15$

ARMADURA HORIZONTAL EXTERIOR

$N_d = 1,5 \cdot 12,3\ Tm/m = 18,5\ Tm/m$

$n_d = 1,5 \cdot 44,5\ T/m = 66,8\ T/m$ (TRACCION)

SECC. 100 × 170

$a_s = \phi 16/0,15$

REACCIONES SOBRE BORDES LATERALES

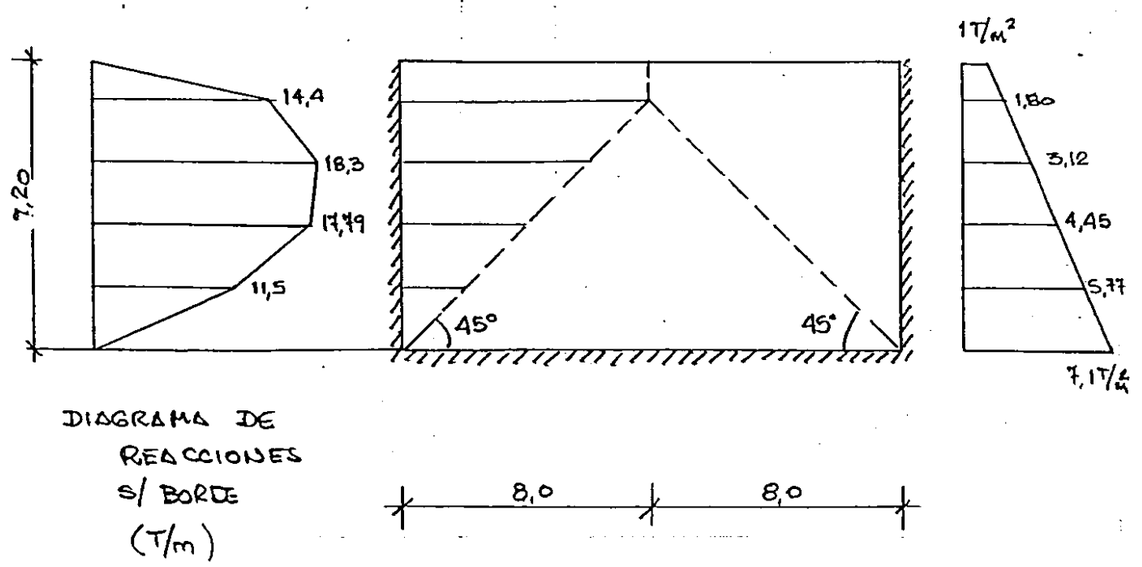
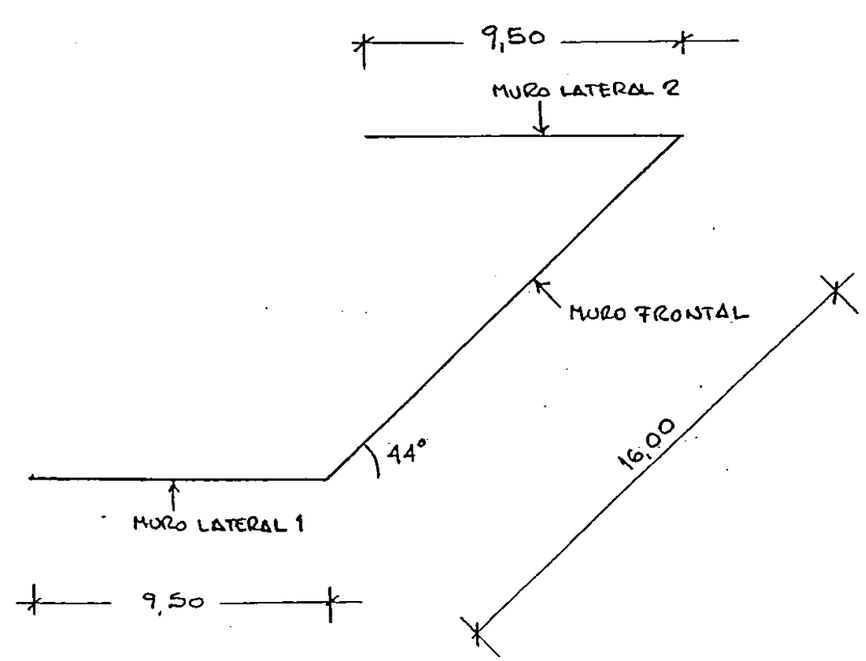
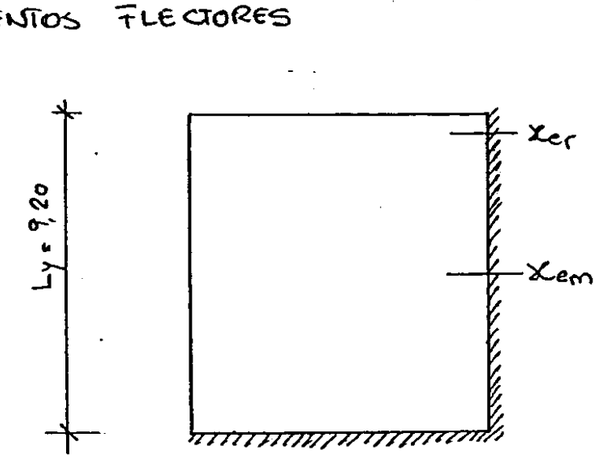


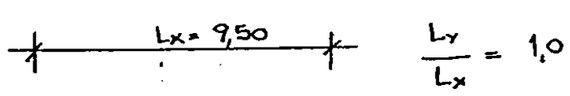
DIAGRAMA DE REACCIONES S/ BORDE (T/m)



MURO LATERAL 1 Y 2

MOMENTOS FLECTORES





$$\frac{L_y}{L_x} = 1{,}0$$

$$K_1 = 1{,}0\ T/m^2 \cdot 9{,}20m \cdot 9{,}50m = 87{,}4\ T$$

$$K_2 = \frac{1}{2} \cdot 6{,}1\ T/m^2 \cdot 9{,}2m \cdot 9{,}5m = 266{,}6\ T$$

$$m_{x_{er}} = -\frac{87{,}4}{3{,}23} - \frac{266{,}6}{6{,}60} = -67{,}5\ \frac{Tm}{m}$$

$$m_{x_{em}} = -\frac{87{,}4}{7{,}33} - \frac{266{,}6}{9{,}40} = -40{,}3\ \frac{Tm}{m}$$

REACCIONES SOBRE BORDES LATERALES

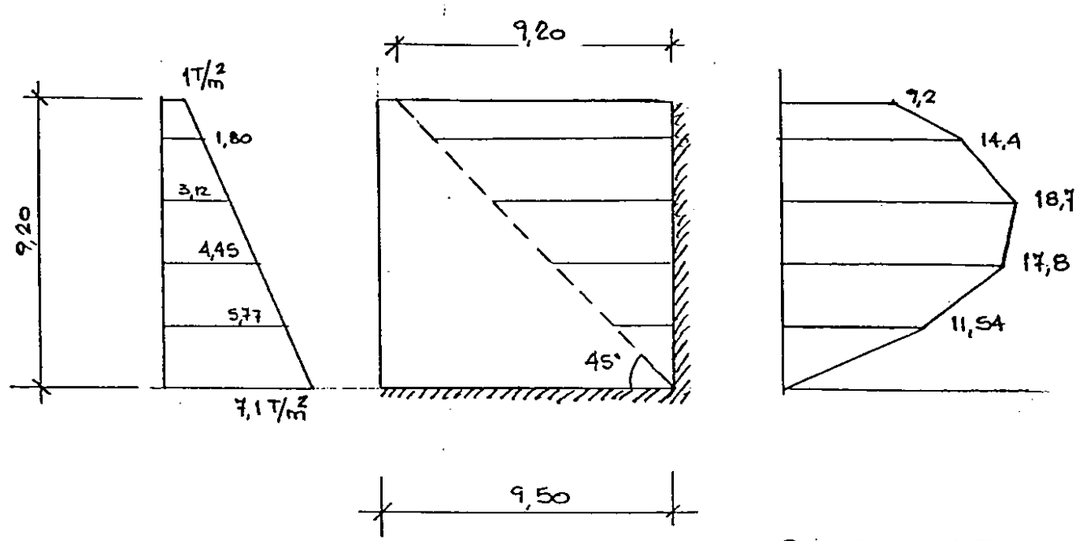
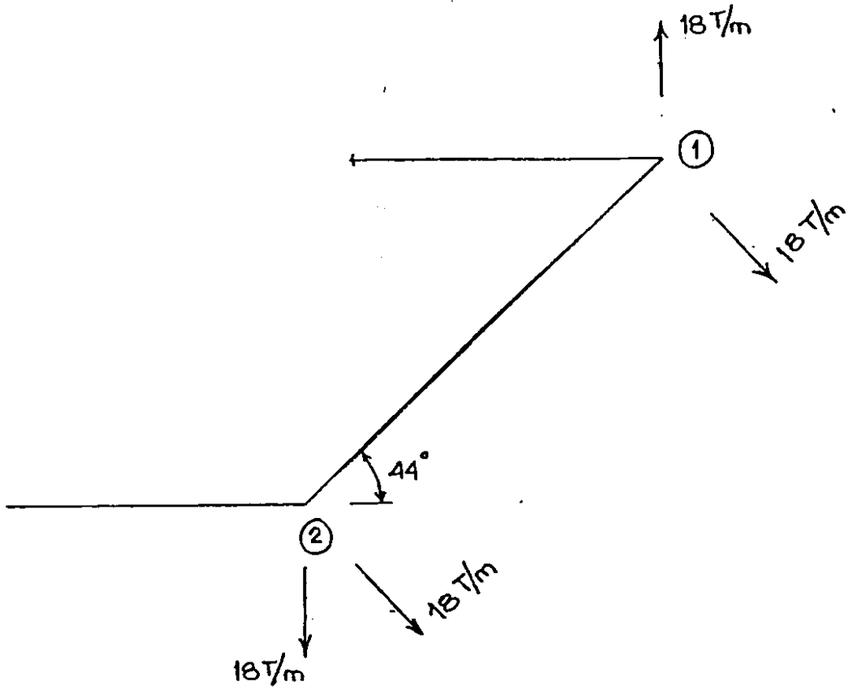
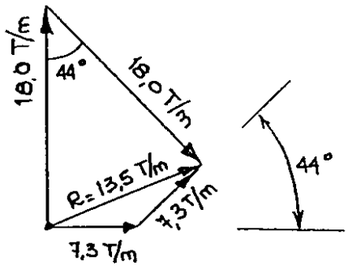
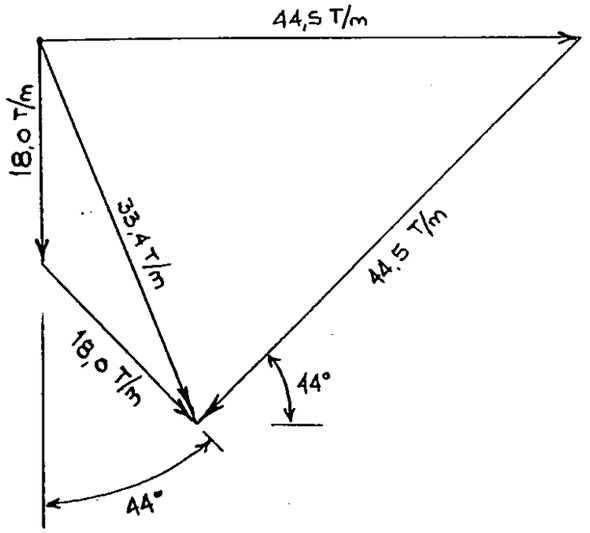


DIAGRAMA DE REACCIONES S/BORDE (T/m)

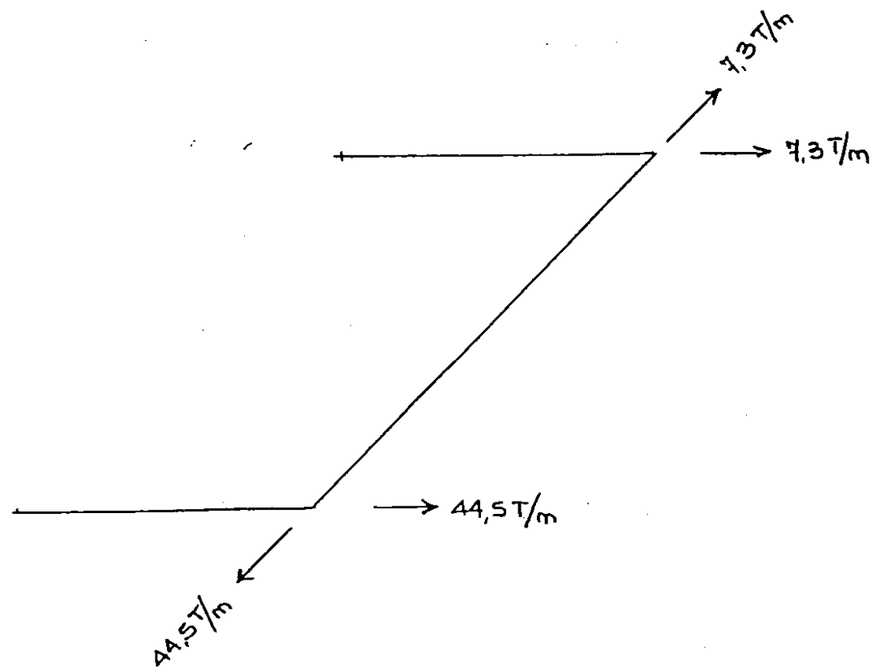


EQUILIBRIO NUDO (1)

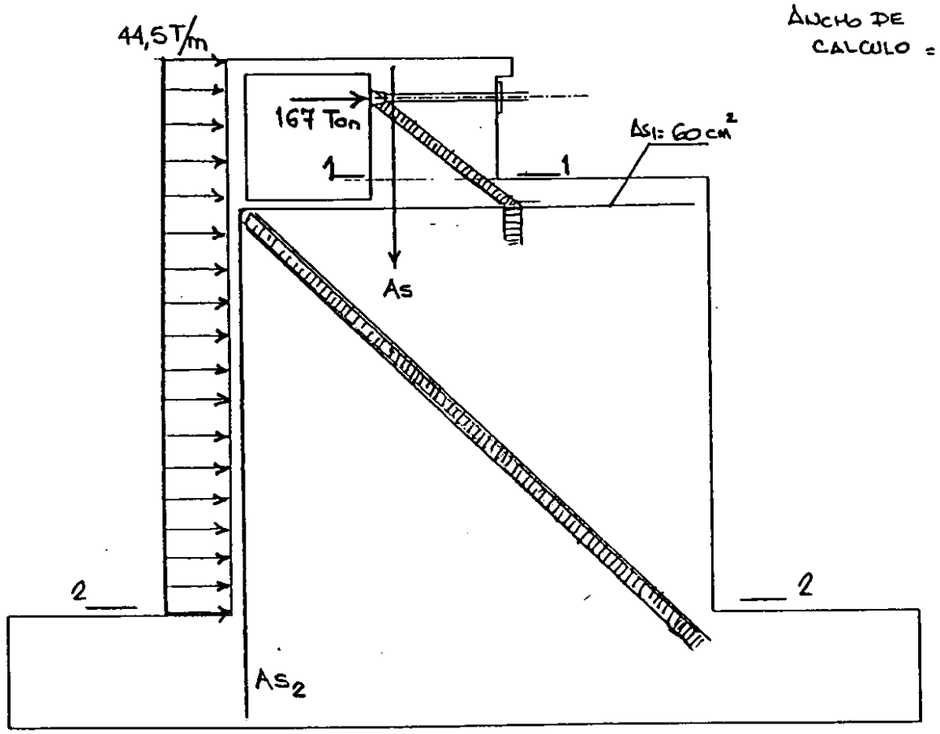




EQUILIBRIO NUDO (2)



CALCULO DE LA ARMADURA EN TABIQUES DE ESQUINA



ANCHO DE CALCULO = 1,20 M.

SECCION 1-1

• ARMADURA PARA RESISTIR EL MOMENTO FLECTOR (A_{sf})

$$M_d = 1{,}5 \times 167\ \text{Tm} \times 1{,}8\ \text{m} = 450{,}9\ \text{Tm}$$

Sección = 120×200

$A_{sf} = 54{,}1\ \text{cm}^2$ $\quad x = 17{,}6\ \text{cm}$

$\varepsilon_{bs} = 0{,}99 \times 10^{-3}$

$\varepsilon_{bi} = -10{,}28 \times 10^{-3}$

$\varepsilon_s = -10{,}00 \times 10^{-3}$

• ARMADURA PARA RESISTIR EL ESFUERZO CORTANTE (A_{sv})

$$V_d = 1{,}5 \times 167\ \text{Tm} = 250{,}5\ \text{Tm}$$

$$A_{sv} = \frac{V_d}{f_{yd}\ \text{cotg}\,\theta} = \frac{250{,}5\ \text{T}}{4{,}2\ \text{T/cm}^2} = 59{,}6\ \text{cm}^2$$

$$\tau_d = \frac{V_d}{b\,d} = \frac{250{,}5\ \text{Tm}}{1{,}2\ \text{m} \times 2{,}0\ \text{m}} = 104{,}4\ \text{T/m}^2 \leq 0{,}17\, f_{ck} = 425\ \text{T/m}^2$$

$\leq 50\ \text{Kg/cm}^2 = 500\ \text{T/m}^2$

COMPLE

$A_s = A_{sf} = \underline{54{,}1\ \text{cm}^2}$ ←

$A_s = \frac{2}{3} A_{sv} = \frac{2}{3} \times 59{,}6\ \text{cm}^2 = 39{,}7\ \text{cm}^2$

$A_s = 0{,}04 \cdot \frac{166{,}7}{4435} \times 120 \times 200 = 36{,}1\ \text{cm}^2$

$A_s = 54{,}1\ \text{cm}^2$ ← $7\phi 25$

• ARMADURAS SECUNDARIAS (A_{se})

$A_{se} = 0{,}50\ A_{sf} = 27{,}0\ \text{cm}^2$ ← $8\phi 16$

SECCION 2.2

$$M_d = 1{,}50 \left[167\ \text{Tm} \times 8{,}5\ \text{m} + 44{,}5\ \text{T/m} \times \frac{(9\ \text{m})^2}{2} \right]$$

$M_d = 4833\ \text{Tm}$

$$A_{s_2} = \frac{4833\ \text{Tm}}{6{,}80\ \text{m} \cdot 4{,}2\ \text{T/cm}^2} = 169\ \text{cm}^2 = \underline{22\,\phi 32}$$

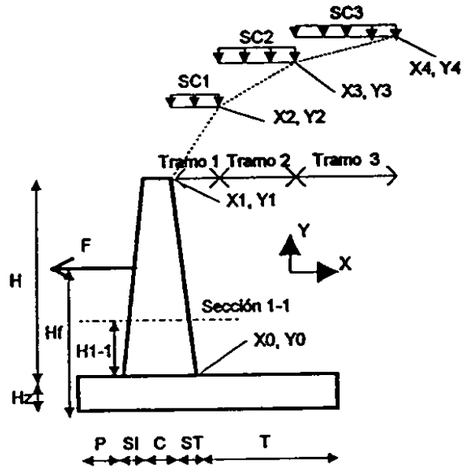
CALCULO DE MUROS.

NOMBRE PROYECTO : L.A.V. MADRID-ZARAGOZA
NOMBRE OBRA : E-1502.8 Estribo1 Muro 1

DATOS

GEOMETRIA DE CALCULO DEL MURO

C. Canto del muro en coronación (m) :	0.500
ST. Sobreespesor muro en trasdós (m) :	1.100
SI. Sobreespesor muro en intradós (m) :	0.000
P. Puntera zapata (m) :	1.500
T. Talón zapata (m) :	3.400
H. Altura muro (m) :	9.200
Hz. Canto zapata (m) :	1.800
Anchura total cimentación (m) :	6.500
Angulo trasdós muro (°) :	83.182



DEFINICION TERRENO

	X	Y
0. Coordenadas base trasdos (m) :	0.000	0.000
1. Coordenadas coronación trasdos (m) :	-1.100	9.200
2. Coordenadas fin tramo 1 terreno (m) :	4.600	9.200
3. Coordenadas fin tramo 2 terreno (m) :	9.200	9.200
4. Coordenadas fin tramo 3 terreno (m) :	13.800	9.200

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
*Po (coeficiente combinación variables) :	1.00

	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS DEL TERRENO

γ. Peso específico (T/m³) :	2.00
ϕ. Angulo rozamiento interno (°) :	30.000
δmt. Angulo rozamiento muro-tierras (°) :	0.000
ϕtt. Angulo rozamiento tierras-tierras (°) :	0.000
μ. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	35.000

ARMADO

H1-1. Dist. sección 1 a sup. zapata (m) :	1.500
Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050

Cuantias mínimas

Vertical muros (1/3 min cara)(o/oo) :	0.900
Horizontal muros (1/3 min. cara)(o/oo) :	1.600
Cortante o montaje alzado (cm²/m²) :	4.500
Transversal zapata (sup+inf)(o/oo) :	1.447
Longitudinal zapata (sup+inf)(o/oo) :	1.447
Cortante zapata (cm²/m²) :	0.000
Perimetral zapata (en canto)(cm²/m) :	13.024

CARGAS (sin mayorar)

Acciones permanentes (G)

Peso propio barrera coronación (T/m) :	1.100

Acciones permanentes de valor no constante (G*)

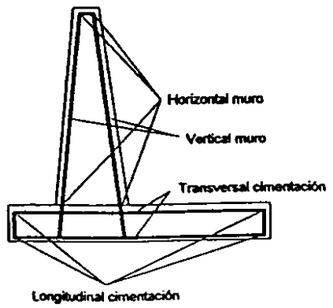
Fg. Carga horizontal sobre muro (T/m) :	1.700
Hfg. Posición Fg a inferior zapata (m) :	10.000

Acciones variables (Q)

SC1. Sobrecarga en tramo 1 (T/m) :	3.000
SC2. Sobrecarga en tramo 2 (T/m) :	3.000
SC3. Sobrecarga en tramo 3 (T/m) :	3.000
Fq. Carga horizontal sobre muro (T/m) :	1.700
Hfq. Posición Fq a inferior zapata (m) :	10.000

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H-250
Hormigón cimentación (T/m²) :	H-250
Acero (T/²) :	AEH-500



RESUMEN ACCIONES SOBRE EL MURO

		F.vertical (T / m)	X (m)	F. Horizontal (T / m)	Y (m)
Acciones permanentes (G)					
Peso propio muro + barrera	Sobre sección 1 (ΣP i, i=1..3)	19.586	2.002	---	---
	Sobre sección base muro (ΣP i, i=1..3)	25.250	2.059	---	---
	Total peso propio (ΣP i, i=1..6)	54.500	2.698	---	---
Acciones permanentes de valor no constante (G*)					
Tierras	Sobre sección 1 (E1't)	2.688	2.614	22.479	5.867
	Sobre sección base muro (E1t)	3.837	2.733	32.090	4.867
	Total tierras (E2t + ΣT)	72.680	4.512	40.175	3.667
	Verticales sobre talón (ΣT' i)	62.560	4.800	---	---
	Verticales sobre talón (cortante) (ΣT* i)	46.460	5.238	---	---
Fuerza Fg	Sobre sección 1	---	---	1.700	10.000
	Sobre sección base muro	---	---	1.700	10.000
	Total Fg	---	---	1.700	10.000
Acciones variables (Q)					
Sobrecargas sobre terreno	Sección 1 (E1'sc)	1.047	2.460	8.758	7.150
	Base muro (E1sc)	1.251	2.550	10.464	6.400
	Inf. cimentación (E2sc + ΣS)	13.500	4.250	10.957	5.500
	Verticales sobre talón (ΣS' i, i=1..3)	10.200	4.800	---	---
	Verticales sobre talón (cortante) (ΣS* i)	7.575	5.238	---	---
Fuerza Fq	Sobre sección 1	---	---	1.700	10.000
	Sobre sección base muro	---	---	1.700	10.000
	Total Fq	---	---	1.700	10.000

COMPROBACIONES

SEGURIDAD AL DESLIZAMIENTO (Planteamiento clásico)

	Fuerzas (T / m) Opuestas	Deslizantes
Acciones permanentes (G)		
Peso propio muro	31.610	—
Acciones permanentes de valor no constante (G*)		
Tierras	42.154	40.175
Fuerza Fg	—	1.700
Acciones variables (Q)		
Sobrecargas sobre terreno	7.830	10.957
Fuerza Fq	—	1.700
TOTAL	**81.594**	**54.631**

Csd=	**1.500**	Vale

SEGURIDAD AL VUELCO (Planteamiento clásico)

	Momentos (mT / m) Estabilizadores	Volcadores
Acciones permanentes (G)		
Peso propio muro	147.051	—
Acciones permanentes de valor no constante (G*)		
Tierras	327.949	147.307
Fuerza Fg	—	17.000
Acciones variables (Q)		
Sobrecargas sobre terreno	57.375	60.262
Fuerza Fq	—	17.000
TOTAL	**532.375**	**241.569**

Csv=	**2.204**	Vale

TENSIONES MAXIMAS EN CIMENTACION

	N (T / m)	M (mT / m)
Acciones permanentes (G)		
Peso propio muro	54.500	30.074
Acciones permanentes de valor no constante (G*)		
Tierras	72.680	55.568
Fuerza Fg	0.000	17.000
Acciones variables (Q)		
Sobrecargas sobre terreno	13.500	46.762
Fuerza Fq	0.000	17.000
TOTAL	**140.680**	**166.404**

D (m) =	**6.20**
σ puntera (T / m²) =	**45.37**
σ talón (T / m²) =	**0.00**
σmed (T / m²) =	**22.69**
σcob (T / m²) =	**34.03**
Vale	

ARMADO

Secciones

Elemento	Designación	Datos reales Ancho (m)	Canto (m)	Datos de cálculo Ancho (m)	Canto (m)
ALZADO	0-0	1.00	1.60	1.00	1.60
	1-1	1.00	1.42	1.00	1.42
PUNTERA	2-2 f	1.00	1.80	1.00	1.80
	2-2 c	1.00	1.80	1.00	0.99
TALON	3-3 f	1.00	1.80	1.00	1.80
	3-3 c	1.00	1.80	1.00	1.80

Esfuerzos mayorados

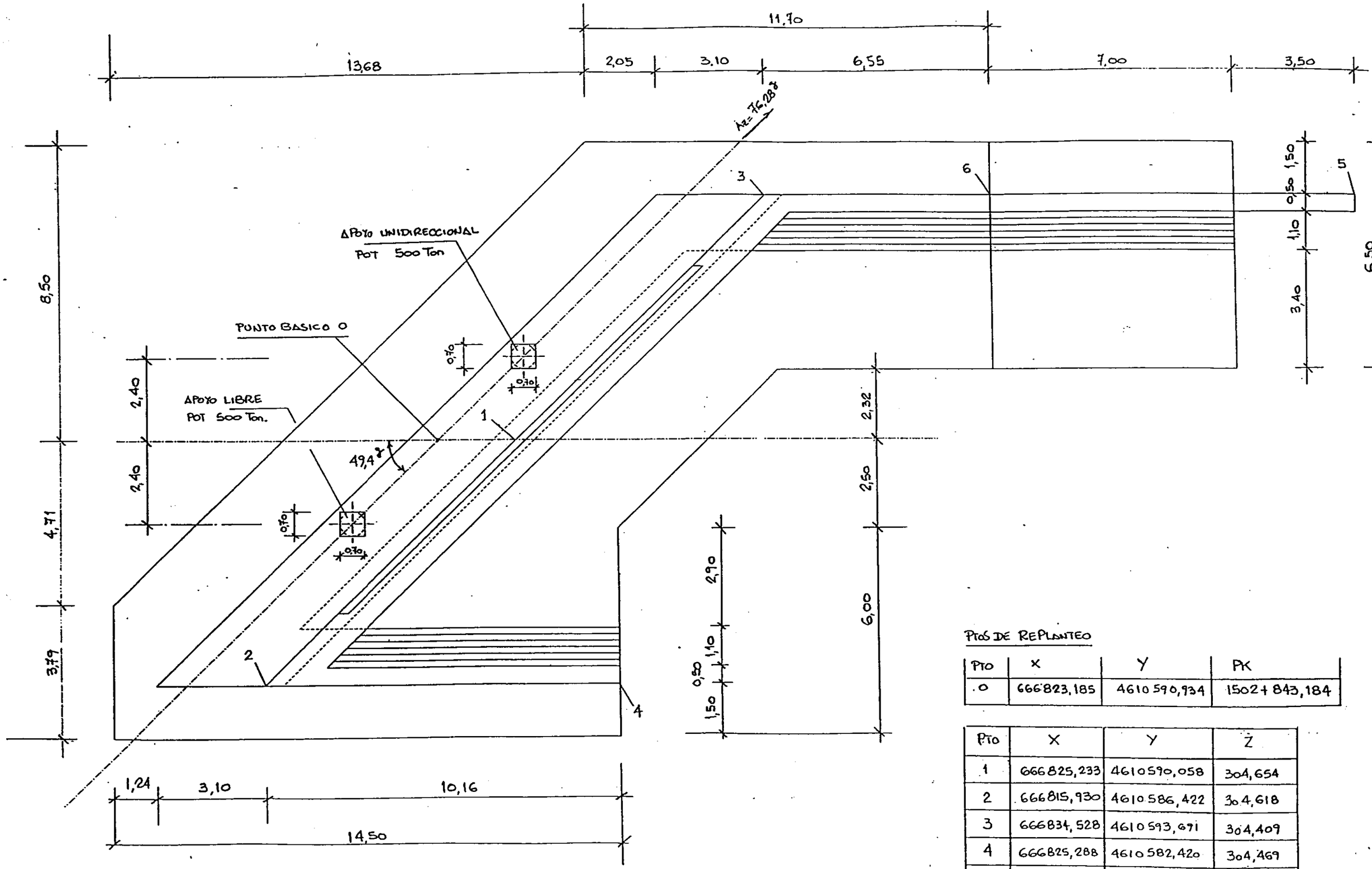
Elemento	Sección	Nd (T / m)	Md (mT / m)	Vd (T / m)
ALZADO	0-0 (+)	30.357	264.154	68.932
	0-0 (-)	22.725	5.478	0.000
	1-1 (+)	23.230	172.947	51.956
	1-1 (-)	17.628	3.673	0.000
PUNTERA	2-2 f (+)	0.000	83.169	—
	2-2 f (-)	0.000	10.073	—
	2-2 c (+)	—	—	36.172
	2-2 c (-)	—	—	4.356
TALON	3-3 f (+)	-1.489	-17.954	—
	3-3 f (-)	-25.287	-163.272	—
	3-3 c (+)	—	—	-6.376
	3-3 c (-)	—	—	-61.603

Armaduras

Elemento	Armadura	Sección	ARMADURA DE CALCULO Necesaria cm2/m	Minima cm2/m	Control cálculo	Adoptada cm2/m
ALZADO	Vert. trasdós	0-0 (+)	36.821	9.600	Vale	**36.821**
		0-0 (-)	0.000	4.800	Vale	
		1-1 (+)	26.918	8.524	Vale	**26.918**
		1-1 (-)	0.000	4.262	Vale	
	Vert. intrados	0-0 (+)	0.000	4.800	Vale	**4.800**
		0-0 (-)	0.000	4.800	Vale	
		1-1 (+)	0.000	4.262	Vale	
		1-1 (-)	0.000	4.262	Vale	
	Hor. trasdós (*)	—	7.364	17.067	Vale	**17.067**
	Hor. intradós (*)	—	0.000	8.533	Vale	**8.533**
	Cortante	0-0 (+)	0.000	4.500	Vale	**4.500 (cm²/m²)**
		0-0 (-)	0.000	4.500	Vale	
		1-1 (+)	0.000	4.500	Vale	
		1-1 (-)	0.000	4.500	Vale	
PUNTERA	Trans. inferior	2-2 f (+)	10.821	13.024	Vale	**13.024**
		2-2 f (-)	1.299	13.024	Vale	
	Long. inf. (*)	—	2.164	13.024	Vale	**13.024**
	Trans. superior	2-2 f (+)	0.000	13.024	Vale	**27.151**
		2-2 f (-)	0.000	13.024	Vale	
	Long. sup. (*)	—	0.000	13.024	Vale	**13.024**
	Cortante	2-2 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		2-2 c (-)	0.000	0.000	Vale	
TALON	Trans. inferior	3-3 f (+)	0.000	13.024	Vale	13.024
		3-3 f (-)	0.000	13.024	Vale	
	Long. inf. (*)	—	0.000	13.024	Vale	13.024
	Trans. superior	3-3 f (+)	2.654	13.024	Vale	27.151
		3-3 f (-)	27.151	13.024	Vale	
	Long. sup. (*)	—	5.430	13.024	Vale	13.024
	Cortante	3-3 c (+)	0.000	0.000	Vale	0.000 (cm²/m²)
		3-3 c (-)	0.000	0.000	Vale	
ZAPATA	Perimetral	—	0.000	13.024	Vale	**13.024**

(*) Calculada como el 20% de la armadura perpendicular a ella

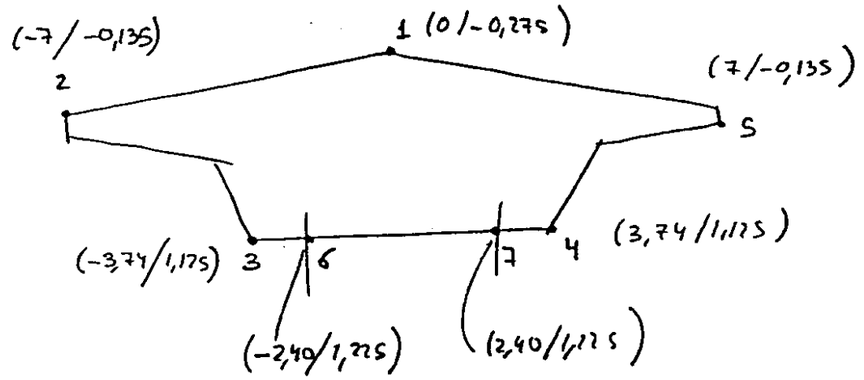
E-1502.8 ESTRIBO 2



PTOS DE REPLANTEO

PTO	X	Y	PK
.0	666823,185	4610590,934	1502+843,184

PTO	X	Y	Z
1	666825,233	4610590,058	304,654
2	666815,930	4610586,422	304,618
3	666834,528	4610593,691	304,409
4	666825,288	4610582,420	304,469
5	666850,209	4610586,939	304,151
6	666840,547	4610591,104	304,311



5

SECC	PUNTO	PK	AZ	X	Y	Z	
1	1	1502843.184	76.280	666823.185	4610590.934	304.687	← 0
1	2	1502850.297	76.280	666832.483	4610594.568	304.442	
1	3	1502846.987	76.280	666828.153	4610592.876	303.231	
1	4	1502839.374	76.280	666818.213	4610588.992	303.342	
1	5	1502836.051	76.280	666813.879	4610587.297	304.650	
1	6	1502845.626	76.280	666826.374	4610592.180	303.151	
1	7	1502840.740	76.280	666819.995	4610589.688	303.222	
2	1	1502845.412	76.280	666825.233	4610590.058	304.654	← 1
2	2	1502852.521	76.280	666834.528	4610593.691	304.409	← 3
2	3	1502849.212	76.280	666830.200	4610591.999	303.198	
2	4	1502841.604	76.280	666820.263	4610588.116	303.310	
2	5	1502838.283	76.280	666815.930	4610586.422	304.618	← 2
2	6	1502847.851	76.280	666828.421	4610591.304	303.118	
2	7	1502842.970	76.280	666822.045	4610588.812	303.190	
3	1	1502851.973	76.280	666831.264	4610587.474	304.557	
3	2	1502859.066	76.280	666840.547	4610591.104	304.311	← 6
3	3	1502855.764	76.280	666836.224	4610589.414	303.101	
3	4	1502848.172	76.280	666826.298	4610585.534	303.214	
3	5	1502844.855	76.280	666821.968	4610583.842	304.522	
3	6	1502854.405	76.280	666834.446	4610588.720	303.021	
3	7	1502849.533	76.280	666828.076	4610586.230	303.093	
4	1	1502855.582	76.280	666834.580	4610586.050	304.503	
4	2	1502862.670	76.280	666843.861	4610589.677	304.256	
4	3	1502859.371	76.280	666839.539	4610587.989	303.046	
4	4	1502851.785	76.280	666829.617	4610584.111	303.160	
4	5	1502848.470	76.280	666825.288	4610582.420	304.469	← 4
4	6	1502858.014	76.280	666837.763	4610587.294	302.967	
4	7	1502853.144	76.280	666831.394	4610584.806	303.040	
5	1	1502862.501	76.280	666840.936	4610583.316	304.399	
5	2	1502869.576	76.280	666850.209	4610586.939	304.151	← 5
5	3	1502866.284	76.280	666845.891	4610585.252	302.941	
5	4	1502858.714	76.280	666835.980	4610581.377	303.056	
5	5	1502855.408	76.280	666831.657	4610579.687	304.366	
5	6	1502864.929	76.280	666844.117	4610584.558	302.862	
5	7	1502860.073	76.280	666837.757	4610582.071	302.936	

NOMBRE PROYECTO : LINEA DE ALTA VELOCIDAD MADRID - BARCELONA - FRONT. FRANCESA

DESIGNACION ESTRIBO: E-1502.8 ESTRIBO 2 - MURO FRONTAL

CALCULO ESTRIBOS CERRADOS

DATOS REQUERIDOS:

DIMENSIONES(en metros)

H1= 2.20
H2= 5.80
H3= 1.80
Htierras= 8.00
B1= 2.50
B2= 1.70
B3= 4.30

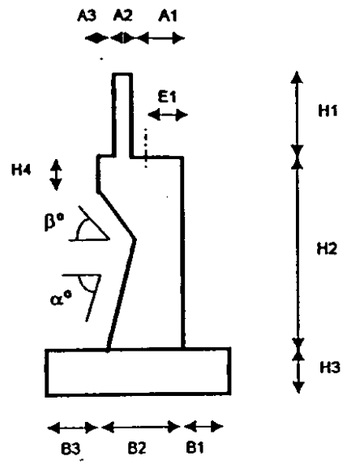
A1= 2.52
A2= 0.5
A3= 0.01

H4= 0.5
α(grados)= 90
β(grados)= 45
E1= 0.6

Longitud= 1
Recubrim.= 0.05

Puntera
Zapata tipo I

Talón
Zapata tipo III



CARACTERISTICAS DE TERRENO

Peso tierras(T/m3)	γ=	2
Angulo rozamiento interno	φ=	30
Coef.rozamiento zapata-terreno	μ=	0.58
Angulo. rozamiento tierras muro	δ=	0
Tension admisible.(T/m2)	σ=	32

COEFICIENTES DE SEGURIDAD

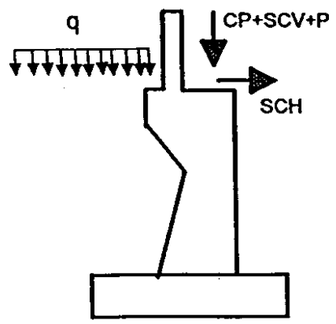
Mayoracion de cargas	γf= 1.5
Seguridad al deslizamiento	Csd= 1.5
Seguridad al vuelco	Csv= 1.5
Minoracion acero	gs= 1.15
Minoracion hormigon	gc= 1.5

CARACTERISTICAS DE LOS MATERIALES

Peso especifico hgon(T/m3)	γη= 2.5
Resistencia acero (T/m2)	Fyk= 51000
Resistencia hgon. ciment. (T/m2)	Fck1= 2500
Resistencia hgon. alzado (T/m2)	Fck2= 2500

CARGAS TRANSMITIDAS POR LA ESTRUCTURA(valores sin mayorar)

Cargas verticales(ton/m)
Cargas permanentes CP= 21.15
Sobrecargas SCV= 17.15
Pretensado P= 0.00
Cargas horizontales(ton/m)
Sobrecargas horizontales SCH= 0.97
Sobrecarga(ton/m2) q= 3.00

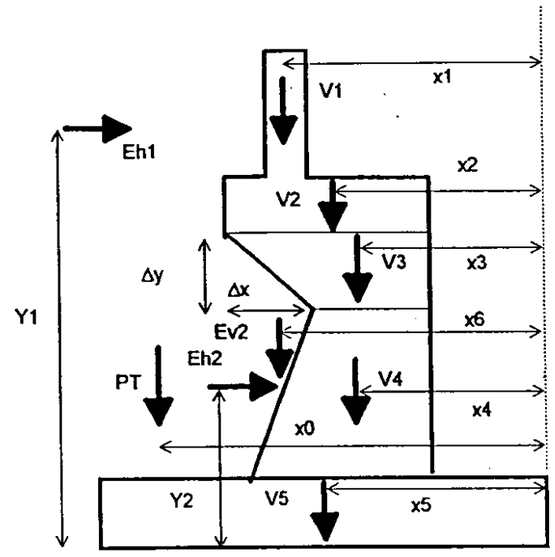


NOMBRE PROYECTO : LINEA DE ALTA VELOCIDAD MADRID - BARCELONA - FRONT. FRANCESA

DESIGNACION ESTRIBO: E-1502.8 ESTRIBO 2 - MURO FRONTAL

CALCULO ESTRIBOS CERRADOS

CARGAS DE PESO PROPIO Y EMPUJES DE TIERRAS SOBRE ESTRIBO(ton/m. sin mayorar)



Resultados intermedios:

Δx= 1.330
Δy= 1.330

COEFICIENTES EMPUJE ACTIVO ALZADO MURO

Coef. empuje activo λh= 0.333
Coef. empuje activo λv= 0.000

COEFICIENTES EMPUJE ACTIVO MURETE

Coef. empuje activo λh= 0.333
Coef. empuje activo λv= 0.000

PESO TIERRAS TRASDOS

PT=	59.894	x0=	6.578

PESO PROPIO

V1=	2.750	x1=	5.270
V2=	3.788	x2=	4.015
V3=	7.864	x3=	3.714
V4=	16.873	x4=	3.350
V5=	38.250	x5=	4.250
TOTAL PP=	69.524		3.998

EMPUJES

Eh1=	9.444	Y1=	7.400
Eh2=	19.890	Y2=	3.610
Eh3=	12.480	Y3=	0.874
Empuje hor.	41.813		3.649
Ev2=	0.000	x6=	4.200

NOMBRE PROYECTO : LINEA DE ALTA VELOCIDAD MADRID - BARCELONA - FRONT. FRANCESA

DESIGNACION ESTRIBO: E-1502.8 ESTRIBO 2 - MURO FRONTAL

CALCULO ESTRIBOS CERRADOS

COMPROBACIONES

1) SEGURIDAD AL DESLIZAMIENTO

$$C_{SD} = \frac{\sum_i \text{Fuerzas} - \text{opuestas}}{\sum_i \text{Fuerzas} - \text{deslizantes}}$$

1,A) En construccion:

Fuerzas opuestas			
	Peso propio	40.324	
	Peso tierras	34.738	
	Ev2	0.000	
		TOTAL	75.062
Fuerzas deslizantes			
	Empuje horizontal	41.813	
		TOTAL	41.813

Csd= 1.80

1,B) En Servicio:

Fuerzas opuestas			
	Peso propio	40.324	
	Peso tierras	34.738	
	Ev2	0.000	
	Carga perma	12.267	
		TOTAL	87.329
Fuerzas deslizantes			
	Empuje horiz	41.813	
	Sobrecarga h	0.967	
		TOTAL	42.780

Csd= 2.04

2) SEGURIDAD AL VUELCO

$$C_{SV} = \frac{\sum_i \text{Momentos} - \text{estabilizadores}}{\sum_i \text{Momentos} - \text{volcadores}}$$

2,A) En construccion:

Mom.estabilizadores			
	Peso propio	277.988	
	Peso tierras	393.972	
	M Ev2	0.000	
		TOTAL	671.959
Mom. volcadores			
	Empuje horizontal	152.597	
		TOTAL	152.597

Csv= 4.40

2,B) En Servicio:

Mom.estabilizadores			
	Peso propio	277.988	
	Peso tierras	393.972	
	M Ev2	0.000	
	Carga perma	65.565	
		TOTAL	737.524
Mom. volcadores			
	Empuje horiz	152.597	
	Sobrecarga h	7.349	
		TOTAL	159.946

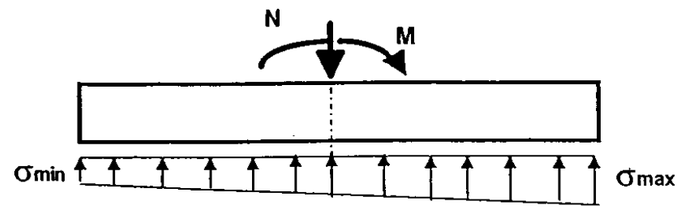
Csv= 4.61

NOMBRE PROYECTO : LINEA DE ALTA VELOCIDAD MADRID - BARCELONA - FRONT. FRANCESA

DESIGNACION ESTRIBO: E-1502.8 ESTRIBO 2 - MURO FRONTAL

CALCULO ESTRIBOS CERRADOS

3) TENSIONES MAXIMAS Y MINIMAS EN CIMENTACION



3,A) En construccion:

Carga vertical N. (t/m)			
	Peso propio	69.524	
	Peso tierras	59.894	
	Ev2	0.000	
		TOTAL	129.417
Momento M. (m.t/m)			
	Peso propio	17.488	
	Peso tierras	-139.423	
	M Ev2	0.000	
	Empuje horizontal	152.597	
		TOTAL	30.662

Ancho zapata= 8.50

σmax= 17.77 (ton/m2)

σmin= 12.68 (ton/m2)

σcob= 16.12 (ton/m2)

σmed= 15.23 (ton/m2)

3,B) En Servicio:

Carga vertical N. (t/m)			
	Peso propio	69.524	
	Peso tierras	59.894	
	Ev2	0.000	
	Carga perma	21.150	
	Sc. vertical	17.150	
	Pretensado	0.000	
		TOTAL	167.717
Momento M. (m.t/m)			
	Peso propio	17.488	
	Peso tierras	-139.423	
	M Ev2	0.000	
	Carga perma	24.323	
	Sc. vertical	19.723	
	Pretensado	0.000	
	Empuje horiz	152.597	
	Sobrecarga h	7.349	
		TOTAL	82.056

Ancho zapata (m)= 8.50

σmax= 26.55 (ton/m2)

σmin= 12.92 (ton/m2)

σcob= 22.30 (ton/m2)

σmed= 19.73 (ton/m2)

NOMBRE PROYECTO : LINEA DE ALTA VELOCIDAD MADRID - BARCELONA - FRONT. FRANCESA

DESIGNACION ESTRIBO: E-1502.8 ESTRIBO 2 - MURO FRONTAL

CALCULO ESTRIBOS CERRADOS

CALCULOS

4) ESFUERZOS DE DISEÑO

4,A) Esfuerzos en el muro.

Seccion	Base	1/3 H2
h(m)	0	1.93
Canto (m.)	1.7	1.7
M cargas verti	9.575	9.575
M cargas horiz	5.609	3.739
M peso propio	-10.658	-10.658
M empuje hori	88.889	43.211
M empuje vert	0.000	0.000
Md (mt/m)	**140.121**	**68.800**
V cargas horiz	0.967	0.967
V empuje hori	41.813	18.335
Vd (t/m)	**64.171**	**28.953**
Ndmax(t/m)	104.36	92.04
Ndmin(t/m)	28.15	20.75

4,B) Esfuerzos en el murete.

Seccion	Base murete
h(m)	5.80
Canto (m.)	0.5
M empuje horizontal	3.603
Md (mt/m)	**5.405**
V empuje horizontal	3.813
Vd (t/m)	**5.720**
Nd (t/m)	2.75

4,C) Esfuerzos en la puntera.

(momentos (+) implica tracciones en cara inferior)

Seccion	Cara intrados
Distancia a vuelco	2.5
M peso propio	-14.063
M tens.terreno	78.780
Md puntera(mt/m)	**97.076**
Posicion seccion S2 cortante	1.625
Canto util seccion S2	1.750
V peso propio	-7.313
V tens.terreno	41.020
Vd en puntera(t/m)	**50.561**

4,D) Esfuerzos en el talon

(momentos (+) implica tracciones en cara superior)

Seccion	Cara trasdos
Distancia a vuelco	4.2
M tierras	142.42
M peso propio	41.60
M tens.terreno	-125.159
Md talon(mt/m)	**88.292**
Posicion seccion S2 cortant	5.950
Canto util seccion S2	1.750
V tierras	35.52
V peso propio	11.48
V tens.terreno	-34.280
Vd en talon(t/m)	**19.070**
Cortante base	64.171
Area comp.cim.talon/total	0.464
Traccion superior d. (t/m)	29.780

NOMBRE PROYECTO : LINEA DE ALTA VELOCIDAD MADRID - BARCELONA - FRONT. FRANCESA

DESIGNACION ESTRIBO: E-1502.8 ESTRIBO 2 - MURO FRONTAL

CALCULO ESTRIBOS CERRADOS

5) CALCULO DE SECCIONES

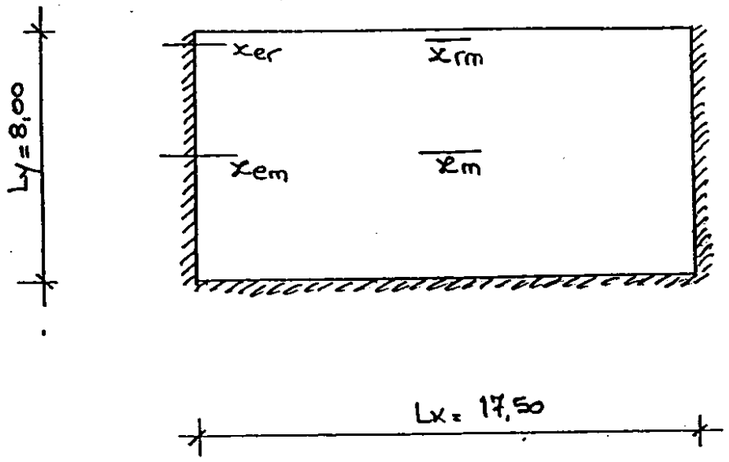
Elementos	Seccion Designacion	b(m.)	d(m.)	Esfuerzos de diseño Md(m.ton)	Nd(ton.)	Vd(ton.)
MURO	0-0	1.00	1.70	140.12	-	64.17
	1-1	1.00	1.70	68.80	-	28.95
PUNTERA	2-2	1.00	1.80	97.08	-	50.56
TALÓN	3-3	1.00	1.80	88.29	-	19.07
MURETE	4-4	1.00	0.50	5.40	-	5.72

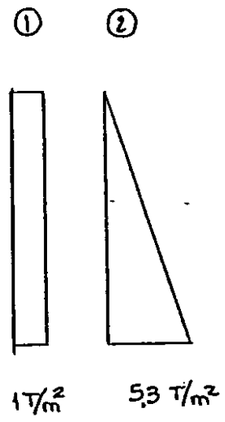
Elementos	Designacion armaduras	Nombre Seccion	ARMADURA(cm2/m) Necesaria	Minima	Adoptada
MURO	Asv1	0-0	16.97	10.20	16.97
	Asv1	1-1	8.25	7.65	8.25
	Asv3	-	0.00	7.65	7.65
	Ash1	-	0.00	13.60	13.60
	Ash2	-	0.00	13.60	13.60
	Cortante	0-0	0.00	0.00	0.00
PUNTERA	As inf L.	2-2	2.20	13.02	13.02
	As inf T.	-	11.00	13.02	13.02
	Cortante	S2	0.00	0.00	0.00
TALÓN	As sup L.	3-3	3.17	13.02	13.02
	As sup T.	-	15.83	13.02	15.83
	Cortante	S2	0.00	0.00	0.00
MURETE	Asv2	4-4	2.38	2.25	2.38
	Asv4	-	0.00	2.25	2.25
	Ash3	-	0.00	4.00	4.00
	Ash4	-	0.00	4.00	4.00

NOTA: las armaduras longitudinales en talón y puntera que aparecen en las casillas de armadura "necesaria" han sido obtenidas multiplicando la armadura transversal por el coeficiente de poisson.

MURO FRONTAL

MOMENTOS FLECTORES





$\frac{Ly}{Lx} = 0{,}45$

$K_1 = 1\,T/m^2 \times 8{,}0\,M \times 17{,}5\,M = 140{,}0\,T$

$K_2 = \frac{5{,}3\,T/M^2 \times 8{,}0\,M \times 17{,}5\,M}{2} = 371{,}0\,T$

$m_{xer} = -\frac{140}{6{,}8} - \frac{371}{14{,}7} = -45{,}8\ Tm/m$

$m_{xem} = -\frac{140}{17{,}0} - \frac{371}{22{,}1} = -25{,}0\ Tm/m$

$m_{xrm} = \frac{140}{24{,}0} + \frac{371}{43{,}9} = 14{,}3\ Tm/m$

$m_{xm} = \frac{140}{54{,}6} + \frac{371}{91{,}6} = 6{,}6\ Tm/m$

REACIONES SOBRE BORDES LATERALES

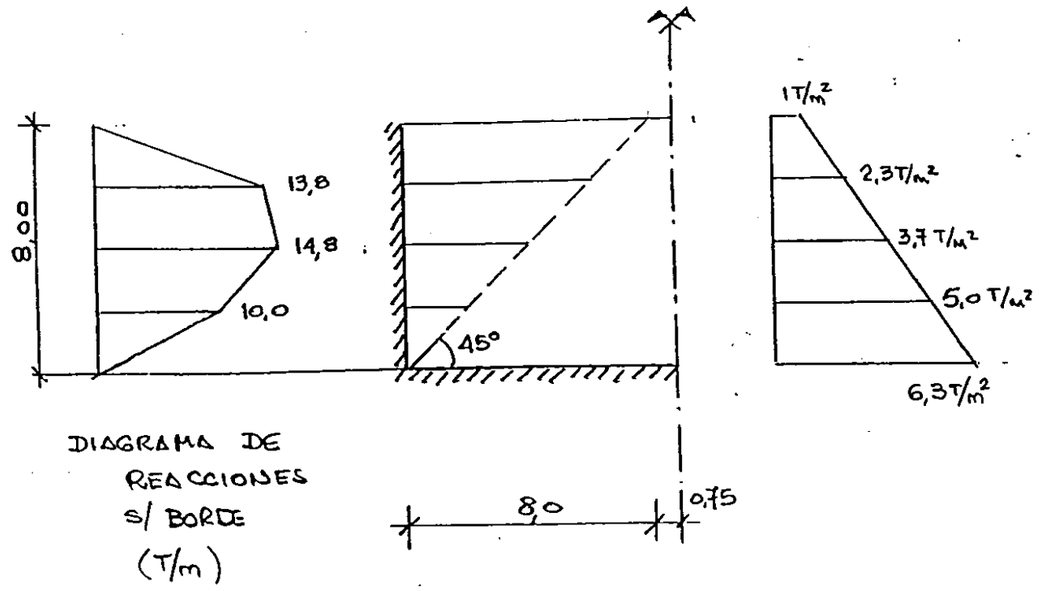
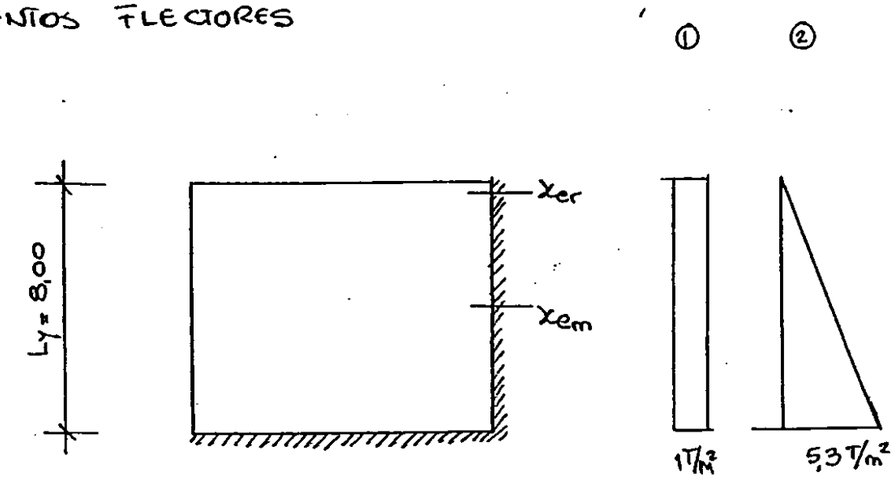


DIAGRAMA DE REACCIONES S/ BORDE (T/m)

MURO LATERAL 1 Y 2

MOMENTOS FLECTORES



$$\frac{L_y}{L_x} = 0{,}85$$

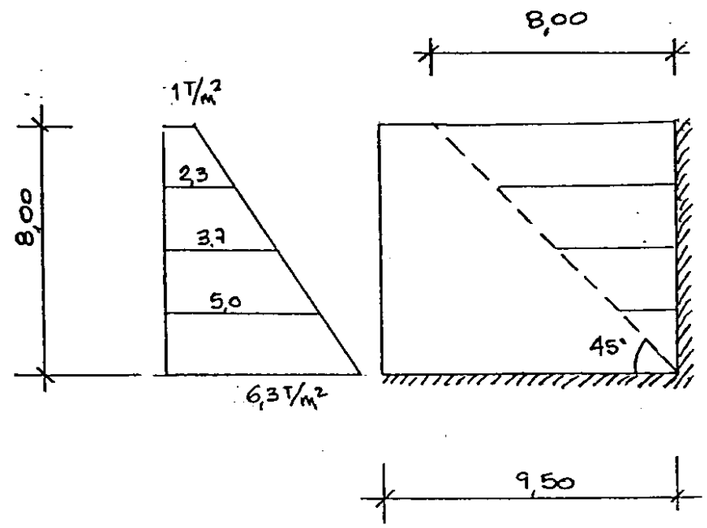
$$K_1 = 1{,}0\ T/m^2 \times 8{,}00m \times 9{,}50m = 76{,}0\ T$$

$$K_2 = \frac{1}{2} \times 5{,}3\ T/m^2 \times 8{,}0m \times 9{,}5m = 201{,}4\ T$$

$$m_{x_{er}} = -\frac{76{,}0}{3{,}41} - \frac{201{,}4}{8{,}77} = -52{,}0\ \frac{Tm}{m}$$

$$m_{x_{em}} = -\frac{76{,}0}{8{,}43} - \frac{201{,}4}{11{,}30} = -26{,}8\ \frac{Tm}{m}$$

REACCIONES SOBRE BORDES LATERALES



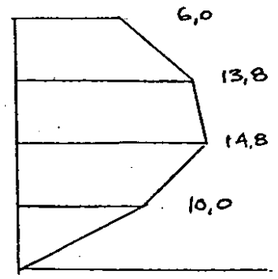
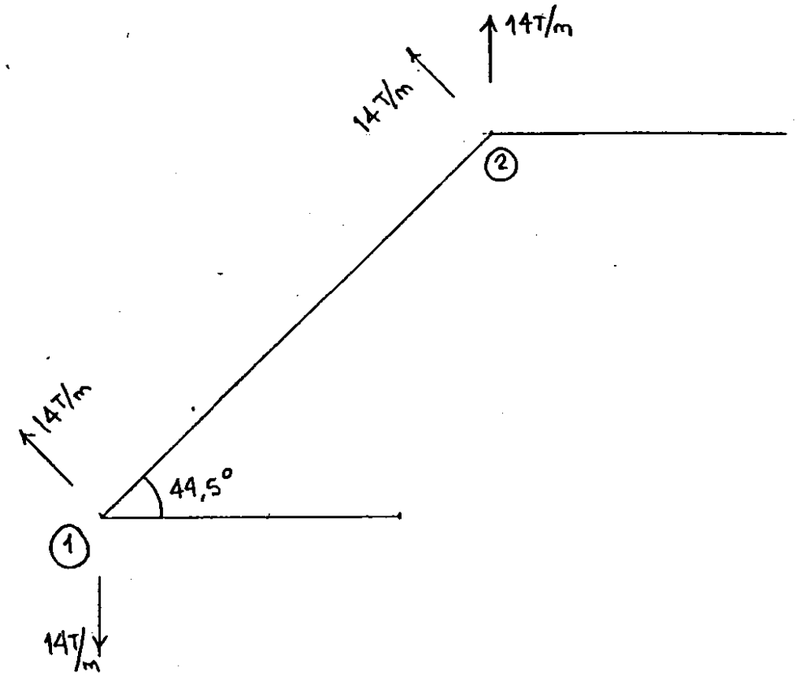
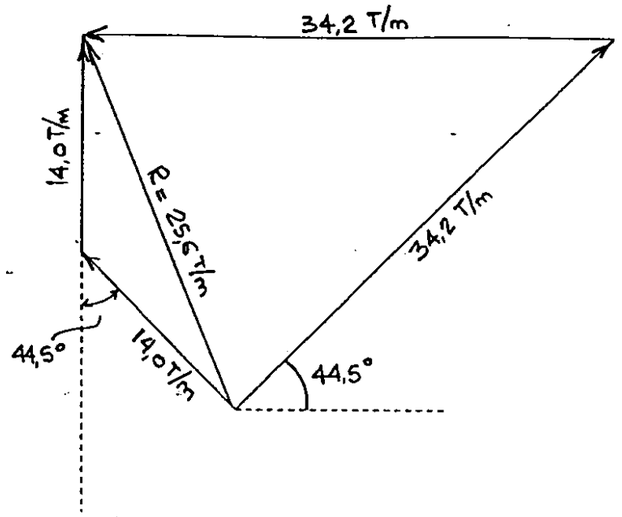
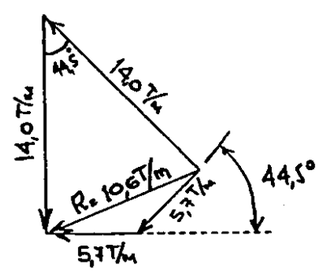


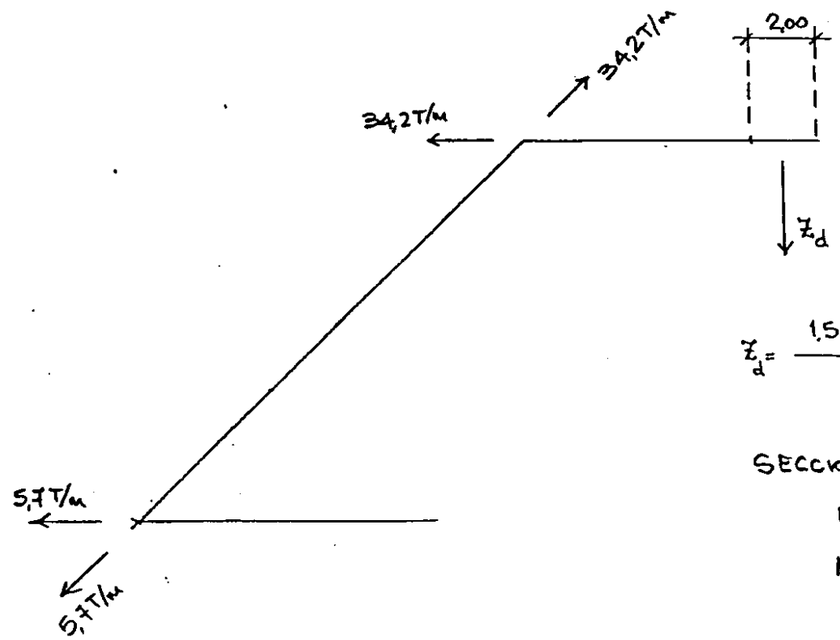
DIAGRAMA DE REACCIONES S/BORDE (T/m)



EQUILIBRIO NUDO (2)







$$T_d = \frac{1.5 \cdot 34{,}2\,T/m\,(8{,}2\,m)^2}{2 \times 8{,}5\,m} = 203\ Ton\ (TRACCION)$$

SECCION 200 x 170

N_d = 203,0 Ton

M_d = 373,7 Tm

CALCULO DE MUROS.

NOMBRE PROYECTO : L.A.V. MADRID-ZARAGOZA
NOMBRE OBRA : E-1502.8 Estribo2 Muro 1

DATOS

GEOMETRIA DE CALCULO DEL MURO

C. Canto del muro en coronación (m) :	0.500
ST. Sobreespesor muro en trasdós (m) :	1.100
SI. Sobreespesor muro en intradós (m) :	0.000
P. Puntera zapata (m) :	1.500
T. Talón zapata (m) :	3.400
H. Altura muro (m) :	7.900
Hz. Canto zapata (m) :	1.900
Anchura total cimentación (m) :	6.500
Angulo trasdós muro (°) :	82.073

DEFINICION TERRENO

	X	Y
0. Coordenadas base trasdos (m) :	0.000	0.000
1. Coordenadas coronación trasdos (m) :	-1.100	7.900
2. Coordenadas fin tramo 1 terreno (m) :	3.950	7.900
3. Coordenadas fin tramo 2 terreno (m) :	7.900	7.900
4. Coordenadas fin tramo 3 terreno (m) :	11.850	7.900

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Yo (coeficiente combinación variables) :	1.00

	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS DEL TERRENO

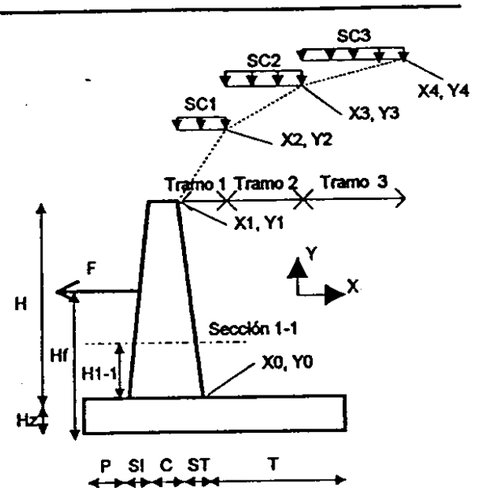
γ. Peso específico (T/m³) :	2.00
φ. Angulo rozamiento interno (°) :	30.000
δmt. Angulo rozamiento muro-tierras (°) :	0.000
δtt. Angulo rozamiento tierras-tierras (°) :	0.000
μ. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	95.000

ARMADO

H1-1. Dist. sección 1 a sup. zapata (m) :	1.500
Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050

Cuantías mínimas

Vertical muros (1/3 min cara)(o/oo) :	0.900
Horizontal muros (1/3 min. cara)(o/oo) :	1.600
Cortante o montaje alzado (cm²/m²) :	4.500
Transversal zapata (sup+inf)(o/oo) :	1.447
Longitudinal zapata (sup+inf)(o/oo) :	1.447
Cortante zapata (cm²/m²) :	0.000
Perimetral zapata (en canto)(cm²/m) :	13.024



CARGAS (sin mayorar)

Acciones permanentes (G)

Peso propio barrera coronación (T/m) :	1.100

Acciones permanentes de valor no constante (G*)

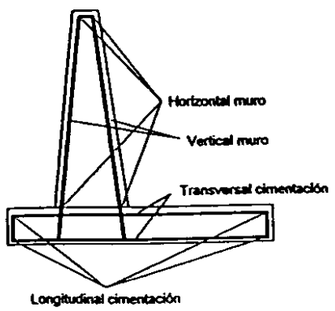
Fg. Carga horizontal sobre muro (T/m) :	1.700
Hfg. Posición Fg a inferior zapata (m) :	8.700

Acciones variables (Q)

SC1. Sobrecarga en tramo 1 (T/m) :	3.000
SC2. Sobrecarga en tramo 2 (T/m) :	0.000
SC3. Sobrecarga en tramo 3 (T/m) :	0.000
Fq. Carga horizontal sobre muro (T/m) :	1.700
Hfq. Posición Fq a inferior zapata (m) :	8.700

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H-250
Hormigón cimentación (T/m²) :	H-250
Acero (T/²) :	AEH-500



RESUMEN ACCIONES SOBRE EL MURO

		F.vertical (T / m)	X (m)	F. Horizontal (T / m)	Y (m)
Acciones permanentes (G)					
Peso propio muro + barrera	Sobre sección 1 (ΣP' i, i=1..3)	16.229	1.990	—	—
	Sobre sección base muro (ΣP i, i=1..3)	21.838	2.057	—	—
	Total peso propio (ΣP i, i=1..6)	51.088	2.740	—	—
Acciones permanentes de valor no constante (G*)					
Tierras	Sobre sección 1 (E1't)	2.204	2.594	15.832	5.433
	Sobre sección base muro (E1t)	3.359	2.733	24.123	4.433
	Total tierras (E2t + ΣT)	62.410	4.512	31.357	3.233
	Verticales sobre talón (ΣT' ij)	53.720	4.800	—	—
	Verticales sobre talón (cortante) (ΣT'' ij)	39.895	5.238	—	—
Fuerza Fg	Sobre sección 1	—	—	1.700	8.700
	Sobre sección base muro	—	—	1.700	8.700
	Total Fg	—	—	1.700	8.700
Acciones variables (Q)					
Sobrecargas sobre terreno	Sección 1 (E1'sc)	1.033	2.446	7.421	6.500
	Base muro (E1sc)	1.276	2.550	9.161	5.750
	Inf. cimentación (E2sc + ΣS)	13.500	4.250	9.698	4.850
	Verticales sobre talón (ΣS' i, i=1..3)	10.200	4.800	—	—
	Verticales sobre talón (cortante) (ΣS'' i)	7.575	5.238	—	—
Fuerza Fq	Sobre sección 1	—	—	1.700	8.700
	Sobre sección base muro	—	—	1.700	8.700
	Total Fq	—	—	1.700	8.700

COMPROBACIONES

SEGURIDAD AL DESLIZAMIENTO (Planteamiento clásico)

	Fuerzas (T / m) Opuestas	Deslizantes
Acciones permanentes (G)		
Peso propio muro	29.631	—
Acciones permanentes de valor no constante (G*)		
Tierras	36.198	31.357
Fuerza Fg	—	1.700
Acciones variables (Q)		
Sobrecargas sobre terreno	7.830	9.698
Fuerza Fq	—	1.700
TOTAL	**73.659**	**44.455**

Csd=	**1.660**	Vale

SEGURIDAD AL VUELCO (Planteamiento clásico)

	Momentos (mT / m) Estabilizadores	Volcadores
Acciones permanentes (G)		
Peso propio muro	139.977	—
Acciones permanentes de valor no constante (G*)		
Tierras	281.609	101.387
Fuerza Fg	—	14.790
Acciones variables (Q)		
Sobrecargas sobre terreno	—	—
Fuerza Fq	—	14.790
TOTAL	**421.585**	**130.967**

Csv=	**3.219**	Vale

TENSIONES MAXIMAS EN CIMENTACION

	N (T / m)	M (mT / m)
Acciones permanentes (G)		
Peso propio muro	51.088	26.058
Acciones permanentes de valor no constante (G*)		
Tierras	62.410	22.611
Fuerza Fg	0.000	14.790
Acciones variables (Q)		
Sobrecargas sobre terreno	13.500	33.535
Fuerza Fq	0.000	14.790
TOTAL	**126.998**	**111.784**

D (m) =	**6.50**
σ puntera (T / m²) =	**35.41**
σ talón (T / m²) =	**3.66**
σmed (T / m²) =	**19.54**
σcob (T / m²) =	**26.80**
Vale	

ARMADO

Secciones

Elemento	Designación	Datos reales Ancho (m)	Datos reales Canto (m)	Datos de cálculo Ancho (m)	Datos de cálculo Canto (m)
ALZADO	0-0	1.00	1.60	1.00	1.60
	1-1	1.00	1.39	1.00	1.39
PUNTERA	2-2 f	1.00	1.80	1.00	1.80
	2-2 c	1.00	1.80	1.00	0.99
TALON	3-3 f	1.00	1.80	1.00	1.80
	3-3 c	1.00	1.80	1.00	1.80

Esfuerzos mayorados

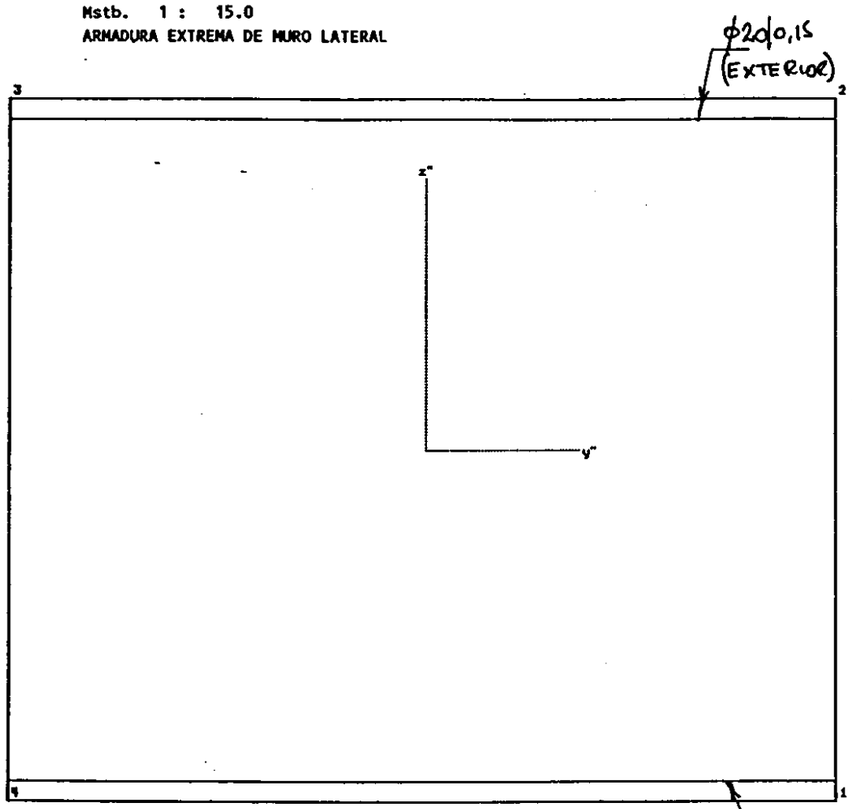
Elemento	Sección	Nd (T / m)	Md (mT / m)	Vd (T / m)
ALZADO	0-0 (+)	26.605	186.872	55.026
	0-0 (-)	19.654	4.781	0.000
	1-1 (+)	19.463	115.118	39.980
	1-1 (-)	14.606	2.998	0.000
PUNTERA	2-2 f (+)	0.000	63.761	—
	2-2 f (-)	0.000	8.719	—
	2-2 c (+)	—	—	27.550
	2-2 c (-)	—	—	3.771
TALON	3-3 f (+)	-1.593	-15.818	—
	3-3 f (-)	-25.051	-113.405	—
	3-3 c (+)	—	—	-5.576
	3-3 c (-)	—	—	-42.949

Armaduras

Elemento	Armadura	Sección	ARMADURA DE CALCULO Necesaria cm2/m	Mínima cm2/m	Control cálculo	Adoptada cm2/m
ALZADO	Vert. trasdós	0-0 (+)	25.064	9.600	Vale	**25.064**
		0-0 (-)	0.000	4.800	Vale	
		1-1 (+)	17.646	8.347	Vale	**17.646**
		1-1 (-)	0.000	4.173	Vale	
	Vert. intrados	0-0 (+)	0.000	4.800	Vale	**4.800**
		0-0 (-)	0.000	4.800	Vale	
		1-1 (+)	0.000	4.173	Vale	
		1-1 (-)	0.000	4.173	Vale	
	Hor. trasdós (*)	—	5.013	17.067	Vale	**17.067**
	Hor. intradós (*)	—	0.000	8.533	Vale	**8.533**
	Cortante	0-0 (+)	0.000	4.500	Vale	**4.500 (cm²/m²)**
		0-0 (-)	0.000	4.500	Vale	
		1-1 (+)	0.000	4.500	Vale	
		1-1 (-)	0.000	4.500	Vale	
PUNTERA	Trans. inferior	2-2 f (+)	8.277	13.024	Vale	**13.024**
		2-2 f (-)	1.125	13.024	Vale	
	Long. inf. (*)	—	1.655	13.024	Vale	**13.024**
	Trans. superior	2-2 f (+)	0.000	13.024	Vale	**20.457**
		2-2 f (-)	0.000	13.024	Vale	
	Long. sup. (*)	—	0.000	13.024	Vale	**13.024**
	Cortante	2-2 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		2-2 c (-)	0.000	0.000	Vale	
TALON	Trans. inferior	3-3 f (+)	0.000	13.024	Vale	**13.024**
		3-3 f (-)	0.000	13.024	Vale	
	Long. inf. (*)	—	0.000	13.024	Vale	**13.024**
	Trans. superior	3-3 f (+)	2.401	13.024	Vale	**20.457**
		3-3 f (-)	20.457	13.024	Vale	
	Long. sup. (*)	—	4.091	13.024	Vale	**13.024**
	Cortante	3-3 c (+)	0.000	0.000	Vale	**0.000 (cm²/m²)**
		3-3 c (-)	0.000	0.000	Vale	
ZAPATA	Perimetral	—	0.000	13.024	Vale	**13.024**

(*) Calculada como el 20% de la armadura perpendicular a ella

Mstb. 1 : 15.0
ARMADURA EXTREMA DE MURO LATERAL



Sección :"MUROLAT1" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 200.00 cm Canto = 170.00 cm

Características mecánicas de la sección:
Area : Ax= 3.400 [m2]
Momentos de inercia : Iy= 0.818833 [m4] Iz= 1.133 [m4]
Inercia a torsión : Ix= 1.597 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.850000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-1.000	-1.133	0.333
dch.	Iz	1.000	1.133	-0.333
abajo	Iy	-0.850	-0.963332	0.283
arriba	Iy	0.850	0.963332	-0.283

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	98.20	-100.00	5.00	100.00	5.00
2	AEH500	(2)	41.89	-100.00	165.00	100.00	165.00
	Total:		140.09	Cuantía de armadura: 0.412 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	200.00 [cm]	166.00 [cm]	0.00
Vy	0.00 [cm2/m]	170.00 [cm]	196.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Dimensionamiento : Viga "MUROLAT1"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
203.000				373.700		45.0

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección 1.30
Factor necesario de minoración de la resistencia de la sección .. 1.00

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado (As-min)	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-100.0	5.0	100.0	5.0	98.20	-	98.20
2 "AEH500"	-100.0	165.0	100.0	165.0	41.89	-	41.89
				Cuantía arm. 0.41 [o/o]		Suma	140.09

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-100.00	170.00	-0.828	-92.954	"H250"
Armadura-Min	-100.00	165.00	-0.500	-1049.235	"AEH500"
Hormigón-Max	100.00	0.00	10.328	0.000	"H250"
Armadura-Max	100.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 157.39 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 12.61 cm Zona comprimida/Canto útil 0.08

PUENTE 1502.8

5º PROYECTO DE PRUEBA DE CARGA

PRUEBA DE CARGA

OBJETO DE LA PRUEBA

El objeto de la prueba es comprobar la respuesta estructural, frente a situaciones de carga estática, de manera tal que confrontando la respuesta real con la teórica, determinar la fiabilidad del comportamiento en servicio del puente.

Esta prueba de carga se realizará antes de la colocación del balasto, carriles, etc., mediante el empleo de camiones cargados con arena, y servirá para obtener una recepción provisional de la obra. Para la recepción definitiva de la estructura será necesario realizar otra prueba de carga con locomotoras, una vez colocada la infraestructura ferroviaria, que no es objeto del presente documento.

CARGA DE PRUEBA

La prueba se realizará empleando camiones, el la disposición que se adjunta a continuación, de tres ejes separados 3.825 y 1.36 m. con cargas por eje de 7.6, 13.7 y 13.7 T.

APARATOS DE MEDIDA Y MEDICIONES

Para la realización de las mediciones se colocarán flexímetros en el centro del vano (medidas f1) y apoyos (medidas f2). Los valores de los desplazamientos que se adjuntan son los descensos relativos esperados entre los puntos de los vanos y los fijos de los apoyos. Estos valores deben ser del orden de la magnitud del valor f1-f2 medido en obra.

La apreciación mínima de cualquiera de los flexímetros será del orden del 3% de los valores máximos esperados de las magnitudes a medir.

El rango de los aparatos deberá ser como mínimo superior en un 50% a los esperados de dicha magnitud.

Las medidas se realizarán inmediatamente antes de la carga, inmediatamente después de su colocación y a los quince minutos de haberla retirado.

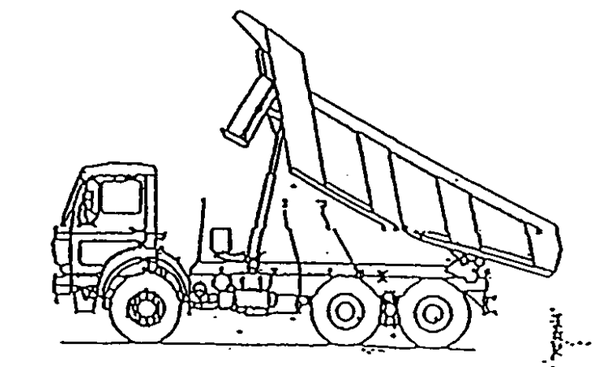
Durante la realización de la prueba se deberá anotar las condiciones climatológicas existentes a lo largo de la misma.

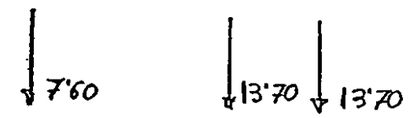
ANALISIS

Para obtener las solicitaciones y desplazamientos verticales en los puntos a medir se procesó la estructura mediante el programa COSMOS/M. El modelo es el mismo usado en el cálculo del tablero. Los esfuerzos que se consiguen son del orden del 30 % de los obtenidos en la realización de una prueba de carga con locomotoras y la infraestructura ferroviaria colocada.

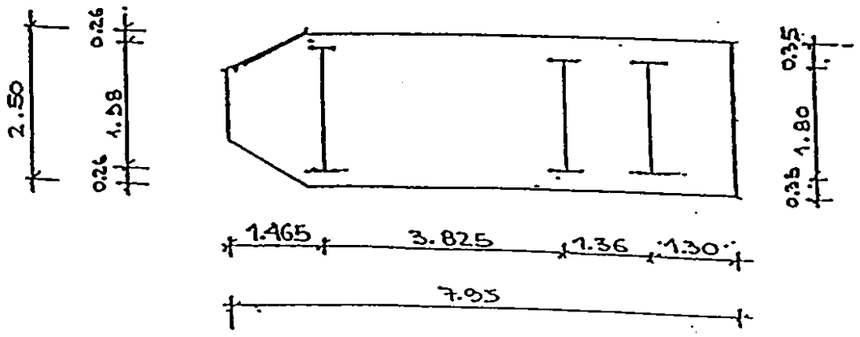
DEFINICION TREN DE CARGAS

CAMION VOLQUETE DE 35 Ton.

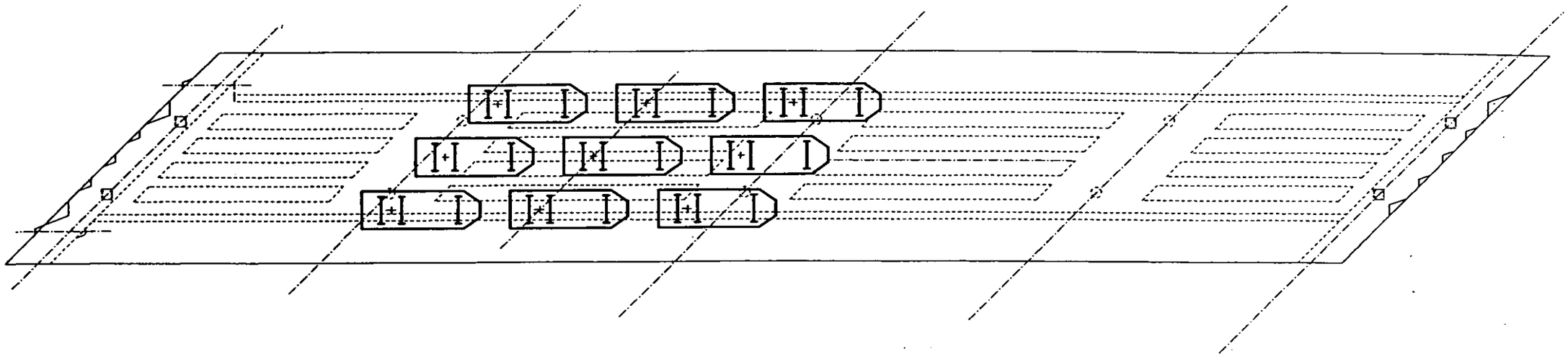




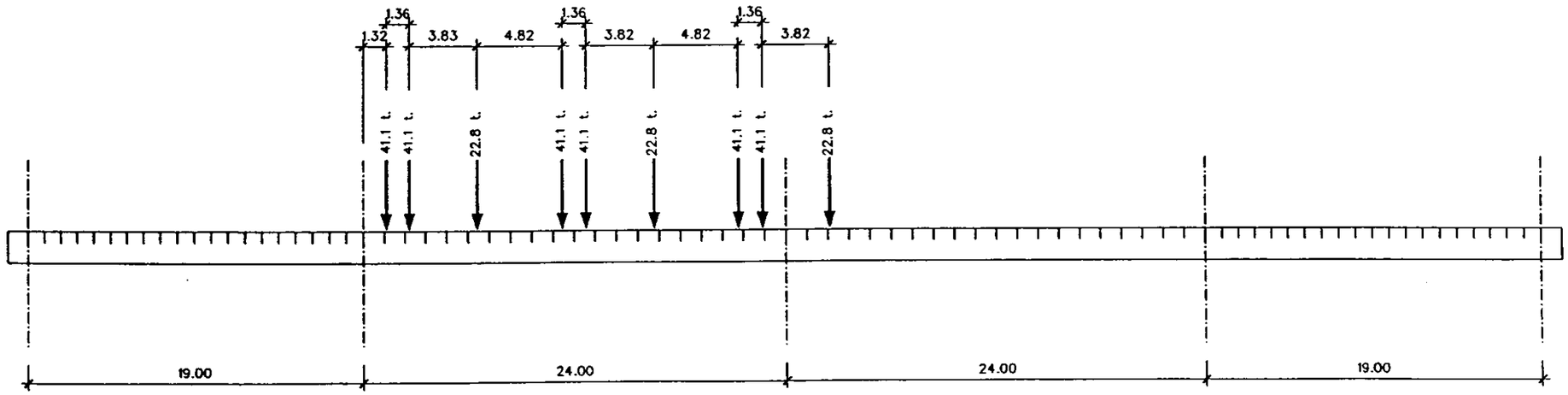
ALZADO



PLANTA



SITUACION EN PLANTA DE CAMIONES EN PRUEBA DE CARGA

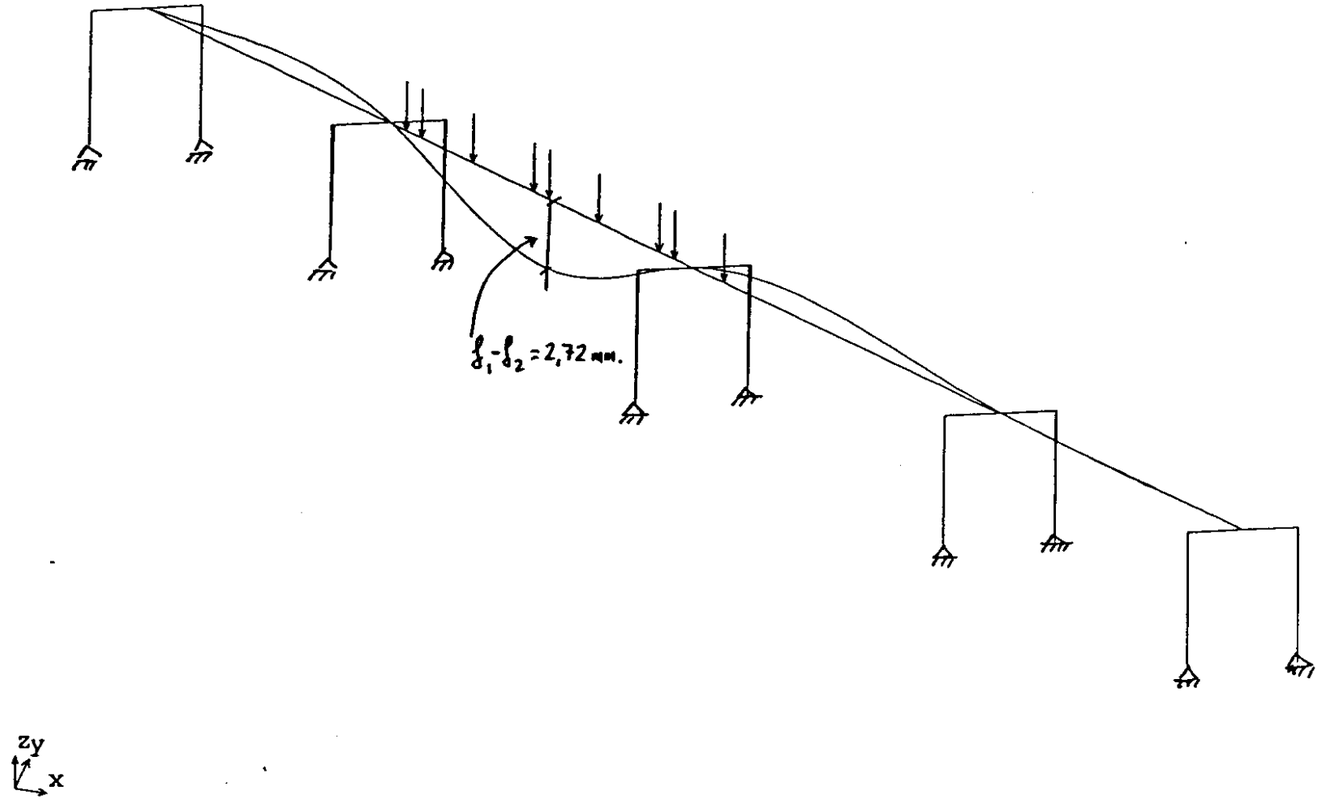


SITUACION EN ALZADO DE EJES DE CAMIONES

E-1502.8

DEPLAZAMIENTOS VERTICALES EN NODOS (mm.)

Node	UZ	Node	UZ	Node	UZ	Node	UZ
1	0.00	31	2.67	61	-0.04	91	0.00
2	0.00	32	2.72	62	0.00	92	0.00
3	-0.06	33	2.68	63	0.02	93	0.00
4	-0.12	34	2.55	64	0.04	94	0.00
5	-0.19	35	2.34	65	0.05	95	0.00
6	-0.26	36	2.08	66	0.06	96	0.00
7	-0.33	37	1.76	67	0.07	97	0.00
8	-0.40	38	1.40	68	0.07	98	0.00
9	-0.47	39	1.03	69	0.08	99	0.00
10	-0.53	40	0.67	70	0.08	100	0.00
11	-0.59	41	0.32	71	0.08	101	0.00
12	-0.63	42	0.03	72	0.07	102	0.00
13	-0.66	43	-0.21	73	0.07		
14	-0.68	44	-0.40	74	0.06		
15	-0.67	45	-0.54	75	0.05		
16	-0.65	46	-0.65	76	0.05		
17	-0.61	47	-0.73	77	0.04		
18	-0.54	48	-0.77	78	0.03		
19	-0.44	49	-0.78	79	0.02		
20	-0.32	50	-0.77	80	0.01		
21	-0.16	51	-0.74	81	0.01		
22	0.02	52	-0.70	82	0.00		
23	0.31	53	-0.63	83	-0.01		
24	0.66	54	-0.56	84	0.00		
25	1.02	55	-0.48	85	0.03		
26	1.39	56	-0.40	86	0.01		
27	1.74	57	-0.31	87	0.02		
28	2.06	58	-0.23	88	0.03		
29	2.33	59	-0.16	89	0.00		
30	2.54	60	-0.09	90	-0.01		



E - 1502 . 8

PRUEBA DE CARGA DINAMICA

El objeto de la prueba de carga dinámica es el de obtener el valor de los principales parámetros dinámicos de cálculo que presenta la estructura. Es el caso de las frecuencias propias de vibración libre.

La valoración del período o frecuencia de vibración vertical correspondiente al modo fundamental, tiene especial repercusión en el coeficiente de amplificación dinámico al paso de la sobrecarga, utilizado en el cálculo.

Para la obtención de estos parámetros es necesaria la excitación dinámica de la estructura. Esto se obtiene mediante el paso de un camión, a distintas velocidades, sobre un obstáculo colocado en el tablero. Las características del mismo serán las de un tablón de forma redondeada de 50cm por 300cm con un espesor de 6 cm.

Se utilizará un solo vehículo pudiendo ser un camión de 2 o 3 ejes con un peso total suficiente para provocar la respuesta de la estructura con la debida amplitud.

El ensayo consistirá en efectuar algunas pasadas a muy baja velocidad, e ir incrementando la velocidad en escalones de 10 km/h.

La instrumentación a disponer consistirá en anillos extensométricos, para la medida de flechas, para registrar los desplazamientos de cada vano y en dos acelerómetros piezoeléctricos, para la medida de vibraciones, colocados en una de los centros de vanos del puente, de manera de determinar las frecuencias principales de vibración vertical, que deberán coincidir con los valores calculados a continuación.

PUENTE E-1502.8

```
**********************************************************************
**                                                                  **
**                                                                  **
**  CCCC  OOOO  SSSS  M   M  OOOO  SSSS   /M   M  **
**  C   C  O  O  S     MM MM  O  O  S      / MM MM  **
**  C   C  O  O  SSSS  M M M  O  O  SSSS  / M M M  **
**  C   C  O  O     S  M   M  O  O     S  / M   M  **
**  CCCC  OOOO  SSSS  M   M  OOOO  SSSS  /  M   M  **
**                                                                  **
**                                                                  **
**                VERSION: 2.00                                     **
**              DISTRIBUTED BY:                                     **
**    STRUCTURAL RESEARCH AND ANALYSIS CORPORATION                  **
**         12121 WILSHIRE BLVD. SUITE 700                           **
**        LOS ANGELES,  CALIFORNIA  90025                           **
**          TEL. NO.  (310) 207-2800                                **
**          COPYRIGHT 1988  S. R. A. C.                             **
**                                                                  **
**********************************************************************
**********************************************************************
Problem name: COEF-N2
Date     : 09/11/1998   Time:  18:09:26
Title    :                                          |
Subtitle :

 CONTROL INFORMATION
  NUMBER OF LOAD CASES ..........(NLCASE) =     1
  SOLUTION MODE .................(MODEX) =     2
    EQ. 0, STATIC ANALYSIS
    EQ. 1, BUCKLING ANALYSIS
    EQ. 2, DYNAMIC ANALYSIS
  THERMAL LOADING FLAG ..........(ITHERM) =     0
    EQ. 0, NO THERMAL EFFECTS CONSIDERED
    EQ. 1, ADD TEMPERATURE EFFECT
  GRAVITY LOADING FLAG ..........(IGRAV) =     0
    EQ. 0, NO GRAVITY LOADING CONSIDERED
    EQ. 1, ADD GRAVITY LOADING EFFECT
  CENTRIFUGAL LOADING FLAG .....(ICNTRF) =     0
    EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
    EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
  IN-PLANE STIFFENING FLAG .....(INPLN) =     0
    EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
    EQ. 1, IN-PLANE EFFECTS CONSIDERED
  SOFT SPRING ADDITION FLAG .....(ISOFT) =     0
    EQ. 0, NO SOFT SPRING OPTION
    EQ. 1, SOFT SPRING ADDED

  SAVE DECOMPOSED STIFFNESS MATRIX FLAG ...(ISAVK) =     0
    EQ. 0, DO NOT SAVE DECOMPOSED K
    EQ. 1, SAVE DECOMPOSED K
  FORM STIFFNESS MATRIX FLAG .....(IFORMK) =     0
    EQ. 0, FORM STIFFNESS MATRIX
    EQ. 1, USE EXISTING DECOMPOSED STIFFNESS MATRIX

  SPIN SOFTENING FLAG ...........(ISPIN) =     0
    EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
    EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
  INERTIA RELIEF FLAG ...........(IFORMK) =     0
    EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
    EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
  RIGID CONNECTIONS FLAG ........(IRIGID) =     0
    EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS & SHELLS
    EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS & SHELLS

 TOTAL SYSTEM DATA
  NUMBER OF EQUATIONS ..........(NEQ) =     516
  NUMBER OF MATRIX ELEMENTS ....(NWK) =    4821
  MAXIMUM HALF BANDWIDTH .......(MK ) =      18
  MEAN HALF BANDWIDTH ..........(MM ) =       9
  NUMBER OF ELEMENTS. ..........(NUME) =      90
  NUMBER OF NODAL POINTS. ......(NUMNP)=      92
  ADJUSTED BLOCK SIZE ..........(MTBLK)=    4822
  EXTRA MEMORY AVAILABLE (in 8-byte words) . .(XMTBLK)=  4687234
  NUMBER OF STIFFNESS BLOCKS. ..... (NBLK) =       1

  MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE =  .108231E+11 (   390)
  MINIMUM DIAGONAL STIFFNESS MATRIX VALUE =  .129152E+08 (   154)
!

 ------------------------------------------------------------------
 |      MASS MOMENT INFORMATION                                   |
 |----------------------------------------------------------------|
 |MASS    .219631E+03 |VOLUME  .352181E+05 |WEIGHT  .000000E+00 |
 |----------------------------------------------------------------|
 | MASS MOMENT OF INERTIA W.R.T. C.G.                             |
 |----------------------------------------------------------------|
 |IX     .255931E+05 |IY     .122545E+06 |IZ     .149320E+06 |
 |----------------------------------------------------------------|
 | MASS PRODUCT OF INERTIA W.R.T. C.G.                            |
 |----------------------------------------------------------------|
 |PXY    -.397323E+05 |PXZ    .000000E+00 |PYZ    .000000E+00 |
 |----------------------------------------------------------------|
 | RADII OF GYRATION W.R.T. C.G.                                  |
 |----------------------------------------------------------------|
 |RX     .107948E+02 |RY     .236211E+02 |RZ     .260743E+02 |
 |----------------------------------------------------------------|
 | CENTER OF GRAVITY                                              |
 |----------------------------------------------------------------|
 |CGx    .680108E+04 |CGy    .106003E+05 |CGz    .000000E+00 |
 |----------------------------------------------------------------|
 | PRINCIPAL MASS MOMENT OF INERTIA                               |
 |----------------------------------------------------------------|
 |P1     .149320E+06 |P2     .136747E+06 |P3     .113907E+05 |
 |----------------------------------------------------------------|
 | PRINCIPAL RADII OF GYRATION                                    |
 |----------------------------------------------------------------|
 |R1     .260743E+02 |R2     .249524E+02 |R3     .720159E+01 |
 |----------------------------------------------------------------|
 | PRINCIPAL AXES (DIRECTION COSINES IN ROWS W.R.T C.G)           |
 |----------------------------------------------------------------|
 |N_11   .558843E+00 |N_12   .829273E+00 |N_13   .000000E+00 |
 |----------------------------------------------------------------|
 |N_21   .336595E+00 |N_22   .941649E+00 |N_23   .000000E+00 |
 |----------------------------------------------------------------|
 |N_31   .000000E+00 |N_32   .000000E+00 |N_33   .247105E+00 |
 ------------------------------------------------------------------

 Note: In the above table, WEIGHT is computed based on the user
       defined acceleration for the first active Load Case

 SOLUTION PARAMETERS
  NUMBER OF EIGENVALUES. .....(NFR)=       2
  MASS TYPE: 1-LUMPED,2-CONSISTENT. . . .(MASS)=       1
  MODE SHAPE PRINT FLAG. .....(MPRNT)=       1
  INTERMEDIATE SOLUTION PRINT FLAG . . .(IFPR)=       0
  STURM SEQUENCE CHECK FLAG. .....(IFSS)=       0
  MAXIMUM NUMBER OF ITERATIONS . . . . .(ITMAX)=      16
  FREQUENCY SHIFT FLAG .....(IFRSH)=       0
  FREQUENCY SHIFT. .....(FRSH)= .0000000E+00
  CONVERGENCE TOLERANCE. .....(RTOL)= .1000000E-04
  COMPOSITE MODAL DAMPING CALC. FLAG . . .(IMDC)=       0
  MODAL ACCELERATION FLAG. .....(IMAM)=       0

 SUBSPACE ITERATION

  ITERATION NUMBER   1

  ITERATION NUMBER   2

  ITERATION NUMBER   3

  ITERATION NUMBER   4

 CONVERGENCE REACHED FOR RTOL .1000E-04

 FREQUENCY ANALYSIS
        by
 SUBSPACE ALGORITHM

   FREQUENCY     FREQUENCY     FREQUENCY     PERIOD
    NUMBER       (RAD/SEC)   (CYCLES/SEC)  (SECONDS)

       1      .3833032E+02  .6100460E+01  .1639221E+00
       2      .4885950E+02  .7776231E+01  .1285970E+00

 MODE SHAPE NO.  1

   NODE  X-DISPLACEMENT  Y-DISPLACEMENT  Z-DISPLACEMENT  X - ROTATION
 Y - ROTATION   Z - ROTATION

      1  .0000000E+00  .0000000E+00  .0000000E+00  .0000000E+00  .0000000E+00
 .0000000E+00
      2  -.6607429E-07  .4942551E-06  .3152716E-06  -.5802296E-02  -.2268689E-02
 .3764319E-07
      3  -.9885362E-06  -.1785512E-05  .4332632E-02  -.5398903E-02  -.2903102E-02  -
 .5012304E-05
      4  -.3566752E-05  -.8077691E-05  .8996016E-02  -.4892099E-02  -.3413773E-02  -
 .9085271E-05
      5  -.7410934E-05  -.1742633E-04  .1384145E-01  -.4267548E-02  -.3788118E-02  -
 .1196150E-04
      6  -.1207435E-04  -.2868788E-04  .1870285E-01  -.3571824E-02  -.3992537E-02  -
 .1346991E-04
      7  -.1705700E-04  -.4070215E-04  .2340235E-01  -.2808571E-02  -.4034381E-02  -
 .1371453E-04
      8  -.2191600E-04  -.5243212E-04  .2778134E-01  -.1981113E-02  -.3923456E-02  -
 .1282846E-04
      9  -.2626684E-04  -.6294518E-04  .3168638E-01  -.1094824E-02  -.3671649E-02  -
 .1096783E-04
     10  -.2977258E-04  -.7146167E-04  .3497574E-01  -.1566951E-03  -.3293353E-02  -
 .8324898E-05
     11  -.3222322E-04  -.7738451E-04  .3753426E-01  .8292498E-03  -.2803014E-02  -
 .5079403E-05
     12  -.3340224E-04  -.8028869E-04  .3924989E-01  .1853552E-02  -.2218848E-02  -
 .1481957E-05
```

13 -.3323650E-04 -.7996276E-04 .4003664E-01 .2911142E-02 -.1557229E-02 .2249597E-05
14 -.3171874E-04 -.7640154E-04 .3982258E-01 .3991965E-02 -.8380824E-03 .5860961E-05
15 -.2893531E-04 -.6982743E-04 .3856432E-01 .5089241E-02 -.7966309E-04 .9095818E-05
16 -.2506789E-04 -.6066061E-04 .3622171E-01 .6195540E-02 .7003620E-03 .1173266E-04
17 -.2037618E-04 -.4952506E-04 .3278451E-01 .7304676E-02 .1485062E-02 .1352831E-04
18 -.1521545E-04 -.3727270E-04 .2825923E-01 .8407536E-02 .2256877E-02 .1427398E-04
19 -.1000321E-04 -.2489739E-04 .2266532E-01 .9499357E-02 .3002359E-02 .1377999E-04
20 -.5224516E-05 -.1355626E-04 .1603625E-01 .1057517E-01 .3709664E-02 .1188948E-04
21 -.1569962E-05 -.4888460E-05 .8447855E-02 .1155387E-01 .4330516E-02 .7663097E-05
22 .1196230E-06 -.8944448E-06 -.3840492E-05 .1244617E-01 .4869410E-02 .1206981E-05
23 .8318747E-05 .1863719E-04 -.1259660E-01 .1227156E-01 .7392645E-02 .3274952E-04
24 .2963275E-04 .6935034E-04 -.2752533E-01 .1175965E-01 .9344574E-02 .5746065E-04
25 .6072904E-04 .1431036E-03 -.4394385E-01 .1087003E-01 .1066633E-01 .7445389E-04
26 .9763159E-04 .2308457E-03 -.6091514E-01 .9670593E-02 .1125045E-01 .8284498E-04
27 .1366436E-03 .3233929E-03 -.7752984E-01 .8181423E-02 .1114684E-01 .8327414E-04
28 .1740836E-03 .4124142E-03 -.9291563E-01 .6430301E-02 .1042015E-01 .7662564E-04
29 .2070603E-03 .4906326E-03 -.1063260E+00 .4450450E-02 .9149988E-02 .6393595E-04
30 .2329600E-03 .5520487E-03 -.1171055E+00 .2281100E-02 .7429917E-02 .4646222E-04
31 .2499118E-03 .5921169E-03 -.1247363E+00 -.3390527E-04 .5364014E-02 .2557945E-04
32 .2566003E-03 .6079221E-03 -.1288396E+00 -.2446573E-02 .3067029E-02 .2840014E-05
33 .2525651E-03 .5982666E-03 -.1291876E+00 -.4904787E-02 .6581244E-03 -.2020274E-04
34 .2380385E-03 .5636920E-03 -.1257219E+00 -.7362757E-02 -.1744556E-02 -.4192027E-04
35 .2139725E-03 .5066208E-03 -.1185206E+00 -.9763862E-02 -.4017980E-02 -.6073384E-04
36 .1820341E-03 .4309931E-03 -.1078145E+00 -.1206481E-01 -.6051756E-02 -.7513450E-04
37 .1447544E-03 .3426429E-03 -.9401986E-01 -.1421663E-01 -.7735549E-02 -.8366353E-04
38 .1051059E-03 .2486852E-03 -.7763856E-01 -.1618167E-01 -.8977189E-02 -.8508877E-04
39 .6658695E-04 .1575708E-03 -.5928353E-01 -.1792588E-01 -.9696509E-02 -.7834905E-04
40 .3324218E-04 .7876117E-04 -.3966586E-01 -.1942285E-01 -.9828863E-02 -.6256122E-04
41 .9606546E-05 .2282179E-04 -.1964458E-01 -.2055365E-01 -.9365710E-02 -.3709806E-04
42 -.7030824E-08 .1872388E-07 .1023834E-04 -.2135484E-01 -.8351045E-02 -.2627719E-05
43 -.9767191E-05 -.2282283E-04 .1967233E-01 -.2055649E-01 -.9392612E-02 -.3727836E-04
44 -.3365304E-04 -.7901742E-04 .3973862E-01 -.1942560E-01 -.9879963E-02 -.6292717E-04
45 -.6740191E-04 -.1581837E-03 .5943420E-01 -.1792652E-01 -.9768249E-02 -.7884678E-04
46 -.1063862E-03 -.2497638E-03 .7788427E-01 -.1617734E-01 -.9064546E-02 -.8567265E-04
47 -.1466090E-03 -.3443356E-03 .9439324E-01 -.1420251E-01 -.7832121E-02 -.8427709E-04
48 -.1844534E-03 -.4333011E-03 .1083132E+00 -.1203775E-01 -.6151983E-02 -.7572198E-04
49 -.2169072E-03 -.5093626E-03 .1191275E+00 -.9725048E-02 -.4120089E-02 -.6126079E-04
50 -.2414601E-03 -.5668547E-03 .1264398E+00 -.7307726E-02 -.1842304E-02 -.4233002E-04
51 -.2563700E-03 -.6017050E-03 .1300028E+00 -.4832522E-02 .5683001E-03 -.2045235E-04
52 -.2606255E-03 -.6114921E-03 .1297222E+00 -.2354778E-02 .2988175E-02 .2749508E-05
53 -.2539608E-03 -.5956658E-03 .1256657E+00 .7596752E-04 .5298347E-02 .2568348E-04
54 -.2369308E-03 -.5554257E-03 .1180536E+00 .2408663E-02 .7377767E-02 .4671046E-04
55 -.2107664E-03 -.4937172E-03 .1072622E+00 .4595005E-02 .9113211E-02 .6432949E-04
56 -.1772438E-03 -.4150797E-03 .9379862E-01 .6589964E-02 .1040006E-01 .7716451E-04
57 -.1391414E-03 -.3256058E-03 .7833737E-01 .8351201E-02 .1114263E-01 .8390791E-04
58 -.9951157E-04 -.2324625E-03 .6161503E-01 .9847763E-02 .1126190E-01 .8350179E-04
59 -.6184529E-04 -.1441264E-03 .4449013E-01 .1105020E-01 .1069116E-01 .7507486E-04
60 -.3024864E-04 -.6989828E-04 .2792678E-01 .1193606E-01 .9382750E-02 .5797080E-04
61 -.8493518E-05 -.1882848E-04 .1281124E-01 .1243998E-01 .7440478E-02 .3306114E-04
62 -.1057751E-06 .8569565E-06 -.2334756E-05 .1260127E-01 .4923527E-02 .1230328E-05
63 .1681839E-05 .4928270E-05 -.8609086E-02 .1169447E-01 .4390896E-02 .7863036E-05
64 .5520961E-05 .1378541E-04 -.1636555E-01 .1069934E-01 .3773988E-02 .1220295E-04
65 .1053875E-04 .2538336E-04 -.2314344E-01 .9604257E-02 .3068255E-02 .1416656E-04
66 .1602582E-04 .3807382E-04 -.2888535E-01 .8490312E-02 .2320472E-02 .1469170E-04
67 .2145869E-04 .5063181E-04 -.3353886E-01 .7365749E-02 .1544771E-02 .1393671E-04
68 .2640275E-04 .6205067E-04 -.3708637E-01 .6234361E-02 .7541883E-03 .1210214E-04
69 .3049204E-04 .7147429E-04 -.3951998E-01 .5103767E-02 -.3454318E-04 .9404103E-05
70 .3345116E-04 .7825723E-04 -.4084972E-01 .3980368E-02 -.8043795E-03 .6079508E-05
71 .3507418E-04 .8194389E-04 -.4111114E-01 .2875655E-02 -.1534824E-02 .2364809E-05
72 .3528020E-04 .8231578E-04 -.4034454E-01 .1793205E-02 -.2209329E-02 -.1475066E-05
73 .3406834E-04 .7937883E-04 -.3862507E-01 .7458180E-03 -.2806235E-02 -.5179121E-05
74 .3151946E-04 .7334670E-04 -.3603716E-01 -.2622902E-03 -.3309492E-02 -.8522881E-05
75 .2782241E-04 .6464148E-04 -.3268820E-01 -.1222379E-02 -.3700952E-02 -.1126554E-04
76 .2324309E-04 .5388224E-04 -.2870219E-01 -.2127600E-02 -.3964674E-02 -.1319460E-04
77 .1812296E-04 .4186395E-04 -.2421875E-01 -.2971835E-02 -.4086415E-02 -.1412025E-04
78 .1284411E-04 .2954350E-04 -.1939003E-01 -.3749494E-02 -.4053828E-02 -.1388765E-04
79 .7913968E-05 .1799062E-04 -.1438748E-01 -.4455928E-02 -.3857284E-02 -.1234972E-04
80 .3805510E-05 .8376024E-05 -.9371477E-02 -.5089187E-02 -.3488219E-02 -.9406980E-05
81 .1054011E-05 .1886188E-05 -.4528717E-02 -.5600726E-02 -.2980788E-02 -.5204254E-05
82 .5804538E-07 -.4722104E-06 -.9558207E-05 -.6005204E-02 -.2348046E-02 .2061220E-07
83 .0000000E+00 .0000000E+00 .0000000E+00 -.5803175E-02 -.2266439E-02 -.2290541E-06
84 .0000000E+00 .0000000E+00 .0000000E+00 -.5802355E-02 -.2268537E-02 .1913508E-06
85 .0000000E+00 .0000000E+00 .0000000E+00 .1244832E-01 .4863899E-02 -.2219290E-06
86 .0000000E+00 .0000000E+00 .0000000E+00 .1244631E-01 .4869048E-02 -.9848515E-06
87 .0000000E+00 .0000000E+00 .0000000E+00 -.2135620E-01 -.8347556E-02 .1305126E-05
88 .0000000E+00 .0000000E+00 .0000000E+00 -.2135619E-01 -.8347593E-02 .1322588E-05
89 .0000000E+00 .0000000E+00 .0000000E+00 .1260142E-01 .4923148E-02 -.9817247E-06
90 .0000000E+00 .0000000E+00 .0000000E+00 .1260340E-01 .4918070E-02 -.2486282E-06
91 .0000000E+00 .0000000E+00 .0000000E+00 -.6005259E-02 -.2347905E-02 .1921687E-06
92 .0000000E+00 .0000000E+00 .0000000E+00 -.6006075E-02 -.2345821E-02 -.2127597E-06

MODE SHAPE NO. 2

NODE X-DISPLACEMENT Y-DISPLACEMENT Z-DISPLACEMENT X-ROTATION Y-ROTATION Z-ROTATION

1 .0000000E+00 .0000000E+00 .0000000E+00 .0000000E+00 .0000000E+00 .0000000E+00
2 .5157392E-07 -.3772440E-06 -.7485945E-06 .1343234E-01 .5251515E-02 .4646647E-06
3 .3416972E-05 .7645756E-05 -.9896771E-02 .1270429E-01 .6330857E-02 .1714671E-04
4 .1216142E-04 .2861641E-04 -.2028387E-01 .1175408E-01 .7096664E-02 .2995623E-04
5 .2479658E-04 .5892488E-04 -.3080064E-01 .1055381E-01 .7520283E-02 .3842126E-04
6 .3975972E-04 .9470900E-04 -.4106153E-01 .9193777E-02 .7561903E-02 .4250110E-04
7 .5546966E-04 .1322568E-03 -.5067191E-01 .7686203E-02 .7248639E-02 .4256187E-04
8 .7053450E-04 .1682847E-03 -.5929067E-01 .6044031E-02 .6614867E-02 .3906972E-04
9 .8375214E-04 .1998892E-03 -.6660484E-01 .4285440E-02 .5702312E-02 .3257327E-04
10 .9410831E-04 .2246910E-03 -.7234417E-01 .2432653E-02 .4560252E-02 .2372701E-04
11 .1009454E-03 .2409544E-03 -.7631538E-01 .5029673E-03 .3237803E-02 .1316759E-04
12 .1037048E-03 .2475000E-03 -.7834961E-01 -.1475549E-02 .1795048E-02 .1705196E-05
13 .1022104E-03 .2438654E-03 -.7835499E-01 -.3482984E-02 .2867247E-03 -.9931288E-05
14 .9653979E-04 .2302641E-03 -.7629468E-01 -.5490064E-02 -.1224497E-02 -.2092601E-04
15 .8709022E-04 .2076063E-03 -.7220315E-01 -.7474328E-02 -.2681018E-02 -.3048795E-04
16 .7448157E-04 .1774533E-03 -.6615261E-01 -.9412611E-02 -.4027838E-02 -.3791113E-04
17 .5964830E-04 .1419617E-03 -.5828460E-01 -.1128477E-01 -.5213145E-02 -.4247789E-04
18 .4376159E-04 .1039885E-03 -.4880048E-01 -.1306708E-01 -.6187598E-02 -.4356786E-04

19	.2819667E-04	.6678308E-04	-.3793394E-01	-.1474456E-01	-.6911969E-02
-.4064353E-04					
20	.1451066E-04	.3406015E-04	-.2596011E-01	-.1630347E-01	-.7353477E-02
-.3327029E-04					
21	.4505290E-05	.1012830E-04	-.1320635E-01	-.1762515E-01	-.7485095E-02
-.2057488E-04					
22	.6292479E-07	-.5106473E-06	.9426838E-08	-.1873448E-01	-.7328606E-02
-.2933880E-05					
23	-.1354390E-04	-.3259960E-04	.1774037E-01	-.1869394E-01	-.8882940E-02
-.5288771E-04					
24	-.4738680E-04	-.1128016E-03	.3669189E-01	-.1827460E-01	-.9665048E-02
-.8978917E-04					
25	-.9523914E-04	-.2260258E-03	.5576534E-01	-.1744219E-01	-.9614821E-02
-.1127351E-03					
26	-.1505066E-03	-.3570857E-03	.7383785E-01	-.1626603E-01	-.8747535E-02
-.1222452E-03					
27	-.2074211E-03	-.4918255E-03	.8993970E-01	-.1478755E-01	-.7161358E-02
-.1196259E-03					
28	-.2605152E-03	-.6177151E-03	.1031839E+00	-.1305921E-01	-.4982090E-02
-.1065583E-03					
29	-.3055537E-03	-.7242591E-03	.1129182E+00	-.1114299E-01	-.2355226E-02
-.8497828E-04					
30	-.3389828E-03	-.8032401E-03	.1186522E+00	-.9107910E-02	.5538284E-03
-.5709678E-04					
31	-.3584318E-03	-.8489765E-03	.1201398E+00	-.7028336E-02	.3569797E-02
-.2525014E-04					
32	-.3625785E-03	-.8584358E-03	.1173456E+00	-.4980754E-02	.6508506E-02
.8086749E-05					
33	-.3512694E-03	-.8313405E-03	.1105079E+00	-.3043400E-02	.9189411E-02
.4051570E-04					
34	-.3255656E-03	-.7698937E-03	.1000466E+00	-.1285041E-02	.1144159E-01
.6972083E-04					
35	-.2873281E-03	-.6790551E-03	.8666255E-01	.2219778E-03	.1310159E-01
.9354105E-04					
36	-.2394882E-03	-.5656462E-03	.7118833E-01	.1420388E-02	.1403004E-01
.1101004E-03					
37	-.1860514E-03	-.4388293E-03	.5468736E-01	.2257240E-02	.1410487E-01
.1177456E-03					
38	-.1313764E-03	-.3090814E-03	.3832128E-01	.2693594E-02	.1323167E-01
.1152196E-03					
39	-.8032443E-04	-.1882031E-03	.2337114E-01	.2699285E-02	.1133889E-01
.1015709E-03					
40	-.3829903E-04	-.8878994E-04	.1119034E-01	.2252959E-02	.8376263E-02
.7613149E-04					
41	-.1034591E-04	-.2251663E-04	.3062065E-02	.1393240E-02	.4589648E-02
.4187541E-04					
42	-.2108480E-06	.1636182E-05	.1943734E-04	.1674359E-03	.6548128E-04
.3172078E-07					
43	-.1019422E-04	-.2194648E-04	.2749839E-02	-.1069068E-02	-.4441119E-02
.4103501E-04					
44	-.3769459E-04	-.8694715E-04	.1056392E-01	-.1946925E-02	-.8225272E-02
.7476021E-04					
45	-.7918658E-04	-.1845173E-03	.2243621E-01	-.2416661E-02	-.1119740E-01
.9988332E-04					
46	-.1296274E-03	-.3033045E-03	.3710565E-01	-.2438386E-02	-.1311231E-01
.1134270E-03					
47	-.1838174E-03	-.4310526E-03	.5324992E-01	-.2031829E-02	-.1401923E-01
.1160309E-03					
48	-.2368340E-03	-.5560351E-03	.6958346E-01	-.1226076E-02	-.1398512E-01
.1086026E-03					
49	-.2843749E-03	-.6677200E-03	.8492543E-01	-.6123134E-04	-.1310429E-01
.9239502E-04					
50	-.3225449E-03	-.7573803E-03	.9825855E-01	.1413765E-02	-.1149451E-01
.6899174E-04					
51	-.3483814E-03	-.8181248E-03	.1087298E+00	.3141169E-02	-.9293187E-02
.4024230E-04					
52	-.3598813E-03	-.8451025E-03	.1156505E+00	.5050965E-02	-.6660909E-02
.8293086E-05					
53	-.3560660E-03	-.8360609E-03	.1185718E+00	.7072171E-02	-.3765803E-02
.2460500E-04					
54	-.3370432E-03	-.7913011E-03	.1172797E+00	.9129135E-02	-.7880972E-03
.5602277E-04					
55	-.3040761E-03	-.7137679E-03	.1117770E+00	.1114544E-01	.2094044E-02
.8357890E-04					
56	-.2593691E-03	-.6089903E-03	.1022780E+00	.1304655E-01	.4708499E-02
.1049727E-03					
57	-.2065714E-03	-.4851536E-03	.8928225E-01	.1476154E-01	.6888102E-02
.1179680E-03					
58	-.1500066E-03	-.3523905E-03	.7342826E-01	.1623152E-01	.8491355E-02
.1206453E-03					
59	-.9484396E-04	-.2231392E-03	.5554147E-01	.1740190E-01	.9393035E-02
.1113431E-03					
60	-.4724582E-04	-.1114863E-03	.3664720E-01	.1823001E-01	.9494769E-02
.8876752E-04					
61	-.1346549E-04	-.3230125E-04	.1777143E-01	.1864807E-01	.8777979E-02
.5233625E-04					
62	.7289707E-07	-.5544552E-06	-.9222832E-05	.1868819E-01	.7300778E-02
.2921928E-05					
63	.4665227E-05	.1014783E-04	-.1326789E-01	.1759081E-01	.7495595E-02
.2082062E-04					
64	.1502506E-04	.3428658E-04	-.2612947E-01	.1627728E-01	.7398577E-02
.3370835E-04					
65	.2917521E-04	.6733436E-04	-.3821748E-01	.1472184E-01	.6987355E-02
.4123895E-04					
66	.4531905E-04	.1050018E-03	-.4923355E-01	.1304049E-01	.6285581E-02
.4425297E-04					
67	.6180580E-04	.1434176E-03	-.5886384E-01	.1125190E-01	.5328201E-02
.4317926E-04					
68	.7721403E-04	.1793337E-03	-.6687643E-01	.9369821E-02	.4154447E-02
.3857658E-04					
69	.9033720E-04	.2099162E-03	-.7306888E-01	.7415508E-02	.2812072E-02
.3107275E-04					
70	.1002220E-03	.2329580E-03	-.7729483E-01	.5409391E-02	.1352364E-02
.2136763E-04					
71	.1061838E-03	.2467978E-03	-.7946380E-01	.3382025E-02	-.1644052E-03
.1020570E-04					
72	.1078160E-03	.2505629E-03	-.7954066E-01	.1350203E-02	-.1684199E-02
-.1618735E-05					
73	.1050299E-03	.2440252E-03	-.7755972E-01	-.6514720E-03	-.3140879E-02
-.1326911E-04					
74	.9801044E-04	.2276512E-03	-.7360950E-01	-.2604472E-02	-.4480628E-02
-.2400870E-04					
75	.8725847E-04	.2025876E-03	-.6784341E-01	-.4481918E-02	-.5644477E-02
-.3305192E-04					
76	.7354545E-04	.1706304E-03	-.6047129E-01	-.6260907E-02	-.6579106E-02
-.3968697E-04					
77	.5789783E-04	.1341693E-03	-.5175568E-01	-.7920664E-02	-.7236148E-02
-.4326828E-04					
78	.4151635E-04	.9614042E-04	-.4200138E-01	-.9442284E-02	-.7573230E-02
-.4324763E-04					
79	.2594460E-04	.5990390E-04	-.3157548E-01	-.1081016E-01	-.7555559E-02
-.3913289E-04					
80	.1270378E-04	.2914311E-04	-.2082910E-01	-.1201502E-01	-.7154863E-02
-.3055921E-04					
81	.3559957E-05	.7828398E-05	-.1019104E-01	-.1296371E-01	-.6409938E-02
-.1751232E-04					
82	.4195253E-07	-.3370175E-06	-.2183377E-04	-.1368446E-01	-.5350158E-02
-.4997042E-06					
83	.0000000E+00	.0000000E+00	.0000000E+00	.1343412E-01	.5246961E-02
-.7169033E-07					
84	.0000000E+00	.0000000E+00	.0000000E+00	.1343221E-01	.5251833E-02
-.3929285E-06					
85	.0000000E+00	.0000000E+00	.0000000E+00	-.1873629E-01	-.7323988E-02
.1683926E-05					
86	.0000000E+00	.0000000E+00	.0000000E+00	-.1873509E-01	-.7327061E-02
.1250068E-05					
87	.0000000E+00	.0000000E+00	.0000000E+00	.1643439E-03	.7338757E-04
-.7148799E-06					
88	.0000000E+00	.0000000E+00	.0000000E+00	.1705488E-03	.5751560E-04
.6827418E-06					
89	.0000000E+00	.0000000E+00	.0000000E+00	.1868881E-01	.7299180E-02
-.1223086E-05					
90	.0000000E+00	.0000000E+00	.0000000E+00	.1868991E-01	.7296351E-02
-.1698825E-05					
91	.0000000E+00	.0000000E+00	.0000000E+00	-.1368433E-01	-.5350497E-02
.3944427E-06					
92	.0000000E+00	.0000000E+00	.0000000E+00	-.1368620E-01	-.5345705E-02
.1052765E-06					

SOLUTION TIME LOG (sec)

INPUT PHASE	2
ASSEMBLAGE OF THE STIFFNESS MATRIX	1
ASSEMBLAGE OF THE MASS MATRIX	0
DECOMPOSITION OF THE STIFFNESS MATRIX	0
EIGENVALUE SOLUTION	0
OUTPUT PHASE	0
TOTAL SOLUTION TIME	3

4.2.3 Puente EVN1-1.4

PUENTE EVN1-1.4

INDICE

1º DEFINICION GEOMETRICA

2º CALCULO DEL TABLERO

3º CALCULO DE PILAS

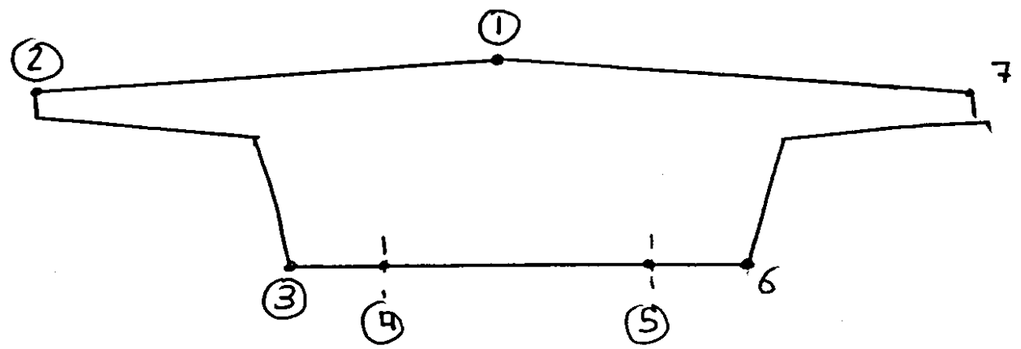
4º CALCULO DE ESTRIBOS

5º PROYECTO DE PRUEBA DE CARGA

PUENTE EVN1-1.4

1º DEFINICION GEOMETRICA

NOMBRE del EJE : T00VIA33
TRAMO donde se situa la estructura: 10
CASO en que se encuentra la estructura(0-1-2)
0 .... La seccion de la carretera tiene calzada unica
1 .... La estructura se situa en la calzada DERECHA
2 .... La estructura se situa en la calzada IZQUIERDA
CASO= 0
NUMERO de VANOS del tablero: 4
PK Estribo n§1 : 1421.471
PK Pila n§ 1 : 1435.275
PK Pila n§ 2 : 1452.674
PK Pila n§ 3 : 1470.074
PK Estribo n§2 : 1483.875
Distancia eje REP.PLANTA al de la ESTRUCTURA: .000
ESPESOR del pavimento (en metros): .000
NUMERO puntos DE REPLANTEO: 7
PUNTO n§.. 1 X= .000 Y= -.220
PUNTO n§.. 2 X= -6.400 Y= -.092
PUNTO n§.. 3 X= -3.400 Y= .880
PUNTO n§.. 4 X= -2.300 Y= .880
PUNTO n§.. 5 X= 2.300 Y= .880
PUNTO n§.. 6 X= 3.400 Y= .880
PUNTO n§.. 7 X= 6.400 Y= -.092
NUMERO de puntos que acompa¤an a los bordes: 0
VANO n§.. 1 NUMERO de secciones NORMALES: 21
VANO n§.. 2 NUMERO de secciones NORMALES: 21
VANO n§.. 3 NUMERO de secciones NORMALES: 21
VANO n§.. 4 NUMERO de secciones NORMALES: 21
NUMERO de secciones ESVIADAS a calcular: 5
SECCION N§.. 1 PK= 1421.471 AZIMUT(g)= 76.180
SECCION N§.. 2 PK= 1435.275 AZIMUT(g)= 76.180
SECCION N§.. 3 PK= 1452.674 AZIMUT(g)= 76.180
SECCION N§.. 4 PK= 1470.074 AZIMUT(g)= 76.180
SECCION N§.. 5 PK= 1483.875 AZIMUT(g)= 76.180
TIPO de tablero (1-2-3-4): 1
VANO.. 1 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 7 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 7 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 7 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 7 Variac. HORIZONTAL tipo: 1



ESQUEMA DE PUNTOS DE REPLANTEO

VAN-SEC-PUNTO	P.K.	AZ(g)	X	Y	Z
1 1 1	1421.471	57.531	667165.109	4610710.880	295.739
1 1 2	1421.471	57.531	667160.081	4610706.920	295.611
1 1 3	1421.471	57.531	667162.438	4610708.776	294.639
1 1 4	1421.471	57.531	667163.302	4610709.457	294.639
1 1 5	1421.471	57.531	667166.916	4610712.303	294.639
1 1 6	1421.471	57.531	667167.780	4610712.983	294.639
1 1 7	1421.471	57.531	667170.137	4610714.840	295.611
1 2 1	1422.161	57.589	667164.683	4610711.422	295.734
1 2 2	1422.161	57.589	667159.651	4610707.467	295.606
1 2 3	1422.161	57.589	667162.010	4610709.321	294.634
1 2 4	1422.161	57.589	667162.874	4610710.001	294.634
1 2 5	1422.161	57.589	667166.491	4610712.844	294.634
1 2 6	1422.161	57.589	667167.356	4610713.523	294.634
1 2 7	1422.161	57.589	667169.714	4610715.377	295.606
1 3 1	1422.851	57.647	667164.256	4610711.965	295.729
1 3 2	1422.851	57.647	667159.221	4610708.014	295.601
1 3 3	1422.851	57.647	667161.581	4610709.866	294.629
1 3 4	1422.851	57.647	667162.447	4610710.545	294.629
1 3 5	1422.851	57.647	667166.066	4610713.385	294.629
1 3 6	1422.851	57.647	667166.931	4610714.064	294.629
1 3 7	1422.851	57.647	667169.291	4610715.916	295.601
1 4 1	1423.542	57.706	667163.830	4610712.508	295.724
1 4 2	1423.542	57.706	667158.792	4610708.562	295.596
1 4 3	1423.542	57.706	667161.154	4610710.412	294.624
1 4 4	1423.542	57.706	667162.020	4610711.090	294.624
1 4 5	1423.542	57.706	667165.641	4610713.926	294.624
1 4 6	1423.542	57.706	667166.507	4610714.605	294.624
1 4 7	1423.542	57.706	667168.869	4610716.454	295.596
1 5 1	1424.232	57.765	667163.405	4610713.052	295.719
1 5 2	1424.232	57.765	667158.363	4610709.111	295.591
1 5 3	1424.232	57.765	667160.726	4610710.958	294.619
1 5 4	1424.232	57.765	667161.593	4610711.635	294.619
1 5 5	1424.232	57.765	667165.217	4610714.468	294.619
1 5 6	1424.232	57.765	667166.084	4610715.146	294.619
1 5 7	1424.232	57.765	667168.448	4610716.993	295.591
1 6 1	1424.922	57.824	667162.980	4610713.596	295.714
1 6 2	1424.922	57.824	667157.934	4610709.659	295.586
1 6 3	1424.922	57.824	667160.300	4610711.505	294.614
1 6 4	1424.922	57.824	667161.167	4610712.181	294.614
1 6 5	1424.922	57.824	667164.794	4610715.011	294.614
1 6 6	1424.922	57.824	667165.661	4610715.687	294.614
1 6 7	1424.922	57.824	667168.026	4610717.532	295.586
1 7 1	1425.612	57.883	667162.556	4610714.140	295.708
1 7 2	1425.612	57.883	667157.506	4610710.208	295.580
1 7 3	1425.612	57.883	667159.873	4610712.051	294.608
1 7 4	1425.612	57.883	667160.741	4610712.727	294.608
1 7 5	1425.612	57.883	667164.371	4610715.553	294.608
1 7 6	1425.612	57.883	667165.239	4610716.229	294.608
1 7 7	1425.612	57.883	667167.606	4610718.072	295.580
1 8 1	1426.302	57.943	667162.132	4610714.685	295.703
1 8 2	1426.302	57.943	667157.079	4610710.758	295.575
1 8 3	1426.302	57.943	667159.448	4610712.599	294.603
1 8 4	1426.302	57.943	667160.316	4610713.274	294.603
1 8 5	1426.302	57.943	667163.948	4610716.096	294.603
1 8 6	1426.302	57.943	667164.817	4610716.771	294.603
1 8 7	1426.302	57.943	667167.186	4610718.612	295.575
1 9 1	1426.993	58.003	667161.709	4610715.230	295.698
1 9 2	1426.993	58.003	667156.652	4610711.308	295.570
1 9 3	1426.993	58.003	667159.022	4610713.146	294.598
1 9 4	1426.993	58.003	667159.892	4610713.821	294.598
1 9 5	1426.993	58.003	667163.526	4610716.640	294.598
1 9 6	1426.993	58.003	667164.396	4610717.314	294.598
1 9 7	1426.993	58.003	667166.766	4610719.153	295.570
1 10 1	1427.683	58.063	667161.286	4610715.776	295.692
1 10 2	1427.683	58.063	667156.225	4610711.858	295.564
1 10 3	1427.683	58.063	667158.598	4610713.695	294.592
1 10 4	1427.683	58.063	667159.468	4610714.368	294.592
1 10 5	1427.683	58.063	667163.105	4610717.184	294.592
1 10 6	1427.683	58.063	667163.975	4610717.857	294.592
1 10 7	1427.683	58.063	667166.347	4610719.693	295.564
1 11 1	1428.373	58.123	667160.864	4610716.322	295.686
1 11 2	1428.373	58.123	667155.800	4610712.409	295.558
1 11 3	1428.373	58.123	667158.174	4610714.243	294.586
1 11 4	1428.373	58.123	667159.044	4610714.916	294.586
1 11 5	1428.373	58.123	667162.684	4610717.728	294.586
1 11 6	1428.373	58.123	667163.555	4610718.400	294.586
1 11 7	1428.373	58.123	667165.929	4610720.235	295.558
1 12 1	1429.063	58.184	667160.442	4610716.868	295.681
1 12 2	1429.063	58.184	667155.374	4610712.960	295.553
1 12 3	1429.063	58.184	667157.750	4610714.792	294.581
1 12 4	1429.063	58.184	667158.621	4610715.464	294.581
1 12 5	1429.063	58.184	667162.264	4610718.273	294.581
1 12 6	1429.063	58.184	667163.135	4610718.944	294.581
1 12 7	1429.063	58.184	667165.511	4610720.776	295.553
1 13 1	1429.753	58.245	667160.021	4610717.415	295.675
1 13 2	1429.753	58.245	667154.949	4610713.512	295.547
1 13 3	1429.753	58.245	667157.327	4610715.341	294.575
1 13 4	1429.753	58.245	667158.198	4610716.012	294.575
1 13 5	1429.753	58.245	667161.844	4610718.818	294.575
1 13 6	1429.753	58.245	667162.716	4610719.488	294.575
1 13 7	1429.753	58.245	667165.093	4610721.318	295.547
1 14 1	1430.444	58.306	667159.601	4610717.962	295.669
1 14 2	1430.444	58.306	667154.525	4610714.064	295.541
1 14 3	1430.444	58.306	667156.904	4610715.891	294.569
1 14 4	1430.444	58.306	667157.776	4610716.561	294.569
1 14 5	1430.444	58.306	667161.425	4610719.363	294.569
1 14 6	1430.444	58.306	667162.297	4610720.033	294.569
1 14 7	1430.444	58.306	667164.676	4610721.860	295.541
1 15 1	1431.134	58.367	667159.180	4610718.510	295.663
1 15 2	1431.134	58.367	667154.101	4610714.616	295.535
1 15 3	1431.134	58.367	667156.482	4610716.441	294.563
1 15 4	1431.134	58.367	667157.355	4610717.111	294.563
1 15 5	1431.134	58.367	667161.006	4610719.909	294.563
1 15 6	1431.134	58.367	667161.879	4610720.578	294.563
1 15 7	1431.134	58.367	667164.260	4610722.403	295.535
1 16 1	1431.824	58.429	667158.761	4610719.058	295.658
1 16 2	1431.824	58.429	667153.677	4610715.169	295.530
1 16 3	1431.824	58.429	667156.060	4610716.992	294.558
1 16 4	1431.824	58.429	667156.934	4610717.660	294.558
1 16 5	1431.824	58.429	667160.588	4610720.455	294.558
1 16 6	1431.824	58.429	667161.461	4610721.123	294.558
1 16 7	1431.824	58.429	667163.844	4610722.946	295.530
1 17 1	1432.514	58.491	667158.342	4610719.606	295.652
1 17 2	1432.514	58.491	667153.255	4610715.723	295.524
1 17 3	1432.514	58.491	667155.639	4610717.543	294.552
1 17 4	1432.514	58.491	667156.514	4610718.211	294.552
1 17 5	1432.514	58.491	667160.170	4610721.002	294.552
1 17 6	1432.514	58.491	667161.044	4610721.669	294.552
1 17 7	1432.514	58.491	667163.429	4610723.490	295.524
1 18 1	1433.204	58.553	667157.923	4610720.155	295.646
1 18 2	1433.204	58.553	667152.832	4610716.276	295.518
1 18 3	1433.204	58.553	667155.219	4610718.095	294.546
1 18 4	1433.204	58.553	667156.094	4610718.761	294.546
1 18 5	1433.204	58.553	667159.753	4610721.549	294.546
1 18 6	1433.204	58.553	667160.628	4610722.215	294.546
1 18 7	1433.204	58.553	667163.014	4610724.033	295.518
1 19 1	1433.895	58.616	667157.505	4610720.704	295.639
1 19 2	1433.895	58.616	667152.410	4610716.831	295.511
1 19 3	1433.895	58.616	667154.799	4610718.646	294.539
1 19 4	1433.895	58.616	667155.674	4610719.312	294.539
1 19 5	1433.895	58.616	667159.336	4610722.096	294.539
1 19 6	1433.895	58.616	667160.212	4610722.762	294.539
1 19 7	1433.895	58.616	667162.600	4610724.578	295.511
1 20 1	1434.585	58.678	667157.088	4610721.254	295.633
1 20 2	1434.585	58.678	667151.989	4610717.385	295.505
1 20 3	1434.585	58.678	667154.379	4610719.199	294.533
1 20 4	1434.585	58.678	667155.255	4610719.864	294.533
1 20 5	1434.585	58.678	667158.920	4610722.644	294.533
1 20 6	1434.585	58.678	667159.796	4610723.309	294.533
1 20 7	1434.585	58.678	667162.186	4610725.122	295.505
1 21 1	1435.275	58.741	667156.671	4610721.804	295.627
1 21 2	1435.275	58.741	667151.568	4610717.940	295.499
1 21 3	1435.275	58.741	667153.960	4610719.751	294.527
1 21 4	1435.275	58.741	667154.837	4610720.415	294.527
1 21 5	1435.275	58.741	667158.504	4610723.192	294.527
1 21 6	1435.275	58.741	667159.381	4610723.856	294.527
1 21 7	1435.275	58.741	667161.773	4610725.667	295.499
2 1 1	1435.275	58.741	667156.671	4610721.804	295.627
2 1 2	1435.275	58.741	667151.568	4610717.940	295.499
2 1 3	1435.275	58.741	667153.960	4610719.751	294.527
2 1 4	1435.275	58.741	667154.837	4610720.415	294.527
2 1 5	1435.275	58.741	667158.504	4610723.192	294.527
2 1 6	1435.275	58.741	667159.381	4610723.856	294.527
2 1 7	1435.275	58.741	667161.773	4610725.667	295.499
2 2 1	1436.145	58.821	667156.146	4610722.498	295.619
2 2 2	1436.145	58.821	667151.039	4610718.641	295.491
2 2 3	1436.145	58.821	667153.433	4610720.449	294.519
2 2 4	1436.145	58.821	667154.311	4610721.112	294.519
2 2 5	1436.145	58.821	667157.981	4610723.884	294.519
2 2 6	1436.145	58.821	667158.859	4610724.547	294.519
2 2 7	1436.145	58.821	667161.253	4610726.355	295.491
2 3 1	1437.015	58.901	667155.622	4610723.192	295.611
2 3 2	1437.015	58.901	667150.510	4610719.342	295.483
2 3 3	1437.015	58.901	667152.906	4610721.147	294.511
2 3 4	1437.015	58.901	667153.785	4610721.808	294.511
2 3 5	1437.015	58.901	667157.459	4610724.576	294.511
2 3 6	1437.015	58.901	667158.338	4610725.238	294.511
2 3 7	1437.015	58.901	667160.734	4610727.043	295.483
2 4 1	1437.885	58.981	667155.099	4610723.888	295.603
2 4 2	1437.885	58.981	667149.982	4610720.043	295.475
2 4 3	1437.885	58.981	667152.381	4610721.845	294.503
2 4 4	1437.885	58.981	667153.260	4610722.506	294.503
2 4 5	1437.885	58.981	667156.938	4610725.269	294.503
2 4 6	1437.885	58.981	667157.818	4610725.930	294.503
2 4 7	1437.885	58.981	667160.216	4610727.732	295.475
2 5 1	1438.755	59.062	667154.577	4610724.583	295.594
2 5 2	1438.755	59.062	667149.455	4610720.746	295.466
2 5 3	1438.755	59.062	667151.856	4610722.545	294.494
2 5 4	1438.755	59.062	667152.736	4610723.204	294.494
2 5 5	1438.755	59.062	667156.418	4610725.963	294.494
2 5 6	1438.755	59.062	667157.298	4610726.622	294.494
2 5 7	1438.755	59.062	667159.699	4610728.421	295.466
2 6 1	1439.625	59.144	667154.056	4610725.280	295.586
2 6 2	1439.625	59.144	667148.929	4610721.449	295.458
2 6 3	1439.625	59.144	667151.332	4610723.245	294.486
2 6 4	1439.625	59.144	667152.213	4610723.903	294.486
2 6 5	1439.625	59.144	667155.898	4610726.657	294.486
2 6 6	1439.625	59.144	667156.779	4610727.315	294.486
2 6 7	1439.625	59.144	667159.183	4610729.111	295.458
2 7 1	1440.495	59.225	667153.536	4610725.977	295.577
2 7 2	1440.495	59.225	667148.404	4610722.152	295.449
2 7 3	1440.495	59.225	667150.809	4610723.945	294.477
2 7 4	1440.495	59.225	667151.691	4610724.603	294.477
2 7 5	1440.495	59.225	667155.380	4610727.352	294.477
2 7 6	1440.495	59.225	667156.262	4610728.009	294.477
2 7 7	1440.495	59.225	667158.667	4610729.802	295.449
2 8 1	1441.365	59.307	667153.016	4610726.675	295.569
2 8 2	1441.365	59.307	667147.880	4610722.857	295.441
2 8 3	1441.365	59.307	667150.287	4610724.647	294.469
2 8 4	1441.365	59.307	667151.170	4610725.303	294.469
2 8 5	1441.365	59.307	667154.862	4610728.047	294.469
2 8 6	1441.365	59.307	667155.745	4610728.703	294.469
2 8 7	1441.365	59.307	667158.153	4610730.493	295.441
2 9 1	1442.235	59.390	667152.498	4610727.373	295.560
2 9 2	1442.235	59.390	667147.356	4610723.562	295.432
2 9 3	1442.235	59.390	667149.766	4610725.349	294.460
2 9 4	1442.235	59.390	667150.650	4610726.004	294.460
2 9 5	1442.235	59.390	667154.345	4610728.743	294.460
2 9 6	1442.235	59.390	667155.229	4610729.398	294.460
2 9 7	1442.235	59.390	667157.639	4610731.185	295.432
2 10 1	1443.105	59.473	667151.980	4610728.073	295.551
2 10 2	1443.105	59.473	667146.834	4610724.268	295.423
2 10 3	1443.105	59.473	667149.246	4610726.052	294.451
2 10 4	1443.105	59.473	667150.131	4610726.705	294.451
2 10 5	1443.105	59.473	667153.829	4610729.440	294.451
2 10 6	1443.105	59.473	667154.714	4610730.094	294.451
2 10 7	1443.105	59.473	667157.126	4610731.877	295.423
2 11 1	1443.974	59.556	667151.463	4610728.773	295.542
2 11 2	1443.974	59.556	667146.312	4610724.975	295.414
2 11 3	1443.974	59.556	667148.727	4610726.755	294.442
2 11 4	1443.974	59.556	667149.612	4610727.408	294.442
2 11 5	1443.974	59.556	667153.315	4610730.137	294.442
2 11 6	1443.974	59.556	667154.200	4610730.790	294.442
2 11 7	1443.974	59.556	667156.615	4610732.570	295.414
2 12 1	1444.844	59.640	667150.948	4610729.473	295.533
2 12 2	1444.844	59.640	667145.791	4610725.682	295.405
2 12 3	1444.844	59.640	667148.208	4610727.459	294.433
2 12 4	1444.844	59.640	667149.094	4610728.111	294.433
2 12 5	1444.844	59.640	667152.801	4610730.836	294.433
2 12 6	1444.844	59.640	667153.687	4610731.487	294.433
2 12 7	1444.844	59.640	667156.104	4610733.264	295.405
2 13 1	1445.714	59.724	667150.433	4610730.174	295.524
2 13 2	1445.714	59.724	667145.271	4610726.390	295.396
2 13 3	1445.714	59.724	667147.691	4610728.164	294.424
2 13 4	1445.714	59.724	667148.578	4610728.814	294.424
2 13 5	1445.714	59.724	667152.288	4610731.534	294.424
2 13 6	1445.714	59.724	667153.175	4610732.185	294.424
2 13 7	1445.714	59.724	667155.594	4610733.959	295.396
2 14 1	1446.584	59.808	667149.919	4610730.876	295.515
2 14 2	1446.584	59.808	667144.752	4610727.099	295.387
2 14 3	1446.584	59.808	667147.174	4610728.870	294.415
2 14 4	1446.584	59.808	667148.062	4610729.519	294.415
2 14 5	1446.584	59.808	667151.775	4610732.234	294.415
2 14 6	1446.584	59.808	667152.663	4610732.883	294.415
2 14 7	1446.584	59.808	667155.085	4610734.654	295.387
2 15 1	1447.454	59.893	667149.406	4610731.579	295.505
2 15 2	1447.454	59.893	667144.234	4610727.808	295.377
2 15 3	1447.454	59.893	667146.658	4610729.576	294.405
2 15 4	1447.454	59.893	667147.547	4610730.224	294.405
2 15 5	1447.454	59.893	667151.264	4610732.934	294.405
2 15 6	1447.454	59.893	667152.153	4610733.582	294.405
2 15 7	1447.454	59.893	667154.577	4610735.349	295.377
2 16 1	1448.324	59.978	667148.894	4610732.282	295.496
2 16 2	1448.324	59.978	667143.717	4610728.519	295.368
2 16 3	1448.324	59.978	667146.144	4610730.283	294.396
2 16 4	1448.324	59.978	667147.033	4610730.930	294.396
2 16 5	1448.324	59.978	667150.754	4610733.635	294.396
2 16 6	1448.324	59.978	667151.644	4610734.282	294.396
2 16 7	1448.324	59.978	667154.070	4610736.046	295.368
2 17 1	1449.194	60.064	667148.383	4610732.986	295.486
2 17 2	1449.194	60.064	667143.201	4610729.230	295.358
2 17 3	1449.194	60.064	667145.630	4610730.990	294.386
2 17 4	1449.194	60.064	667146.521	4610731.636	294.386
2 17 5	1449.194	60.064	667150.245	4610734.336	294.386
2 17 6	1449.194	60.064	667151.135	4610734.982	294.386
2 17 7	1449.194	60.064	667153.564	4610736.743	295.358
2 18 1	1450.064	60.150	667147.872	4610733.691	295.477
2 18 2	1450.064	60.150	667142.686	4610729.941	295.349
2 18 3	1450.064	60.150	667145.117	4610731.699	294.377
2 18 4	1450.064	60.150	667146.009	4610732.343	294.377
2 18 5	1450.064	60.150	667149.736	4610735.038	294.377

2 18 6	1450.064	60.150	667150.628	4610735.683	294.377
2 18 7	1450.064	60.150	667153.059	4610737.440	295.349
2 19 1	1450.934	60.237	667147.363	4610734.396	295.467
2 19 2	1450.934	60.237	667142.172	4610730.654	295.339
2 19 3	1450.934	60.237	667144.605	4610732.408	294.367
2 19 4	1450.934	60.237	667145.497	4610733.051	294.367
2 19 5	1450.934	60.237	667149.229	4610735.741	294.367
2 19 6	1450.934	60.237	667150.121	4610736.384	294.367
2 19 7	1450.934	60.237	667152.555	4610738.139	295.339
2 20 1	1451.804	60.324	667146.855	4610735.102	295.457
2 20 2	1451.804	60.324	667141.658	4610731.367	295.329
2 20 3	1451.804	60.324	667144.094	4610733.118	294.357
2 20 4	1451.804	60.324	667144.987	4610733.760	294.357
2 20 5	1451.804	60.324	667148.723	4610736.445	294.357
2 20 6	1451.804	60.324	667149.616	4610737.087	294.357
2 20 7	1451.804	60.324	667152.052	4610738.838	295.329
2 21 1	1452.674	60.411	667146.348	4610735.809	295.447
2 21 2	1452.674	60.411	667141.146	4610732.081	295.319
2 21 3	1452.674	60.411	667143.584	4610733.828	294.347
2 21 4	1452.674	60.411	667144.478	4610734.469	294.347
2 21 5	1452.674	60.411	667148.217	4610737.149	294.347
2 21 6	1452.674	60.411	667149.111	4610737.790	294.347
2 21 7	1452.674	60.411	667151.550	4610739.537	295.319
3 1 1	1452.674	60.411	667146.348	4610735.809	295.447
3 1 2	1452.674	60.411	667141.146	4610732.081	295.319
3 1 3	1452.674	60.411	667143.584	4610733.828	294.347
3 1 4	1452.674	60.411	667144.478	4610734.469	294.347
3 1 5	1452.674	60.411	667148.217	4610737.149	294.347
3 1 6	1452.674	60.411	667149.111	4610737.790	294.347
3 1 7	1452.674	60.411	667151.550	4610739.537	295.319
3 2 1	1453.544	60.499	667145.841	4610736.516	295.437
3 2 2	1453.544	60.499	667140.634	4610732.795	295.309
3 2 3	1453.544	60.499	667143.075	4610734.540	294.337
3 2 4	1453.544	60.499	667143.970	4610735.179	294.337
3 2 5	1453.544	60.499	667147.713	4610737.854	294.337
3 2 6	1453.544	60.499	667148.608	4610738.493	294.337
3 2 7	1453.544	60.499	667151.048	4610740.238	295.309
3 3 1	1454.414	60.587	667145.336	4610737.225	295.426
3 3 2	1454.414	60.587	667140.124	4610733.511	295.298
3 3 3	1454.414	60.587	667142.567	4610735.252	294.326
3 3 4	1454.414	60.587	667143.463	4610735.890	294.326
3 3 5	1454.414	60.587	667147.209	4610738.559	294.326
3 3 6	1454.414	60.587	667148.105	4610739.198	294.326
3 3 7	1454.414	60.587	667150.548	4610740.939	295.298
3 4 1	1455.284	60.675	667144.832	4610737.933	295.416
3 4 2	1455.284	60.675	667139.614	4610734.227	295.288
3 4 3	1455.284	60.675	667142.060	4610735.964	294.316
3 4 4	1455.284	60.675	667142.957	4610736.601	294.316
3 4 5	1455.284	60.675	667146.707	4610739.266	294.316
3 4 6	1455.284	60.675	667147.603	4610739.903	294.316
3 4 7	1455.284	60.675	667150.049	4610741.640	295.288
3 5 1	1456.154	60.764	667144.328	4610738.643	295.406
3 5 2	1456.154	60.764	667139.106	4610734.944	295.278
3 5 3	1456.154	60.764	667141.554	4610736.678	294.306
3 5 4	1456.154	60.764	667142.451	4610737.314	294.306
3 5 5	1456.154	60.764	667146.205	4610739.973	294.306
3 5 6	1456.154	60.764	667147.103	4610740.608	294.306
3 5 7	1456.154	60.764	667149.551	4610742.342	295.278
3 6 1	1457.024	60.853	667143.826	4610739.353	295.395
3 6 2	1457.024	60.853	667138.598	4610735.661	295.267
3 6 3	1457.024	60.853	667141.049	4610737.392	294.295
3 6 4	1457.024	60.853	667141.947	4610738.026	294.295
3 6 5	1457.024	60.853	667145.705	4610740.680	294.295
3 6 6	1457.024	60.853	667146.603	4610741.315	294.295
3 6 7	1457.024	60.853	667149.054	4610743.045	295.267
3 7 1	1457.894	60.943	667143.324	4610740.064	295.384
3 7 2	1457.894	60.943	667138.092	4610736.380	295.256
3 7 3	1457.894	60.943	667140.545	4610738.107	294.284
3 7 4	1457.894	60.943	667141.444	4610738.740	294.284
3 7 5	1457.894	60.943	667145.205	4610741.389	294.284
3 7 6	1457.894	60.943	667146.104	4610742.022	294.284
3 7 7	1457.894	60.943	667148.557	4610743.749	295.256
3 8 1	1458.764	61.033	667142.824	4610740.776	295.373
3 8 2	1458.764	61.033	667137.586	4610737.099	295.245
3 8 3	1458.764	61.033	667140.041	4610738.822	294.273
3 8 4	1458.764	61.033	667140.942	4610739.455	294.273
3 8 5	1458.764	61.033	667144.707	4610742.098	294.273
3 8 6	1458.764	61.033	667145.607	4610742.730	294.273
3 8 7	1458.764	61.033	667148.062	4610744.453	295.245
3 9 1	1459.634	61.124	667142.325	4610741.488	295.363
3 9 2	1459.634	61.124	667137.081	4610737.819	295.235
3 9 3	1459.634	61.124	667139.539	4610739.539	294.263
3 9 4	1459.634	61.124	667140.440	4610740.170	294.263
3 9 5	1459.634	61.124	667144.209	4610742.807	294.263
3 9 6	1459.634	61.124	667145.110	4610743.438	294.263
3 9 7	1459.634	61.124	667147.568	4610745.158	295.235
3 10 1	1460.504	61.215	667141.826	4610742.202	295.352
3 10 2	1460.504	61.215	667136.578	4610738.539	295.224
3 10 3	1460.504	61.215	667139.038	4610740.256	294.252
3 10 4	1460.504	61.215	667139.940	4610740.885	294.252
3 10 5	1460.504	61.215	667143.713	4610743.518	294.252
3 10 6	1460.504	61.215	667144.615	4610744.147	294.252
3 10 7	1460.504	61.215	667147.075	4610745.864	295.224
3 11 1	1461.374	61.306	667141.329	4610742.915	295.340
3 11 2	1461.374	61.306	667136.075	4610739.261	295.212
3 11 3	1461.374	61.306	667138.538	4610740.974	294.240
3 11 4	1461.374	61.306	667139.441	4610741.602	294.240
3 11 5	1461.374	61.306	667143.217	4610744.229	294.240
3 11 6	1461.374	61.306	667144.120	4610744.857	294.240
3 11 7	1461.374	61.306	667146.583	4610746.570	295.212
3 12 1	1462.244	61.398	667140.833	4610743.630	295.329
3 12 2	1462.244	61.398	667135.574	4610739.983	295.201
3 12 3	1462.244	61.398	667138.039	4610741.692	294.229
3 12 4	1462.244	61.398	667138.943	4610742.319	294.229
3 12 5	1462.244	61.398	667142.723	4610744.941	294.229
3 12 6	1462.244	61.398	667143.627	4610745.568	294.229
3 12 7	1462.244	61.398	667146.092	4610747.277	295.201
3 13 1	1463.114	61.490	667140.336	4610744.349	295.318
3 13 2	1463.114	61.490	667135.072	4610740.709	295.190
3 13 3	1463.114	61.490	667137.540	4610742.415	294.218
3 13 4	1463.114	61.490	667138.444	4610743.041	294.218
3 13 5	1463.114	61.490	667142.228	4610745.657	294.218
3 13 6	1463.114	61.490	667143.133	4610746.282	294.218
3 13 7	1463.114	61.490	667145.601	4610747.988	295.190
3 14 1	1463.984	61.582	667139.842	4610745.065	295.306
3 14 2	1463.984	61.582	667134.572	4610741.433	295.178
3 14 3	1463.984	61.582	667137.043	4610743.135	294.206
3 14 4	1463.984	61.582	667137.948	4610743.760	294.206
3 14 5	1463.984	61.582	667141.736	4610746.370	294.206
3 14 6	1463.984	61.582	667142.641	4610746.994	294.206
3 14 7	1463.984	61.582	667145.112	4610748.697	295.178
3 15 1	1464.854	61.674	667139.349	4610745.781	295.295
3 15 2	1464.854	61.674	667134.074	4610742.157	295.167
3 15 3	1464.854	61.674	667136.547	4610743.856	294.195
3 15 4	1464.854	61.674	667137.453	4610744.479	294.195
3 15 5	1464.854	61.674	667141.245	4610747.084	294.195
3 15 6	1464.854	61.674	667142.151	4610747.707	294.195
3 15 7	1464.854	61.674	667144.624	4610749.406	295.167
3 16 1	1465.724	61.767	667138.857	4610746.499	295.283
3 16 2	1465.724	61.767	667133.577	4610742.882	295.155
3 16 3	1465.724	61.767	667136.052	4610744.577	294.183
3 16 4	1465.724	61.767	667136.959	4610745.199	294.183
3 16 5	1465.724	61.767	667140.754	4610747.798	294.183
3 16 6	1465.724	61.767	667141.662	4610748.420	294.183
3 16 7	1465.724	61.767	667144.137	4610750.115	295.155
3 17 1	1466.594	61.859	667138.366	4610747.217	295.271
3 17 2	1466.594	61.859	667133.080	4610743.608	295.143
3 17 3	1466.594	61.859	667135.558	4610745.300	294.171
3 17 4	1466.594	61.859	667136.466	4610745.920	294.171
3 17 5	1466.594	61.859	667140.265	4610748.514	294.171
3 17 6	1466.594	61.859	667141.173	4610749.134	294.171
3 17 7	1466.594	61.859	667143.651	4610750.826	295.143
3 18 1	1467.464	61.951	667137.875	4610747.936	295.260
3 18 2	1467.464	61.951	667132.585	4610744.334	295.132
3 18 3	1467.464	61.951	667135.065	4610746.022	294.160
3 18 4	1467.464	61.951	667135.974	4610746.641	294.160
3 18 5	1467.464	61.951	667139.777	4610749.230	294.160
3 18 6	1467.464	61.951	667140.686	4610749.849	294.160
3 18 7	1467.464	61.951	667143.166	4610751.537	295.132
3 19 1	1468.334	62.044	667137.386	4610748.655	295.248
3 19 2	1468.334	62.044	667132.091	4610745.062	295.120
3 19 3	1468.334	62.044	667134.573	4610746.746	294.148
3 19 4	1468.334	62.044	667135.483	4610747.364	294.148
3 19 5	1468.334	62.044	667139.290	4610749.947	294.148
3 19 6	1468.334	62.044	667140.200	4610750.564	294.148
3 19 7	1468.334	62.044	667142.682	4610752.249	295.120
3 20 1	1469.204	62.136	667136.899	4610749.375	295.236
3 20 2	1469.204	62.136	667131.598	4610745.789	295.108
3 20 3	1469.204	62.136	667134.082	4610747.470	294.136
3 20 4	1469.204	62.136	667134.994	4610748.087	294.136
3 20 5	1469.204	62.136	667138.804	4610750.664	294.136
3 20 6	1469.204	62.136	667139.715	4610751.281	294.136
3 20 7	1469.204	62.136	667142.200	4610752.961	295.108
3 21 1	1470.074	62.228	667136.412	4610750.096	295.223
3 21 2	1470.074	62.228	667131.105	4610746.518	295.095
3 21 3	1470.074	62.228	667133.593	4610748.195	294.123
3 21 4	1470.074	62.228	667134.505	4610748.810	294.123
3 21 5	1470.074	62.228	667138.318	4610751.382	294.123
3 21 6	1470.074	62.228	667139.230	4610751.997	294.123
3 21 7	1470.074	62.228	667141.718	4610753.675	295.095
4 1 1	1470.074	62.228	667136.412	4610750.096	295.223
4 1 2	1470.074	62.228	667131.105	4610746.518	295.095
4 1 3	1470.074	62.228	667133.593	4610748.195	294.123
4 1 4	1470.074	62.228	667134.505	4610748.810	294.123
4 1 5	1470.074	62.228	667138.318	4610751.382	294.123
4 1 6	1470.074	62.228	667139.230	4610751.997	294.123
4 1 7	1470.074	62.228	667141.718	4610753.675	295.095
4 2 1	1470.764	62.302	667136.026	4610750.669	295.214
4 2 2	1470.764	62.302	667130.716	4610747.096	295.086
4 2 3	1470.764	62.302	667133.205	4610748.771	294.114
4 2 4	1470.764	62.302	667134.118	4610749.385	294.114
4 2 5	1470.764	62.302	667137.934	4610751.952	294.114
4 2 6	1470.764	62.302	667138.847	4610752.566	294.114
4 2 7	1470.764	62.302	667141.336	4610754.241	295.086
4 3 1	1471.454	62.375	667135.641	4610751.242	295.204
4 3 2	1471.454	62.375	667130.327	4610747.676	295.076
4 3 3	1471.454	62.375	667132.818	4610749.347	294.104
4 3 4	1471.454	62.375	667133.731	4610749.960	294.104
4 3 5	1471.454	62.375	667137.551	4610752.523	294.104
4 3 6	1471.454	62.375	667138.464	4610753.136	294.104
4 3 7	1471.454	62.375	667140.956	4610754.808	295.076
4 4 1	1472.144	62.448	667135.257	4610751.815	295.194
4 4 2	1472.144	62.448	667129.939	4610748.255	295.066
4 4 3	1472.144	62.448	667132.432	4610749.924	294.094
4 4 4	1472.144	62.448	667133.346	4610750.536	294.094
4 4 5	1472.144	62.448	667137.168	4610753.094	294.094
4 4 6	1472.144	62.448	667138.082	4610753.706	294.094
4 4 7	1472.144	62.448	667140.576	4610755.375	295.066
4 5 1	1472.834	62.521	667134.874	4610752.388	295.184
4 5 2	1472.834	62.521	667129.551	4610748.835	295.056
4 5 3	1472.834	62.521	667132.046	4610750.500	294.084
4 5 4	1472.834	62.521	667132.961	4610751.111	294.084
4 5 5	1472.834	62.521	667136.786	4610753.666	294.084
4 5 6	1472.834	62.521	667137.701	4610754.276	294.084
4 5 7	1472.834	62.521	667140.196	4610755.942	295.056
4 6 1	1473.524	62.594	667134.491	4610752.963	295.174
4 6 2	1473.524	62.594	667129.164	4610749.415	295.046
4 6 3	1473.524	62.594	667131.661	4610751.078	294.074
4 6 4	1473.524	62.594	667132.576	4610751.688	294.074
4 6 5	1473.524	62.594	667136.405	4610754.238	294.074
4 6 6	1473.524	62.594	667137.320	4610754.847	294.074
4 6 7	1473.524	62.594	667139.817	4610756.510	295.046
4 7 1	1474.214	62.668	667134.109	4610753.537	295.164
4 7 2	1474.214	62.668	667128.778	4610749.995	295.036
4 7 3	1474.214	62.668	667131.277	4610751.656	294.064
4 7 4	1474.214	62.668	667132.193	4610752.264	294.064
4 7 5	1474.214	62.668	667136.024	4610754.810	294.064
4 7 6	1474.214	62.668	667136.940	4610755.419	294.064
4 7 7	1474.214	62.668	667139.439	4610757.079	295.036
4 8 1	1474.904	62.741	667133.727	4610754.112	295.154
4 8 2	1474.904	62.741	667128.392	4610750.577	295.026
4 8 3	1474.904	62.741	667130.893	4610752.234	294.054
4 8 4	1474.904	62.741	667131.810	4610752.841	294.054
4 8 5	1474.904	62.741	667135.644	4610755.383	294.054
4 8 6	1474.904	62.741	667136.561	4610755.990	294.054
4 8 7	1474.904	62.741	667139.062	4610757.647	295.026
4 9 1	1475.594	62.814	667133.346	4610754.687	295.143
4 9 2	1475.594	62.814	667128.007	4610751.158	295.015
4 9 3	1475.594	62.814	667130.510	4610752.812	294.043
4 9 4	1475.594	62.814	667131.428	4610753.419	294.043
4 9 5	1475.594	62.814	667135.265	4610755.956	294.043
4 9 6	1475.594	62.814	667136.182	4610756.562	294.043
4 9 7	1475.594	62.814	667138.685	4610758.217	295.015
4 10 1	1476.284	62.887	667132.966	4610755.263	295.133
4 10 2	1476.284	62.887	667127.623	4610751.740	295.005
4 10 3	1476.284	62.887	667130.127	4610753.392	294.033
4 10 4	1476.284	62.887	667131.046	4610753.997	294.033
4 10 5	1476.284	62.887	667134.886	4610756.530	294.033
4 10 6	1476.284	62.887	667135.804	4610757.135	294.033
4 10 7	1476.284	62.887	667138.309	4610758.787	295.005
4 11 1	1476.975	62.961	667132.586	4610755.840	295.123
4 11 2	1476.975	62.961	667127.239	4610752.323	294.995
4 11 3	1476.975	62.961	667129.746	4610753.971	294.023
4 11 4	1476.975	62.961	667130.665	4610754.576	294.023
4 11 5	1476.975	62.961	667134.508	4610757.104	294.023
4 11 6	1476.975	62.961	667135.427	4610757.708	294.023
4 11 7	1476.975	62.961	667137.933	4610759.357	294.995
4 12 1	1477.665	63.034	667132.207	4610756.416	295.112
4 12 2	1477.665	63.034	667126.856	4610752.906	294.984
4 12 3	1477.665	63.034	667129.365	4610754.551	294.012
4 12 4	1477.665	63.034	667130.284	4610755.155	294.012
4 12 5	1477.665	63.034	667134.131	4610757.678	294.012
4 12 6	1477.665	63.034	667135.050	4610758.282	294.012
4 12 7	1477.665	63.034	667137.559	4610759.927	294.984
4 13 1	1478.355	63.107	667131.829	4610756.994	295.102
4 13 2	1478.355	63.107	667126.474	4610753.489	294.974
4 13 3	1478.355	63.107	667128.984	4610755.132	294.002
4 13 4	1478.355	63.107	667129.905	4610755.734	294.002
4 13 5	1478.355	63.107	667133.754	4610758.253	294.002
4 13 6	1478.355	63.107	667134.674	4610758.855	294.002
4 13 7	1478.355	63.107	667137.184	4610760.498	294.974
4 14 1	1479.045	63.180	667131.452	4610757.571	295.091
4 14 2	1479.045	63.180	667126.093	4610754.073	294.963
4 14 3	1479.045	63.180	667128.605	4610755.712	293.991
4 14 4	1479.045	63.180	667129.526	4610756.314	293.991
4 14 5	1479.045	63.180	667133.378	4610758.828	293.991
4 14 6	1479.045	63.180	667134.299	4610759.430	293.991
4 14 7	1479.045	63.180	667136.811	4610761.070	294.963
4 15 1	1479.735	63.253	667131.075	4610758.149	295.081
4 15 2	1479.735	63.253	667125.712	4610754.657	294.953
4 15 3	1479.735	63.253	667128.226	4610756.294	293.981
4 15 4	1479.735	63.253	667129.147	4610756.894	293.981

4 15 5	1479.735	63.253	667133.002	4610759.404	293.981
4 15 6	1479.735	63.253	667133.924	4610760.005	293.981
4 15 7	1479.735	63.253	667136.438	4610761.642	294.953
4 16 1	1480.425	63.327	667130.699	4610758.728	295.070
4 16 2	1480.425	63.327	667125.331	4610755.242	294.942
4 16 3	1480.425	63.327	667127.847	4610756.876	293.970
4 16 4	1480.425	63.327	667128.770	4610757.475	293.970
4 16 5	1480.425	63.327	667132.627	4610759.981	293.970
4 16 6	1480.425	63.327	667133.550	4610760.580	293.970
4 16 7	1480.425	63.327	667136.066	4610762.214	294.942
4 17 1	1481.115	63.400	667130.323	4610759.307	295.059
4 17 2	1481.115	63.400	667124.952	4610755.827	294.931
4 17 3	1481.115	63.400	667127.470	4610757.458	293.959
4 17 4	1481.115	63.400	667128.393	4610758.056	293.959
4 17 5	1481.115	63.400	667132.253	4610760.557	293.959
4 17 6	1481.115	63.400	667133.176	4610761.155	293.959
4 17 7	1481.115	63.400	667135.694	4610762.787	294.931
4 18 1	1481.805	63.473	667129.948	4610759.886	295.048
4 18 2	1481.805	63.473	667124.573	4610756.412	294.920
4 18 3	1481.805	63.473	667127.093	4610758.040	293.948
4 18 4	1481.805	63.473	667128.016	4610758.637	293.948
4 18 5	1481.805	63.473	667131.880	4610761.134	293.948
4 18 6	1481.805	63.473	667132.804	4610761.731	293.948
4 18 7	1481.805	63.473	667135.323	4610763.360	294.920
4 19 1	1482.495	63.546	667129.574	4610760.466	295.037
4 19 2	1482.495	63.546	667124.195	4610756.998	294.909
4 19 3	1482.495	63.546	667126.716	4610758.623	293.937
4 19 4	1482.495	63.546	667127.641	4610759.219	293.937
4 19 5	1482.495	63.546	667131.507	4610761.712	293.937
4 19 6	1482.495	63.546	667132.432	4610762.308	293.937
4 19 7	1482.495	63.546	667134.953	4610763.933	294.909
4 20 1	1483.185	63.619	667129.200	4610761.046	295.026
4 20 2	1483.185	63.619	667123.817	4610757.584	294.898
4 20 3	1483.185	63.619	667126.341	4610759.207	293.926
4 20 4	1483.185	63.619	667127.266	4610759.802	293.926
4 20 5	1483.185	63.619	667131.135	4610762.290	293.926
4 20 6	1483.185	63.619	667132.060	4610762.885	293.926
4 20 7	1483.185	63.619	667134.584	4610764.507	294.898
4 21 1	1483.875	63.693	667128.828	4610761.626	295.015
4 21 2	1483.875	63.693	667123.441	4610758.171	294.887
4 21 3	1483.875	63.693	667125.966	4610759.791	293.915
4 21 4	1483.875	63.693	667126.892	4610760.385	293.915
4 21 5	1483.875	63.693	667130.764	4610762.868	293.915
4 21 6	1483.875	63.693	667131.689	4610763.462	293.915
4 21 7	1483.875	63.693	667134.215	4610765.082	294.887

5

SECC	PUNTO	PK	AZ	X	Y	Z
1 1	1421.471	76.180	667165.110	4610710.879	295.739
1 2	1423.385	76.180	667158.889	4610708.438	295.597
1 3	1422.492	76.180	667161.804	4610709.583	294.632
1 4	1422.162	76.180	667162.874	4610710.001	294.634
1 5	1420.776	76.180	667167.345	4610711.758	294.644
1 6	1420.441	76.180	667168.415	4610712.179	294.646
1 7	1419.524	76.180	667171.333	4610713.325	295.625
2 1	1435.275	76.180	667156.671	4610721.804	295.627
2 2	1437.057	76.180	667150.485	4610719.375	295.483
2 3	1436.226	76.180	667153.384	4610720.513	294.518
2 4	1435.919	76.180	667154.447	4610720.931	294.521
2 5	1434.627	76.180	667158.895	4610722.677	294.533
2 6	1434.315	76.180	667159.959	4610723.095	294.536
2 7	1433.460	76.180	667162.861	4610724.235	295.515
3 1	1452.673	76.180	667146.348	4610735.808	295.447
3 2	1454.276	76.180	667140.205	4610733.397	295.300
3 3	1453.528	76.180	667143.084	4610734.527	294.337
3 4	1453.254	76.180	667144.139	4610734.942	294.340
3 5	1452.090	76.180	667148.556	4610736.676	294.354
3 6	1451.810	76.180	667149.612	4610737.092	294.357
3 7	1451.039	76.180	667152.494	4610738.223	295.338
4 1	1470.075	76.180	667136.411	4610750.097	295.223
4 2	1471.485	76.180	667130.310	4610747.701	295.075
4 3	1470.827	76.180	667133.169	4610748.824	294.113
4 4	1470.585	76.180	667134.218	4610749.235	294.116
4 5	1469.559	76.180	667138.605	4610750.957	294.131
4 6	1469.313	76.180	667139.654	4610751.370	294.134
4 7	1468.633	76.180	667142.516	4610752.494	295.115
5 1	1483.875	76.180	667128.827	4610761.627	295.015
5 2	1485.132	76.180	667122.755	4610759.242	294.867
5 3	1484.546	76.180	667125.602	4610760.359	293.905
5 4	1484.331	76.180	667126.645	4610760.770	293.908
5 5	1483.416	76.180	667131.011	4610762.483	293.923
5 6	1483.196	76.180	667132.055	4610762.894	293.926
5 7	1482.589	76.180	667134.903	4610764.011	294.908

PUENTE EVN1-1.4

2º CALCULO DEL TABLERO

GINPROSA

ASUNTO
EUN 1-1.4
CARGAS CONSIDERADAS

PAG. 1

1) Peso propio $\gamma = 2,5$ t/m3

2) Carga muerta

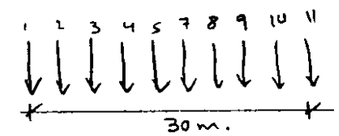
Traviesas + Carriles	=	1,28 t/m.
Balasto	=	11,80 t/m.
Cables + Conductos	=	2,05 t/m.
Barreras	=	1,50 t/m.
TOTAL CARGA MUERTA	=	16,13 t/m.

3) TREN TIPO B (IPF-75)

Se supone una carga de 10 t/m aplicada como si fuese una sobrecarga de uso y los 20 t/m de exceso de peso por locomotora aplicada como un tren de cargas puntuales

$q = 10 \times 2 = 20$ t/m (sc. movil)

Exceso locomotora

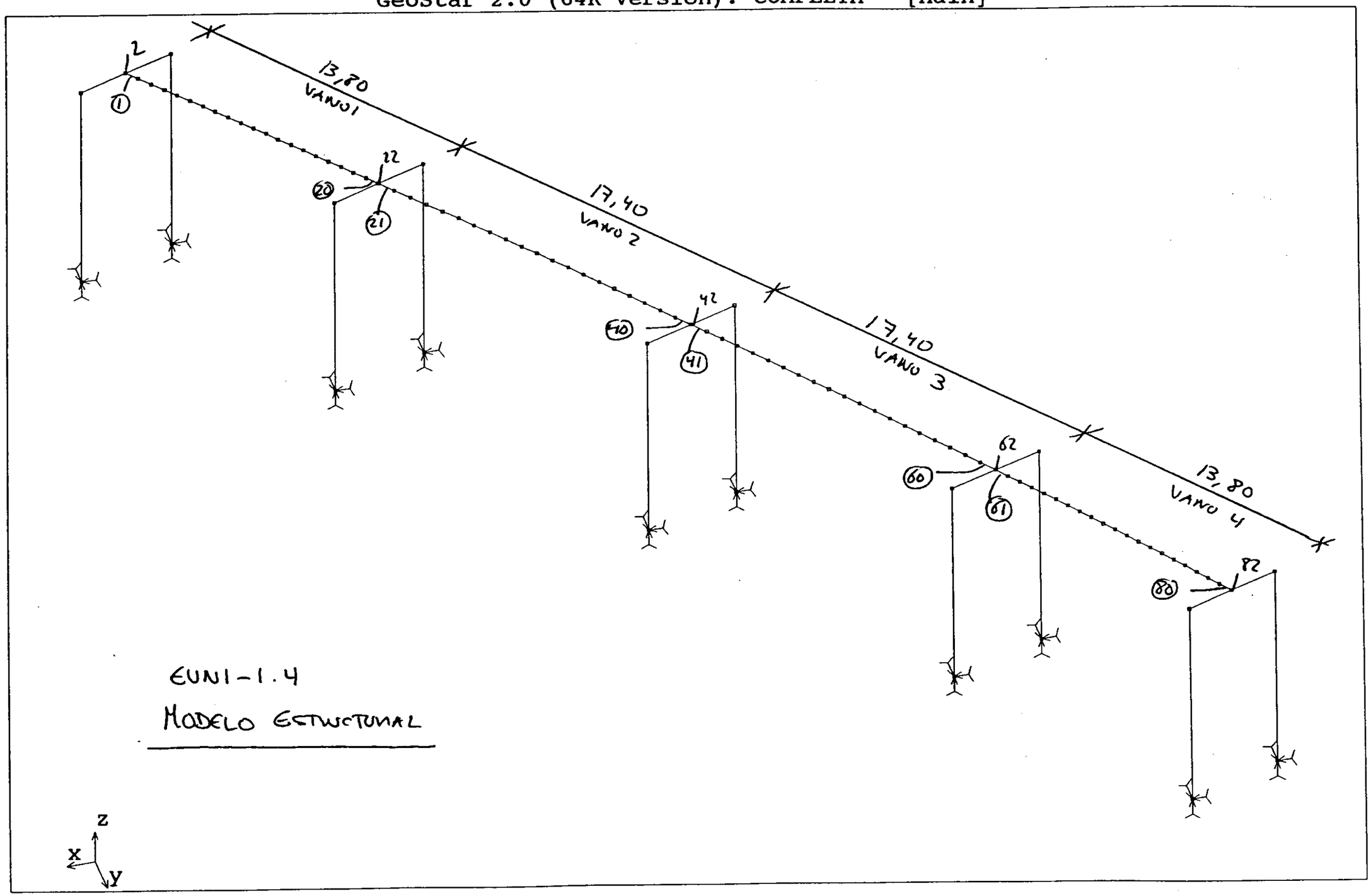


11 cargas puntuales de $P = 2 \times \frac{2 \times 30}{11} = 10,9$ ton.

27,94 t/m.

15,7 ton

GeoStar 2.0 (64K Version): COMPLETA - [Main]



```
**********************************************************
*****
**********************************************************
*****
**                                **
**                                **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS   /M    M **
** C    O  O S     MM  MM  O  O S     / MM  MM **
** C    O  O SSSS  M MM M  O  O SSSS  / M MM M **
** C    O  O    S  M    M  O  O    S / M    M **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS/  M    M **
**                                **
**                                **
**          VERSION: 2.00          **
**        DISTRIBUTED BY:          **
**   STRUCTURAL RESEARCH AND ANALYSIS CORPORATION
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**      LOS ANGELES,  CALIFORNIA  90025       **
**        TEL. NO.  (310) 207-2800            **
**        COPYRIGHT 1988  S. R. A. C.         **
**                                **
**********************************************************
*****
**********************************************************
*****
Problem name: COMPLETA
Date     : 11/16/1998   Time:  12:39:21
Title    :                                    |
Subtitle :


Element group data
------------------

Element group number=  1
Element name:
BEAM3D  Three dimensional Elastic Beam elements
 Type of beam element = ..............  0
   EQ. 0 ; Symmetric beam element
   EQ. 1 ; Unsymmetric beam element
   EQ. 2 ; Symmetric tapered beam element


Real constant data
------------------

Real constant set   1
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set   2
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set   3
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set   4
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set   5
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set   6
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set   7
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set   8
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set   9
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set  10
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set  11
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set  12
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set  13
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
 Moment of Inertia about element Z-axis =  .85612
 Depth of beam (y-axis)        =  1.1000
 Width of beam (z-axis)        =  12.800
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  1.6778
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle             =  .00000
 Torsion const for max shear stress  =  .00000
Real constant set  14
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                          =  9.3832
 Moment of Inertia about element Y-axis =  74.881
```

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 15
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 16
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 17
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 18
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 19
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 20
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 21
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 22
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 23
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 24
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 25
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 26
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 27
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 28
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 29
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 30
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 31
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 32
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 33
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 34
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 35
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 36
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 37
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 38
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 39
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 40
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 41
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 42
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 43
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 44
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 45
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 46
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 47
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 48
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 49
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 50
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 51
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 52
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 53
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 54
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 55
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 56
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 57
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 58
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 59
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 60
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 61
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 62
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 63
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 64
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 65
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 66
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 67
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 68
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 69
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 70
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 71
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 72
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 73
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 74
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 75
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 76
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 77
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 78
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 79
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 80
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 81
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 1000.0
Moment of Inertia about element Y-axis = 1000.0
Moment of Inertia about element Z-axis = 1000.0
Depth of beam (y-axis) = 10.000
Width of beam (z-axis) = 10.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1000.0
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 82
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.000
Moment of Inertia about element Y-axis = .10000E-03
Moment of Inertia about element Z-axis = .10000E-03
Depth of beam (y-axis) = 1.0000
Width of beam (z-axis) = 1.0000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = .10000E-03
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000

Material propery data

Material property set 1

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0
ALPX : X thermal expansion	.10000E-04	0
DENS : Mass Density	2.5000	0

Material property set 2

	Value	Temp curve no.
EX : X Elastic Modulus	1.0000	0
NUXY : Poisson Ratio	.20000	0

Material property set 3

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0

Nodal input data

NODE	BOUNDARY CONDITION CODES (0 = FREE ; 1 = FIXED)						NODAL POINT COORDINATES		
	X	Y	Z	XX	YY	ZZ	X	Y	Z
1	1	1	1	1	1	1	.00000	.00000	.10000E+07
2	0	0	0	0	0	0	7165.1	10711.	.00000
3	0	0	0	0	0	0	7164.7	10711.	.00000
4	0	0	0	0	0	0	7164.3	10712.	.00000
5	0	0	0	0	0	0	7163.8	10713.	.00000
6	0	0	0	0	0	0	7163.4	10713.	.00000
7	0	0	0	0	0	0	7163.0	10714.	.00000
8	0	0	0	0	0	0	7162.6	10714.	.00000
9	0	0	0	0	0	0	7162.1	10715.	.00000
10	0	0	0	0	0	0	7161.7	10715.	.00000
11	0	0	0	0	0	0	7161.3	10716.	.00000
12	0	0	0	0	0	0	7160.9	10716.	.00000
13	0	0	0	0	0	0	7160.4	10717.	.00000
14	0	0	0	0	0	0	7160.0	10717.	.00000
15	0	0	0	0	0	0	7159.6	10718.	.00000
16	0	0	0	0	0	0	7159.2	10719.	.00000
17	0	0	0	0	0	0	7158.8	10719.	.00000
18	0	0	0	0	0	0	7158.3	10720.	.00000
19	0	0	0	0	0	0	7157.9	10720.	.00000
20	0	0	0	0	0	0	7157.5	10721.	.00000
21	0	0	0	0	0	0	7157.1	10721.	.00000
22	0	0	0	0	0	0	7156.7	10722.	.00000
23	0	0	0	0	0	0	7156.1	10722.	.00000
24	0	0	0	0	0	0	7155.6	10723.	.00000
25	0	0	0	0	0	0	7155.1	10724.	.00000
26	0	0	0	0	0	0	7154.6	10725.	.00000
27	0	0	0	0	0	0	7154.1	10725.	.00000
28	0	0	0	0	0	0	7153.5	10726.	.00000
29	0	0	0	0	0	0	7153.0	10727.	.00000
30	0	0	0	0	0	0	7152.5	10727.	.00000
31	0	0	0	0	0	0	7152.0	10728.	.00000
32	0	0	0	0	0	0	7151.5	10729.	.00000
33	0	0	0	0	0	0	7150.9	10729.	.00000
34	0	0	0	0	0	0	7150.4	10730.	.00000
35	0	0	0	0	0	0	7149.9	10731.	.00000
36	0	0	0	0	0	0	7149.4	10732.	.00000
37	0	0	0	0	0	0	7148.9	10732.	.00000
38	0	0	0	0	0	0	7148.4	10733.	.00000
39	0	0	0	0	0	0	7147.9	10734.	.00000
40	0	0	0	0	0	0	7147.4	10734.	.00000
41	0	0	0	0	0	0	7146.9	10735.	.00000
42	0	0	0	0	0	0	7146.3	10736.	.00000
43	0	0	0	0	0	0	7145.8	10737.	.00000
44	0	0	0	0	0	0	7145.3	10737.	.00000
45	0	0	0	0	0	0	7144.8	10738.	.00000
46	0	0	0	0	0	0	7144.3	10739.	.00000
47	0	0	0	0	0	0	7143.8	10739.	.00000
48	0	0	0	0	0	0	7143.3	10740.	.00000
49	0	0	0	0	0	0	7142.8	10741.	.00000
50	0	0	0	0	0	0	7142.3	10741.	.00000
51	0	0	0	0	0	0	7141.8	10742.	.00000
52	0	0	0	0	0	0	7141.3	10743.	.00000
53	0	0	0	0	0	0	7140.8	10744.	.00000
54	0	0	0	0	0	0	7140.3	10744.	.00000
55	0	0	0	0	0	0	7139.8	10745.	.00000
56	0	0	0	0	0	0	7139.3	10746.	.00000
57	0	0	0	0	0	0	7138.9	10746.	.00000
58	0	0	0	0	0	0	7138.4	10747.	.00000
59	0	0	0	0	0	0	7137.9	10748.	.00000
60	0	0	0	0	0	0	7137.4	10749.	.00000
61	0	0	0	0	0	0	7136.9	10749.	.00000
62	0	0	0	0	0	0	7136.4	10750.	.00000
63	0	0	0	0	0	0	7136.0	10751.	.00000
64	0	0	0	0	0	0	7135.6	10751.	.00000
65	0	0	0	0	0	0	7135.3	10752.	.00000
66	0	0	0	0	0	0	7134.9	10752.	.00000
67	0	0	0	0	0	0	7134.5	10753.	.00000
68	0	0	0	0	0	0	7134.1	10754.	.00000
69	0	0	0	0	0	0	7133.7	10754.	.00000
70	0	0	0	0	0	0	7133.3	10755.	.00000
71	0	0	0	0	0	0	7133.0	10755.	.00000
72	0	0	0	0	0	0	7132.6	10756.	.00000
73	0	0	0	0	0	0	7132.2	10756.	.00000
74	0	0	0	0	0	0	7131.8	10757.	.00000
75	0	0	0	0	0	0	7131.5	10758.	.00000
76	0	0	0	0	0	0	7131.1	10758.	.00000
77	0	0	0	0	0	0	7130.7	10759.	.00000
78	0	0	0	0	0	0	7130.3	10759.	.00000
79	0	0	0	0	0	0	7129.9	10760.	.00000
80	0	0	0	0	0	0	7129.6	10760.	.00000
81	0	0	0	0	0	0	7129.2	10761.	.00000
82	0	0	0	0	0	0	7128.8	10762.	.00000
83	0	0	0	0	0	0	7162.9	10710.	.00000
84	0	0	0	0	0	0	7167.3	10712.	.00000
85	0	0	0	0	0	0	7154.4	10721.	.00000
86	0	0	0	0	0	0	7158.9	10723.	.00000
87	0	0	0	0	0	0	7144.1	10735.	.00000
88	0	0	0	0	0	0	7148.6	10737.	.00000
89	0	0	0	0	0	0	7134.2	10749.	.00000
90	0	0	0	0	0	0	7138.6	10751.	.00000
91	0	0	0	0	0	0	7126.6	10761.	.00000
92	0	0	0	0	0	0	7131.0	10762.	.00000
93	1	1	1	0	0	0	7162.9	10710.	-10.000
94	1	1	1	0	0	0	7167.3	10712.	-10.000
95	1	1	1	0	0	0	7154.4	10721.	-10.000
96	1	1	1	0	0	0	7158.9	10723.	-10.000
97	1	1	1	0	0	0	7144.1	10735.	-10.000
98	1	1	1	0	0	0	7148.6	10737.	-10.000
99	1	1	1	0	0	0	7134.2	10749.	-10.000
100	1	1	1	0	0	0	7138.6	10751.	-10.000
101	1	1	1	0	0	0	7126.6	10761.	-10.000
102	1	1	1	0	0	0	7131.0	10762.	-10.000

Element input data

ELEM	EGRP	MP	REAL	ECS	NODE 1	NODE 2	NODE 3	NODE 4	NODE 5	NODE 6	NODE 7	NODE 8	NODE 9	NODE10	NODE11	NODE12	NODE13	NODE14	NODE15	NODE16	NODE17	NODE18	NODE19	NODE20
1	1	1	1	-1	2	3	1																	
2	1	1	2	-1	3	4	1																	
3	1	1	3	-1	4	5	1																	
4	1	1	4	-1	5	6	1																	
5	1	1	5	-1	6	7	1																	
6	1	1	6	-1	7	8	1																	
7	1	1	7	-1	8	9	1																	
8	1	1	8	-1	9	10	1																	
9	1	1	9	-1	10	11	1																	
10	1	1	10	-1	11	12	1																	
11	1	1	11	-1	12	13	1																	
12	1	1	12	-1	13	14	1																	
13	1	1	13	-1	14	15	1																	
14	1	1	14	-1	15	16	1																	
15	1	1	15	-1	16	17	1																	
16	1	1	16	-1	17	18	1																	
17	1	1	17	-1	18	19	1																	
18	1	1	18	-1	19	20	1																	
19	1	1	19	-1	20	21	1																	
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22	1	1	22	-1	23	24	1																	
23	1	1	23	-1	24	25	1																	
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31	1	1	31	-1	32	33	1																	
32	1	1	32	-1	33	34	1																	
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34	1	1	34	-1	35	36	1																	
35	1	1	35	-1	36	37	1																	
36	1	1	36	-1	37	38	1																	
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39	1	1	39	-1	40	41	1																	
40	1	1	40	-1	41	42	1																	
41	1	1	41	-1	42	43	1																	
42	1	1	42	-1	43	44	1																	
43	1	1	43	-1	44	45	1																	
44	1	1	44	-1	45	46	1																	
45	1	1	45	-1	46	47	1																	
46	1	1	46	-1	47	48	1																	
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49	1	1	49	-1	50	51	1																	
50	1	1	50	-1	51	52	1																	
51	1	1	51	-1	52	53	1																	
52	1	1	52	-1	53	54	1																	
53	1	1	53	-1	54	55	1																	

```
54  1 1  54  -1    55    56    1
55  1 1  55  -1    56    57    1
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57  1 1  57  -1    58    59    1
58  1 1  58  -1    59    60    1
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60  1 1  60  -1    61    62    1
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62  1 1  62  -1    63    64    1
63  1 1  63  -1    64    65    1
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82  1 3  81  -1     2    84    1
83  1 3  81  -1    85    22    1
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92  1 3  82  -1    84    94    1
93  1 3  82  -1    85    95    1
94  1 3  82  -1    86    96    1
95  1 3  82  -1    87    97    1
96  1 3  82  -1    88    98    1
97  1 3  82  -1    89    99    1
98  1 3  82  -1    90   100    1
99  1 3  82  -1    91   101    1
100  1 3  82  -1    92   102    1

 SOLUTION TIME LOG IN SEC FOR STRESS
CALCULATIONS

   READING GENERAL INFORMATION AND ELEMENT DATA. . . =
1
   STRESS CALCULATION AND PRINTOUT . . . . . =   0
   UPDATING DATABASE . . . . . =   0
   TOTAL SOLUTION TIME. . . . . =   1
                          ( 0: 0: 1)



%%%
```

GINPROSA

ASUNTO
EUN 1 – 1.4
CALCULO DEL COEFICIENTE DE IMPACTO

F.

PAG. 1

Masa vibrante

peso propio $\gamma = 2{,}5$ t/m3

carga muerta $g = 16{,}13$ t/m

Adoptamos un peso específico ficticio $\gamma' = 2{,}5 + \frac{16{,}13}{A_{tra}} = 4{,}21$ t/m3

El periodo mayor da $T = \frac{1}{5{,}34} = 0{,}187$ seg. $\quad n_o = 5{,}34$ Hz.

La frecuencia $n_o = 5{,}34$ Hz está comprendida en los límites marcados por el Eurocodigo:

$n_{min} = 80/17{,}40 = 4{,}59$ Hz

$n_{max} = 94{,}76 \times 17{,}40^{-0{,}748} = 11{,}18$ Hz.

Según la IAP-75

$$N = \frac{55{,}5 \cdot 0{,}187}{2 \cdot 15{,}60} = 0{,}333 \longrightarrow \underline{I = 1{,}27}$$

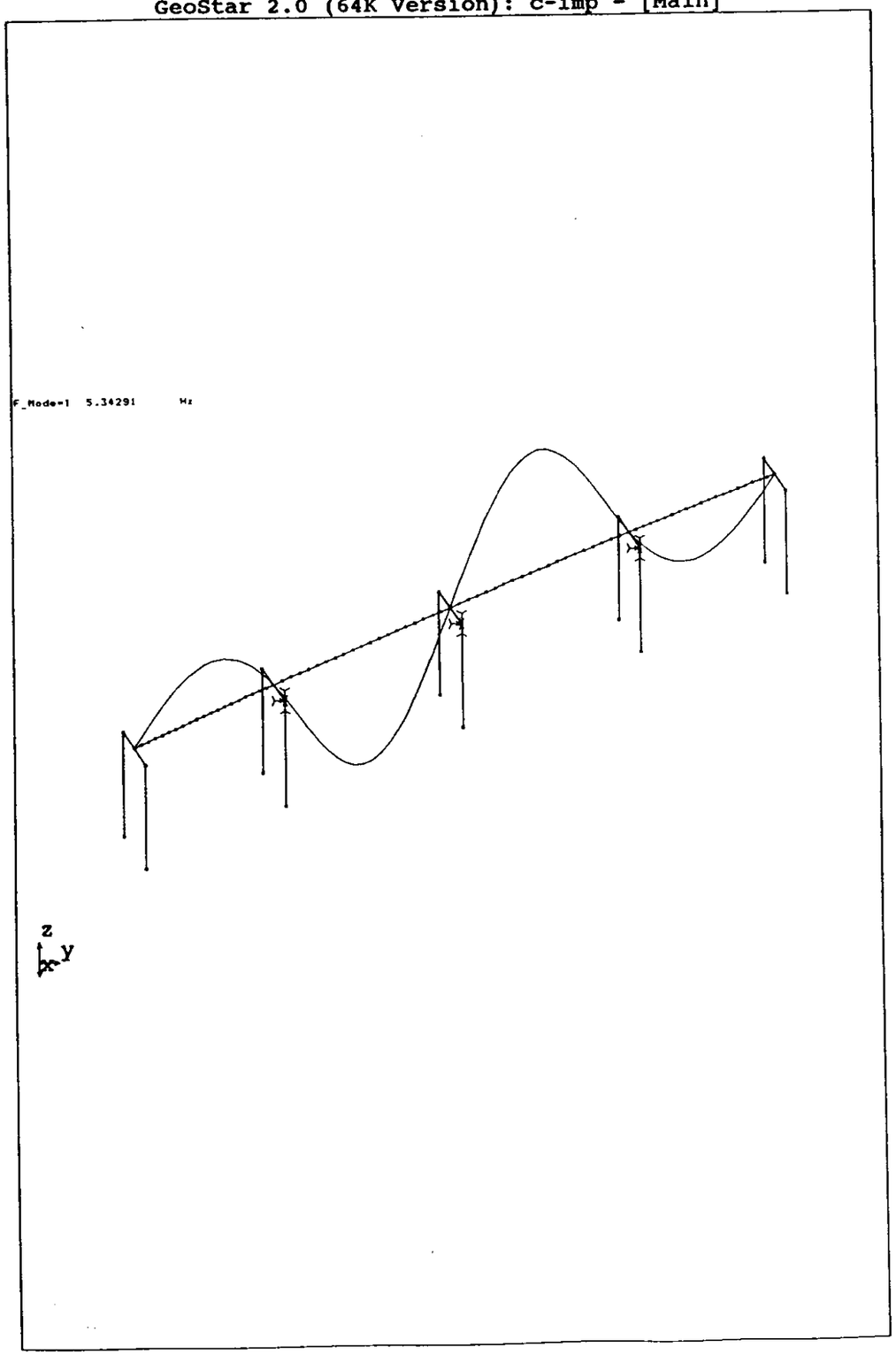
Coeficiente según Eurocodigo.

$$\phi_2 = \frac{1{,}44}{\sqrt{L\phi} - 0{,}2} + 0{,}82$$

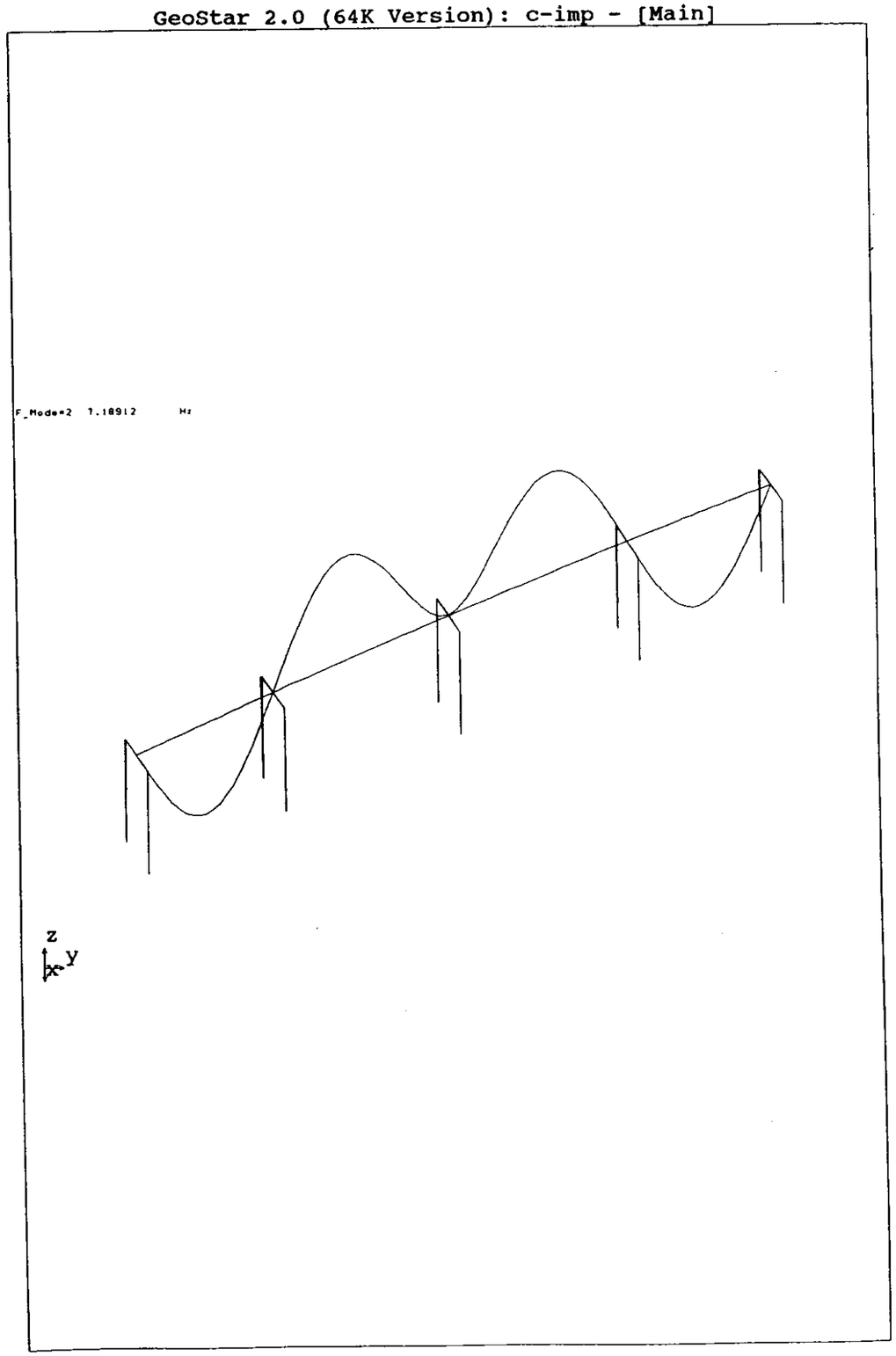
$$L\phi = 1{<}Lm = 1{,}40 \times \frac{62{,}40}{4} = 21{,}84 \text{ m.}$$

$$\underline{\phi_2 = 1{,}14}$$

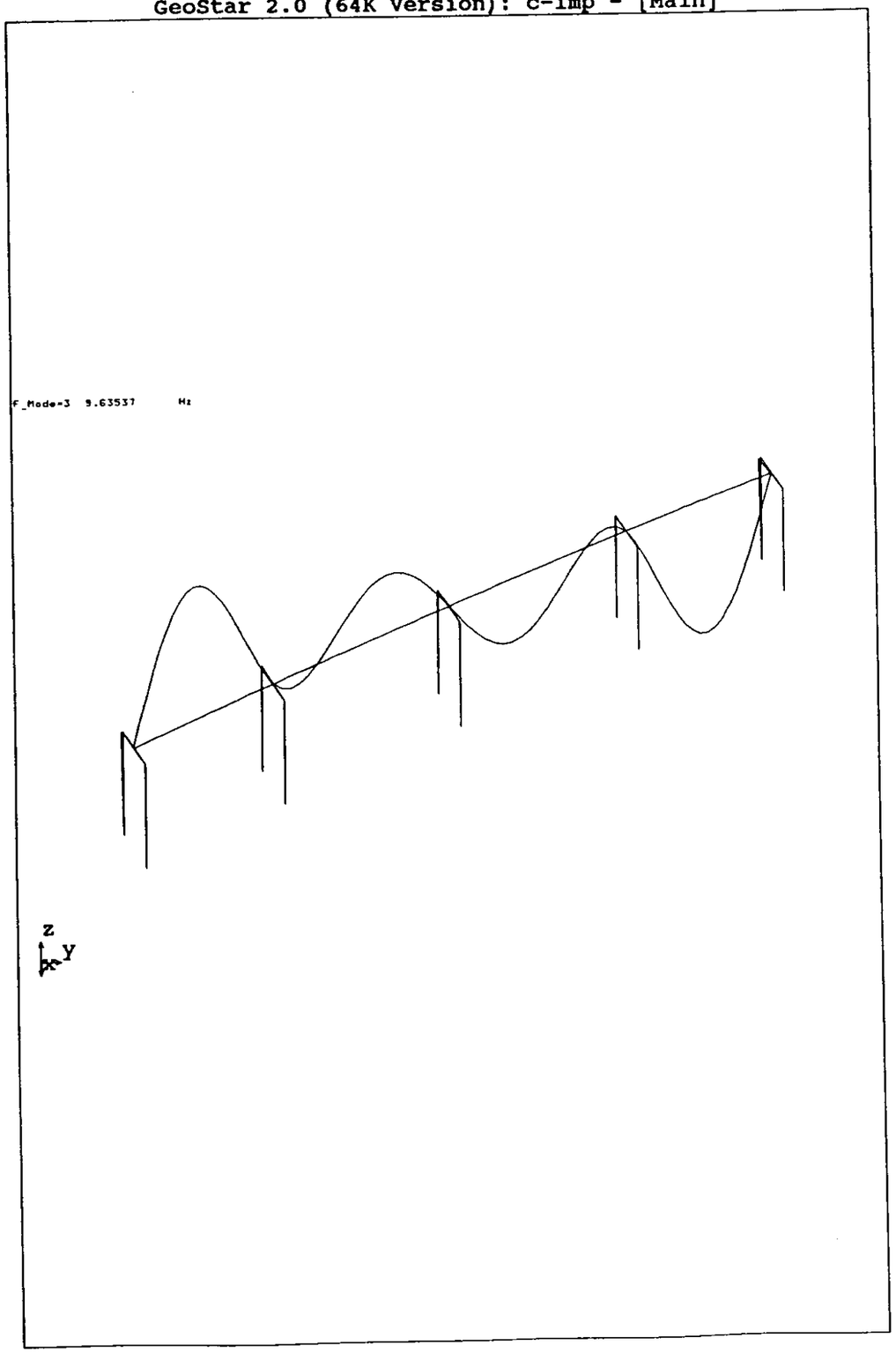
GeoStar 2.0 (64K Version): c-imp - [Main]



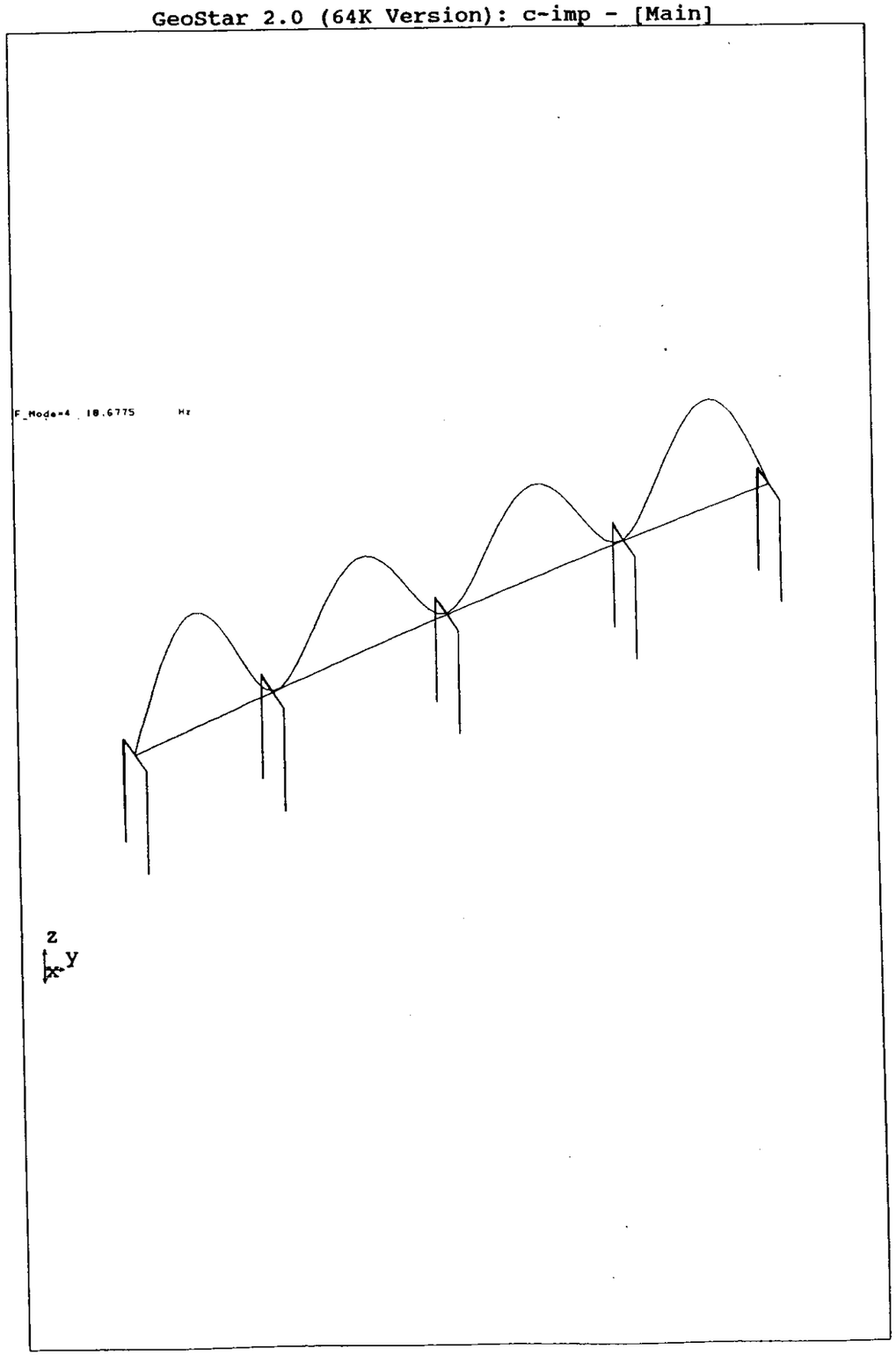
GeoStar 2.0 (64K Version): c-imp - [Main]



GeoStar 2.0 (64K Version): c-imp - [Main]



GeoStar 2.0 (64K Version): c-imp - [Main]



```
**********************************************************************
**********************************************************************
**                                  **
**                                  **
** CCCC  OOOO  SSSS M   M OOOO SSSS  /M   M **
** C   O O S    MM  MM O O S    / MM  MM **
** C   O O SSSS  M M M M O O SSSS / M M M M **
** C   O O    S M M M O O    S / M M M **
** CCCC  OOOO  SSSS M   M OOOO SSSS/  M   M **
**                                  **
**                                  **
**              VERSION: 2.00               **
**              DISTRIBUTED BY:             **
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**          TEL. NO.  (310) 207-2800          **
**          COPYRIGHT 1988  S. R. A. C.           **
**                                  **
**********************************************************************
**********************************************************************
```

Problem name: c-imp
Date : 10/21/1998 Time: 16:46:37
Title :
Subtitle :

Element group data

Element group number= 1
Element name:
BEAM3D Three dimensional Elastic Beam elements
Type of beam element = ... 0
EQ. 0 ; Symmetric beam element
EQ. 1 ; Unsymmetric beam element
EQ. 2 ; Symmetric tapered beam element

Real constant data

Real constant set 1
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 2
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 3
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 4
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 5
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 6
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 7
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 8
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 9
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 10
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000

Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 11
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 12
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 13
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 14
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 15
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 16
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 17
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 18
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 19
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 20
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 21
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 22
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832

Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 23
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 24
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 25
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 26
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 27
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 28
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 29
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 30
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 31
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 32
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 33
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 34

Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 35
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 36
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 37
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 38
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 39
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 40
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 41
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 42
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 43
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 44
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 45
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000

Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 46
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 47
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 48
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 49
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 50
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 51
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 52
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 53
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 54
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 55
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 56
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 57
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000

Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 58
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 59
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 60
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 61
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778

Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 62
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 63
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 64
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 65
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0

Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 66
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 67
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 68
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 69
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0

End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 70
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 71
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 72
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 73
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 74
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 75
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 76
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 77
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 78
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 79
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 80
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 81
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 1000.0
Moment of Inertia about element Y-axis = 1000.0
Moment of Inertia about element Z-axis = 1000.0

Depth of beam (y-axis) = 10.000
Width of beam (z-axis) = 10.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1000.0
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 82
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.000
Moment of inertia about element Y-axis = .10000E-03
Moment of inertia about element Z-axis = .10000E-03
Depth of beam (y-axis) = 1.0000
Width of beam (z-axis) = 1.0000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = .10000E-03
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000

Material propery data

Material property set 1

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0
ALPX : X thermal expansion	.10000E-04	0
DENS : Mass Density	.42100	0

Material property set 2

	Value	Temp curve no.
EX : X Elastic Modulus	1.0000	0
NUXY : Poisson Ratio	.20000	0

Material property set 3

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0

Nodal input data

NODE	BOUNDARY CONDITION CODES (0 = FREE ; 1 = FIXED)						NODAL POINT COORDINATES		
	X	Y	Z	XX	YY	ZZ	X	Y	Z
1	1	1	1	1	1	1	.00000	.00000	.10000E+07
2	0	0	0	0	0	0	7165.1	10711.	.00000
3	0	0	0	0	0	0	7164.7	10711.	.00000
4	0	0	0	0	0	0	7164.3	10712.	.00000
5	0	0	0	0	0	0	7163.8	10713.	.00000
6	0	0	0	0	0	0	7163.4	10713.	.00000
7	0	0	0	0	0	0	7163.0	10714.	.00000
8	0	0	0	0	0	0	7162.6	10714.	.00000
9	0	0	0	0	0	0	7162.1	10715.	.00000
10	0	0	0	0	0	0	7161.7	10715.	.00000
11	0	0	0	0	0	0	7161.3	10716.	.00000
12	0	0	0	0	0	0	7160.9	10716.	.00000
13	0	0	0	0	0	0	7160.4	10717.	.00000
14	0	0	0	0	0	0	7160.0	10717.	.00000
15	0	0	0	0	0	0	7159.6	10718.	.00000
16	0	0	0	0	0	0	7159.2	10719.	.00000
17	0	0	0	0	0	0	7158.8	10719.	.00000
18	0	0	0	0	0	0	7158.3	10720.	.00000
19	0	0	0	0	0	0	7157.9	10720.	.00000
20	0	0	0	0	0	0	7157.5	10721.	.00000
21	0	0	0	0	0	0	7157.1	10721.	.00000
22	0	0	0	0	0	0	7156.7	10722.	.00000
23	0	0	0	0	0	0	7156.1	10722.	.00000
24	0	0	0	0	0	0	7155.6	10723.	.00000
25	0	0	0	0	0	0	7155.1	10724.	.00000
26	0	0	0	0	0	0	7154.6	10725.	.00000
27	0	0	0	0	0	0	7154.1	10725.	.00000
28	0	0	0	0	0	0	7153.5	10726.	.00000
29	0	0	0	0	0	0	7153.0	10727.	.00000
30	0	0	0	0	0	0	7152.5	10727.	.00000
31	0	0	0	0	0	0	7152.0	10728.	.00000
32	0	0	0	0	0	0	7151.5	10729.	.00000
33	0	0	0	0	0	0	7150.9	10729.	.00000
34	0	0	0	0	0	0	7150.4	10730.	.00000
35	0	0	0	0	0	0	7149.9	10731.	.00000
36	0	0	0	0	0	0	7149.4	10732.	.00000
37	0	0	0	0	0	0	7148.9	10732.	.00000
38	0	0	0	0	0	0	7148.4	10733.	.00000
39	0	0	0	0	0	0	7147.9	10734.	.00000
40	0	0	0	0	0	0	7147.4	10734.	.00000
41	0	0	0	0	0	0	7146.9	10735.	.00000
42	0	0	0	0	0	0	7146.3	10736.	.00000
43	0	0	0	0	0	0	7145.8	10737.	.00000
44	0	0	0	0	0	0	7145.3	10737.	.00000
45	0	0	0	0	0	0	7144.8	10738.	.00000
46	0	0	0	0	0	0	7144.3	10739.	.00000
47	0	0	0	0	0	0	7143.8	10739.	.00000
48	0	0	0	0	0	0	7143.3	10740.	.00000
49	0	0	0	0	0	0	7142.8	10741.	.00000
50	0	0	0	0	0	0	7142.3	10741.	.00000
51	0	0	0	0	0	0	7141.8	10742.	.00000
52	0	0	0	0	0	0	7141.3	10743.	.00000
53	0	0	0	0	0	0	7140.8	10744.	.00000
54	0	0	0	0	0	0	7140.3	10744.	.00000
55	0	0	0	0	0	0	7139.8	10745.	.00000
56	0	0	0	0	0	0	7139.3	10746.	.00000
57	0	0	0	0	0	0	7138.9	10746.	.00000
58	0	0	0	0	0	0	7138.4	10747.	.00000
59	0	0	0	0	0	0	7137.9	10748.	.00000
60	0	0	0	0	0	0	7137.4	10749.	.00000
61	0	0	0	0	0	0	7136.9	10749.	.00000
62	0	0	0	0	0	0	7136.4	10750.	.00000
63	0	0	0	0	0	0	7136.0	10751.	.00000
64	0	0	0	0	0	0	7135.6	10751.	.00000
65	0	0	0	0	0	0	7135.3	10752.	.00000
66	0	0	0	0	0	0	7134.9	10752.	.00000
67	0	0	0	0	0	0	7134.5	10753.	.00000
68	0	0	0	0	0	0	7134.1	10754.	.00000
69	0	0	0	0	0	0	7133.7	10754.	.00000
70	0	0	0	0	0	0	7133.3	10755.	.00000
71	0	0	0	0	0	0	7133.0	10755.	.00000
72	0	0	0	0	0	0	7132.6	10756.	.00000
73	0	0	0	0	0	0	7132.2	10756.	.00000
74	0	0	0	0	0	0	7131.8	10757.	.00000
75	0	0	0	0	0	0	7131.5	10758.	.00000
76	0	0	0	0	0	0	7131.1	10758.	.00000
77	0	0	0	0	0	0	7130.7	10759.	.00000
78	0	0	0	0	0	0	7130.3	10759.	.00000
79	0	0	0	0	0	0	7129.9	10760.	.00000
80	0	0	0	0	0	0	7129.6	10760.	.00000
81	0	0	0	0	0	0	7129.2	10761.	.00000
82	0	0	0	0	0	0	7128.8	10762.	.00000
83	0	0	0	0	0	0	7162.9	10710.	.00000
84	1	1	1	0	0	0	7167.3	10712.	.00000
85	0	0	0	0	0	0	7154.4	10721.	.00000
86	1	1	1	0	0	0	7158.9	10723.	.00000
87	0	0	0	0	0	0	7144.1	10735.	.00000
88	1	1	1	0	0	0	7148.6	10737.	.00000
89	0	0	0	0	0	0	7134.2	10749.	.00000
90	1	1	1	0	0	0	7138.6	10751.	.00000
91	0	0	0	0	0	0	7126.6	10761.	.00000
92	1	1	1	0	0	0	7131.0	10762.	.00000
93	1	1	1	0	0	0	7162.9	10710.	-10.000
94	1	1	1	0	0	0	7167.3	10712.	-10.000
95	1	1	1	0	0	0	7154.4	10721.	-10.000
96	1	1	1	0	0	0	7158.9	10723.	-10.000
97	1	1	1	0	0	0	7144.1	10735.	-10.000
98	1	1	1	0	0	0	7148.6	10737.	-10.000
99	1	1	1	0	0	0	7134.2	10749.	-10.000
100	1	1	1	0	0	0	7138.6	10751.	-10.000
101	1	1	1	0	0	0	7126.6	10761.	-10.000
102	1	1	1	0	0	0	7131.0	10762.	-10.000

Element input data

ELEM	EGRP	MP	REAL	ECS	NODE 1	NODE 2	NODE 3	NODE 4	NODE 5	NODE 6
					NODE 7	NODE 8	NODE 9	NODE10	NODE11	NODE12
					NODE13	NODE14	NODE15	NODE16	NODE17	NODE18
					NODE19	NODE20				
1	1	1	-1	-1	2	3	1			
2	1	1	2	-1	3	4	1			
3	1	1	3	-1	4	5	1			
4	1	1	4	-1	5	6	1			
5	1	1	5	-1	6	7	1			
6	1	1	6	-1	7	8	1			
7	1	1	7	-1	8	9	1			
8	1	1	8	-1	9	10	1			
9	1	1	9	-1	10	11	1			
10	1	1	10	-1	11	12	1			
11	1	1	11	-1	12	13	1			
12	1	1	12	-1	13	14	1			
13	1	1	13	-1	14	15	1			
14	1	1	14	-1	15	16	1			
15	1	1	15	-1	16	17	1			
16	1	1	16	-1	17	18	1			
17	1	1	17	-1	18	19	1			
18	1	1	18	-1	19	20	1			
19	1	1	19	-1	20	21	1			
20	1	1	20	-1	21	22	1			
21	1	1	21	-1	22	23	1			
22	1	1	22	-1	23	24	1			
23	1	1	23	-1	24	25	1			
24	1	1	24	-1	25	26	1			
25	1	1	25	-1	26	27	1			
26	1	1	26	-1	27	28	1			
27	1	1	27	-1	28	29	1			
28	1	1	28	-1	29	30	1			
29	1	1	29	-1	30	31	1			
30	1	1	30	-1	31	32	1			
31	1	1	31	-1	32	33	1			
32	1	1	32	-1	33	34	1			
33	1	1	33	-1	34	35	1			
34	1	1	34	-1	35	36	1			
35	1	1	35	-1	36	37	1			
36	1	1	36	-1	37	38	1			
37	1	1	37	-1	38	39	1			
38	1	1	38	-1	39	40	1			

```
39   1 1  39 -1   40   41    1
40   1 1  40 -1   41   42    1
41   1 1  41 -1   42   43    1
42   1 1  42 -1   43   44    1
43   1 1  43 -1   44   45    1
44   1 1  44 -1   45   46    1
45   1 1  45 -1   46   47    1
46   1 1  46 -1   47   48    1
47   1 1  47 -1   48   49    1
48   1 1  48 -1   49   50    1
49   1 1  49 -1   50   51    1
50   1 1  50 -1   51   52    1
51   1 1  51 -1   52   53    1
52   1 1  52 -1   53   54    1
53   1 1  53 -1   54   55    1
54   1 1  54 -1   55   56    1
55   1 1  55 -1   56   57    1
56   1 1  56 -1   57   58    1
57   1 1  57 -1   58   59    1
58   1 1  58 -1   59   60    1
59   1 1  59 -1   60   61    1
60   1 1  60 -1   61   62    1
61   1 1  61 -1   62   63    1
62   1 1  62 -1   63   64    1
63   1 1  63 -1   64   65    1
64   1 1  64 -1   65   66    1
65   1 1  65 -1   66   67    1
66   1 1  66 -1   67   68    1
67   1 1  67 -1   68   69    1
68   1 1  68 -1   69   70    1
69   1 1  69 -1   70   71    1
70   1 1  70 -1   71   72    1
71   1 1  71 -1   72   73    1
72   1 1  72 -1   73   74    1
73   1 1  73 -1   74   75    1
74   1 1  74 -1   75   76    1
75   1 1  75 -1   76   77    1
76   1 1  76 -1   77   78    1
77   1 1  77 -1   78   79    1
78   1 1  78 -1   79   80    1
79   1 1  79 -1   80   81    1
80   1 1  80 -1   81   82    1
81   1 3  81 -1   83    2    1
82   1 3  81 -1    2   84    1
83   1 3  81 -1   85   22    1
84   1 3  81 -1   22   86    1
85   1 3  81 -1   87   42    1
86   1 3  81 -1   42   88    1
87   1 3  81 -1   89   62    1
88   1 3  81 -1   62   90    1
89   1 3  81 -1   91   82    1
90   1 3  81 -1   82   92    1
91   1 3  82 -1   83   93    1
92   1 3  82 -1   84   94    1
93   1 3  82 -1   85   95    1
94   1 3  82 -1   86   96    1
95   1 3  82 -1   87   97    1
96   1 3  82 -1   88   98    1
97   1 3  82 -1   89   99    1
98   1 3  82 -1   90  100    1
99   1 3  82 -1   91  101    1
100  1 3  82 -1   92  102    1
```

CONTROL INFORMATION

```
NUMBER OF LOAD CASES ..... (NLCASE) =     1
SOLUTION MODE ..... (MODEX) =     2
  EQ. 0, STATIC ANALYSIS
  EQ. 1, BUCKLING ANALYSIS
  EQ. 2, DYNAMIC ANALYSIS
THERMAL LOADING FLAG ..... (ITHERM) =     0
  EQ. 0, NO THERMAL EFFECTS CONSIDERED
  EQ. 1, ADD TEMPERATURE EFFECT
GRAVITY LOADING FLAG ..... (IGRAV) =     0
  EQ. 0, NO GRAVITY LOADING CONSIDERED
  EQ. 1, ADD GRAVITY LOADING EFFECT
CENTRIFUGAL LOADING FLAG ..... (ICNTRF) =     0
  EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
  EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
IN-PLANE STIFFENING FLAG ..... (INPLN) =     0
  EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
  EQ. 1, IN-PLANE EFFECTS CONSIDERED
SOFT SPRING ADDITION FLAG ..... (ISOFT) =     0
  EQ. 0, NO SOFT SPRING OPTION
  EQ. 1, SOFT SPRING ADDED

SAVE DECOMPOSED STIFFNESS MATRIX FLAG ... (ISAVK) =     0
  EQ. 0, DO NOT SAVE DECOMPOSED K
  EQ. 1, SAVE DECOMPOSED K
FORM STIFFNESS MATRIX FLAG ..... (IFORMK) =     0
  EQ. 0, FORM STIFFNESS MATRIX
  EQ. 1, USE EXISTING DECOMPOSED STIFFNESS MATRIX

SPIN SOFTENING FLAG ..... (ISPIN) =     0
  EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
  EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
INERTIA RELIEF FLAG ..... (IFORMK) =     0
  EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
  EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
RIGID CONNECTIONS FLAG ..... (IRIGID) =     0
  EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS & SHELLS
  EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS & SHELLS
```

TOTAL SYSTEM DATA

```
NUMBER OF EQUATIONS ..... (NEQ) =     561
NUMBER OF MATRIX ELEMENTS ..... (NWK) =    5775
MAXIMUM HALF BANDWIDTH ..... (MK ) =      33
MEAN HALF BANDWIDTH ..... (MM ) =      10
NUMBER OF ELEMENTS. ..... (NUME) =     100
NUMBER OF NODAL POINTS. ..... (NUMNP)=     102
ADJUSTED BLOCK SIZE ..... (MTBLK)=    5776
EXTRA MEMORY AVAILABLE (in 8-byte words) . . .(XMTBLK)=  4255688
NUMBER OF STIFFNESS BLOCKS. ..... (NBLK) =       1


MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE =  .146038E+11 (    432)
MINIMUM DIAGONAL STIFFNESS MATRIX VALUE =  .145833E+02 (      3)
1
```

```
|-------------------------------------------------------|
|      MASS MOMENT INFORMATION                          |
|-------------------------------------------------------|
|MASS    .246526E+03 |VOLUME  .253166E+05 |WEIGHT  .000000E+00 |
|-------------------------------------------------------|
| MASS MOMENT OF INERTIA W.R.T. C.G.                    |
|-------------------------------------------------------|
|IX      .555988E+05 |IY      .283705E+05 |IZ      .864758E+05 |
|-------------------------------------------------------|
| MASS PRODUCT OF INERTIA W.R.T. C.G.                   |
|-------------------------------------------------------|
|PXY    -.357623E+05 |PXZ     .000000E+00 |PYZ     .000000E+00 |
|-------------------------------------------------------|
| RADII OF GYRATION W.R.T. C.G.                         |
|-------------------------------------------------------|
|RX      .150176E+02 |RY      .107276E+02 |RZ      .187291E+02 |
|-------------------------------------------------------|
| CENTER OF GRAVITY                                     |
|-------------------------------------------------------|
|CGx     .714656E+04 |CGy     .107360E+05 |CGz     .000000E+00 |
|-------------------------------------------------------|
| PRINCIPAL MASS MOMENT OF INERTIA                      |
|-------------------------------------------------------|
|P1      .864758E+05 |P2      .802507E+05 |P3      .371867E+04 |
|-------------------------------------------------------|
| PRINCIPAL RADII OF GYRATION                           |
|-------------------------------------------------------|
|R1      .187291E+02 |R2      .180424E+02 |R3      .388385E+01 |
|-------------------------------------------------------|
| PRINCIPAL AXES (DIRECTION COSINES IN ROWS W.R.T C.G)  |
|-------------------------------------------------------|
|N_11    .851624E+00 |N_12    .524153E+00 |N_13    .000000E+00 |
|-------------------------------------------------------|
|N_21    .823340E+00 |N_22    .567549E+00 |N_23    .000000E+00 |
|-------------------------------------------------------|
|N_31    .000000E+00 |N_32    .000000E+00 |N_33    .517823E-01 |
---------------------------------------------------------
```

Note: In the above table, WEIGHT is computed based on the user defined acceleration for the first active Load Case

SOLUTION PARAMETERS

```
NUMBER OF EIGENVALUES. ..... (NFR)=      10
MASS TYPE: 1-LUMPED,2-CONSISTENT. . . . (MASS)=       1
MODE SHAPE PRINT FLAG. ..... (MPRNT)=       1
INTERMEDIATE SOLUTION PRINT FLAG . . . .(IFPR)=       0
STURM SEQUENCE CHECK FLAG. ..... (IFSS)=       0
MAXIMUM NUMBER OF ITERATIONS . . . . . (ITMAX)=      16
FREQUENCY SHIFT FLAG ..... (IFRSH)=       0
FREQUENCY SHIFT. ..... (FRSH)= .0000000E+00
CONVERGENCE TOLERANCE. ..... (RTOL)= .1000000E-04
COMPOSITE MODAL DAMPING CALC. FLAG . . .(IMDC)=       0
MODAL ACCELERATION FLAG. ..... (IMAM)=       0
```

SUBSPACE ITERATION

```
ITERATION NUMBER   1

ITERATION NUMBER   2

ITERATION NUMBER   3

ITERATION NUMBER   4

ITERATION NUMBER   5

ITERATION NUMBER   6

ITERATION NUMBER   7
```

CONVERGENCE REACHED FOR RTOL .1000E-04

FREQUENCY ANALYSIS
by
SUBSPACE ALGORITHM

FREQUENCY NUMBER	FREQUENCY (RAD/SEC)	FREQUENCY (CYCLES/SEC)	PERIOD (SECONDS)
1	.3357048E+02	.5342908E+01	.1871640E+00
2	.4517060E+02	.7189123E+01	.1390990E+00
3	.6054082E+02	.9635370E+01	.1037843E+00
4	.6708852E+02	.1067747E+02	.9365515E-01
5	.1266510E+03	.2015713E+02	.4961023E-01
6	.1525986E+03	.2428682E+02	.4117460E-01
7	.2005500E+03	.3191852E+02	.3132977E-01
8	.2062418E+03	.3282440E+02	.3046514E-01
9	.2783241E+03	.4429665E+02	.2257507E-01
10	.3134321E+03	.4988426E+02	.2004640E-01

SOLUTION TIME LOG (sec)

INPUT PHASE	1
ASSEMBLAGE OF THE STIFFNESS MATRIX	1
ASSEMBLAGE OF THE MASS MATRIX	0
DECOMPOSITION OF THE STIFFNESS MATRIX	0
EIGENVALUE SOLUTION	0
OUTPUT PHASE	0
TOTAL SOLUTION TIME	2

GINPROSA

ASUNTO
EVN1 - 1.4
VERIFICACIÓN DEL PRETENSADO

FECHA

PAG. 1

Se realizarán las siguientes comprobaciones:

a) Durante las fases constructivas

Combinacion: $PP + \binom{0,9}{1,1} Pret + SC_{constructiva}$

Condiciones $\sigma_{max} = f_{ck}/1,60 = 2500\ t/m^2$

$\sigma_{min} = f_{ctk} = -244\ t/m^2$

b) En las fases finales:

Combinacion frecuente:

$PP + CM + \binom{0,9}{1,1} Pret + 0,60\ SC + 0,5\ \sigma_{rel}$

Condicion: $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = 0$

Combinacion rara:

$PP + CM + \binom{0,9}{1,1} \times Pret + SC + 0,6\ \sigma_{rel}$.

Condicion $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = f_{ctk}$

GINPROSA

ASUNTO
EVN1 - 1.4
CALCULO DE TENDONES DE ANCLAJE AL ESTRIBO

PAG. 1

Peso del tablero + carga muerta = 2585 tm.

Fuerza de coaccion sobre punto fijo = 0,03 x 2585 = 78 tm.

Carga de frenado = $\frac{(10 \times 65 + 30 \times 2) \times (1+0,90)}{8}$ = 169 tm.

Fuerza total en punto fijo = 246 tm. Se toma con dos tendones

Las fuerzas de diseño por anclaje son:

En servicio $H_s = \frac{246}{2} = 123$ tm.

En rotura $H_L = 123 \times 1,50 = 185$ tm.

Se disponen tendones de 15 x 0,6" con una carga de rotura

$P_u = 399$ tm > 251 tm.

Se tesan al 40 % de Ca carga de rotura $P_o = 0,4 \times 399 = 160$ tm.

Se disponen 2 neoprenos: 300 x 400 x 71 (32) en cada anclaje

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-1.LIS

DATOS GENERALES

Anclaje IZQUIERDO .(1=ACTIVO)(2=PASIVO)...1
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1
Anclaje desde el que se tesa primero..(1=IZDO.)(2=DCHO.)...1

Fuerza de tesado inicial P0(ton)= 7140.0
Fuerza de tesado final P1(ton)= 6692.0
Area del cable (cm2)=470.399994
Coef.rozamiento cable-vaina NU=0.210000
Coef.rozamientos parasitos (K/NU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento El stico de Hormig¢n(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento el stico ser n= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=14

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	5.900000	-0.004309	0.050847	0.500000
2	5.900000	11.800000	-0.006436	0.075949	0.425949
3	11.800000	13.800000	0.018987	-0.524051	3.965949
4	13.800000	15.800000	0.022989	-0.634483	4.727931
5	15.800000	22.500000	-0.006862	0.308801	-2.724010
6	22.500000	29.200001	-0.006862	0.308801	-2.724009
7	29.200001	31.200001	0.022989	-1.434483	22.727930
8	31.200001	33.200001	0.022989	-1.434483	22.727930
9	33.200001	39.900002	-0.006862	0.547607	-10.174754
10	39.900002	46.600002	-0.006862	0.547607	-10.174754
11	46.600002	48.600002	0.022989	-2.234483	54.647938
12	48.600002	50.600002	0.018987	-1.845569	45.197334
13	50.600002	56.500004	-0.006436	0.727311	-19.896549
14	56.500004	62.400005	-0.004309	0.486929	-13.105744

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	5.900000	0.000000	0.050802
2	5.900000	11.800000	0.050806	0.126605
3	11.800000	13.800000	0.126622	0.202425
4	13.800000	15.800000	0.202448	0.294146
5	15.800000	22.500000	0.294153	0.385846
6	22.500000	29.200001	0.385846	0.477539
7	29.200001	31.200001	0.477554	0.569252
8	31.200001	33.200001	0.569252	0.660950
9	33.200001	39.900002	0.660966	0.752659
10	39.900002	46.600002	0.752659	0.844352
11	46.600002	48.600002	0.844375	0.936074
12	48.600002	50.600002	0.936154	1.011957
13	50.600002	56.500004	1.012029	1.087828
14	56.500004	62.400005	1.087859	1.138661

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	5.900000	1.138661	1.087858
2	5.900000	11.800000	1.087855	1.012056
3	11.800000	13.800000	1.012039	0.936236
4	13.800000	15.800000	0.936213	0.844515
5	15.800000	22.500000	0.844508	0.752815
6	22.500000	29.200001	0.752815	0.661122
7	29.200001	31.200001	0.661107	0.569409
8	31.200001	33.200001	0.569409	0.477711
9	33.200001	39.900002	0.477695	0.386002
10	39.900002	46.600002	0.386002	0.294309
11	46.600002	48.600002	0.294286	0.202587
12	48.600002	50.600002	0.202507	0.126704
13	50.600002	56.500004	0.126633	0.050833
14	56.500004	62.400005	0.050802	0.000000

ALARGAMIENTOS POR PENETRACION DE CU¥AS Y RETESADO

Penetracion de cuñas por izda. a_izda= 5.000(mm.)
Penetracion por retesado por izda. retesado _izda= 2.487(mm.)
Penetracion de cuñas ficticia por izda. a_ficticia_izda= 7.487(mm.)

Alcance de penetracion de cuñas+retesado por izda. x= 13.723(m.) perdidas= 5.746%

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 2.487(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 7.487(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 48.679(m.) perdidas= 5.746%

Punto de interseccion de curvas de perdidas x= 31.200(m.) perdidas= 14.689%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CU¥AS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

---

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	5.900000	12.5	10.7	6245.0	6373.1
2	5.900000	11.800000	10.7	8.5	6373.1	6534.9
3	11.800000	13.722664	8.5	6.8	6534.9	6655.3
4	13.722664	13.800000	6.8	6.9	6655.3	6650.4
5	13.800000	15.800000	6.9	8.9	6650.4	6505.5
6	15.800000	22.500000	8.9	11.4	6505.5	6325.8
7	22.500000	29.200001	11.4	13.9	6325.8	6150.9
8	29.200001	31.200001	13.9	15.7	6150.9	6016.8
9	31.200001	33.200001	15.7	13.9	6016.6	6150.7
10	33.200001	39.900002	13.9	11.4	6150.7	6325.6
11	39.900002	46.600002	11.4	8.9	6325.6	6505.3
12	46.600002	48.600002	8.9	6.9	6505.3	6650.2
13	48.600002	48.678825	6.9	6.8	6650.3	6655.2
14	48.678825	50.600002	6.8	8.5	6655.2	6535.0
15	50.600002	56.500004	8.5	10.7	6534.9	6373.1
16	56.500004	62.400005	10.7	12.5	6373.0	6244.9

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 427.389

Alargamiento por la dcha.(mm.)= 37.199
ALARGAMIENTO TOTAL(mm.)= 464.588

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	5.900000	53.611	54.923
2	5.900000	11.800000	82.034	83.395
3	11.800000	13.722664	-246.026	-252.723
4	13.722664	13.800000	-252.723	-252.543
5	13.800000	15.800000	-305.771	-295.355
6	15.800000	22.500000	88.161	86.815
7	22.500000	29.200001	86.815	83.356
8	29.200001	31.200001	-279.259	-276.640
9	31.200001	33.200001	-276.631	-279.245
10	33.200001	39.900002	83.353	86.812
11	39.900002	46.600002	86.812	88.159
12	46.600002	48.600002	-295.352	-305.762
13	48.600002	48.678825	-252.538	-252.722
14	48.678825	50.600002	-252.722	-246.031
15	50.600002	56.500004	83.394	82.034
16	56.500004	62.400005	54.923	53.611

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	-317.129	6236.924
x= 62.400	-317.047	-6236.881

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase nº: PUENTE EN VACIO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: ER1-1.A

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	1117	-14
2	Σ pp(i) + 1.1 x Σ pret(i)	1411	-94
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	1105	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1400	-87

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	-6.5	120.7	0.0	0.1	6.5	6245.0	42.9	-294.2	0.0	-6.5	120.7	6245.0	42.9	-294.2	617.9	576.7	756.1	703.8	618.0	576.6	756.2	703.8
1	2	0.0	71.1	104.5	0.0	4.3	5.6	6245.0	-147.1	-257.1	0.0	71.1	104.5	6245.0	-147.1	-257.1	562.8	641.6	678.6	795.1	565.4	638.6	681.2	792.1
1	3	0.0	137.7	88.3	0.0	7.9	4.8	6245.0	-311.8	-219.9	0.0	137.7	88.3	6245.0	-311.8	-219.9	514.7	698.3	611.0	874.8	519.4	692.8	615.7	869.3
1	4	0.0	193.1	72.2	0.0	10.9	3.9	6245.0	-450.8	-182.8	0.0	193.1	72.2	6245.0	-450.8	-182.8	473.6	746.7	553.5	942.5	480.0	739.2	559.9	934.9
1	5	0.0	237.4	56.0	0.0	13.3	3.0	6245.0	-564.2	-145.6	0.0	237.4	56.0	6245.0	-564.2	-145.6	439.5	786.9	506.0	998.4	447.3	777.7	513.9	989.2
1	6	0.0	270.4	39.8	0.0	15.1	2.1	6245.0	-651.9	-108.5	0.0	270.4	39.8	6245.0	-651.9	-108.5	412.4	818.8	468.6	1042.5	421.3	808.3	477.5	1032.1
1	7	0.0	292.3	23.6	0.0	16.2	1.2	6245.0	-714.0	-71.4	0.0	292.3	23.6	6245.0	-714.0	-71.4	392.3	842.4	441.2	1074.8	401.9	831.2	450.8	1063.5
1	8	0.0	303.0	7.4	0.0	16.7	0.3	6245.0	-750.4	-34.2	0.0	303.0	7.4	6245.0	-750.4	-34.2	379.3	857.8	423.9	1095.2	389.2	846.1	433.8	1083.5
1	9	0.0	302.6	-8.8	0.0	16.7	-0.5	6245.0	-761.3	3.0	0.0	302.6	-8.8	6245.0	-761.3	3.0	373.3	864.8	416.6	1103.8	383.1	853.3	426.4	1092.2
1	10	0.0	290.9	-25.0	0.0	16.0	-1.4	6245.0	-745.2	45.4	0.0	290.9	-25.0	6245.0	-745.2	45.4	374.9	862.9	420.1	1099.6	384.4	851.8	429.6	1088.5
1	11	0.0	268.1	-41.2	0.0	14.7	-2.3	6373.0	-710.4	105.5	0.0	268.1	-41.2	6373.0	-710.4	105.5	392.2	868.3	444.3	1103.8	400.9	859.0	452.9	1093.6
1	12	0.0	234.1	-57.4	0.0	12.8	-3.2	6373.0	-618.1	162.1	0.0	234.1	-57.4	6373.0	-618.1	162.1	421.2	835.2	484.1	1056.9	426.8	826.3	491.7	1048.0
1	13	0.0	188.9	-73.6	0.0	10.3	-4.1	6373.0	-486.8	218.7	0.0	188.9	-73.6	6373.0	-486.8	218.7	464.2	784.5	542.6	988.0	470.3	777.3	548.7	980.8
1	14	0.0	132.6	-89.7	0.0	7.2	-5.0	6373.0	-316.6	275.3	0.0	132.6	-89.7	6373.0	-316.6	275.3	521.4	717.1	619.9	897.0	525.6	712.1	624.1	892.0
1	15	0.0	65.1	-105.9	0.0	3.5	-5.8	6373.0	-106.8	331.9	0.0	65.1	-105.9	6373.0	-106.8	331.9	592.9	632.9	716.2	783.5	595.0	630.5	718.2	781.1
1	16	0.0	-13.6	-122.1	0.0	-0.9	-6.7	6373.0	141.6	388.5	0.0	-13.6	-122.1	6373.0	141.6	388.5	678.5	532.1	831.0	648.3	678.0	532.7	830.5	648.9
1	17	0.0	-103.5	-138.3	0.0	-5.8	-7.6	6373.0	429.5	445.2	0.0	-103.5	-138.3	6373.0	429.5	445.2	778.3	414.6	964.8	490.7	774.8	416.6	961.4	494.8
1	18	0.0	-204.6	-154.5	0.0	-11.4	-8.5	6373.0	756.4	601.8	0.0	-204.6	-154.5	6373.0	756.4	501.8	892.2	280.4	1117.3	311.1	885.5	288.3	1110.6	319.0
1	19	0.0	-316.7	-170.7	0.0	-17.5	-9.4	6535.0	1080.0	366.4	0.0	-316.7	-170.7	6535.0	1080.0	366.4	1013.4	171.4	1280.1	160.6	1003.1	183.6	1269.8	172.8
1	20	0.0	-440.1	-186.9	0.0	-24.3	-10.3	6535.0	1273.0	194.9	0.0	-440.1	-186.9	6535.0	1273.0	194.9	1043.1	136.5	1332.6	98.9	1026.8	153.4	1318.3	115.7
1	21	0.0	-574.6	-203.1	0.0	-31.7	-11.1	6535.0	1348.0	19.1	0.0	-574.6	-203.1	6535.0	1348.0	19.1	1003.6	183.0	1301.9	135.0	984.9	205.1	1283.2	157.0
2	1	0.0	-569.4	202.2	0.0	-30.9	11.0	6650.0	1356.0	16.7	0.0	-569.4	202.2	6650.0	1356.0	16.7	1021.9	185.5	1323.7	138.7	1003.7	206.9	1305.4	160.2
2	2	0.0	-402.3	181.7	0.0	-21.8	9.9	6650.0	1255.0	-249.4	0.0	-402.3	181.7	6650.0	1255.0	-249.4	1066.9	132.5	1356.7	99.8	1054.0	147.7	1343.9	115.0
2	3	0.0	-253.1	161.3	0.0	-13.7	8.8	6650.0	922.4	-515.4	0.0	-253.1	161.3	6650.0	922.4	-515.4	978.3	236.8	1228.9	250.4	970.2	246.3	1220.8	259.9
2	4	0.0	-121.6	140.9	0.0	-6.5	7.7	6506.0	431.2	-542.6	0.0	-121.6	140.9	6506.0	431.2	-542.6	781.2	438.9	970.8	517.6	777.4	443.4	967.8	522.1
2	5	0.0	-8.0	120.5	0.0	-0.3	6.6	6506.0	6.7	-449.4	0.0	-8.0	120.5	6506.0	6.7	-449.4	622.9	625.4	762.3	763.1	622.7	625.6	762.1	763.4
2	6	0.0	88.1	100.1	0.0	4.9	5.4	6505.0	-350.7	-371.7	0.0	88.1	100.1	6505.0	-350.7	-371.7	489.7	782.1	587.0	969.5	492.6	778.7	589.8	966.1
2	7	0.0	166.2	79.7	0.0	9.1	4.3	6505.0	-640.1	-294.1	0.0	166.2	79.7	6505.0	-640.1	-294.1	382.1	908.8	445.2	1136.4	387.5	902.4	450.6	1130.0
2	8	0.0	226.8	59.3	0.0	12.4	3.2	6505.0	-862.3	-216.4	0.0	226.8	59.3	6505.0	-862.3	-216.4	299.9	1005.6	336.8	1264.1	307.2	997.0	344.1	1255.5
2	9	0.0	269.5	38.9	0.0	14.7	2.1	6505.0	-1017.0	-138.8	0.0	269.5	38.9	6505.0	-1017.0	-138.8	242.9	1072.7	261.6	1352.7	251.6	1062.5	270.3	1342.5
2	10	0.0	294.5	18.5	0.0	16.1	1.0	6505.0	-1104.0	-61.0	0.0	294.5	18.5	6505.0	-1104.0	-61.0	211.5	1109.7	219.9	1401.8	221.0	1098.6	229.4	1390.7
2	11	0.0	301.7	-1.9	0.0	16.4	-0.1	6505.0	-1123.0	16.7	0.0	301.7	-1.9	6505.0	-1123.0	16.7	205.6	1116.6	211.8	1411.3	215.3	1105.2	221.5	1399.9
2	12	0.0	291.1	-22.3	0.0	15.8	-1.2	6326.0	-1032.0	92.1	0.0	291.1	-22.3	6326.0	-1032.0	92.1	230.5	1049.9	243.6	1328.2	239.9	1038.9	253.0	1317.2
2	13	0.0	262.9	-42.7	0.0	14.3	-2.4	6326.0	-918.8	167.6	0.0	262.9	-42.7	6326.0	-918.8	167.6	274.0	998.7	300.4	1261.2	282.4	988.8	308.9	1251.3
2	14	0.0	216.8	-63.1	0.0	11.7	-3.5	6326.0	-740.1	243.2	0.0	216.8	-63.1	6326.0	-740.1	243.2	341.7	919.0	389.2	1156.7	348.6	910.8	396.1	1148.5
2	15	0.0	153.0	-83.5	0.0	8.2	-4.6	6326.0	-495.5	318.7	0.0	153.0	-83.5	6326.0	-495.5	318.7	433.9	810.3	510.3	1014.0	438.8	804.6	515.2	1008.3
2	16	0.0	71.5	-103.9	0.0	3.8	-5.7	6326.0	-185.5	394.2	0.0	71.5	-103.9	6326.0	-185.5	394.2	550.4	673.1	663.4	833.7	562.7	670.5	665.6	831.1
2	17	0.0	-27.9	-124.3	0.0	-1.7	-6.8	6326.0	190.4	469.8	0.0	-27.9	-124.3	6326.0	190.4	469.8	691.4	507.0	848.7	615.4	690.4	508.2	847.7	616.6
2	18	0.0	-145.0	-144.8	0.0	-8.1	-7.9	6326.0	632.2	545.4	0.0	-145.0	-144.8	6326.0	632.2	545.4	856.9	312.1	1066.3	359.1	852.1	317.8	1061.6	364.7
2	19	0.0	-279.8	-165.2	0.0	-15.5	-9.0	6326.0	1125.0	572.4	0.0	-279.8	-165.2	6326.0	1125.0	572.4	1039.0	97.6	1306.6	76.1	1029.9	108.4	1297.5	86.8
2	20	0.0	-432.2	-185.6	0.0	-23.8	-10.2	6151.0	1446.0	262.9	0.0	-432.2	-185.6	6151.0	1446.0	262.9	1102.8	-14.0	1404.5	-83.9	1088.7	2.5	1390.5	-67.3
2	21	0.0	-602.5	-206.0	0.0	-33.1	-11.3	6151.0	1567.0	16.9	0.0	-602.5	-206.0	6151.0	1567.0	16.9	1066.6	28.6	1382.6	-58.0	1047.0	51.7	1363.0	-35.0
3	1	0.0	-602.6	205.9	0.0	-32.6	11.2	6017.0	1542.0	-16.6	0.0	-602.6	205.9	6017.0	1542.0	-16.6	1040.4	31.5	1350.6	-54.6	1021.1	54.2	1331.3	-31.9
3	2	0.0	-432.3	185.5	0.0	-23.4	10.1	6017.0	1423.0	-257.3	0.0	-432.3	185.5	6017.0	1423.0	-257.3	1077.7	-12.4	1373.8	-81.9	1063.9	3.8	1360.0	-65.7
3	3	0.0	-279.8	165.1	0.0	-15.1	9.0	6017.0	1094.0	-498.1	0.0	-279.8	165.1	6017.0	1094.0	-498.1	992.9	87.4	1250.3	63.6	984.0	97.8	1241.4	74.0
3	4	0.0	-145.2	144.7	0.0	-7.7	7.9	6151.0	626.1	-546.9	0.0	-145.2	144.7	6151.0	626.1	-546.9	836.8	299.3	1041.7	343.4	832.2	304.7	1037.2	348.8
3	5	0.0	-28.1	124.2	0.0	-1.4	6.8	6151.0	196.0	-457.3	0.0	-28.1	124.2	6151.0	196.0	-457.3	677.4	487.0	831.7	590.8	676.6	487.9	830.9	591.8
3	6	0.0	71.0	103.9	0.0	4.0	5.6	6151.0	-169.7	-383.9	0.0	71.0	103.9	6151.0	-169.7	-383.9	541.8	646.8	652.9	801.4	544.1	644.0	655.2	798.7
3	7	0.0	152.6	83.4	0.0	8.4	4.5	6151.0	-472.1	-310.4	0.0	152.6	83.4	6151.0	-472.1	-310.4	429.3	779.2	504.7	975.9	434.3	773.3	509.7	970.0
3	8	0.0	216.3	63.0	0.0	11.9	3.4	6151.0	-710.2	-236.9	0.0	216.3	63.0	6151.0	-710.2	-236.9	340.5	883.8	387.8	1113.7	347.5	875.6	394.8	1105.4
3	9	0.0	262.2	42.6	0.0	14.4	2.3	6151.0	-884.3	-163.5	0.0	262.2	42.6	6151.0	-884.3	-163.5	275.1	960.8	301.9	1214.8	283.6	950.8	310.4	1204.8
3	10	0.0	290.4	22.2	0.0	15.9	1.2	6151.0	-994.8	-90.0	0.0	290.4	22.2	6151.0	-994.8	-90.0	233.1	1010.3	246.8	1278.7	242.5	999.3	256.2	1268.7
3	11	0.0	300.9	1.8	0.0	16.5	0.1	6151.0	-1041.0	-16.7	0.0	300.9	1.8	6151.0	-1041.0	-16.7	214.8	1031.9	223.0	1307.7	224.5	1020.5	232.7	1296.3
3	12	0.0	293.6	-18.6	0.0	16.0	-1.0	6326.0	-1066.0	58.9	0.0	293.6	-18.6	6326.0	-1066.0	58.9	214.0	1069.4	223.0	1352.4	223.4	1058.3	232.5	1341.3

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES	Fase nº: PUENTE EN VACIO
PROYECTO : L.A.V. MADRID-ZARAGOZA	
ESTRUCTURA: ER1-1.4	

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	1117	-14
2	Σ pp(i) + 1.1 x Σ pret(i)	1411	-84
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	1105	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1400	-67

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	13	0.0	268.4	-39.1	0.0	14.6	-2.2	6326.0	-981.0	134.8	0.0	268.4	-39.1	6326.0	-981.0	134.8	244.2	1033.8	263.3	1305.0	252.9	1023.6	272.0	1294.8
3	14	0.0	225.4	-59.5	0.0	12.3	-3.3	6326.0	-830.8	210.3	0.0	225.4	-59.5	6326.0	-830.8	210.3	298.8	969.7	335.4	1220.0	305.9	961.2	342.7	1211.5
3	15	0.0	164.9	-79.9	0.0	8.9	-4.4	6326.0	-615.3	285.8	0.0	164.9	-79.9	6326.0	-615.3	285.8	377.3	877.0	439.6	1097.3	382.6	870.8	444.9	1091.1
3	16	0.0	86.4	-100.3	0.0	4.6	-5.5	6326.0	-333.7	361.3	0.0	86.4	-100.3	6326.0	-333.7	361.3	480.6	755.4	576.0	936.6	483.3	752.2	578.8	933.4
3	17	0.0	-9.7	-120.7	0.0	-0.6	-6.6	6326.0	13.3	436.8	0.0	-9.7	-120.7	6326.0	13.3	436.8	608.1	605.2	744.5	738.2	607.7	605.6	744.1	738.6
3	18	0.0	-123.6	-141.1	0.0	-6.9	-7.7	6326.0	426.4	512.4	0.0	-123.6	-141.1	6326.0	426.4	512.4	760.3	426.0	945.4	501.6	756.2	430.7	941.4	506.3
3	19	0.0	-255.3	-161.5	0.0	-14.1	-8.8	6326.0	868.9	532.1	0.0	-255.3	-161.5	6326.0	868.9	532.1	928.1	228.2	1167.8	239.5	919.8	238.0	1159.5	249.3
3	20	0.0	-404.6	-181.9	0.0	-22.2	-10.0	6506.0	1229.0	244.0	0.0	-404.6	-181.9	6506.0	1229.0	244.0	1037.9	136.6	1321.6	104.4	1024.8	152.0	1308.5	119.9
3	21	0.0	-571.7	-202.3	0.0	-31.4	-11.1	6506.0	1328.0	-16.2	0.0	-571.7	-202.3	6506.0	1328.0	-16.2	991.9	190.8	1287.2	144.9	973.4	212.6	1268.7	166.7
4	1	0.0	-574.7	203.3	0.0	-31.1	11.0	6655.0	1353.0	33.8	0.0	-574.7	203.3	6655.0	1353.0	33.8	1017.7	191.5	1319.2	145.3	999.3	213.1	1300.8	166.9
4	2	0.0	-439.8	187.1	0.0	-23.7	10.2	6655.0	1290.0	-216.2	0.0	-439.8	187.1	6655.0	1290.0	-216.2	1063.8	137.2	1357.9	99.7	1049.8	153.6	1343.9	116.2
4	3	0.0	-316.2	170.9	0.0	-17.0	9.3	6655.0	1094.0	-371.9	0.0	-316.2	170.9	6655.0	1094.0	-371.9	1032.7	173.8	1303.6	163.7	1022.6	195.7	1293.5	175.5
4	4	0.0	-203.8	154.7	0.0	-10.9	8.4	6655.0	765.6	-595.3	0.0	-203.8	154.7	6655.0	765.6	-595.3	924.6	301.1	1156.8	336.6	918.1	308.7	1150.3	344.2
4	5	0.0	-102.8	138.6	0.0	-5.5	7.5	6535.0	422.8	-456.1	0.0	-102.8	138.6	6535.0	422.8	-456.1	790.7	433.8	979.8	514.4	787.4	437.6	976.6	518.2
4	6	0.0	-12.7	122.4	0.0	-0.6	6.6	6535.0	127.6	-398.0	0.0	-12.7	122.4	6535.0	127.6	-398.0	687.1	555.8	841.4	677.4	686.8	556.2	841.1	677.8
4	7	0.0	66.2	106.2	0.0	3.7	5.7	6535.0	-126.9	-340.0	0.0	66.2	106.2	6535.0	-126.9	-340.0	598.5	660.2	722.8	817.1	600.6	657.6	725.0	814.6
4	8	0.0	133.9	90.0	0.0	7.3	4.9	6535.0	-341.6	-281.9	0.0	133.9	90.0	6535.0	-341.6	-281.9	524.4	747.4	623.4	934.2	528.8	742.3	627.7	929.1
4	9	0.0	190.4	73.8	0.0	10.4	4.0	6535.0	-515.9	-223.9	0.0	190.4	73.8	6535.0	-515.9	-223.9	465.2	817.2	543.6	1028.1	471.3	809.9	549.8	1020.9
4	10	0.0	235.8	57.6	0.0	12.8	3.1	6535.0	-650.5	-165.9	0.0	235.8	57.6	6535.0	-650.5	-165.9	420.5	869.8	483.1	1099.5	426.1	860.9	490.6	1090.6
4	11	0.0	270.0	41.4	0.0	14.7	2.2	6535.0	-745.0	-107.7	0.0	270.0	41.4	6535.0	-745.0	-107.7	390.5	905.1	441.9	1148.0	399.2	894.9	450.6	1137.8
4	12	0.0	293.0	25.3	0.0	15.9	1.3	6535.0	-799.3	-49.7	0.0	293.0	25.3	6535.0	-799.3	-49.7	375.3	923.1	420.2	1173.5	384.6	912.1	429.6	1162.5
4	13	0.0	304.9	9.1	0.0	16.5	0.4	6373.0	-786.6	-8.6	0.0	304.9	9.1	6373.0	-786.6	-8.6	373.5	891.3	416.5	1136.5	383.2	879.9	426.2	1125.1
4	14	0.0	305.6	-7.1	0.0	16.5	-0.4	6373.0	-775.4	35.3	0.0	305.6	-7.1	6373.0	-775.4	35.3	379.9	883.9	424.2	1127.5	389.6	872.4	433.9	1116.0
4	15	0.0	295.1	-23.3	0.0	15.9	-1.3	6373.0	-737.9	73.2	0.0	295.1	-23.3	6373.0	-737.9	73.2	393.6	867.7	442.3	1106.1	402.9	856.7	451.7	1095.1
4	16	0.0	273.4	-39.5	0.0	14.6	-2.2	6373.0	-674.4	111.1	0.0	273.4	-39.5	6373.0	-674.4	111.1	414.5	843.1	470.7	1072.6	423.1	832.9	479.4	1062.5
4	17	0.0	240.6	-55.7	0.0	12.8	-3.1	6373.0	-584.7	149.0	0.0	240.6	-55.7	6373.0	-584.7	149.0	442.8	809.8	509.6	1026.9	450.3	800.9	517.2	1018.0
4	18	0.0	196.6	-71.9	0.0	10.4	-4.0	6373.0	-468.8	186.9	0.0	196.6	-71.9	6373.0	-468.8	186.9	476.3	767.8	558.9	966.8	484.5	760.6	585.0	961.6
4	19	0.0	141.5	-88.1	0.0	7.3	-4.9	6373.0	-326.8	224.8	0.0	141.5	-88.1	6373.0	-326.8	224.8	521.2	717.3	618.5	898.6	525.6	712.2	622.8	893.5
4	20	0.0	75.1	-104.2	0.0	3.7	-5.7	6373.0	-158.6	262.7	0.0	75.1	-104.2	6373.0	-158.6	262.7	571.4	658.3	688.5	816.2	573.5	655.7	680.7	813.6
4	21	0.0	-2.3	-120.4	0.0	-0.6	-6.6	6373.0	35.4	300.5	0.0	-2.3	-120.4	6373.0	35.4	300.5	628.7	590.7	768.8	721.6	628.4	591.1	768.4	722.0

CÁLCULO DE TENSIONES EN PUENTES

Fase : PUENTE COMPLETO EN TIEMPO INICIAL

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: ER1-1.4

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	PP,Inicial + CM + 0.9 x Pret,Inicial + 0.6 x SC(+) + 0.5 x GRAD	1052	52
2	PP,Inicial + CM + 1.1 x Pret,Inicial + 0.6 x SC(+) + 0.5 x GRAD	1348	-18
3	PP,Inicial + CM + 0.9 x Pret,Inicial + 0.6 x SC(-) + 0.5 x GRAD	1147	180
4	PP,Inicial + CM + 1.1 x Pret,Inicial + 0.6 x SC(-) + 0.5 x GRAD	1442	186
5	PP,Inicial + CM + 0.9 x Pret,Inicial + 1.0* SC(+) + 0.6 x GRAD	1121	-23
6	PP,Inicial + CM + 1.1 x Pret,Inicial + 1.0* SC(+) + 0.6 x GRAD	1412	-93
7	PP,Inicial + CM + 0.9 x Pret,Inicial + 1.0* SC(-) + 0.6 x GRAD	1387	-63
8	PP,Inicial + CM + 1.1 x Pret,Inicial + 1.0* SC(-) + 0.6 x GRAD	1558	88

PP,Inicial= Peso propio en tiempo inicial
Pret,Inicial = Pretensado en tiempo inicial
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INICIAL									Envolvente SC(+)			Envolvente SC(-)			Gradiente			TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta												Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	-8.5	120.7	6245.0	42.9	-294.2	0.1	1.7	82.3	0.0	249.7	0	0.0	-49.5	0.0	3.4	12.26	620	574	758	702	619	576	757	703	620	574	758	701	619	576	757	703
1	2	0.0	71.1	104.5	6245.0	-147.1	-257.1	0.1	54.6	71.2	189.1	260.7	0	-36.6	-55.9	0.0	11.8	12.26	665	521	781	674	581	620	697	773	711	467	827	621	572	630	688	784
1	3	0.0	137.7	88.3	6245.0	-311.8	-219.9	0.1	99.9	60.0	351.6	212.5	0	-77.1	-55.9	0.0	20.3	12.26	704	475	800	652	546	661	643	838	788	376	885	553	528	683	624	859
1	4	0.0	193.1	72.2	6245.0	-450.8	-182.8	0.1	137.5	48.9	495.8	178.6	0	-115.7	-55.9	0.0	28.7	12.26	739	435	819	630	514	699	594	895	857	295	937	490	486	732	566	927
1	5	0.0	237.4	56.0	6245.0	-564.2	-145.6	0.1	167.4	37.7	609.7	151.6	0	-154.2	-55.9	0.0	37.2	12.26	765	403	832	615	484	735	550	946	911	231	978	443	447	778	514	988
1	6	0.0	270.4	39.8	6245.0	-651.9	-108.5	0.1	189.6	26.6	707.8	131.7	0	-182.8	-55.9	0.0	45.6	12.26	788	376	844	600	456	767	512	991	958	176	1014	400	411	821	467	1045
1	7	0.0	292.3	23.6	6245.0	-714.0	-71.4	0.1	204.1	15.5	786.4	83.5	0	-231.3	-55.9	0.0	54.1	12.26	807	354	856	586	431	797	480	1029	996	132	1045	364	376	861	425	1094
1	8	0.0	303.0	7.4	6245.0	-750.4	-34.2	0.1	211.0	4.3	840.0	70.9	0	-289.9	-55.9	0.0	62.6	12.26	820	339	864	577	408	824	453	1061	1022	101	1066	339	345	899	389	1136
1	9	0.0	302.6	-8.8	6245.0	-761.3	3.0	0.1	210.2	-6.8	868.5	22.7	0	-308.4	-55.9	0.0	71.0	12.26	826	332	869	571	388	847	431	1086	1035	86	1078	325	315	933	359	1172
1	10	0.0	290.9	-25.0	6245.0	-745.2	45.4	0.1	201.6	-17.9	878.3	-10.5	0	-347.0	-55.9	0.0	79.5	12.26	828	329	873	568	371	868	416	1104	1040	79	1085	316	289	964	334	1201
1	11	0.0	268.1	-41.2	6373.0	-710.4	105.5	0.1	185.4	-29.1	868.3	-24.2	0	-385.6	-55.9	0.0	87.9	12.26	835	348	887	582	365	901	417	1136	1045	100	1097	335	274	1008	326	1243
1	12	0.0	234.1	-57.4	6373.0	-618.1	162.1	0.1	161.5	-40.2	831.9	-58.1	0	-424.1	-55.9	0.0	96.4	12.26	839	343	902	584	366	900	429	1122	1041	105	1104	326	266	1018	329	1239
1	13	0.0	188.9	-73.6	6373.0	-486.8	218.7	0.1	130.0	-51.3	776.5	-106.3	0	-462.7	-55.9	0.0	104.8	12.26	847	334	925	537	377	887	456	1091	1036	111	1115	314	268	1016	346	1219
1	14	0.0	132.6	-69.7	6373.0	-316.6	275.3	0.1	90.8	-62.5	700.6	-119.3	0	-501.2	-55.9	0.0	113.3	12.26	856	323	955	502	398	863	496	1043	1028	120	1127	300	279	1002	378	1182
1	15	0.0	65.1	-105.9	6373.0	-106.8	331.9	0.1	43.8	-73.6	608.7	-125.5	0	-539.8	-55.9	0.0	121.7	12.26	870	306	993	457	428	828	551	978	1021	129	1144	279	300	978	424	1126
1	16	0.0	-13.6	-122.1	6373.0	141.6	388.5	0.1	-10.8	-84.7	512.8	-152.5	0	-578.3	-55.9	0.0	130.2	12.26	892	281	1045	397	467	781	620	897	1021	129	1173	245	331	942	483	1058
1	17	0.0	-103.5	-138.3	6373.0	429.5	445.2	0.1	-73.2	-95.9	396.3	-179.4	0	-616.9	-55.9	0.0	138.6	12.26	917	251	1104	327	517	723	703	799	1019	131	1206	207	371	894	558	970
1	18	0.0	-204.6	-154.5	6373.0	756.4	501.8	0.1	-143.2	-107.0	290.8	-124.9	0	-690.6	-177.9	0.0	147.1	12.26	954	208	1179	238	583	668	788	699	1031	116	1256	147	400	860	625	891
1	19	0.0	-316.7	-170.7	6535.0	1060.0	366.4	0.1	-220.8	-118.1	227.3	-55.8	0	-846.9	-281.0	0.0	156.5	12.26	1009	176	1276	165	583	679	850	667	1072	102	1339	91	384	913	650	903
1	20	0.0	-440.1	-186.9	6535.0	1273.0	194.9	0.1	-306.1	-129.3	198.8	-11.1	0	-1061.7	-359.2	0.0	164.0	12.26	981	209	1271	172	487	782	776	754	1038	143	1327	105	236	1087	526	1049
1	21	0.0	-574.6	-203.1	6535.0	1348.0	19.1	0.1	-399.2	-140.4	197.7	14.3	0	-1325.4	-411.5	0.0	172.4	12.26	889	318	1187	270	298	1013	597	965	946	251	1244	203	-14	1382	284	1333
2	1	0.0	-569.4	202.2	6650.0	1356.0	16.7	0.2	-389.3	138.7	197.7	-52.1	0	-1325.4	452.4	0.0	167.8	-2.726	912	315	1213	269	323	1009	625	962	968	249	1270	202	10	1377	312	1330
2	2	0.0	-402.3	161.7	6650.0	1255.0	-249.4	0.2	-274.6	124.7	167.7	-20.5	0	-967.7	379.6	0.0	165.4	-2.726	1013	196	1303	163	562	727	952	894	1062	138	1352	105	334	996	624	963
2	3	0.0	-253.1	161.3	6650.0	922.4	-515.4	0.2	-172.3	110.6	174.1	33.3	0	-679.5	284.4	0.0	163.1	-2.726	986	227	1237	241	636	840	887	653	1037	168	1288	181	476	829	726	942
2	4	0.0	-121.6	140.9	6506.0	431.2	-642.6	0.2	-82.1	96.6	248.0	125.6	0	-470.4	185.7	0.0	160.7	-2.726	968	337	1058	415	566	892	756	771	936	257	1126	335	455	823	645	902
2	5	0.0	-8.0	120.5	6506.0	6.7	-449.4	0.2	-4.2	82.6	377.9	164.0	0	-344.1	99.8	0.0	158.3	-2.726	801	416	940	554	499	772	638	910	899	300	1039	437	417	867	557	1005
2	6	0.0	86.1	100.1	6505.0	-350.7	-371.7	0.2	61.5	68.5	555.8	193.8	0	-331.6	-19.8	0.0	156.0	-2.726	769	453	866	641	409	878	506	1065	909	288	1006	475	330	970	428	1157
2	7	0.0	166.2	79.7	6505.0	-640.1	-294.1	0.2	115.0	54.5	716.1	152.7	0	-348.8	-19.8	0.0	153.6	-2.726	749	477	812	705	327	974	390	1202	927	267	990	495	244	1071	307	1299
2	8	0.0	226.8	59.3	6505.0	-862.3	-216.4	0.2	156.4	40.5	839.2	133.4	0	-366.0	-19.8	0.0	151.2	-2.726	734	495	771	753	263	1050	300	1308	941	251	978	509	176	1151	213	1410
2	9	0.0	269.5	38.9	6505.0	-1017.0	-136.8	0.2	185.5	26.5	928.7	91.9	0	-383.2	-19.8	0.0	148.9	-2.726	725	505	744	785	217	1104	235	1384	953	236	972	516	126	1210	145	1490
2	10	0.0	294.5	18.5	6505.0	-1104.0	-81.0	0.1	202.4	12.4	981.6	50.8	0	-400.4	-19.8	0.0	146.5	-2.726	722	509	730	801	189	1136	198	1428	962	228	970	518	95	1247	103	1539
2	11	0.0	301.7	-1.9	6505.0	-1123.0	16.7	0.1	207.1	-1.6	1010.4	9.6	0	-417.7	-19.8	0.0	144.1	-2.726	728	501	734	796	180	1147	186	1442	975	211	981	505	81	1263	88	1558
2	12	0.0	291.1	-22.3	6326.0	-1032.0	92.1	0.1	199.6	-15.6	1008.3	-17.2	0	-434.9	-19.8	0.0	141.7	-2.726	747	442	760	720	194	1093	207	1371	993	151	1006	430	92	1213	105	1492
2	13	0.0	262.9	-42.7	6326.0	-818.8	167.6	0.1	179.9	-29.7	973.5	-72.4	0	-452.1	-19.8	0.0	139.4	-2.726	766	419	792	682	220	1062	247	1325	1004	139	1030	402	113	1188	140	1450
2	14	0.0	216.8	-63.1	6326.0	-740.1	243.2	0.1	147.9	-43.7	900.2	-113.5	0	-469.3	-19.8	0.0	137.0	-2.726	788	393	836	631	263	1012	310	1250	1009	134	1056	371	152	1142	200	1380
2	15	0.0	153.0	-83.5	6326.0	-495.5	318.7	0.1	103.8	-57.8	790.1	-133.7	0	-486.5	-19.8	0.0	134.6	-2.726	815	362	891	566	323	941	399	1145	1009	133	1085	337	208	1076	285	1280
2	16	0.0	71.5	-103.9	6326.0	-185.5	394.2	0.1	47.4	-71.8	651.7	-174.2	0	-503.8	-19.8	0.0	132.3	-2.726	848	322	961	483	400	850	513	1011	1010	132	1123	293	281	990	394	1151
2	17	0.0	-27.9	-124.3	6326.0	190.4	469.8	0.1	-21.1	-85.8	478.8	-172.9	0	-526.6	-62.3	0.0	129.9	-2.726	887	277	1044	385	492	742	649	851	1007	135	1165	243	367	889	524	997
2	18	0.0	-145.0	-144.8	6326.0	632.2	545.4	0.1	-102.0	-99.9	334.4	-144.3	0	-616.2	-146.0	0.0	127.5	-2.726	953	199	1162	246	579	640	788	687	1039	97	1249	144	433	811	643	858
2	19	0.0	-279.8	-165.2	6326.0	1125.0	572.4	0.1	-194.9	-113.9	258.0	-42.1	0	-815.8	-287.9	0.0	125.1	-2.726	1052	82	1320	60	635	573	903	552	1121	2	1388	-20	443	800	710	778
2	20	0.0	-432.2	-185.6	6151.0	1446.0	262.9	0.2	-300.0	-127.9	239.3	11.1	0	-1100.9	-381.9	0.0	122.8	-2.726	1047	52	1348	-18	536	653	838	584	1110	-23	1412	-93	276	959	578	890
2	21	0.0	-602.5	-206.0	6151.0	1567.0	16.9	0.2	-417.3	-141.9	260.0	42.7	0	-1459.5	-454.6	0.0	120.4	-2.726	948	168	1264	82	304	927	620	840	1016	88	1332	1	-41	1333	275	1246
3	1	0.0	-602.6	205.9	6017.0	1542.0	-16.6	0.2	-411.4	141.3	260.0	-47.0	0	-1459.5	450.0	0.0	119.5	2.886	925	167	1235	81	281	926	591	840	993	87	1304	1	-63	1332	247	1246
3	2	0.0	-432.3	165.5	6017.0	1423.0	-257.3	0.2	-294.5	127.2	235.5	-15.5	0	-1100.7	377.8	0.0	122.0	2.886	1023	52	1319	-18	514	651	810	582	1066	-22	1362	-92	255	957	551	888
3	3	0.0	-279.8	165.1	6017.0	1094.0	-498.1	0.2	-189.9	113.2	250.5	37.8	0	-815.2	290.6	0.0	124.6	2.886	1006	72	1284	48	592	559	850	535	1073	-7	1330	-30	400	786	657	762
3	4	0.0	-145.2	144.7	6151.0	826.1	-646.9	0.2	-97.6	99.2	337.6	147.1	0	-616.5	148.0	0.0	127.1	2.886	936	182	1141	226	561	624	766	668	1023	80	1228	124	415	796	620	840
3	5	0.0	-28.1	124.2	6151.0	196.0	-457.3	0.2	-17.4	85.1	479.9	189.8	0	-528.9	62.3	0.0	129.6	2.886	875	254	1030	358	480	720	634	823	996	112	1150	215	355	867	509	970
3	6	0.0	71.0	103.9	6151.0	-169.7	-383.9	0.2	50.6	71.1	649.1	191.1	0	-504.0	19.8	0.0	132.1	2.886	840	295	951	450	393	822	504	976	1001	105	1112	260	274	962	385	1117
3	7	0.0	152.6	83.4	6151.0	-472.1	-310.4	0.2	108.4	57.1	791.7	135.9	0	-486.7	19.8	0.0	134.6	2.886	812	328	887	525	320	908	395	1105	1007	99	1082	296	205	1044	280	1240
3	8	0.0	216.3	63.0	6151.0	-710.2	-236.9	0.1	149.9	43.0	896.5	95.1	0	-469.5	19.8	0.0	137.1	2.886	787	357	835	587	263	975	310	1205	1008	98	1055	328	152	1106	199	1336
3	9	0.0	262.2	42.6	6151.0	-884.3	-163.5	0.1	181.3	29.0	973.6	54.0	0	-452.3	19.8	0.0	139.6	2.886	768	380	795	634	222	1023	249	1277	1006	100	1033	354	115	1149	142	1403
3	10	0.0	290.4	22.2	6151.0	-994.8	-90.0	0.2	200.4	15.0	1012.9	12.8	0	-435.0	19.8	0.0	142.1	2.886	752	399	766	669	197	1052	211	1322	999	108	1013	377	95	1173	108	1443
3	11	0.0	300.9	1.8	6151.0	-1041.0	-16.7	0.2	207.3	0.9	1013.7	-6.8	0	-417.8	19.8	0.0	144.7	2.886	739	415	747	691	169	1062	197	1338	986	123	995	399	91	1178	99	1454
3	12	0.0	293.6	-18.6	6326.0	-1066.0	58.9	0.2	202.0	-13.1	983.3	-33.8	0	-408.2	7.1	0.0	147.2	2.886	725	488	734	751	189	1099	198	1382	965	184	974	467	92	1213	101	1496
3	13	0.0	268.4	-39.1	6326.0	-981.0	134.8	0.2	184.4	-27.2	927.4	-75.1	0	-401.9	7.1	0.0	149.7	2.886	725	467	745	738	211	1073	230	1344	953	199	972	470	116	1185	135	1456
3	14	0.0	225.4	-59.5	6326.0	-830.8	210.3	0.2	154.6	-41.2	836.4	-130.3	0	-395.7	7.1	0.0	152.2	2.886	731	461	768	711	250	1027	287	1278	937	218	974	468	156	1137	193	1388

CÁLCULO DE TENSIONES EN PUENTES

Fase : PUENTE COMPLETO EN TIEMPO INICIAL

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: ER1-1.4

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	PP,Inicial + CM + 0.9 x Pret,Inicial + 0.6 x SC(+) + 0.5 x GRAD	1052	52
2	PP,Inicial + CM + 1.1 x Pret,Inicial + 0.6 x SC(+) + 0.5 x GRAD	1348	-18
3	PP,Inicial + CM + 0.9 x Pret,Inicial + 0.6 x SC(-) + 0.5 x GRAD	1147	180
4	PP,Inicial + CM + 1.1 x Pret,Inicial + 0.6 x SC(-) + 0.5 x GRAD	1442	186
5	PP,Inicial + CM + 0.9 x Pret,Inicial + 1.0* SC(+) + 0.6 x GRAD	1121	-23
6	PP,Inicial + CM + 1.1 x Pret,Inicial + 1.0* SC(+) + 0.6 x GRAD	1412	-93
7	PP,Inicial + CM + 0.9 x Pret,Inicial + 1.0* SC(-) + 0.6 x GRAD	1387	-63
8	PP,Inicial + CM + 1.1 x Pret,Inicial + 1.0* SC(-) + 0.6 x GRAD	1558	88

PP,Inicial= Peso propio en tiempo inicial
Pret,Inicial = Pretensado en tiempo inicial
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INICIAL																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	15	0.0	164.9	-79.9	6326.0	-615.3	265.8	0.2	112.7	-55.3	711.9	-171.1	0	-389.5	7.1	0.0	154.7	2.886	741	448	804	668	306	961	368	1181	919	239	981	460	214	1069	276	1290
3	16	0.0	86.4	-100.3	6326.0	-333.7	361.3	0.2	58.5	-69.3	555.0	-212.1	0	-383.3	7.1	0.0	157.2	2.886	758	429	853	610	379	875	475	1056	898	264	994	445	289	981	384	1162
3	17	0.0	-9.7	-120.7	6326.0	13.3	436.8	0.2	-7.8	-83.3	380.5	-182.2	0	-396.9	-64.1	0.0	159.7	2.886	785	397	922	530	463	776	599	909	885	280	1021	413	369	896	506	1019
3	18	0.0	-123.6	-141.1	6326.0	426.4	512.4	0.2	-86.5	-97.4	250.8	-122.9	0	-489.3	-143.0	0.0	162.3	2.886	846	325	1031	401	536	690	721	766	915	244	1100	320	421	826	606	902
3	19	0.0	-255.3	-161.5	6326.0	868.9	532.1	0.2	-177.3	-111.4	174.2	-33.2	0	-679.8	-282.2	0.0	164.8	2.886	934	222	1174	233	583	635	823	646	985	162	1224	173	422	824	662	835
3	20	0.0	-404.6	-181.9	6506.0	1229.0	244.0	0.2	-280.2	-125.4	167.7	20.5	0	-967.9	-376.8	0.0	167.3	2.886	981	203	1265	171	530	735	814	703	1031	145	1314	113	302	1004	585	972
3	21	0.0	-571.7	-202.3	6506.0	1328.0	-16.2	0.2	-395.3	-139.4	197.8	52.1	0	-1326.5	-449.6	0.0	169.8	2.886	879	324	1174	278	289	1019	585	973	935	257	1231	211	-24	1387	271	1341
4	1	0.0	-574.7	203.3	6655.0	1353.0	33.8	0.1	-391.4	139.1	197.8	-14.3	0	-1326.5	414.7	0.0	171.2	-12.26	907	322	1209	275	317	1017	619	970	964	255	1266	208	4	1385	306	1339
4	2	0.0	-439.8	187.1	6655.0	1290.0	-216.2	0.1	-299.1	128.0	196.9	11.1	0	-1063.1	355.4	0.0	162.7	-12.26	1006	206	1300	168	511	788	805	751	1062	139	1356	102	260	1084	554	1046
4	3	0.0	-316.2	170.9	6655.0	1094.0	-371.9	0.1	-214.5	116.8	227.3	55.8	0	-848.0	283.8	0.0	154.2	-12.26	1032	175	1303	164	606	676	877	666	1095	101	1366	90	406	912	677	902
4	4	0.0	-203.8	154.7	6655.0	765.6	-595.3	0.1	-137.8	105.7	290.9	124.9	0	-690.9	180.8	0.0	145.8	-12.26	989	225	1221	260	599	685	831	720	1067	134	1299	169	436	877	668	912
4	5	0.0	-102.8	138.6	6535.0	422.8	-456.1	0.1	-68.8	94.6	423.4	208.3	0	-616.8	55.9	0.0	137.3	-12.26	940	257	1130	338	532	739	721	819	1048	130	1238	211	386	910	575	991
4	6	0.0	-12.7	122.4	6535.0	127.6	-396.0	0.1	-7.3	83.4	564.0	174.6	0	-578.2	55.9	0.0	128.8	-12.26	920	281	1075	403	478	802	632	924	1061	115	1215	237	342	963	496	1084
4	7	0.0	66.2	106.2	6535.0	-126.9	-340.0	0.1	46.4	72.3	679.6	161.3	0	-539.7	55.9	0.0	120.4	-12.26	902	303	1026	460	435	853	559	1010	1069	106	1194	262	307	1003	432	1160
4	8	0.0	133.9	90.0	6535.0	-341.6	-281.9	0.1	92.5	61.2	772.4	113.1	0	-501.1	55.9	0.0	111.9	-12.26	885	322	984	509	402	892	501	1079	1074	100	1173	286	283	1031	382	1218
4	9	0.0	190.4	73.8	6535.0	-515.9	-223.9	0.1	130.8	50.1	847.0	79.3	0	-462.6	55.9	0.0	103.5	-12.26	873	337	951	548	379	919	457	1130	1079	95	1157	306	269	1048	348	1259
4	10	0.0	235.8	57.6	6535.0	-650.5	-165.9	0.1	161.6	38.9	897.2	66.9	0	-424.0	55.9	0.0	95.0	-12.26	861	350	924	580	366	934	428	1164	1079	94	1141	324	266	1052	328	1282
4	11	0.0	270.0	41.4	6535.0	-745.0	-107.7	0.1	184.6	27.8	923.4	18.7	0	-385.5	55.9	0.0	86.5	-12.26	852	362	903	605	363	938	414	1180	1075	99	1126	342	272	1045	323	1288
4	12	0.0	293.0	25.3	6535.0	-799.3	-49.7	0.1	200.0	16.7	931.9	-15.9	0	-346.9	55.9	0.0	78.0	-12.26	846	368	891	619	370	929	415	1179	1071	104	1116	354	289	1025	334	1276
4	13	0.0	304.9	9.1	6373.0	-786.6	-8.6	0.1	207.6	5.5	917.2	-28.4	0	-308.4	55.9	0.0	69.6	-12.26	841	341	884	586	387	876	430	1121	1062	81	1105	326	314	961	357	1207
4	14	0.0	305.6	-7.1	6373.0	-775.4	35.3	0.1	207.6	-5.6	878.4	-62.1	0	-269.8	55.9	0.0	61.1	-12.26	831	352	876	596	407	852	451	1096	1042	104	1087	347	343	927	387	1171
4	15	0.0	295.1	-23.3	6373.0	-737.9	73.2	0.1	199.9	-16.7	820.8	-110.3	0	-231.3	55.9	0.0	52.6	-12.26	818	368	866	607	430	825	478	1064	1014	137	1063	375	375	890	424	1128
4	16	0.0	273.4	-39.5	6373.0	-674.4	111.1	0.1	184.5	-27.9	739.4	-123.6	0	-192.7	55.9	0.0	44.2	-12.26	798	391	854	621	455	795	511	1025	975	183	1031	412	410	849	466	1078
4	17	0.0	240.6	-55.7	6373.0	-584.7	149.0	0.1	161.5	-39.0	634.0	-157.4	0	-154.2	55.9	0.0	35.7	-12.26	773	421	840	638	483	762	550	978	925	242	992	459	447	805	514	1022
4	18	0.0	196.6	-71.9	6373.0	-468.8	186.9	0.1	130.7	-50.1	509.1	-205.6	0	-115.6	55.9	0.0	27.2	-12.26	744	455	824	656	515	725	595	926	865	312	946	513	487	757	568	958
4	19	0.0	141.5	-88.1	6373.0	-326.8	224.8	0.1	92.3	-61.3	367.3	-239.2	0	-77.1	55.9	0.0	18.7	-12.26	711	494	809	675	548	685	646	867	799	390	896	571	530	707	627	888
4	20	0.0	75.1	-104.2	6373.0	-158.6	262.7	0.1	46.2	-72.4	193.0	-266.2	0	-38.5	55.9	0.0	10.3	-12.26	670	542	787	700	585	642	702	800	716	488	833	646	576	653	693	811
4	21	0.0	-2.3	-120.4	6373.0	35.4	300.5	0.1	-7.5	-83.5	0.0	-257.7	0	0.0	23.0	0.0	1.8	-12.26	625	595	765	726	624	596	764	727	625	595	765	726	624	596	764	727

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INFINITO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: BR1-1.4

Resumen de combinaciones:

		Tension máxima (t/m2)	Tension mínima (t/m2)
1	PP_final + CM + 0.9 x Pret_final + 0.6 * SC(+) + 0.5 x GRAD	908	85
2	PP_final + CM + 1.1 x Pret_final + 0.6 * SC(+) + 0.5 x GRAD	1149	26
3	PP_final + CM + 0.9 x Pret_final + 0.6 * SC(-) + 0.5 x GRAD	1043	114
4	PP_final + CM + 1.1 x Pret_final + 0.6 * SC(-) + 0.5 x GRAD	1247	182
5	PP_final + CM + 0.9 x Pret_final + 1.0* SC(+) + 0.6 x GRAD	1047	-52
6	PP_final + CM + 1.1 x Pret_final + 1.0* SC(+) + 0.6 x GRAD	1213	-46
7	PP_final + CM + 0.9 x Pret_final + 1.0* SC(-) + 0.6 x GRAD	1412	-231
8	PP_final + CM + 1.1 x Pret_final + 1.0* SC(-) + 0.6 x GRAD	1371	42

PP_final= Peso propio en tiempo final
Pret_final = Pretensado en tiempo final
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	-6.5	120.7	5496.0	37.7	-258.9	0.1	1.7	82.3	0.0	249.7	0	0.0	-49.5	0.0	3.4	12.26	545	506	667	618	544	507	666	619	546	506	667	617	544	507	666	619
1	2	0.0	71.1	104.5	5496.0	-129.4	-226.2	0.1	54.6	71.2	189.1	260.7	0	-38.6	-55.9	0.0	11.8	12.26	603	438	705	573	519	537	621	672	648	384	750	520	510	548	612	683
1	3	0.0	137.7	88.3	5496.0	-274.4	-193.5	0.1	99.9	60.0	351.6	212.5	0	-77.1	-55.9	0.0	20.3	12.26	652	380	737	535	494	566	579	721	736	281	821	436	476	587	561	743
1	4	0.0	193.1	72.2	5496.0	-396.7	-160.8	0.1	137.5	48.9	495.8	178.6	0	-115.7	-55.9	0.0	28.7	12.26	696	329	766	501	471	594	541	766	814	189	885	361	443	626	514	798
1	5	0.0	237.4	56.0	5496.0	-496.5	-128.1	0.1	167.4	37.7	609.7	151.6	0	-154.2	-55.9	0.0	37.2	12.26	729	289	788	475	448	621	506	807	875	117	934	303	411	664	470	850
1	6	0.0	270.4	39.8	5496.0	-573.7	-95.5	0.1	189.6	26.6	707.8	131.7	0	-192.8	-55.9	0.0	45.6	12.26	758	255	807	452	426	647	475	844	928	55	977	252	380	700	430	897
1	7	0.0	292.3	23.6	5496.0	-626.3	-62.8	0.1	204.1	15.5	786.4	83.5	0	-231.3	-55.9	0.0	54.1	12.26	781	226	824	433	405	672	448	876	970	6	1013	211	350	736	393	940
1	8	0.0	303.0	7.4	5496.0	-660.4	-30.1	0.1	211.0	4.3	840.0	70.9	0	-269.9	-55.9	0.0	62.6	12.26	796	211	835	420	384	696	423	904	997	-27	1037	182	321	771	360	979
1	9	0.0	302.6	-8.8	5496.0	-669.9	2.6	0.1	210.2	-6.8	868.5	22.7	0	-308.4	-55.9	0.0	71.0	12.26	802	203	840	413	365	718	403	929	1012	-43	1050	167	292	804	330	1014
1	10	0.0	290.9	-25.0	5496.9	-655.8	40.8	0.1	201.6	-17.9	878.3	-10.5	0	-347.0	-55.9	0.0	79.5	12.26	804	201	844	410	347	740	386	948	1016	-48	1056	160	265	836	305	1044
1	11	0.0	268.1	-41.2	5608.8	-625.2	92.8	0.1	185.4	-29.1	868.3	-24.2	0	-385.6	-55.9	0.0	87.9	12.26	807	221	853	428	337	775	383	981	1017	-26	1063	180	246	882	292	1088
1	12	0.0	234.1	-57.4	5608.8	-544.0	142.6	0.1	161.5	-40.2	831.9	-58.1	0	-424.1	-55.9	0.0	96.4	12.26	805	223	861	418	332	780	388	975	1007	-15	1063	180	232	898	288	1093
1	13	0.0	188.9	-73.6	5608.8	-428.4	192.5	0.1	130.0	-51.3	776.5	-106.3	0	-462.7	-55.9	0.0	104.8	12.26	804	224	873	403	335	777	404	956	994	1	1063	180	226	906	295	1085
1	14	0.0	132.6	-89.7	5608.8	-278.6	242.2	0.1	90.8	-62.5	700.6	-118.3	0	-501.2	-55.9	0.0	113.3	12.26	803	225	890	384	344	766	431	924	975	23	1062	181	226	905	313	1063
1	15	0.0	65.1	-105.9	5608.8	-94.0	292.1	0.1	43.8	-73.6	606.7	-125.5	0	-539.8	-55.9	0.0	121.7	12.26	804	225	912	358	361	746	470	879	954	47	1063	180	234	896	342	1029
1	16	0.0	-13.6	-122.1	5608.8	124.6	341.9	0.1	-10.8	-84.7	512.8	-152.5	0	-578.3	-55.9	0.0	130.2	12.26	810	218	944	320	385	718	519	820	938	66	1073	169	249	879	383	981
1	17	0.0	-103.5	-136.3	5608.8	378.0	391.8	0.1	-73.2	-95.9	398.3	-179.4	0	-616.9	-55.9	0.0	138.6	12.26	816	210	980	277	416	681	560	748	918	90	1083	157	270	853	435	920
1	18	0.0	-204.6	-154.5	5608.8	665.7	441.6	0.1	-143.2	-107.0	290.8	-124.9	0	-690.6	-177.9	0.0	147.1	12.26	833	191	1031	218	442	651	640	678	910	100	1108	127	279	843	477	870
1	19	0.0	-316.7	-170.7	5751.0	950.2	322.4	0.1	-220.8	-118.1	227.3	-55.8	0	-846.9	-281.0	0.0	155.5	12.26	865	182	1100	173	439	684	674	675	928	108	1163	99	239	919	474	910
1	20	0.0	-440.1	-186.9	5751.0	1121.0	171.5	0.1	-306.1	-129.3	198.6	-11.1	0	-1061.7	-359.2	0.0	164.0	12.26	825	229	1080	196	331	812	586	779	882	163	1137	129	80	1107	335	1074
1	21	0.0	-574.6	-203.1	5751.0	1186.0	16.8	0.1	-399.2	-140.4	197.7	14.3	0	-1325.4	-411.5	0.0	172.4	12.26	726	344	990	302	138	1039	400	997	785	277	1047	235	-175	1408	87	1365
2	1	0.0	-569.4	202.2	5852.0	1194.0	14.7	0.2	-389.3	138.7	197.7	-52.1	0	-1325.4	452.4	0.0	167.8	-2.726	749	340	1015	299	161	1033	426	992	806	273	1071	232	-152	1402	113	1361
2	2	0.0	-402.3	181.7	5852.0	1104.0	-219.5	0.2	-274.6	124.7	167.7	-20.5	0	-967.7	379.6	0.0	165.4	-2.726	856	214	1111	185	406	745	661	716	906	156	1161	127	177	1014	432	985
2	3	0.0	-253.1	161.3	5852.0	811.7	-453.5	0.2	-172.3	110.6	174.1	33.3	0	-679.5	284.4	0.0	163.1	-2.726	851	220	1072	232	501	633	721	645	902	160	1122	172	340	821	561	833
2	4	0.0	-121.6	140.9	5725.8	379.4	-477.5	0.2	-82.1	96.6	248.8	125.6	0	-470.4	185.7	0.0	160.7	-2.726	766	294	932	363	464	650	631	719	834	214	1000	283	353	780	520	850
2	5	0.0	-8.0	120.5	5725.8	5.9	-395.5	0.2	-4.2	82.6	377.9	164.0	0	-344.1	99.6	0.0	158.3	-2.726	726	341	848	463	423	697	546	819	824	225	947	347	342	793	465	914
2	6	0.0	88.1	100.1	5725.8	-308.6	-327.1	0.2	61.5	68.5	555.8	193.8	0	-331.6	-19.8	0.0	156.0	-2.726	716	352	802	517	356	776	442	941	857	187	942	352	278	869	364	1034
2	7	0.0	166.2	79.7	5725.8	-563.2	-258.8	0.2	115.8	54.5	716.1	152.7	0	-348.8	-19.8	0.0	153.6	-2.726	715	354	770	554	293	851	348	1052	893	144	948	345	210	948	266	1149
2	8	0.0	226.8	59.3	5725.8	-758.8	-190.4	0.2	156.4	40.5	839.2	133.4	0	-366.0	-19.8	0.0	151.2	-2.726	714	355	746	582	243	910	275	1137	921	111	953	339	156	1012	189	1239
2	9	0.0	269.5	38.9	5725.8	-894.7	-122.1	0.2	185.5	26.5	928.7	91.9	0	-383.2	-19.8	0.0	148.9	-2.726	715	354	732	600	207	952	223	1199	943	85	960	331	116	1059	133	1305
2	10	0.0	294.5	18.5	5725.8	-971.3	-63.7	0.1	202.4	12.4	981.6	50.8	0	-400.4	-19.8	0.0	146.5	-2.726	717	351	725	606	185	978	192	1235	958	68	965	325	90	1090	98	1347
2	11	0.0	301.7	-1.9	5725.0	-988.2	14.7	0.1	207.1	-1.6	1010.4	9.6	0	-417.7	-19.8	0.0	144.1	-2.726	725	342	730	602	177	988	182	1247	972	51	977	311	78	1104	84	1363
2	12	0.0	291.1	-22.3	5567.8	-908.0	81.0	0.1	199.6	-15.6	1008.3	-17.2	0	-434.9	-19.8	0.0	141.7	-2.726	740	291	752	536	187	942	199	1187	986	1	998	246	85	1063	96	1308
2	13	0.0	262.9	-42.7	5567.8	-808.5	147.5	0.1	179.9	-29.7	973.5	-72.4	0	-452.1	-19.8	0.0	139.4	-2.726	752	278	775	509	206	920	229	1151	990	-3	1013	228	99	1046	122	1277
2	14	0.0	216.8	-63.1	5567.8	-651.3	214.0	0.1	147.9	-43.7	900.2	-113.5	0	-469.3	-19.8	0.0	137.0	-2.726	762	265	804	474	237	884	279	1093	983	5	1025	214	126	1014	168	1223
2	15	0.0	153.0	-83.5	5567.8	-436.0	280.5	0.1	103.8	-57.8	790.1	-133.7	0	-486.5	-19.8	0.0	134.6	-2.726	773	252	841	431	282	831	349	1010	968	23	1035	202	167	966	234	1146
2	16	0.0	71.5	-103.9	5567.8	-163.3	346.9	0.1	47.4	-71.8	651.7	-174.2	0	-503.8	-19.8	0.0	132.3	-2.726	787	236	887	377	339	764	438	905	949	45	1048	187	220	904	320	1045
2	17	0.0	-27.9	-124.3	5567.8	167.5	413.4	0.1	-21.1	-85.8	478.8	-172.9	0	-528.6	-62.3	0.0	129.9	-2.726	802	219	940	314	407	684	545	779	922	76	1061	172	282	831	421	926
2	18	0.0	-145.0	-144.8	5567.8	556.4	479.9	0.1	-102.0	-99.9	334.4	-144.3	0	-616.2	-146.0	0.0	127.5	-2.726	840	174	1024	215	466	615	650	656	926	72	1110	113	320	786	504	827
2	19	0.0	-279.8	-165.2	5567.8	990.3	503.7	0.1	-194.9	-113.9	256.0	-42.1	0	-815.8	-267.9	0.0	125.1	-2.726	906	93	1143	74	491	585	726	566	976	13	1212	-6	298	811	534	792
2	20	0.0	-432.2	-185.6	5413.8	1272.0	231.3	0.2	-300.0	-127.9	239.3	11.1	0	-1100.9	-381.9	0.0	122.8	-2.726	864	90	1149	29	373	691	638	630	947	15	1213	-46	113	997	379	936
2	21	0.0	-602.5	-206.0	5413.8	1379.0	14.8	0.2	-417.3	-141.9	260.0	42.7	0	-1459.5	-454.6	0.0	120.4	-2.726	777	215	1055	139	133	974	411	898	846	135	1124	58	-211	1380	67	1303
3	1	0.0	-602.6	205.9	5295.8	1357.0	-14.6	0.2	-411.4	141.3	260.0	-47.0	0	-1459.5	450.8	0.0	119.5	2.886	757	214	1030	138	114	972	387	897	826	133	1099	58	-231	1378	42	1302
3	2	0.0	-432.3	185.5	5295.8	1252.0	-226.5	0.2	-294.5	127.2	235.5	-15.5	0	-1100.7	377.8	0.0	122.0	2.886	863	89	1124	28	354	689	615	628	926	15	1187	-46	94	995	355	934
3	3	0.0	-279.8	165.1	5295.8	962.6	-438.3	0.2	-189.9	113.2	250.5	37.8	0	-815.2	290.6	0.0	124.6	2.886	867	85	1094	64	453	572	680	551	934	6	1160	-15	261	799	487	778
3	4	0.0	-145.2	144.7	5413.8	551.0	-481.3	0.2	-97.6	99.2	337.6	147.1	0	-616.5	146.0	0.0	127.1	2.886	826	158	1006	197	450	600	631	639	913	56	1093	95	305	772	485	811
3	5	0.0	-28.1	124.2	5413.8	172.5	-402.4	0.2	-17.4	85.1	479.9	189.8	0	-528.9	62.3	0.0	129.6	2.886	792	198	928	289	397	663	532	755	913	55	1049	147	272	810	408	902
3	6	0.0	71.0	103.9	5413.8	-149.4	-337.8	0.2	50.6	71.1	649.1	191.1	0	-504.0	19.8	0.0	132.1	2.886	780	212	878	348	333	738	431	874	941	22	1039	158	214	878	312	1015
3	7	0.0	152.6	83.4	5413.8	-415.5	-273.1	0.2	106.4	57.1	791.7	135.9	0	-486.7	19.8	0.0	134.6	2.886	771	222	838	395	279	802	345	975	966	-7	1032	166	164	937	231	1110
3	8	0.0	216.3	63.8	5413.8	-625.0	-208.5	0.1	149.9	43.0	898.5	95.1	0	-469.5	19.8	0.0	137.1	2.886	762	233	804	436	237	851	279	1054	982	-26	1024	176	126	982	168	1184
3	9	0.0	262.2	42.6	5413.8	-778.2	-143.9	0.1	181.3	29.0	973.6	54.8	0	-452.3	19.8	0.0	139.6	2.886	753	243	777	467	208	886	231	1110	991	-37	1015	186	101	1012	124	1236
3	10	0.0	290.4	22.2	5413.8	-875.4	-79.2	0.2	200.4	15.0	1012.9	12.8	0	-435.0	19.8	0.0	142.1	2.886	744	254	757	491	190	907	202	1144	992	-37	1004	200	87	1028	99	1265
3	11	0.0	300.9	1.8	5413.8	-916.2	-14.7	0.2	207.3	0.9	1013.7	-6.8	0	-417.8	19.8	0.0	144.7	2.886	734	266	741	509	185	913	192	1156	982	-26	989	217	86	1029	93	1272
3	12	0.0	293.6	-18.6	5567.8	-937.7	51.8	0.2	202.0	-13.1	983.3	-33.8	0	-408.2	7.1	0.0	147.2	2.886	720	315	728	564	184	946	192	1195	961	31	969	280	88	1060	96	1309
3	13	0.0	268.4	-39.1	5567.8	-863.3	118.6	0.2	184.4	-27.2	927.4	-75.1	0	-401.9	7.1	0.0	149.7	2.886	715	321	732	559	200	927	217	1165	943	52	960	291	106	1039	122	1277
3	14	0.0	225.4	-59.5	5567.8	-731.1	185.1	0.2	154.6	-41.2	836.4	-130.3	0	-395.7	7.1	0.0	152.2	2.886	711	326	743	546	230	892	262	1112	917	82	950	303	137	1002	169	1222
3	15	0.0	164.9	-79.9	5567.8	-541.5	251.5	0.2	112.7	-55.3	711.9	-171.1	0	-389.5	7.1	0.0	154.7	2.886	708	329	763	523	272	842	327	1036	885	121	940	314	180	950	235	1144

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INFINITO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: ER1-1.4

Resumen de combinaciones:

		Tension máxima (t/m2)	Tension mínima (t/m2)
1	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	908	85
2	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	1149	28
3	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	1043	114
4	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	1247	182
5	PP,final + CM + 0.9 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	1047	-52
6	PP,final + CM + 1.1 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	1213	-46
7	PP,final + CM + 0.9 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	1412	-231
8	PP,final + CM + 1.1 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	1371	42

PP,final= Peso propio en tiempo final
Pret,final = Pretensado en tiempo final
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmica

		TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	16	0.0	86.4	-100.3	5567.0	-293.7	318.0	0.2	58.5	-69.3	555.0	-212.1	0	-383.3	7.1	0.0	157.2	2.886	706	331	790	490	328	777	412	936	847	166	931	325	237	883	321	1043
3	17	0.0	-9.7	-120.7	5567.0	11.7	384.4	0.2	-7.8	-83.3	380.5	-182.2	0	-396.9	-64.1	0.0	159.7	2.886	712	325	832	442	389	704	509	821	811	208	931	325	296	815	416	932
3	18	0.0	-123.6	-141.1	5567.0	375.3	450.9	0.2	-86.5	-97.4	250.6	-122.9	0	-489.3	-143.0	0.0	162.3	2.886	746	284	909	351	436	649	599	716	815	203	978	270	321	785	484	852
3	19	0.0	-255.3	-161.5	5567.0	782.2	468.3	0.2	-177.3	-111.4	174.2	-33.2	0	-679.8	-282.2	0.0	164.8	2.886	804	216	1015	225	453	629	664	639	855	156	1066	166	293	818	504	828
3	20	0.0	-404.6	-181.9	5725.0	1082.0	214.7	0.2	-280.2	-125.4	167.7	20.5	0	-967.9	-376.8	0.0	167.3	2.886	828	220	1078	192	377	752	627	724	878	162	1128	134	149	1021	398	993
3	21	0.0	-571.7	-202.3	5725.0	1169.0	-14.2	0.2	-395.3	-139.4	197.8	52.1	0	-1326.5	-449.6	0.0	169.8	2.886	719	349	979	308	130	1043	390	1003	776	282	1036	241	-183	1412	77	1371
4	1	0.0	-574.7	203.3	5657.0	1191.0	29.8	0.1	-391.4	139.1	197.8	-14.3	0	-1326.5	414.7	0.0	171.2	-12.26	745	346	1010	306	155	1041	420	1001	801	279	1067	239	-158	1410	107	1369
4	2	0.0	-439.8	167.1	5657.0	1135.0	-190.2	0.1	-299.1	128.0	198.9	11.1	0	-1063.1	355.4	0.0	162.7	-12.26	847	226	1106	193	352	809	611	776	903	159	1162	126	101	1104	360	1071
4	3	0.0	-316.2	170.9	5657.0	962.4	-327.2	0.1	-214.5	116.8	227.3	55.8	0	-848.0	283.8	0.0	154.2	-12.26	886	180	1124	171	460	682	698	673	948	106	1187	97	259	918	498	909
4	4	0.0	-203.8	154.7	5657.0	673.7	-523.8	0.1	-137.8	105.7	290.9	124.9	0	-690.9	180.8	0.0	145.8	-12.26	864	206	1068	237	473	666	678	697	941	115	1146	146	310	858	515	889
4	5	0.0	-102.8	138.6	5751.0	372.8	-401.4	0.1	-68.8	94.6	423.4	208.3	0	-616.8	95.9	0.0	137.3	-12.26	838	214	1005	285	430	695	596	766	946	87	1113	158	284	867	450	938
4	6	0.0	-12.7	122.4	5751.0	112.3	-350.2	0.1	-7.3	83.4	564.0	174.6	0	-576.2	55.9	0.0	128.8	-12.26	837	215	973	322	395	736	531	843	978	50	1114	157	258	897	394	1004
4	7	0.0	66.2	106.2	5751.0	-111.7	-299.2	0.1	46.4	72.3	679.6	161.3	0	-539.7	55.9	0.0	120.4	-12.26	835	218	944	356	368	768	477	906	1002	21	1112	159	240	918	350	1056
4	8	0.0	133.9	90.0	5751.0	-300.6	-248.1	0.1	92.5	61.2	772.4	113.1	0	-501.1	55.9	0.0	111.9	-12.26	832	221	919	386	348	791	435	956	1021	-1	1108	163	230	931	317	1095
4	9	0.0	190.4	73.8	5751.0	-454.0	-197.1	0.1	130.8	50.1	847.0	79.3	0	-462.6	55.9	0.0	103.5	-12.26	830	223	899	409	336	805	405	991	1036	-19	1105	166	227	934	296	1119
4	10	0.0	235.8	57.6	5751.0	-572.4	-146.0	0.1	161.6	38.9	897.2	66.9	0	-424.0	55.9	0.0	95.0	-12.26	828	226	863	429	332	810	387	1012	1045	-30	1100	173	232	928	287	1130
4	11	0.0	270.8	41.4	5751.0	-655.6	-94.8	0.1	184.6	27.8	923.4	18.7	0	-385.5	55.9	0.0	86.5	-12.26	824	231	869	444	335	806	380	1020	1047	-32	1092	182	244	914	290	1127
4	12	0.0	293.8	25.3	5751.0	-703.4	-43.8	0.1	200.0	16.7	931.9	-15.9	0	-346.9	55.9	0.0	78.0	-12.26	822	233	861	454	346	794	386	1014	1046	-31	1086	189	264	890	304	1110
4	13	0.0	304.9	9.1	5608.0	-692.2	-7.5	0.1	207.6	5.5	917.2	-28.4	0	-308.4	55.9	0.0	69.6	-12.26	818	208	856	424	364	743	401	959	1038	-52	1076	164	291	829	329	1045
4	14	0.0	305.6	-7.1	5608.0	-682.3	31.1	0.1	207.6	-5.6	878.4	-62.1	0	-269.8	55.9	0.0	61.1	-12.26	807	221	846	435	383	721	422	935	1018	-28	1057	186	319	796	358	1010
4	15	0.0	295.1	-23.3	5608.0	-649.4	64.4	0.1	199.9	-16.7	820.8	-110.3	0	-231.3	55.9	0.0	52.6	-12.26	791	240	834	449	403	697	446	906	988	8	1031	218	349	761	392	971
4	16	0.0	273.4	-39.5	5608.0	-593.5	97.7	0.1	184.5	-27.9	739.4	-123.6	0	-192.7	55.9	0.0	44.2	-12.26	768	267	817	469	425	671	474	873	945	69	994	261	379	725	429	927
4	17	0.0	240.6	-55.7	5608.0	-514.5	131.1	0.1	161.5	-39.0	634.0	-157.4	0	-154.2	55.9	0.0	35.7	-12.26	737	304	796	495	447	645	506	836	889	125	947	316	411	687	470	878
4	18	0.0	196.6	-71.9	5608.0	-412.6	164.5	0.1	130.7	-50.1	509.1	-205.6	0	-115.6	55.9	0.0	27.2	-12.26	700	347	771	524	471	617	542	794	822	203	893	380	444	649	515	826
4	19	0.0	141.5	-88.1	5608.0	-287.6	197.8	0.1	92.3	-61.3	367.3	-239.2	0	-77.1	55.9	0.0	18.7	-12.26	659	396	744	555	496	587	581	747	746	292	832	452	478	609	563	768
4	20	0.0	75.1	-104.2	5608.0	-139.5	231.2	0.1	46.2	-72.4	193.0	-266.2	0	-38.5	55.9	0.0	10.3	-12.26	607	457	710	596	522	557	625	696	653	403	756	541	513	568	616	707
4	21	0.0	-2.3	-120.4	5608.0	31.2	264.5	0.1	-7.5	-83.5	0.0	-257.7	0	0.0	23.0	0.0	1.8	-12.26	549	525	672	640	549	525	672	640	549	524	673	640	549	525	672	640

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ER1-1.4

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As mín.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As mín.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As mín. (cm2/m.)
1	1	1.7	-8.2	9.383	1.100	12.800	6.800	470.400	0.500	0.600	**0.00**	**0.00**	26.829	**5.25**
1	2	489.9	55.3	9.383	1.100	12.800	6.800	470.400	0.533	0.567	**0.00**	**0.00**	26.829	**5.25**
1	3	914.2	98.1	9.383	1.100	12.800	6.800	470.400	0.562	0.538	**0.00**	**0.00**	26.829	**5.25**
1	4	1282.6	124.0	9.383	1.100	12.800	6.800	470.400	0.587	0.513	**0.00**	**0.00**	26.829	**5.25**
1	5	1577.5	133.0	9.383	1.100	12.800	6.800	470.400	0.608	0.492	**0.00**	**0.00**	26.829	**5.25**
1	6	1820.2	124.8	9.383	1.100	12.800	6.800	470.400	0.624	0.476	**0.00**	**0.00**	26.829	**5.25**
1	7	2005.4	99.8	9.383	1.100	12.800	6.800	470.400	0.637	0.463	**0.00**	**0.00**	26.829	**5.25**
1	8	2124.8	57.8	9.383	1.100	12.800	6.800	470.400	0.645	0.455	**0.00**	**0.00**	26.829	**5.25**
1	9	2178.5	-1.1	9.383	1.100	12.800	6.800	470.400	0.649	0.451	**0.00**	**0.00**	26.829	**5.25**
1	10	2175.4	-77.3	9.383	1.100	12.800	6.800	470.400	0.649	0.451	**0.00**	**0.00**	26.829	**5.25**
1	11	2114.5	-170.2	9.383	1.100	12.800	6.800	470.400	0.644	0.456	**0.00**	**0.00**	26.829	**5.25**
1	12	1985.7	-280.1	9.383	1.100	12.800	6.800	470.400	0.632	0.468	**0.00**	**0.00**	26.829	**5.25**
1	13	1800.3	-407.0	9.383	1.100	12.800	6.800	470.400	0.614	0.486	**0.00**	**0.00**	26.829	**5.25**
1	14	1555.9	-550.8	9.383	1.100	12.800	6.800	470.400	0.589	0.511	**0.00**	**0.00**	26.829	**5.25**
1	15	1258.8	-711.7	9.383	1.100	12.800	6.800	470.400	0.559	0.541	**0.00**	**0.00**	26.829	**5.25**
1	16	942.5	-904.0	9.383	1.100	12.800	6.800	470.400	0.523	0.577	**0.00**	**0.00**	26.829	**5.25**
1	17	646.3	-1190.3	9.383	1.100	12.800	6.800	470.400	0.480	0.620	**0.00**	**0.00**	26.829	**5.25**
1	18	343.9	-1557.7	9.383	1.100	12.800	6.800	470.400	0.431	0.669	**0.00**	**0.00**	26.829	**5.25**
1	19	90.4	-2076.6	9.383	1.100	12.800	6.800	470.400	0.386	0.714	**0.61**	**0.00**	26.829	**5.25**
1	20	-127.4	-2711.9	9.383	1.100	12.800	6.800	470.400	0.359	0.741	**0.00**	**0.00**	26.829	**5.25**
1	21	-321.3	-3448.8	9.383	1.100	12.800	6.800	470.400	0.350	0.750	**0.00**	**0.00**	26.829	**5.25**

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As mín.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As mín.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As mín. (cm2/m.)
2	1	-314.6	-3426.2	9.383	1.100	12.800	6.800	470.400	0.350	0.750	**0.00**	**0.00**	26.829	**5.25**
2	2	-109.6	-2466.9	9.383	1.100	12.800	6.800	470.400	0.368	0.732	**0.00**	**0.00**	26.829	**5.25**
2	3	123.0	-1657.3	9.383	1.100	12.800	6.800	470.400	0.420	0.680	**0.00**	**0.00**	26.829	**5.25**
2	4	429.7	-1011.3	9.383	1.100	12.800	6.800	470.400	0.496	0.604	**0.00**	**0.00**	26.829	**5.25**
2	5	793.4	-534.5	9.383	1.100	12.800	6.800	470.400	0.563	0.537	**0.00**	**0.00**	26.829	**5.25**
2	6	1292.1	-362.7	9.383	1.100	12.800	6.800	470.400	0.620	0.480	**0.00**	**0.00**	26.829	**5.25**
2	7	1726.3	-270.1	9.383	1.100	12.800	6.800	470.400	0.667	0.433	**0.00**	**0.00**	26.829	**5.25**
2	8	2060.4	-204.1	9.383	1.100	12.800	6.800	470.400	0.703	0.397	**0.00**	**0.00**	26.829	**5.25**
2	9	2298.9	-165.3	9.383	1.100	12.800	6.800	470.400	0.729	0.371	**0.00**	**1.00**	26.829	**5.25**
2	10	2437.5	-153.4	9.383	1.100	12.800	6.800	470.400	0.745	0.355	**0.00**	**1.71**	26.829	**5.25**
2	11	2494.9	-168.6	9.383	1.100	12.800	6.800	470.400	0.750	0.350	**0.00**	**1.94**	26.829	**5.25**
2	12	2461.1	-210.7	9.383	1.100	12.800	6.800	470.400	0.745	0.355	**0.00**	**1.71**	26.829	**5.25**
2	13	2333.6	-279.6	9.383	1.100	12.800	6.800	470.400	0.729	0.371	**0.00**	**1.00**	26.829	**5.25**
2	14	2102.9	-375.7	9.383	1.100	12.800	6.800	470.400	0.703	0.397	**0.00**	**0.00**	26.829	**5.25**
2	15	1772.3	-498.7	9.383	1.100	12.800	6.800	470.400	0.667	0.433	**0.00**	**0.00**	26.829	**5.25**
2	16	1354.4	-648.6	9.383	1.100	12.800	6.800	470.400	0.620	0.480	**0.00**	**0.00**	26.829	**5.25**
2	17	868.9	-866.4	9.383	1.100	12.800	6.800	470.400	0.563	0.537	**0.00**	**0.00**	26.829	**5.25**
2	18	470.6	-1294.8	9.383	1.100	12.800	6.800	470.400	0.496	0.604	**0.00**	**0.00**	26.829	**5.25**
2	19	147.5	-1935.7	9.383	1.100	12.800	6.800	470.400	0.420	0.680	**0.00**	**0.00**	26.829	**5.25**
2	20	-115.9	-2749.6	9.383	1.100	12.800	6.800	470.400	0.368	0.732	**0.00**	**0.00**	26.829	**5.25**
2	21	-347.2	-3718.9	9.383	1.100	12.800	6.800	470.400	0.350	0.750	**0.00**	**0.00**	26.829	**5.25**

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As mín.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As mín.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As mín. (cm2/m.)

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ER1-1.4

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
3	1	-343.3	-3710.2	9.383	1.100	12.800	6.800	470.400	0.350	0.750	**0.00**	**0.00**	26.829	**5.25**
3	2	-117.8	-2741.3	9.383	1.100	12.800	6.800	470.400	0.368	0.732	**0.00**	**0.00**	26.829	**5.25**
3	3	139.9	-1927.4	9.383	1.100	12.800	6.800	470.400	0.420	0.680	**0.00**	**0.00**	26.829	**5.25**
3	4	478.6	-1288.9	9.383	1.100	12.800	6.800	470.400	0.496	0.604	**0.00**	**0.00**	26.829	**5.25**
3	5	873.3	-861.6	9.383	1.100	12.800	6.800	470.400	0.563	0.537	**0.00**	**0.00**	26.829	**5.25**
3	6	1354.2	-646.5	9.383	1.100	12.800	6.800	470.400	0.620	0.480	**0.00**	**0.00**	26.829	**5.25**
3	7	1777.9	-497.0	9.383	1.100	12.800	6.800	470.400	0.667	0.433	**0.00**	**0.00**	26.829	**5.25**
3	8	2102.8	-374.7	9.383	1.100	12.800	6.800	470.400	0.704	0.396	**0.00**	**0.00**	26.829	**5.25**
3	9	2335.1	-279.2	9.383	1.100	12.800	6.800	470.400	0.730	0.370	**0.00**	**1.04**	26.829	**5.25**
3	10	2468.7	-210.8	9.383	1.100	12.800	6.800	470.400	0.745	0.355	**0.00**	**1.71**	26.829	**5.25**
3	11	2499.9	-169.3	9.383	1.100	12.800	6.800	470.400	0.750	0.350	**0.00**	**1.94**	26.829	**5.25**
3	12	2439.2	-166.2	9.383	1.100	12.800	6.800	470.400	0.745	0.355	**0.00**	**1.71**	26.829	**5.25**
3	13	2294.8	-195.4	9.383	1.100	12.800	6.800	470.400	0.730	0.370	**0.00**	**1.04**	26.829	**5.25**
3	14	2052.9	-251.6	9.383	1.100	12.800	6.800	470.400	0.704	0.396	**0.00**	**0.00**	26.829	**5.25**
3	15	1716.3	-334.5	9.383	1.100	12.800	6.800	470.400	0.667	0.433	**0.00**	**0.00**	26.829	**5.25**
3	16	1285.7	-444.5	9.383	1.100	12.800	6.800	470.400	0.621	0.479	**0.00**	**0.00**	26.829	**5.25**
3	17	794.5	-621.5	9.383	1.100	12.800	6.800	470.400	0.564	0.536	**0.00**	**0.00**	26.829	**5.25**
3	18	430.3	-1049.0	9.383	1.100	12.800	6.800	470.400	0.496	0.604	**0.00**	**0.00**	26.829	**5.25**
3	19	119.1	-1668.7	9.383	1.100	12.800	6.800	470.400	0.421	0.679	**0.00**	**0.00**	26.829	**5.25**
3	20	-113.8	-2479.1	9.383	1.100	12.800	6.800	470.400	0.369	0.731	**0.00**	**0.00**	26.829	**5.25**
3	21	-318.9	-3440.2	9.383	1.100	12.800	6.800	470.400	0.351	0.749	**0.00**	**0.00**	26.829	**5.25**
4	1	-316.0	-3438.8	9.383	1.100	12.800	6.800	470.400	0.351	0.749	**0.00**	**0.00**	26.829	**5.25**
4	2	-122.6	-2702.9	9.383	1.100	12.800	6.800	470.400	0.358	0.742	**0.00**	**0.00**	26.829	**5.25**
4	3	94.7	-2068.0	9.383	1.100	12.800	6.800	470.400	0.385	0.715	**0.69**	**0.00**	26.829	**5.25**
4	4	347.6	-1548.7	9.383	1.100	12.800	6.800	470.400	0.432	0.668	**0.00**	**0.00**	26.829	**5.25**
4	5	686.6	-1182.6	9.383	1.100	12.800	6.800	470.400	0.481	0.619	**0.00**	**0.00**	26.829	**5.25**
4	6	1021.2	-897.3	9.383	1.100	12.800	6.800	470.400	0.524	0.576	**0.00**	**0.00**	26.829	**5.25**
4	7	1368.8	-708.2	9.383	1.100	12.800	6.800	470.400	0.560	0.540	**0.00**	**0.00**	26.829	**5.25**
4	8	1666.1	-547.9	9.383	1.100	12.800	6.800	470.400	0.590	0.510	**0.00**	**0.00**	26.829	**5.25**
4	9	1907.6	-404.8	9.383	1.100	12.800	6.800	470.400	0.615	0.485	**0.00**	**0.00**	26.829	**5.25**
4	10	2084.3	-278.4	9.383	1.100	12.800	6.800	470.400	0.633	0.467	**0.00**	**0.00**	26.829	**5.25**
4	11	2196.7	-169.1	9.383	1.100	12.800	6.800	470.400	0.645	0.455	**0.00**	**0.00**	26.829	**5.25**
4	12	2254.3	-76.7	9.383	1.100	12.800	6.800	470.400	0.651	0.449	**0.00**	**0.00**	26.829	**5.25**
4	13	2248.9	-1.4	9.383	1.100	12.800	6.800	470.400	0.650	0.450	**0.00**	**0.00**	26.829	**5.25**
4	14	2179.1	57.1	9.383	1.100	12.800	6.800	470.400	0.645	0.455	**0.00**	**0.00**	26.829	**5.25**
4	15	2052.6	98.5	9.383	1.100	12.800	6.800	470.400	0.637	0.463	**0.00**	**0.00**	26.829	**5.25**
4	16	1862.2	123.0	9.383	1.100	12.800	6.800	470.400	0.625	0.475	**0.00**	**0.00**	26.829	**5.25**
4	17	1607.7	130.6	9.383	1.100	12.800	6.800	470.400	0.608	0.492	**0.00**	**0.00**	26.829	**5.25**
4	18	1295.5	121.1	9.383	1.100	12.800	6.800	470.400	0.587	0.513	**0.00**	**0.00**	26.829	**5.25**
4	19	929.8	94.8	9.383	1.100	12.800	6.800	470.400	0.562	0.538	**0.00**	**0.00**	26.829	**5.25**
4	20	486.8	51.3	9.383	1.100	12.800	6.800	470.400	0.533	0.567	**0.00**	**0.00**	26.829	**5.25**
4	21	-6.1	-14.7	9.383	1.100	12.800	6.800	470.400	0.500	0.600	**0.00**	**0.00**	26.829	**5.25**

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ER1-1.4

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	546	506	0.000	0.00	0.00	0.00	0.00	0.000	7	544	507	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	648	384	0.000	0.00	0.00	0.00	0.00	0.000	7	510	548	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	736	281	0.000	0.00	0.00	0.00	0.00	0.000	7	476	587	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	814	189	0.000	0.00	0.00	0.00	0.00	0.000	7	443	626	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	875	117	0.000	0.00	0.00	0.00	0.00	0.000	7	411	664	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	928	55	0.000	0.00	0.00	0.00	0.00	0.000	7	380	700	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	970	6	0.000	0.00	0.00	0.00	0.00	0.000	7	350	736	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	997	-27	1.071	0.00	0.20	1.44	0.00	0.000	7	321	771	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	1012	-43	1.055	0.00	0.31	2.26	0.00	0.000	7	292	804	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	1016	-48	1.050	0.00	0.34	2.50	0.00	0.000	7	265	836	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	1017	-26	1.072	0.00	0.19	1.38	0.00	0.000	7	246	882	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	1007	-15	1.084	0.00	0.11	0.81	0.00	0.000	7	232	898	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	994	1	0.000	0.00	0.00	0.00	0.00	0.000	7	226	906	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	975	23	0.000	0.00	0.00	0.00	0.00	0.000	7	226	905	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	954	47	0.000	0.00	0.00	0.00	0.00	0.000	7	234	896	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	938	66	0.000	0.00	0.00	0.00	0.00	0.000	7	249	879	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	918	90	0.000	0.00	0.00	0.00	0.00	0.000	7	270	853	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	910	100	0.000	0.00	0.00	0.00	0.00	0.000	7	279	843	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	928	108	0.000	0.00	0.00	0.00	0.00	0.000	7	239	919	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	882	163	0.000	0.00	0.00	0.00	0.00	0.000	7	80	1107	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	785	277	0.000	0.00	0.00	0.00	0.00	0.000	7	-175	1408	0.122	0.00	1.558	6.09	6.09	6.09	5.25	5.25	5.25

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	806	273	0.000	0.00	0.00	0.00	0.00	0.000	7	-152	1402	0.108	0.00	1.379	5.39	5.39	5.39	5.25	5.25	5.25
0.00	0.000	5	906	156	0.000	0.00	0.00	0.00	0.00	0.000	7	177	1014	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	902	160	0.000	0.00	0.00	0.00	0.00	0.000	7	340	821	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	834	214	0.000	0.00	0.00	0.00	0.00	0.000	7	353	780	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	824	225	0.000	0.00	0.00	0.00	0.00	0.000	7	342	793	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	857	187	0.000	0.00	0.00	0.00	0.00	0.000	7	278	869	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	893	144	0.000	0.00	0.00	0.00	0.00	0.000	7	210	948	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	921	111	0.000	0.00	0.00	0.00	0.00	0.000	7	156	1012	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	943	85	0.000	0.00	0.00	0.00	0.00	0.000	7	116	1059	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	958	68	0.000	0.00	0.00	0.00	0.00	0.000	7	90	1090	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	972	51	0.000	0.00	0.00	0.00	0.00	0.000	7	78	1104	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	986	1	0.000	0.00	0.00	0.00	0.00	0.000	7	85	1063	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	990	-3	1.097	0.00	0.02	0.15	0.00	0.000	7	99	1046	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	983	5	0.000	0.00	0.00	0.00	0.00	0.000	7	126	1014	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	968	23	0.000	0.00	0.00	0.00	0.00	0.000	7	167	966	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	949	45	0.000	0.00	0.00	0.00	0.00	0.000	7	220	904	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	922	76	0.000	0.00	0.00	0.00	0.00	0.000	7	282	831	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	926	72	0.000	0.00	0.00	0.00	0.00	0.000	7	320	786	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	976	13	0.000	0.00	0.00	0.00	0.00	0.000	7	298	811	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	947	15	0.000	0.00	0.00	0.00	0.00	0.000	7	113	997	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	848	135	0.000	0.00	0.00	0.00	0.00	0.000	7	-211	1380	0.146	0.00	1.870	7.30	7.30	7.30	5.25	5.25	5.25

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	826	133	0.000	0.00	0.00	0.00	0.00	0.000	7	-231	1378	0.158	0.00	2.020	7.89	7.89	7.89	5.25	5.25	5.25
0.00	0.000	5	926	15	0.000	0.00	0.00	0.00	0.00	0.000	7	94	995	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	934	6	0.000	0.00	0.00	0.00	0.00	0.000	7	261	799	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	913	56	0.000	0.00	0.00	0.00	0.00	0.000	7	305	772	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	913	55	0.000	0.00	0.00	0.00	0.00	0.000	7	272	810	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	941	22	0.000	0.00	0.00	0.00	0.00	0.000	7	214	878	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	966	-7	1.092	0.00	0.06	0.41	0.00	0.000	7	164	937	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	982	-26	1.072	0.00	0.19	1.42	0.00	0.000	7	126	982	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	991	-37	1.060	0.00	0.27	1.98	0.00	0.000	7	101	1012	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	992	-37	1.060	0.00	0.27	2.00	0.00	0.000	7	87	1028	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	982	-26	1.072	0.00	0.19	1.40	0.00	0.000	7	86	1029	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	981	31	0.000	0.00	0.00	0.00	0.00	0.000	7	88	1060	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	943	52	0.000	0.00	0.00	0.00	0.00	0.000	7	106	1039	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	917	82	0.000	0.00	0.00	0.00	0.00	0.000	7	137	1002	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	885	121	0.000	0.00	0.00	0.00	0.00	0.000	7	180	950	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	847	166	0.000	0.00	0.00	0.00	0.00	0.000	7	237	883	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ER1-1.4

0.00	0.000	5	811	208	0.000	0.00	0.00	0.00	0.00	0.000	7	298	815	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	815	203	0.000	0.00	0.00	0.00	0.00	0.000	7	321	785	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	855	156	0.000	0.00	0.00	0.00	0.00	0.000	7	293	818	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	878	162	0.000	0.00	0.00	0.00	0.00	0.000	7	149	1021	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	776	282	0.000	0.00	0.00	0.00	0.00	0.000	7	-183	1412	0.126	0.00	1.617	6.32	6.32	6.32	5.25	5.25	5.25

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	801	279	0.000	0.00	0.00	0.00	0.00	0.000	7	-158	1410	0.111	0.00	1.422	5.55	5.55	5.55	5.25	5.25	5.25
0.00	0.000	5	903	159	0.000	0.00	0.00	0.00	0.00	0.000	7	101	1104	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	948	106	0.000	0.00	0.00	0.00	0.00	0.000	7	259	918	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	941	115	0.000	0.00	0.00	0.00	0.00	0.000	7	310	858	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	946	87	0.000	0.00	0.00	0.00	0.00	0.000	7	284	867	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	978	50	0.000	0.00	0.00	0.00	0.00	0.000	7	258	897	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	1002	21	0.000	0.00	0.00	0.00	0.00	0.000	7	240	918	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	1021	-1	1.099	0.00	0.01	0.06	0.00	0.000	7	230	931	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	1036	-19	1.080	0.00	0.14	1.01	0.00	0.000	7	227	934	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	1045	-30	1.070	0.00	0.21	1.51	0.00	0.000	7	232	928	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	1047	-32	1.067	0.00	0.22	1.63	0.00	0.000	7	244	914	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	1046	-31	1.068	0.00	0.22	1.59	0.00	0.000	7	264	890	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	1038	-52	1.048	0.00	0.35	2.61	0.00	0.000	7	291	829	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	1018	-28	1.071	0.00	0.20	1.47	0.00	0.000	7	319	796	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	988	8	0.000	0.00	0.00	0.00	0.00	0.000	7	349	761	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	945	59	0.000	0.00	0.00	0.00	0.00	0.000	7	379	725	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	889	125	0.000	0.00	0.00	0.00	0.00	0.000	7	411	687	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	822	203	0.000	0.00	0.00	0.00	0.00	0.000	7	444	649	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	746	292	0.000	0.00	0.00	0.00	0.00	0.000	7	478	609	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	653	403	0.000	0.00	0.00	0.00	0.00	0.000	7	513	568	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25
0.00	0.000	5	549	524	0.000	0.00	0.00	0.00	0.00	0.000	7	549	525	0.000	0.00	0.000	0.00	5.25	5.25	5.25	5.25	5.25

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ER1-1.4

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 13.80 tg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
1	1	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	2	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	3	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	4	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	5	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	6	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	7	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	8	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	9	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	10	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	11	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	12	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	13	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	14	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	15	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	16	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	17	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	18	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	19	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	20	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
1	21	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmax(-) y Mconc Vsc (m.t)	Vmax(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
1	1	-6.5	120.7	1.7	82.3	295	0	-56	0	3.4	12.26	0.00	0.00	37.7	-258.9	5496.0
1	2	71.1	104.5	54.6	71.2	261	180	-57	-30	11.8	12.26	0.00	0.00	-129.4	-226.2	5496.0
1	3	137.7	88.3	99.9	60.0	230	318	-59	-45	20.3	12.26	0.00	0.00	-274.4	-193.5	5496.0
1	4	193.1	72.2	137.5	48.9	201	416	-63	-48	28.7	12.26	0.00	0.00	-396.7	-160.8	5496.0
1	5	237.4	56.0	167.4	37.7	180	496	-69	-42	37.2	12.26	0.00	0.00	-496.5	-128.1	5496.0
1	6	270.4	39.8	189.6	26.6	155	534	-77	-32	45.6	12.26	0.00	0.00	-573.7	-95.5	5496.0
1	7	292.3	23.6	204.1	15.5	132	546	-86	-20	54.1	12.26	0.00	0.00	-628.3	-62.8	5496.0
1	8	303.0	7.4	211.0	4.3	116	558	-96	-10	62.6	12.26	0.00	0.00	-660.4	-30.1	5496.0
1	9	302.6	-8.8	210.2	-6.8	96	532	-114	116	71.0	12.26	0.00	0.00	-669.9	2.6	5496.0
1	10	290.9	-25.0	201.6	-17.9	79	493	-134	112	79.5	12.26	0.00	0.00	-655.8	40.0	5496.0
1	11	268.1	-41.2	185.4	-29.1	68	467	-149	92	87.9	12.26	0.00	0.00	-625.2	92.8	5608.0
1	12	234.1	-57.4	161.5	-40.2	54	411	-173	64	96.4	12.26	0.00	0.00	-544.0	142.6	5608.0
1	13	188.9	-73.6	130.0	-51.3	44	367	-198	16	104.8	12.26	0.00	0.00	-428.4	192.5	5608.0
1	14	132.6	-89.7	90.8	-62.5	37	329	-217	-62	113.3	12.26	0.00	0.00	-278.6	242.2	5608.0
1	15	65.1	-105.9	43.8	-73.6	30	292	-245	-160	121.7	12.26	0.00	0.00	-94.0	292.1	5608.0
1	16	-13.6	-122.1	-10.8	-84.7	25	259	-274	-278	130.2	12.26	0.00	0.00	124.6	341.9	5608.0
1	17	-103.5	-138.3	-73.2	-95.9	21	231	-304	-423	138.6	12.26	0.00	0.00	378.0	391.8	5608.0
1	18	-204.6	-154.5	-143.2	-107.0	18	210	-328	-607	147.1	12.26	0.00	0.00	665.7	441.6	5608.0
1	19	-316.7	-170.7	-220.8	-118.1	16	197	-359	-814	155.5	12.26	0.00	0.00	950.2	322.4	5751.0
1	20	-440.1	-186.9	-306.1	-129.3	15	193	-393	-1050	164.0	12.26	0.00	0.00	1121.0	171.5	5751.0
1	21	-574.6	-203.1	-399.2	-140.4	14	198	-419	-1325	172.4	12.26	0.00	0.00	1186.0	16.8	5751.0

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 17.40 tg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
2	1	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	2	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	3	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	4	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	5	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	6	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	7	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	8	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	9	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	10	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	11	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	12	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	13	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	14	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	15	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	16	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	17	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	18	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	19	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	20	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
2	21	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmax(-) y Mconc Vsc (m.t)	Vmax(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
2	1	-569.4	202.2	-389.3	138.7	459	-1319	-52	198	167.8	-2.726	0.00	0.00	1194.0	14.7	5852.0
2	2	-402.3	181.7	-274.6	124.7	419	-954	-53	160	165.4	-2.726	0.00	0.00	1104.0	-219.5	5852.0
2	3	-253.1	161.3	-172.3	110.6	380	-637	-54	135	163.1	-2.726	0.00	0.00	811.7	-453.5	5852.0
2	4	-121.6	140.9	-82.1	96.6	341	-367	-58	123	160.7	-2.726	0.00	0.00	379.4	-477.5	5725.0
2	5	-8.0	120.5	-4.2	82.6	305	-141	-62	121	158.3	-2.726	0.00	0.00	5.9	-395.5	5725.0
2	6	88.1	100.1	61.5	68.5	271	40	-69	128	156.0	-2.726	0.00	0.00	-308.6	-327.1	5725.0
2	7	166.2	79.7	115.0	54.5	237	181	-77	140	153.6	-2.726	0.00	0.00	-563.2	-258.8	5725.0
2	8	226.8	59.3	156.4	40.5	213	293	-87	153	151.2	-2.726	0.00	0.00	-758.8	-190.4	5725.0
2	9	269.5	38.9	185.5	26.5	185	367	-98	165	148.9	-2.726	0.00	0.00	-894.7	-122.1	5725.0
2	10	294.5	18.5	202.4	12.4	157	409	-113	315	146.5	-2.726	0.00	0.00	-971.3	-53.7	5725.0
2	11	301.7	-1.9	207.1	-1.6	132	425	-136	312	144.1	-2.726	0.00	0.00	-988.2	14.7	5725.0
2	12	291.1	-22.3	199.6	-15.6	109	345	-161	288	141.7	-2.726	0.00	0.00	-908.0	81.0	5567.0
2	13	262.9	-42.7	179.9	-29.7	92	313	-188	245	139.4	-2.726	0.00	0.00	-808.5	147.5	5567.0
2	14	216.8	-63.1	147.9	-43.7	78	277	-217	170	137.0	-2.726	0.00	0.00	-651.3	214.0	5567.0
2	15	153.0	-83.5	103.8	-57.8	68	256	-241	56	134.6	-2.726	0.00	0.00	-436.0	280.5	5567.0
2	16	71.5	-103.9	47.4	-71.8	60	235	-273	-88	132.3	-2.726	0.00	0.00	-163.3	346.9	5567.0
2	17	-27.9	-124.3	-21.1	-85.8	53	219	-308	-270	129.9	-2.726	0.00	0.00	167.5	413.4	5567.0
2	18	-145.0	-144.8	-102.0	-99.9	48	212	-344	-497	127.5	-2.726	0.00	0.00	556.4	479.9	5567.0
2	19	-279.8	-165.2	-194.9	-113.9	45	215	-382	-769	125.1	-2.726	0.00	0.00	990.3	503.7	5567.0
2	20	-432.2	-185.6	-300.0	-127.9	43	230	-421	-1086	122.8	-2.726	0.00	0.00	1272.0	231.3	5413.0
2	21	-602.5	-206.0	-417.3	-141.9	43	260	-462	-1455	120.4	-2.726	0.00	0.00	1379.0	14.8	5413.0

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 17.40 tg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
3	1	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	2	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	3	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	4	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	5	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	6	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	7	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	8	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	9	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	10	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	11	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	12	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	13	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90
3	14	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmax(-) y Mconc Vsc (m.t)	Vmax(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
3	1	-602.6	205.9	-411.4	141.3	458	-1459	-47	260	119.5	2.886	0.00	0.00	1357.0	-14.6	5295.0
3	2	-432.3	185.5	-294.5	127.2	417	-1088	-48	227	122.0	2.886	0.00	0.00	1252.0	-226.5	5295.0
3	3	-279.8	165.1	-189.9	113.2	385	-762	-49	207	124.6	2.886	0.00	0.00	962.6	-438.3	5295.0
3	4	-145.2	144.7	-97.6	99.2	347	-494	-53	201	127.1	2.886	0.00	0.00	551.0	-481.3	5413.0
3	5	-28.1	124.2	-17.4	85.1	311	-268	-58	204	129.6	2.886	0.00	0.00	172.5	-402.4	5413.0
3	6	71.0	103.9	50.6	71.1	276	-83	-64	216	132.1	2.886	0.00	0.00	-149.4	-337.8	5413.0
3	7	152.6	83.4	106.4	57.1	244	58	-72	233	134.6	2.886	0.00	0.00	-415.5	-273.1	5413.0
3	8	216.3	63.0	149.9	43.0	213	166	-83	251	137.1	2.886	0.00	0.00	-625.0	-208.5	5413.0
3	9	262.2	42.6	181.3	29.0	184	241	-95	267	139.6	2.886	0.00	0.00	-778.2	-143.9	5413.0
3	10	290.4	22.2	200.4	15.0	157	286	-113	432	142.1	2.886	0.00	0.00	-875.4	-79.2	5413.0
3	11	300.9	1.8	207.3	0.9	139	315	-129	426	144.7	2.886	0.00	0.00	-916.2	-14.7	5413.0
3	12	293.6	-18.6	202.0	-13.1	116	318	-155	406	147.2	2.886	0.00	0.00	-937.7	51.8	5567.0
3	13	268.4	-39.1	184.4	-27.2	99	165	-182	364	149.7	2.886	0.00	0.00	-863.3	118.6	5567.0
3	14	225.4	-59.5	154.6	-41.2	87	153	-211	291	152.2	2.886	0.00	0.00	-731.1	185.1	5567.0

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 13.80 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)	VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmáx(-) y Mcorr. Vsd (m.t)	Vmáx(-) y Mcorr. Msd (t.)	Vmáx(+) y Mcorr. Vsp (m.t)	Vmáx(+) y Mcorr. Msp (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
3	15	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	3	15	164.9	-79.9	112.7	-55.3	77	140	-242	185	154.7	2.886	0.00	0.00	-541.5	251.5	5567.0
3	16	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	3	16	86.4	-100.3	58.5	-69.3	69	128	-275	44	157.2	2.886	0.00	0.00	-293.7	318.0	5567.0
3	17	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	3	17	-9.7	-120.7	-7.8	-83.3	62	121	-310	-137	159.7	2.886	0.00	0.00	11.7	384.4	5567.0
3	18	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	3	18	-123.6	-141.1	-86.5	-97.4	58	123	-339	-369	162.3	2.886	0.00	0.00	375.3	450.9	5567.0
3	19	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	3	19	-255.3	-161.5	-177.3	-111.4	54	135	-377	-640	164.8	2.886	0.00	0.00	782.2	468.3	5567.0
3	20	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	3	20	-404.6	-181.9	-280.2	-125.4	53	160	-416	-957	167.3	2.886	0.00	0.00	1082.0	214.7	5725.0
3	21	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	3	21	-571.7	-202.3	-395.3	-139.4	52	198	-457	-1324	169.8	2.886	0.00	0.00	1169.0	-14.2	5725.0
4	1	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	1	-574.7	203.3	-391.4	139.1	422	-1323	-14	198	171.2	-12.26	0.00	0.00	1191.0	29.8	5857.0
4	2	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	2	-439.8	187.1	-299.1	128.0	388	-1055	-15	193	162.7	-12.26	0.00	0.00	1135.0	-190.2	5857.0
4	3	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	3	-316.2	170.9	-214.5	116.8	362	-811	-16	197	154.2	-12.26	0.00	0.00	962.4	-327.2	5857.0
4	4	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	4	-203.8	154.7	-137.8	105.7	331	-606	-18	210	145.8	-12.26	0.00	0.00	673.7	-523.8	5857.0
4	5	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	5	-102.8	138.6	-68.8	94.6	300	-430	-21	231	137.3	-12.26	0.00	0.00	372.0	-401.4	5751.0
4	6	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	6	-12.7	122.4	-7.3	83.4	269	-282	-25	259	128.8	-12.26	0.00	0.00	112.3	-350.2	5751.0
4	7	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	7	66.2	106.2	46.4	72.3	248	-156	-30	292	120.4	-12.26	0.00	0.00	-111.7	-299.2	5751.0
4	8	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	8	133.9	90.0	92.5	61.2	220	-62	-37	329	111.9	-12.26	0.00	0.00	-300.6	-248.1	5751.0
4	9	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	9	190.4	73.8	130.8	50.1	194	11	-44	367	103.5	-12.26	0.00	0.00	-454.0	-197.1	5751.0
4	10	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	10	235.8	57.6	161.6	38.9	176	67	-53	404	95.0	-12.26	0.00	0.00	-572.4	-146.0	5751.0
4	11	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	11	270.0	41.4	184.6	27.8	152	96	-66	457	86.5	-12.26	0.00	0.00	-655.6	-94.8	5751.0
4	12	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	12	293.0	25.3	200.0	16.7	130	109	-82	591	78.0	-12.26	0.00	0.00	-703.4	-43.8	5751.0
4	13	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	13	304.9	9.1	207.6	5.5	117	117	-95	607	69.6	-12.26	0.00	0.00	-692.2	-7.5	5608.0
4	14	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	14	305.6	-7.1	207.6	-5.6	101	92	-117	616	61.1	-12.26	0.00	0.00	-682.3	31.1	5608.0
4	15	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	15	295.1	-23.3	199.9	-16.7	86	57	-140	609	52.6	-12.26	0.00	0.00	-649.4	64.4	5608.0
4	16	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	16	273.4	-39.5	184.5	-27.9	77	46	-158	575	44.2	-12.26	0.00	0.00	-593.5	97.7	5608.0
4	17	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	17	240.6	-55.7	161.5	-39.0	69	-42	-185	519	35.7	-12.26	0.00	0.00	-514.5	131.1	5608.0
4	18	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	18	196.6	-71.9	130.7	-50.1	63	-48	-213	441	27.2	-12.26	0.00	0.00	-412.6	164.5	5608.0
4	19	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	19	141.5	-88.1	92.3	-61.3	59	-45	-243	335	18.7	-12.26	0.00	0.00	-287.6	197.8	5608.0
4	20	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	20	75.1	-104.2	46.2	-72.4	57	-30	-267	184	10.3	-12.26	0.00	0.00	-139.5	231.2	5608.0
4	21	9.383	0.856	0.505	-0.595	0.000	94.5	6.800	6.800	1.100	105.0	90	4	21	-2.3	-120.4	-7.5	-83.5	56	0	-301	0	1.8	-12.26	0.00	0.00	31.2	264.5	5608.0

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ER1-1.4

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
1	1	0.0	0.0	506.8	-160.0	35.6	33.4	**506.8**	**35.6**	606.7	561.0	-244.3	A-B
1	2	0.0	0.0	447.9	-153.2	347.5	-61.0	**447.9**	**347.5**	790.7	344.3	-244.3	A-B
1	3	0.0	0.0	392.5	-148.8	588.7	-127.4	**392.5**	**588.7**	933.0	176.7	-244.3	A-B
1	4	0.0	0.0	340.7	-146.9	766.5	-170.5	**340.7**	**766.5**	1037.9	53.1	-244.3	A-B
1	5	0.0	0.0	300.7	-147.5	911.2	-195.5	**300.7**	**911.2**	1123.3	-47.5	-244.3	A-B
1	6	0.0	0.0	254.6	-150.6	985.6	-207.7	**254.6**	**985.6**	1167.2	-99.2	-244.3	A-B
1	7	0.0	0.0	212.0	-156.1	1016.4	-211.6	**212.0**	**1016.4**	1185.4	-120.6	-244.3	A-B
1	8	0.0	0.0	179.2	-163.9	1041.7	-212.3	**179.2**	**1041.7**	1200.3	-138.2	-244.3	A-B
1	9	0.0	0.0	151.6	-191.1	696.7	273.8	**191.1**	**273.8**	747.3	395.4	-244.3	A-B
1	10	0.0	0.0	138.9	-225.2	646.5	251.6	**225.2**	**251.6**	734.2	410.9	-244.3	A-B
1	11	0.0	0.0	149.5	-236.1	615.0	193.1	**236.1**	**193.1**	711.6	463.5	-244.3	A-B
1	12	0.0	0.0	154.3	-263.7	572.7	145.4	**263.7**	**145.4**	683.5	496.6	-244.3	A-B
1	13	0.0	0.0	164.9	-292.1	565.8	73.2	**292.1**	**73.2**	640.9	546.8	-244.3	A-B
1	14	0.0	0.0	178.6	-312.3	585.2	-36.4	**312.3**	**-36.4**	576.2	622.9	-244.3	A-B
1	15	0.0	0.0	194.3	-344.1	624.6	-170.1	**344.1**	**-170.1**	497.3	715.8	-244.3	A-B
1	16	0.0	0.0	211.7	-379.3	686.6	-329.2	**379.3**	**-329.2**	403.5	826.4	-244.3	A-B
1	17	0.0	0.0	230.9	-415.2	773.9	-522.2	**415.2**	**-522.2**	289.6	960.5	-244.3	A-B
1	18	0.0	0.0	251.5	-442.3	888.8	-766.3	**442.3**	**-766.3**	145.5	1130.2	-244.3	A-B
1	19	0.0	0.0	104.7	-649.6	995.4	-1076.9	**649.6**	**-1076.9**	-22.4	1361.2	-244.3	A-B
1	20	0.0	0.0	-72.6	-891.8	984.5	-1573.2	**891.8**	**-1573.2**	-315.3	1706.2	-244.3	C
1	21	0.0	0.0	-252.5	-1127.3	864.7	-2262.2	**1127.3**	**-2262.2**	-721.7	2184.9	-244.3	C

VANO	SECCIÓN	Pdf. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
1	1	5496.0	585.7	1.84	28.48	90	VERIFICA	680.0	105.0	0.267	4788.4	506.8	VERIFICA
1	2	5496.0	585.7	1.84	28.48	90	VERIFICA	680.0	105.0	0.267	4788.4	447.9	VERIFICA
1	3	5496.0	585.7	1.84	28.48	90	VERIFICA	680.0	105.0	0.267	4788.4	392.5	VERIFICA
1	4	5496.0	585.7	1.84	28.48	90	VERIFICA	680.0	105.0	0.267	4788.4	340.7	VERIFICA
1	5	5496.0	585.7	1.84	28.48	90	VERIFICA	680.0	105.0	0.267	4788.4	300.7	VERIFICA
1	6	5496.0	585.7	1.84	28.48	90	VERIFICA	680.0	105.0	0.267	4788.4	254.6	VERIFICA
1	7	5496.0	585.7	1.84	28.48	90	VERIFICA	680.0	105.0	0.267	4788.4	212.0	VERIFICA
1	8	5496.0	585.7	1.84	28.48	90	VERIFICA	680.0	105.0	0.267	4788.4	179.2	VERIFICA
1	9	5496.0	585.7	1.84	28.48	90	VERIFICA	680.0	105.0	0.267	4788.4	191.1	VERIFICA
1	10	5496.0	585.7	1.84	28.48	90	VERIFICA	680.0	105.0	0.267	4788.4	225.2	VERIFICA
1	11	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	236.1	VERIFICA
1	12	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	263.7	VERIFICA
1	13	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	292.1	VERIFICA
1	14	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	312.3	VERIFICA
1	15	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	344.1	VERIFICA
1	16	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	379.3	VERIFICA
1	17	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	415.2	VERIFICA
1	18	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	442.3	VERIFICA
1	19	5751.0	612.9	1.87	28.10	90	VERIFICA	680.0	105.0	0.267	4746.1	649.6	VERIFICA
1	20	5751.0	612.9	1.87	28.10	90	VERIFICA	680.0	105.0	0.267	4746.1	891.8	VERIFICA
1	21	5751.0	612.9	1.87	28.10	90	VERIFICA	680.0	105.0	0.267	4746.1	1127.3	VERIFICA

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
2	1	0.0	0.0	1214.5	239.3	-2222.9	879.4	**1214.5**	**-2222.9**	-687.7	2168.4	-244.3	C
2	2	0.0	0.0	868.6	-26.8	-1342.1	982.3	**868.6**	**-1342.1**	-168.1	1556.3	-244.3	A-B
2	3	0.0	0.0	523.8	-294.5	-782.6	876.1	**523.8**	**-782.6**	162.0	1167.5	-244.3	A-B
2	4	0.0	0.0	390.8	-354.2	-476.3	621.6	**390.8**	**-476.3**	329.2	941.1	-244.3	A-B
2	5	0.0	0.0	367.3	-310.2	-223.9	414.5	**367.3**	**-223.9**	478.0	765.8	-244.3	A-B
2	6	0.0	0.0	331.9	-282.3	-24.5	252.1	**331.9**	**-24.5**	595.7	627.2	-244.3	A-B
2	7	0.0	0.0	298.6	-257.1	130.6	129.9	**298.6**	**130.6**	687.2	519.4	-244.3	A-B
2	8	0.0	0.0	279.3	-234.6	255.3	42.7	**279.3**	**255.3**	760.8	432.7	-244.3	A-B
2	9	0.0	0.0	252.9	-215.1	338.7	-14.9	**252.9**	**338.7**	810.0	374.7	-244.3	A-B
2	10	0.0	0.0	228.7	-200.1	387.4	168.2	**228.7**	**387.4**	838.7	340.9	-244.3	A-B
2	11	0.0	0.0	209.1	-199.4	108.0	459.2	**209.1**	**108.0**	673.8	535.1	-244.3	A-B
2	12	0.0	0.0	211.1	-221.6	51.7	473.2	**221.6**	**473.2**	872.5	264.4	-244.3	A-B
2	13	0.0	0.0	220.7	-247.5	59.9	432.1	**247.5**	**432.1**	848.2	293.0	-244.3	A-B
2	14	0.0	0.0	235.2	-276.1	92.9	355.7	**276.1**	**355.7**	803.2	346.1	-244.3	A-B
2	15	0.0	0.0	255.4	-297.0	178.4	234.9	**297.0**	**234.9**	731.9	430.1	-244.3	A-B
2	16	0.0	0.0	278.4	-330.8	296.3	80.8	**330.8**	**80.8**	641.0	537.1	-244.3	A-B
2	17	0.0	0.0	304.1	-368.1	452.6	-116.1	**368.1**	**-116.1**	524.8	674.0	-244.3	A-B
2	18	0.0	0.0	332.3	-407.8	651.8	-368.7	**407.8**	**-368.7**	375.7	849.5	-244.3	A-B
2	19	0.0	0.0	320.2	-491.9	885.3	-687.0	**491.9**	**-687.0**	188.0	1070.7	-244.3	A-B
2	20	0.0	0.0	14.0	-875.0	958.6	-1271.4	**875.0**	**-1271.4**	-173.2	1460.4	-244.3	A-B
2	21	0.0	0.0	-234.3	-1203.8	851.2	-2153.0	**1203.8**	**-2153.0**	-693.3	2073.0	-244.3	C

VANO	SECCIÓN	Pdf. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
2	1	5852.0	623.7	1.88	27.95	90	VERIFICA	680.0	105.0	0.267	4729.6	1214.5	VERIFICA
2	2	5852.0	623.7	1.88	27.95	90	VERIFICA	680.0	105.0	0.267	4729.6	868.6	VERIFICA
2	3	5852.0	623.7	1.88	27.95	90	VERIFICA	680.0	105.0	0.267	4729.6	523.8	VERIFICA
2	4	5725.0	610.1	1.87	28.13	90	VERIFICA	680.0	105.0	0.267	4750.4	390.8	VERIFICA
2	5	5725.0	610.1	1.87	28.13	90	VERIFICA	680.0	105.0	0.267	4750.4	367.3	VERIFICA
2	6	5725.0	610.1	1.87	28.13	90	VERIFICA	680.0	105.0	0.267	4750.4	331.9	VERIFICA
2	7	5725.0	610.1	1.87	28.13	90	VERIFICA	680.0	105.0	0.267	4750.4	298.6	VERIFICA
2	8	5725.0	610.1	1.87	28.13	90	VERIFICA	680.0	105.0	0.267	4750.4	279.3	VERIFICA
2	9	5725.0	610.1	1.87	28.13	90	VERIFICA	680.0	105.0	0.267	4750.4	252.9	VERIFICA
2	10	5725.0	610.1	1.87	28.13	90	VERIFICA	680.0	105.0	0.267	4750.4	228.7	VERIFICA
2	11	5725.0	610.1	1.87	28.13	90	VERIFICA	680.0	105.0	0.267	4750.4	209.1	VERIFICA
2	12	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	221.6	VERIFICA
2	13	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	247.5	VERIFICA
2	14	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	276.1	VERIFICA
2	15	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	297.0	VERIFICA
2	16	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	330.8	VERIFICA
2	17	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	368.1	VERIFICA
2	18	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	407.8	VERIFICA
2	19	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	491.9	VERIFICA
2	20	5413.0	576.9	1.83	28.61	90	VERIFICA	680.0	105.0	0.267	4802.3	875.0	VERIFICA
2	21	5413.0	576.9	1.83	28.61	90	VERIFICA	680.0	105.0	0.267	4802.3	1203.8	VERIFICA

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
3	1	0.0	0.0	1196.8	227.4	-2173.1	834.4	**1196.8**	**-2173.1**	-717.8	2074.4	-244.3	C
3	2	0.0	0.0	872.1	-16.4	-1287.5	937.9	**872.1**	**-1287.5**	-195.3	1459.0	-244.3	A-B
3	3	0.0	0.0	560.5	-262.0	-698.6	850.8	**560.5**	**-698.6**	152.2	1049.7	-244.3	A-B
3	4	0.0	0.0	409.6	-340.9	-364.0	633.3	**409.6**	**-364.0**	362.1	829.8	-244.3	A-B
3	5	0.0	0.0	382.5	-300.3	-103.1	438.2	**382.5**	**-103.1**	516.0	648.5	-244.3	A-B
3	6	0.0	0.0	343.4	-276.4	106.2	284.4	**343.4**	**106.2**	639.5	503.1	-244.3	A-B
3	7	0.0	0.0	307.6	-255.2	261.2	167.0	**307.6**	**261.2**	731.0	395.4	-244.3	A-B
3	8	0.0	0.0	274.3	-236.9	378.4	81.1	**274.3**	**378.4**	800.1	314.0	-244.3	A-B
3	9	0.0	0.0	243.5	-221.4	458.3	20.9	**243.5**	**458.3**	847.3	258.4	-244.3	A-B
3	10	0.0	0.0	216.4	-215.9	502.8	214.5	**216.4**	**502.8**	873.5	227.5	-244.3	A-B
3	11	0.0	0.0	202.6	-206.4	535.4	180.8	**206.4**	**180.8**	683.6	451.2	-244.3	A-B

VANO	SECCIÓN	Pdf. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
3	1	5295.0	564.3	1.82	28.80	90	VERIFICA	680.0	105.0	0.267	4822.3	1196.8	VERIFICA
3	2	5295.0	564.3	1.82	28.80	90	VERIFICA	680.0	105.0	0.267	4822.3	872.1	VERIFICA
3	3	5295.0	564.3	1.82	28.80	90	VERIFICA	680.0	105.0	0.267	4822.3	560.5	VERIFICA
3	4	5413.0	576.9	1.83	28.61	90	VERIFICA	680.0	105.0	0.267	4802.3	409.6	VERIFICA
3	5	5413.0	576.9	1.83	28.61	90	VERIFICA	680.0	105.0	0.267	4802.3	382.5	VERIFICA
3	6	5413.0	576.9	1.83	28.61	90	VERIFICA	680.0	105.0	0.267	4802.3	343.4	VERIFICA
3	7	5413.0	576.9	1.83	28.61	90	VERIFICA	680.0	105.0	0.267	4802.3	307.6	VERIFICA
3	8	5413.0	576.9	1.83	28.61	90	VERIFICA	680.0	105.0	0.267	4802.3	274.3	VERIFICA
3	9	5413.0	576.9	1.83	28.61	90	VERIFICA	680.0	105.0	0.267	4802.3	243.5	VERIFICA
3	10	5413.0	576.9	1.83	28.61	90	VERIFICA	680.0	105.0	0.267	4802.3	216.4	VERIFICA
3	11	5413.0	576.9	1.83	28.61	90	VERIFICA	680.0	105.0	0.267	4802.3	206.4	VERIFICA

3	12	0.0	0.0	202.1	-227.5	206.0	414.9	227.5	414.9	838.1	304.9	-244.3	A-B
3	13	0.0	0.0	211.0	-253.6	15.6	361.3	253.6	361.3	806.4	342.2	-244.3	A-B
3	14	0.0	0.0	228.7	-282.6	68.9	275.7	282.6	275.7	756.0	401.7	-244.3	A-B
3	15	0.0	0.0	249.2	-314.3	149.9	152.7	314.3	152.7	683.4	487.2	-244.3	A-B
3	16	0.0	0.0	272.6	-348.9	264.6	-9.6	348.9	-9.6	587.6	600.0	-244.3	A-B
3	17	0.0	0.0	298.6	-386.4	417.7	-220.6	386.4	-220.6	463.2	746.6	-244.3	A-B
3	18	0.0	0.0	327.0	-415.4	614.2	-493.3	415.4	-493.3	302.3	936.1	-244.3	A-B
3	19	0.0	0.0	308.7	-506.3	842.8	-826.8	506.3	-826.8	105.5	1167.9	-244.3	A-B
3	20	0.0	0.0	21.5	-870.5	956.1	-1381.2	870.5	-1381.2	-204.7	1569.9	-244.3	A-B
3	21	0.0	0.0	-239.2	-1211.9	850.1	-2267.7	1211.9	-2267.7	-727.7	2186.0	-244.3	C

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f ct,k (t/m2.)	ZONA
4	1	0.0	0.0	1176.5	298.0	-2242.3	875.0	1176.5	-2242.3	-698.7	2182.4	-244.3	C
4	2	0.0	0.0	864.6	52.9	-1555.2	1003.2	864.6	-1555.2	-293.3	1704.9	-244.3	C
4	3	0.0	0.0	647.9	-110.5	-1049.5	1011.9	647.9	-1049.5	5.0	1353.5	-244.3	A-B
4	4	0.0	0.0	362.6	-334.7	-747.7	900.5	362.6	-747.7	183.1	1143.8	-244.3	A-B
4	5	0.0	0.0	398.0	-241.4	-530.0	770.6	398.0	-530.0	300.2	981.2	-244.3	A-B
4	6	0.0	0.0	362.8	-220.9	-341.3	676.3	362.8	-341.3	411.6	850.1	-244.3	A-B
4	7	0.0	0.0	340.2	-202.3	-176.8	608.4	340.2	-176.8	508.6	735.8	-244.3	A-B
4	8	0.0	0.0	309.1	-185.4	-53.5	563.9	309.1	-53.5	581.4	650.1	-244.3	A-B
4	9	0.0	0.0	279.9	-170.4	44.1	540.4	279.9	44.1	638.9	582.3	-244.3	A-B
4	10	0.0	0.0	263.1	-157.4	124.8	534.1	263.1	124.8	686.5	526.2	-244.3	A-B
4	11	0.0	0.0	237.3	-150.4	169.9	569.5	237.3	169.9	713.2	494.8	-244.3	A-B
4	12	0.0	0.0	214.5	-147.6	200.2	743.2	214.5	200.2	731.0	473.8	-244.3	A-B
4	13	0.0	0.0	189.2	-155.9	251.8	784.0	189.2	251.8	746.2	422.7	-244.3	A-B
4	14	0.0	0.0	170.7	-181.9	-82.7	1103.1	181.9	1103.1	1248.4	-168.9	-244.3	A-B
4	15	0.0	0.0	158.0	-224.1	-117.7	1086.3	224.1	1086.3	1238.5	-157.2	-244.3	A-B
4	16	0.0	0.0	153.2	-258.6	-112.3	1021.5	258.6	1021.5	1200.3	-112.2	-244.3	A-B
4	17	0.0	0.0	149.6	-306.9	-215.9	921.1	306.9	921.1	1141.1	-42.4	-244.3	A-B
4	18	0.0	0.0	149.7	-356.4	-189.3	780.7	356.4	780.7	1058.2	55.2	-244.3	A-B
4	19	0.0	0.0	152.2	-408.4	-144.0	593.3	408.4	593.3	947.7	185.4	-244.3	A-B
4	20	0.0	0.0	157.3	-452.6	-75.1	334.2	452.6	334.2	794.8	365.4	-244.3	A-B

3	12	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	227.5	VERIFICA
3	13	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	253.6	VERIFICA
3	14	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	282.6	VERIFICA
3	15	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	314.3	VERIFICA
3	16	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	348.9	VERIFICA
3	17	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	386.4	VERIFICA
3	18	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	415.4	VERIFICA
3	19	5567.0	593.3	1.85	28.37	90	VERIFICA	680.0	105.0	0.267	4776.5	506.3	VERIFICA
3	20	5725.0	610.1	1.87	28.13	90	VERIFICA	680.0	105.0	0.267	4750.4	870.5	VERIFICA
3	21	5725.0	610.1	1.87	28.13	90	VERIFICA	680.0	105.0	0.267	4750.4	1211.9	VERIFICA

VANO	SECCIÓN	Pdr. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
4	1	5857.0	624.2	1.89	27.94	90	VERIFICA	680.0	105.0	0.267	4728.8	1176.5	VERIFICA
4	2	5857.0	624.2	1.89	27.94	90	VERIFICA	680.0	105.0	0.267	4728.8	864.6	VERIFICA
4	3	5857.0	624.2	1.89	27.94	90	VERIFICA	680.0	105.0	0.267	4728.8	647.9	VERIFICA
4	4	5857.0	624.2	1.89	27.94	90	VERIFICA	680.0	105.0	0.267	4728.8	362.6	VERIFICA
4	5	5751.0	612.9	1.87	28.10	90	VERIFICA	680.0	105.0	0.267	4746.1	398.0	VERIFICA
4	6	5751.0	612.9	1.87	28.10	90	VERIFICA	680.0	105.0	0.267	4746.1	362.8	VERIFICA
4	7	5751.0	612.9	1.87	28.10	90	VERIFICA	680.0	105.0	0.267	4746.1	340.2	VERIFICA
4	8	5751.0	612.9	1.87	28.10	90	VERIFICA	680.0	105.0	0.267	4746.1	309.1	VERIFICA
4	9	5751.0	612.9	1.87	28.10	90	VERIFICA	680.0	105.0	0.267	4746.1	279.9	VERIFICA
4	10	5751.0	612.9	1.87	28.10	90	VERIFICA	680.0	105.0	0.267	4746.1	263.1	VERIFICA
4	11	5751.0	612.9	1.87	28.10	90	VERIFICA	680.0	105.0	0.267	4746.1	237.3	VERIFICA
4	12	5751.0	612.9	1.87	28.10	90	VERIFICA	680.0	105.0	0.267	4746.1	214.5	VERIFICA
4	13	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	189.2	VERIFICA
4	14	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	181.9	VERIFICA
4	15	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	224.1	VERIFICA
4	16	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	258.6	VERIFICA
4	17	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	306.9	VERIFICA
4	18	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	356.4	VERIFICA
4	19	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	408.4	VERIFICA
4	20	5608.0	597.7	1.86	28.31	90	VERIFICA	680.0	105.0	0.267	4769.7	452.6	VERIFICA

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ER1-1.4

VANO	SECCIÓN	$f_{y\alpha,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
1	1	4.2	582.98	-1030.6	-	-	582.98	0.0	86.3	86.3
1	2	4.2	582.98	972.3	-	-	582.98	0.0	86.3	86.3
1	3	4.2	582.98	1117.3	-	-	582.98	0.0	86.3	86.3
1	4	4.2	582.98	1239.6	-	-	582.98	0.0	86.3	86.3
1	5	4.2	582.98	1339.4	-	-	582.98	0.0	86.3	86.3
1	6	4.2	582.98	1416.6	-	-	582.98	0.0	86.3	86.3
1	7	4.2	582.98	1471.2	-	-	582.98	0.0	86.3	86.3
1	8	4.2	582.98	1503.3	-	-	582.98	0.0	86.3	86.3
1	9	4.2	582.98	1512.8	-	-	582.98	0.0	86.3	86.3
1	10	4.2	582.98	1498.7	-	-	582.98	0.0	86.3	86.3
1	11	4.2	582.98	1485.3	-	-	582.98	0.0	86.3	86.3
1	12	4.2	582.98	1404.1	-	-	582.98	0.0	86.3	86.3
1	13	4.2	582.98	1288.5	-	-	582.98	0.0	86.3	86.3
1	14	4.2	582.98	1138.7	-	-	582.98	0.0	86.3	86.3
1	15	4.2	582.98	954.0	-	-	582.98	0.0	86.3	86.3
1	16	4.2	582.98	-1137.6	-	-	582.98	0.0	86.3	86.3
1	17	4.2	582.98	-1391.0	-	-	582.98	0.0	86.3	86.3
1	18	4.2	582.98	-1678.7	-	-	582.98	0.0	86.3	86.3
1	19	4.2	582.98	-1989.1	-	-	582.98	9.0	86.3	86.3
1	20	4.2	582.98	-2159.9	1.174	0.555	379.73	68.9	86.3	86.3
1	21	4.2	582.98	-2224.9	1.125	0.437	286.66	113.1	86.3	113.1

VANO	SECCIÓN	$f_{y\alpha,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
2	1	4.2	582.98	-2251.1	1.117	0.385	250.92	128.8	86.3	128.8
2	2	4.2	582.98	-2161.1	-	-	582.98	38.2	86.3	86.3
2	3	4.2	582.98	-1868.8	-	-	582.98	0.0	86.3	86.3
2	4	4.2	582.98	-1413.6	-	-	582.98	0.0	86.3	86.3
2	5	4.2	582.98	-1040.0	-	-	582.98	0.0	86.3	86.3
2	6	4.2	582.98	1186.6	-	-	582.98	0.0	86.3	86.3
2	7	4.2	582.98	1441.2	-	-	582.98	0.0	86.3	86.3
2	8	4.2	582.98	1636.8	-	-	582.98	0.0	86.3	86.3
2	9	4.2	582.98	1772.7	-	-	582.98	0.0	86.3	86.3
2	10	4.2	582.98	1849.3	-	-	582.98	0.0	86.3	86.3
2	11	4.2	582.98	1866.2	-	-	582.98	0.0	86.3	86.3
2	12	4.2	582.98	1761.8	-	-	582.98	0.0	86.3	86.3
2	13	4.2	582.98	1662.3	-	-	582.98	0.0	86.3	86.3
2	14	4.2	582.98	1505.1	-	-	582.98	0.0	86.3	86.3
2	15	4.2	582.98	1289.8	-	-	582.98	0.0	86.3	86.3
2	16	4.2	582.98	1017.1	-	-	582.98	0.0	86.3	86.3
2	17	4.2	582.98	-1173.1	-	-	582.98	0.0	86.3	86.3
2	18	4.2	582.98	-1562.0	-	-	582.98	0.0	86.3	86.3
2	19	4.2	582.98	-1995.9	-	-	582.98	0.0	86.3	86.3
2	20	4.2	582.98	-2249.8	-	-	582.98	40.1	86.3	86.3
2	21	4.2	582.98	-2356.8	1.182	0.426	293.88	125.0	86.3	125.0

VANO	SECCIÓN	$f_{y\alpha,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
3	1	4.2	582.98	-2313.5	1.192	0.439	305.38	123.5	86.3	**123.5**
3	2	4.2	582.98	-2208.5	-	-	582.98	40.0	86.3	**86.3**
3	3	4.2	582.98	-1919.1	-	-	582.98	0.0	86.3	**86.3**
3	4	4.2	582.98	-1528.8	-	-	582.98	0.0	86.3	**86.3**
3	5	4.2	582.98	-1150.3	-	-	582.98	0.0	86.3	**86.3**
3	6	4.2	582.98	979.6	-	-	582.98	0.0	86.3	**86.3**
3	7	4.2	582.98	1245.7	-	-	582.98	0.0	86.3	**86.3**
3	8	4.2	582.98	1455.2	-	-	582.98	0.0	86.3	**86.3**
3	9	4.2	582.98	1608.4	-	-	582.98	0.0	86.3	**86.3**
3	10	4.2	582.98	1705.6	-	-	582.98	0.0	86.3	**86.3**
3	11	4.2	582.98	1746.4	-	-	582.98	0.0	86.3	**86.3**
3	12	4.2	582.98	1791.5	-	-	582.98	0.0	86.3	**86.3**
3	13	4.2	582.98	1717.1	-	-	582.98	0.0	86.3	**86.3**
3	14	4.2	582.98	1584.9	-	-	582.98	0.0	86.3	**86.3**
3	15	4.2	582.98	1395.3	-	-	582.98	0.0	86.3	**86.3**
3	16	4.2	582.98	1147.5	-	-	582.98	0.0	86.3	**86.3**
3	17	4.2	582.98	-1017.3	-	-	582.98	0.0	86.3	**86.3**
3	18	4.2	582.98	-1380.9	-	-	582.98	0.0	86.3	**86.3**
3	19	4.2	582.98	-1787.8	-	-	582.98	0.0	86.3	**86.3**
3	20	4.2	582.98	-2116.2	-	-	582.98	38.7	86.3	**86.3**
3	21	4.2	582.98	-2203.2	1.126	0.397	260.67	128.1	86.3	**128.1**

VANO	SECCIÓN	$f_{y\alpha,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
4	1	4.2	582.98	-2249.0	1.115	0.404	262.79	122.1	86.3	**122.1**
4	2	4.2	582.98	-2193.0	1.161	0.562	380.69	64.7	86.3	**86.3**
4	3	4.2	582.98	-2020.4	-	-	582.98	8.7	86.3	**86.3**
4	4	4.2	582.98	-1731.7	-	-	582.98	0.0	86.3	**86.3**
4	5	4.2	582.98	-1410.9	-	-	582.98	0.0	86.3	**86.3**
4	6	4.2	582.98	-1151.2	-	-	582.98	0.0	86.3	**86.3**
4	7	4.2	582.98	993.7	-	-	582.98	0.0	86.3	**86.3**
4	8	4.2	582.98	1182.6	-	-	582.98	0.0	86.3	**86.3**
4	9	4.2	582.98	1336.0	-	-	582.98	0.0	86.3	**86.3**
4	10	4.2	582.98	1454.4	-	-	582.98	0.0	86.3	**86.3**
4	11	4.2	582.98	1537.6	-	-	582.98	0.0	86.3	**86.3**
4	12	4.2	582.98	1585.4	-	-	582.98	0.0	86.3	**86.3**
4	13	4.2	582.98	1552.3	-	-	582.98	0.0	86.3	**86.3**
4	14	4.2	582.98	1542.4	-	-	582.98	0.0	86.3	**86.3**
4	15	4.2	582.98	1509.5	-	-	582.98	0.0	86.3	**86.3**
4	16	4.2	582.98	1453.6	-	-	582.98	0.0	86.3	**86.3**
4	17	4.2	582.98	1374.6	-	-	582.98	0.0	86.3	**86.3**
4	18	4.2	582.98	1272.7	-	-	582.98	0.0	86.3	**86.3**
4	19	4.2	582.98	1147.7	-	-	582.98	0.0	86.3	**86.3**
4	20	4.2	582.98	999.6	-	-	582.98	0.0	86.3	**86.3**
4	21	4.2	582.98	-1044.2	-	-	582.98	0.0	86.3	**86.3**

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ER1-1.4

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
1	1	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	506.8	-160.0	35.6	33.4
1	2	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	447.9	-153.2	347.5	-61.0
1	3	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	392.5	-148.8	588.7	-127.4
1	4	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	340.7	-146.9	766.5	-170.5
1	5	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	300.7	-147.5	911.2	-195.5
1	6	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	254.6	-150.6	985.6	-207.7
1	7	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	212.0	-156.1	1016.4	-211.6
1	8	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	179.2	-163.9	1041.7	-212.3
1	9	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	151.6	-191.1	696.7	273.8
1	10	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	138.9	-225.2	646.5	251.6
1	11	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	149.5	-236.1	615.0	193.1
1	12	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	154.3	-263.7	572.7	145.4
1	13	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	164.9	-292.1	565.8	73.2
1	14	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	178.6	-312.3	585.2	-36.4
1	15	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	194.3	-344.1	624.6	-170.1
1	16	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	211.7	-379.3	686.6	-329.2
1	17	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	230.9	-415.2	773.9	-522.2
1	18	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	251.5	-442.3	888.8	-766.3
1	19	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	104.7	-649.6	995.4	-1076.9
1	20	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	-72.6	-891.8	984.5	-1573.2
1	21	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	-252.5	-1127.3	864.7	-2262.2

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
2	1	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	1214.5	239.3	-2222.9	879.4
2	2	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	868.6	-26.8	-1342.1	982.3
2	3	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	523.8	-294.5	-782.6	876.1
2	4	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	390.8	-354.2	-476.3	621.6
2	5	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	367.3	-310.2	-223.9	414.5
2	6	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	331.9	-282.3	-24.5	252.1
2	7	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	298.6	-257.1	130.6	129.9
2	8	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	279.3	-234.6	255.3	42.7
2	9	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	252.9	-215.1	338.7	-14.9
2	10	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	228.7	-200.1	387.4	168.2
2	11	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	209.1	-199.4	108.0	459.2
2	12	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	211.1	-221.6	51.7	473.2
2	13	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	220.7	-247.5	59.9	432.1
2	14	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	235.2	-276.1	92.9	355.7
2	15	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	255.4	-297.0	178.4	234.9
2	16	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	278.4	-330.8	296.3	80.8
2	17	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	304.1	-368.1	452.6	-116.1
2	18	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	332.3	-407.8	651.8	-368.7
2	19	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	320.2	-491.9	885.3	-687.0
2	20	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	14.0	-875.0	958.6	-1271.4
2	21	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	-234.3	-1203.8	851.2	-2153.0

Calculo-rasante

ARMADURA DE RASANTE

VANO	SECCION	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
3	1	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	1196.8	227.4	-2173.1	834.4
3	2	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	872.1	-16.4	-1287.5	937.9
3	3	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	560.5	-262.0	-698.6	850.8
3	4	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	409.6	-340.9	-364.0	633.3
3	5	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	382.5	-300.3	-103.1	438.2
3	6	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	343.4	-276.4	106.2	284.4
3	7	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	307.6	-255.2	261.2	167.0
3	8	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	274.3	-236.9	378.4	81.1
3	9	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	243.5	-221.4	458.3	20.9
3	10	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	216.4	-215.9	502.8	214.5
3	11	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	202.6	-206.4	535.4	180.8
3	12	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	202.1	-227.5	206.0	414.9
3	13	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	211.0	-253.6	15.6	361.3
3	14	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	228.7	-282.6	68.9	275.7
3	15	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	249.2	-314.3	149.9	152.7
3	16	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	272.6	-348.9	264.6	-9.6
3	17	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	298.6	-386.4	417.7	-220.6
3	18	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	327.0	-415.4	614.2	-493.3
3	19	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	308.7	-506.3	842.8	-826.8
3	20	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	21.5	-870.5	956.1	-1381.2
3	21	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	-239.2	-1211.9	850.1	-2267.7

VANO	SECCION	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
4	1	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	1176.5	298.0	-2242.3	875.0
4	2	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	864.6	52.9	-1555.2	1003.2
4	3	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	647.9	-110.5	-1049.5	1011.9
4	4	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	470.4	4435	4200	15455	362.6	-334.7	-747.7	900.5
4	5	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	398.0	-241.4	-530.0	770.6
4	6	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	362.8	-220.9	-341.3	676.3
4	7	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	340.2	-202.3	-176.8	608.4
4	8	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	309.1	-185.4	-53.5	563.9
4	9	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	279.9	-170.4	44.1	540.4
4	10	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	263.1	-157.4	124.8	534.1
4	11	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	237.3	-150.4	169.9	569.5
4	12	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	214.5	-147.6	200.2	743.2
4	13	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	189.2	-155.9	251.8	784.0
4	14	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	170.7	-181.9	-82.7	1103.1
4	15	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	158.0	-224.1	-117.7	1086.3
4	16	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	153.2	-258.6	-112.3	1021.5
4	17	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	149.6	-306.9	-215.9	921.1
4	18	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	149.7	-356.4	-189.3	780.7
4	19	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	152.2	-408.4	-144.0	593.3
4	20	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	157.3	-452.6	-75.1	334.2
4	21	12.800	7.200	1.100	0.456	90	5.65	13.4	15.8	96.5	0	4435	4200	15455	164.8	-510.9	22.4	19.2

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ER1-1.4

VANO	SECCIÓN	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
1	1	-	27.6	-	30.0	17.32	ALA COMPRIMIDA	-	8.7	-	30.0	5.47	ALA COMPRIMIDA	17.32
1	2	-	24.4	-	30.0	15.30	ALA COMPRIMIDA	128.12	-	4.7	45.0	5.12	ALA TRACCIONADA	15.30
1	3	-	21.4	-	30.0	13.41	ALA COMPRIMIDA	128.12	-	4.6	45.0	4.97	ALA TRACCIONADA	13.41
1	4	-	18.6	-	30.0	11.64	ALA COMPRIMIDA	128.12	-	4.5	45.0	4.91	ALA TRACCIONADA	11.64
1	5	-	16.4	-	30.0	10.27	ALA COMPRIMIDA	128.12	-	4.5	45.0	4.93	ALA TRACCIONADA	10.27
1	6	-	13.9	-	30.0	8.70	ALA COMPRIMIDA	128.12	-	4.6	45.0	5.03	ALA TRACCIONADA	8.70
1	7	-	11.6	-	30.0	7.24	ALA COMPRIMIDA	128.12	-	4.8	45.0	5.22	ALA TRACCIONADA	7.24
1	8	-	9.8	-	30.0	6.13	ALA COMPRIMIDA	128.12	-	5.0	45.0	5.48	ALA TRACCIONADA	6.13
1	9	-	8.3	-	30.0	5.18	ALA COMPRIMIDA	-	10.4	-	30.0	6.53	ALA COMPRIMIDA	6.53
1	10	-	7.6	-	30.0	4.75	ALA COMPRIMIDA	-	12.3	-	30.0	7.70	ALA COMPRIMIDA	7.70
1	11	-	8.1	-	30.0	5.11	ALA COMPRIMIDA	-	12.9	-	30.0	8.07	ALA COMPRIMIDA	8.07
1	12	-	8.4	-	30.0	5.27	ALA COMPRIMIDA	-	14.4	-	30.0	9.01	ALA COMPRIMIDA	9.01
1	13	-	9.0	-	30.0	5.64	ALA COMPRIMIDA	-	15.9	-	30.0	9.98	ALA COMPRIMIDA	9.98
1	14	-	9.7	-	30.0	6.10	ALA COMPRIMIDA	128.12	-	9.6	45.0	10.43	ALA TRACCIONADA	10.43
1	15	-	10.6	-	30.0	6.64	ALA COMPRIMIDA	128.12	-	10.6	45.0	11.49	ALA TRACCIONADA	11.49
1	16	-	11.5	-	30.0	7.23	ALA COMPRIMIDA	128.12	-	11.7	45.0	12.67	ALA TRACCIONADA	12.67
1	17	-	12.6	-	30.0	7.89	ALA COMPRIMIDA	128.12	-	12.8	45.0	13.87	ALA TRACCIONADA	13.87
1	18	-	13.7	-	30.0	8.59	ALA COMPRIMIDA	1767.39	-	1.0	45.0	1.07	ALA TRACCIONADA	8.59
1	19	-	5.7	-	30.0	3.58	ALA COMPRIMIDA	1767.39	-	1.4	45.0	1.57	ALA TRACCIONADA	3.58
1	20	-	4.0	-	30.0	2.48	ALA COMPRIMIDA	1767.39	-	2.0	45.0	2.16	ALA TRACCIONADA	2.48
1	21	-	13.8	-	30.0	8.63	ALA COMPRIMIDA	1767.39	-	2.5	45.0	2.73	ALA TRACCIONADA	8.63

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm.)	armadura superior Aα,sup (cm2/m.)	armadura inferior Aα,inf (cm2/m.)
1	1	30	27.6	69.28	0.14	3.45	13.86
1	2	30	24.4	69.28	0.15	2.70	12.61
1	3	30	21.4	69.28	0.16	2.07	11.34
1	4	30	18.6	69.28	0.17	1.56	10.08
1	5	30	16.4	69.28	0.17	1.22	9.06
1	6	30	13.9	69.28	0.18	0.87	7.83
1	7	30	11.6	69.28	0.19	0.60	6.64
1	8	30	9.8	69.28	0.20	0.43	5.69
1	9	30	10.4	69.28	0.19	0.49	6.04
1	10	30	12.3	69.28	0.19	0.68	7.01
1	11	30	12.9	69.28	0.19	0.75	7.32
1	12	30	14.4	69.28	0.18	0.93	8.07
1	13	30	15.9	69.28	0.18	1.15	8.83
1	14	45	9.6	80.00	0.20	0.63	9.81
1	15	45	10.6	80.00	0.20	0.76	10.73
1	16	45	11.7	80.00	0.19	0.92	11.75
1	17	45	12.8	80.00	0.19	1.11	12.76
1	18	30	13.7	69.28	0.18	0.85	7.74
1	19	30	5.7	69.28	0.21	0.15	3.43
1	20	30	4.0	69.28	0.21	0.07	2.41
1	21	30	13.8	69.28	0.18	0.86	7.77

VANO	SECCIÓN	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
2	1	1767.39	-	2.7	45.0	2.94	ALA TRACCIONADA	-	13.0	-	30.0	8.18	ALA COMPRIMIDA	8.18
2	2	1767.39	-	1.9	45.0	2.10	ALA TRACCIONADA	-	1.5	-	30.0	0.92	ALA COMPRIMIDA	2.10
2	3	1767.39	-	1.2	45.0	1.27	ALA TRACCIONADA	-	16.1	-	30.0	10.06	ALA COMPRIMIDA	10.06
2	4	128.12	-	12.0	45.0	13.06	ALA TRACCIONADA	-	19.3	-	30.0	12.10	ALA COMPRIMIDA	13.06
2	5	128.12	-	11.3	45.0	12.27	ALA TRACCIONADA	-	16.9	-	30.0	10.60	ALA COMPRIMIDA	12.27
2	6	128.12	-	10.2	45.0	11.09	ALA TRACCIONADA	-	15.4	-	30.0	9.65	ALA COMPRIMIDA	11.09
2	7	-	16.3	-	30.0	10.20	ALA COMPRIMIDA	-	14.0	-	30.0	8.79	ALA COMPRIMIDA	10.20
2	8	-	15.2	-	30.0	9.54	ALA COMPRIMIDA	-	12.8	-	30.0	8.02	ALA COMPRIMIDA	9.54
2	9	-	13.8	-	30.0	8.64	ALA COMPRIMIDA	128.12	-	6.6	45.0	7.19	ALA TRACCIONADA	8.64
2	10	-	12.5	-	30.0	7.81	ALA COMPRIMIDA	-	10.9	-	30.0	6.84	ALA COMPRIMIDA	7.81
2	11	-	11.4	-	30.0	7.14	ALA COMPRIMIDA	-	10.9	-	30.0	6.81	ALA COMPRIMIDA	7.14
2	12	-	11.5	-	30.0	7.21	ALA COMPRIMIDA	-	12.1	-	30.0	7.57	ALA COMPRIMIDA	7.57
2	13	-	12.0	-	30.0	7.54	ALA COMPRIMIDA	-	13.5	-	30.0	8.46	ALA COMPRIMIDA	8.46
2	14	-	12.8	-	30.0	8.04	ALA COMPRIMIDA	-	15.1	-	30.0	9.44	ALA COMPRIMIDA	9.44
2	15	-	13.9	-	30.0	8.73	ALA COMPRIMIDA	-	16.2	-	30.0	10.15	ALA COMPRIMIDA	10.15
2	16	-	15.2	-	30.0	9.51	ALA COMPRIMIDA	-	18.0	-	30.0	11.31	ALA COMPRIMIDA	11.31
2	17	-	16.6	-	30.0	10.39	ALA COMPRIMIDA	128.12	-	11.3	45.0	12.30	ALA TRACCIONADA	12.30
2	18	-	18.1	-	30.0	11.35	ALA COMPRIMIDA	128.12	-	12.5	45.0	13.62	ALA TRACCIONADA	13.62
2	19	-	17.5	-	30.0	10.94	ALA COMPRIMIDA	1767.39	-	1.1	45.0	1.19	ALA TRACCIONADA	10.94
2	20	-	0.8	-	30.0	0.48	ALA COMPRIMIDA	1767.39	-	2.0	45.0	2.12	ALA TRACCIONADA	2.12
2	21	-	12.8	-	30.0	8.01	ALA COMPRIMIDA	1767.39	-	2.7	45.0	2.92	ALA TRACCIONADA	8.01

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm.)	armadura superior Aα,sup (cm2/m.)	armadura inferior Aα,inf (cm2/m.)
2	1	30	13.0	69.28	0.19	0.77	7.41
2	2	45	1.9	80.00	0.22	0.03	2.08
2	3	30	16.1	69.28	0.18	1.17	8.90
2	4	45	12.0	80.00	0.19	0.98	12.07
2	5	45	11.3	80.00	0.20	0.87	11.41
2	6	45	10.2	80.00	0.20	0.71	10.38
2	7	30	16.3	69.28	0.17	1.20	9.00
2	8	30	15.2	69.28	0.18	1.05	8.49
2	9	30	13.8	69.28	0.18	0.86	7.78
2	10	30	12.5	69.28	0.19	0.70	7.11
2	11	30	11.4	69.28	0.19	0.59	6.56
2	12	30	12.1	69.28	0.19	0.66	6.91
2	13	30	13.5	69.28	0.18	0.82	7.63
2	14	30	15.1	69.28	0.18	1.03	8.41
2	15	30	16.2	69.28	0.17	1.19	8.96
2	16	30	18.0	69.28	0.17	1.47	9.83
2	17	45	11.3	80.00	0.20	0.87	11.43
2	18	45	12.5	80.00	0.19	1.07	12.55
2	19	30	17.5	69.28	0.17	1.38	9.56
2	20	45	2.0	80.00	0.22	0.03	2.09
2	21	30	12.8	69.28	0.19	0.74	7.27

VANO	SECCIÓN	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
3	1	1767.39	-	2.7	45.0	2.90	ALA TRACCIONADA	-	12.4	-	30.0	7.77	ALA COMPRIMIDA	7.77
3	2	1767.39	-	1.9	45.0	2.11	ALA TRACCIONADA	-	0.9	-	30.0	0.56	ALA COMPRIMIDA	2.11
3	3	1767.39	-	1.3	45.0	1.36	ALA TRACCIONADA	-	14.3	-	30.0	8.95	ALA COMPRIMIDA	8.95
3	4	128.12	-	12.6	45.0	13.68	ALA TRACCIONADA	-	18.6	-	30.0	11.65	ALA COMPRIMIDA	13.68
3	5	128.12	-	11.8	45.0	12.78	ALA TRACCIONADA	-	16.4	-	30.0	10.26	ALA COMPRIMIDA	12.78
3	6	-	18.7	-	30.0	11.73	ALA COMPRIMIDA	-	15.1	-	30.0	9.44	ALA COMPRIMIDA	11.73
3	7	-	16.8	-	30.0	10.51	ALA COMPRIMIDA	-	13.9	-	30.0	8.72	ALA COMPRIMIDA	10.51
3	8	-	15.0	-	30.0	9.37	ALA COMPRIMIDA	-	12.9	-	30.0	8.10	ALA COMPRIMIDA	9.37
3	9	-	13.3	-	30.0	8.32	ALA COMPRIMIDA	-	12.1	-	30.0	7.57	ALA COMPRIMIDA	8.32
3	10	-	11.8	-	30.0	7.39	ALA COMPRIMIDA	-	11.8	-	30.0	7.38	ALA COMPRIMIDA	7.39

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm.)	armadura superior Aα,sup (cm2/m.)	armadura inferior Aα,inf (cm2/m.)
3	1	30	12.4	69.28	0.19	0.70	7.07
3	2	45	1.9	80.00	0.22	0.03	2.09
3	3	30	14.3	69.28	0.18	0.92	8.03
3	4	45	12.6	80.00	0.19	1.08	12.61
3	5	45	11.8	80.00	0.19	0.94	11.84
3	6	30	18.7	69.28	0.17	1.59	10.15
3	7	30	16.8	69.28	0.17	1.27	9.24
3	8	30	15.0	69.28	0.18	1.01	8.36
3	9	30	13.3	69.28	0.18	0.80	7.52
3	10	30	11.8	69.28	0.19	0.63	6.76

ARMADURA DE RASANTE

3	11	-	11.0	-	30.0	6.92	ALA COMPRIMIDA	-	11.3	-	30.0	7.05	ALA COMPRIMIDA	7.05	3	11	30	11.3	69.28	0.19	0.57	6.48
3	12	-	11.0	-	30.0	6.91	ALA COMPRIMIDA	-	12.4	-	30.0	7.78	ALA COMPRIMIDA	7.78	3	12	30	12.4	69.28	0.19	0.70	7.08
3	13	-	11.5	-	30.0	7.21	ALA COMPRIMIDA	-	13.8	-	30.0	8.66	ALA COMPRIMIDA	8.66	3	13	30	13.8	69.28	0.18	0.86	7.80
3	14	-	12.5	-	30.0	7.82	ALA COMPRIMIDA	-	15.4	-	30.0	9.66	ALA COMPRIMIDA	9.66	3	14	30	15.4	69.28	0.18	1.07	8.58
3	15	-	13.6	-	30.0	8.52	ALA COMPRIMIDA	-	17.1	-	30.0	10.74	ALA COMPRIMIDA	10.74	3	15	30	17.1	69.28	0.17	1.33	9.41
3	16	-	14.9	-	30.0	9.32	ALA COMPRIMIDA	128.12	-	10.7	45.0	11.66	ALA TRACCIONADA	11.66	3	16	45	10.7	80.00	0.20	0.78	10.87
3	17	-	16.3	-	30.0	10.20	ALA COMPRIMIDA	128.12	-	11.9	45.0	12.91	ALA TRACCIONADA	12.91	3	17	45	11.9	80.00	0.19	0.96	11.95
3	18	-	17.8	-	30.0	11.18	ALA COMPRIMIDA	128.12	-	12.8	45.0	13.88	ALA TRACCIONADA	13.88	3	18	45	12.8	80.00	0.19	1.11	12.77
3	19	-	16.8	-	30.0	10.55	ALA COMPRIMIDA	1767.39	-	1.1	45.0	1.23	ALA TRACCIONADA	10.55	3	19	30	16.8	69.28	0.17	1.28	9.27
3	20	-	1.2	-	30.0	0.73	ALA COMPRIMIDA	1767.39	-	1.9	45.0	2.11	ALA TRACCIONADA	2.11	3	20	45	1.9	80.00	0.22	0.03	2.08
3	21	-	13.0	-	30.0	8.17	ALA COMPRIMIDA	1767.39	-	2.7	45.0	2.93	ALA TRACCIONADA	8.17	3	21	30	13.0	69.28	0.19	0.77	7.41

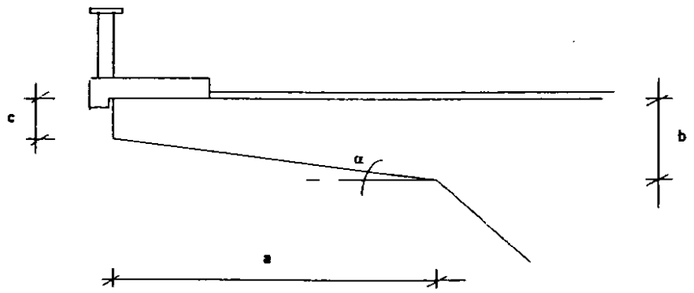
VANO	SECCIÓN	A (cm2)	σ d ala comp. (Kp/cm2.)	σ d ala tracc. (Kp/cm2.)	q (°)	Aσ (+) (cm2/m.)	Situacion del ala	A (cm2)	σ d ala comp. (Kp/cm2.)	σ d ala tracc (Kp/cm2.)	θ (°)	Aσ (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aσ (cm2/m.)
4	1	1767.39	-	2.6	45.0	2.85	ALA TRACCIONADA	-	16.2	-	30.0	10.18	ALA COMPRIMIDA	10.18
4	2	1767.39	-	1.9	45.0	2.09	ALA TRACCIONADA	-	2.9	-	30.0	1.81	ALA COMPRIMIDA	2.09
4	3	1767.39	-	1.4	45.0	1.57	ALA TRACCIONADA	-	6.0	-	30.0	3.78	ALA COMPRIMIDA	3.78
4	4	1767.39	-	0.8	45.0	0.88	ALA TRACCIONADA	-	18.2	-	30.0	11.44	ALA COMPRIMIDA	11.44
4	5	128.12	-	12.2	45.0	13.30	ALA TRACCIONADA	-	13.2	-	30.0	8.25	ALA COMPRIMIDA	13.30
4	6	128.12	-	11.2	45.0	12.12	ALA TRACCIONADA	-	12.0	-	30.0	7.55	ALA COMPRIMIDA	12.12
4	7	128.12	-	10.5	45.0	11.37	ALA TRACCIONADA	-	11.0	-	30.0	6.91	ALA COMPRIMIDA	11.37
4	8	128.12	-	9.5	45.0	10.33	ALA TRACCIONADA	-	10.1	-	30.0	6.33	ALA COMPRIMIDA	10.33
4	9	-	15.3	-	30.0	9.57	ALA COMPRIMIDA	-	9.3	-	30.0	5.82	ALA COMPRIMIDA	9.57
4	10	-	14.3	-	30.0	8.99	ALA COMPRIMIDA	-	8.6	-	30.0	5.38	ALA COMPRIMIDA	8.99
4	11	-	12.9	-	30.0	8.11	ALA COMPRIMIDA	-	8.2	-	30.0	5.14	ALA COMPRIMIDA	8.11
4	12	-	11.7	-	30.0	7.33	ALA COMPRIMIDA	-	8.0	-	30.0	5.04	ALA COMPRIMIDA	7.33
4	13	-	10.3	-	30.0	6.46	ALA COMPRIMIDA	-	8.5	-	30.0	5.33	ALA COMPRIMIDA	6.46
4	14	128.12	-	5.3	45.0	5.70	ALA TRACCIONADA	-	9.9	-	30.0	6.22	ALA COMPRIMIDA	6.22
4	15	128.12	-	4.9	45.0	5.28	ALA TRACCIONADA	-	12.2	-	30.0	7.66	ALA COMPRIMIDA	7.66
4	16	128.12	-	4.7	45.0	5.12	ALA TRACCIONADA	-	14.1	-	30.0	8.84	ALA COMPRIMIDA	8.84
4	17	128.12	-	4.6	45.0	5.00	ALA TRACCIONADA	-	16.7	-	30.0	10.49	ALA COMPRIMIDA	10.49
4	18	128.12	-	4.6	45.0	5.00	ALA TRACCIONADA	-	19.4	-	30.0	12.18	ALA COMPRIMIDA	12.18
4	19	128.12	-	4.7	45.0	5.09	ALA TRACCIONADA	-	22.3	-	30.0	13.96	ALA COMPRIMIDA	13.96
4	20	128.12	-	4.8	45.0	5.26	ALA TRACCIONADA	-	24.7	-	30.0	15.47	ALA COMPRIMIDA	15.47
4	21	-	9.0	-	30.0	5.63	ALA COMPRIMIDA	-	27.8	-	30.0	17.46	ALA COMPRIMIDA	17.46

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm.)	armadura superior Aσ,sup (cm2/m.)	armadura inferior Aσ,inf (cm2/m.)
4	1	30	16.2	69.28	0.17	1.19	8.99
4	2	45	1.9	80.00	0.22	0.03	2.07
4	3	30	6.0	69.28	0.21	0.16	3.61
4	4	30	18.2	69.28	0.17	1.51	9.93
4	5	45	12.2	80.00	0.19	1.02	12.28
4	6	45	11.2	80.00	0.20	0.85	11.27
4	7	45	10.5	80.00	0.20	0.74	10.62
4	8	45	9.5	80.00	0.20	0.61	9.71
4	9	30	15.3	69.28	0.18	1.05	8.51
4	10	30	14.3	69.28	0.18	0.93	8.06
4	11	30	12.9	69.28	0.19	0.76	7.35
4	12	30	11.7	69.28	0.19	0.62	6.71
4	13	30	10.3	69.28	0.19	0.48	5.98
4	14	30	9.9	69.28	0.20	0.44	5.77
4	15	30	12.2	69.28	0.19	0.68	6.98
4	16	30	14.1	69.28	0.18	0.90	7.94
4	17	30	16.7	69.28	0.17	1.27	9.22
4	18	30	19.4	69.28	0.16	1.71	10.47
4	19	30	22.3	69.28	0.15	2.24	11.71
4	20	30	24.7	69.28	0.15	2.75	12.71
4	21	30	27.8	69.28	0.14	3.51	13.95

CALCULO DE ARMADURA DE VOLADIZO

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : ER1-1.4

DATOS GEOMETRIA

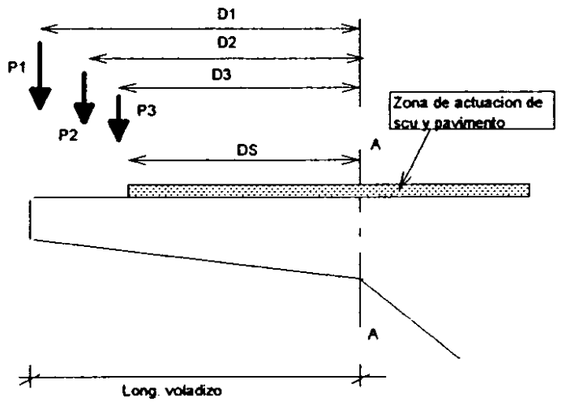


a (longitud voladizo) (m.) =	2.8
b (canto en base del voladizo) (m.) =	0.456
c (canto en extremo del voladizo) (m.) =	0.200
α (angulo cara inferior voladizo) (rad) =	0.091
Recubrimiento (c.d.g. armadura) (m.) =	0.050

DATOS MATERIALES

HORMIGONES		
	Fck(kp/cm2)	γc
Tablero	400	1.5
ACEROS		
	Fk(kp/cm2)	γs
Acero pasivo	5100	1.15

DATOS CARGAS (P1, P2, P3 son cargas permanentes).



Cargas actuantes (valores caracteristicos)

Peso propio hormigón (t/m3) =	2.50

P1(t/m)=	0.75	D1(m.)=	2.80
P2(t/m)=	0.00	D2(m.)=	0.00
P3(t/m)=	0.00	D3(m)=	0.00

Peso pavimento (t/m2)=	0.00
Valor s.c.u. (t/m2)=	0.50

Distancia actuacion s.c. DS(m.)=	2.80

Esfuerzos debidos al carro en Seccion A-A

Momento Mk(m.t/m)=	0.00
Cortante Vk(m.t/m)=	0.00

Coeficientes de ponderacion de acciones

ESTADOS LIMITES ULTIMOS	
	γf
Acciones permanentes desfav.	1.5
Acciones variables desfavorables	1.5

CALCULO

ESFUERZOS (DE SERVICIO) DEBIDOS A LAS CARGAS:

Carga	Momento(mT/	ortante (T/m)
Peso propio	-2.80	2.30
P1	-2.10	0.75
P2	0.00	0.00
P3	0.00	0.00
Pavimento	0.00	0.00
Sobrecarga repartida (s.c.u.)	-1.96	1.40
Carro	0.00	0.00
TOTAL	-6.86	4.45

ESFUERZOS DE DISEÑO PARA EL DIMENSIONAMIENTO

Carga	Momento(mT/	ortante (T/m	V.reducido (T/
Peso propio	-4.19	3.44	2.50
P1	-3.15	1.13	0.42
P2	0.00	0.00	0.00
P3	0.00	0.00	0.00
Pavimento	0.00	0.00	0.00
Sobrecarga repartida (s.c.u.)	-2.94	2.10	1.44
Carro	0.00	0.00	0.00
TOTAL	-10.28	6.67	4.35

ARMADO FLEXION (por metro)

As sup.(cm²)	omprobació	Def.sup.(o/oo	Def.inf.(o/oo)	ef. acero(o/oo)
5.87	Vale	-11.336	0.845	-10.000

ARMADO CORTANTE (como viga, por metro)

As 90ª(cm²/m)	omprobació	Vu1 (T)	Vcu (T)	Vsu (T)
0.00	Vale	324.80	33.15	0.00

DISTRIBUCIÓN CONJUNTA DE ARMADURA DE RASANTE Y FLEXIÓN EN VOLADIZOS

PROYECTO : **L.A.V. MADRID - ZARAGOZA**
ESTRUCTURA : **ER1-1.4**

ARMADURA SUPERIOR DISPUESTA=	**20.91**	CM2/M
ARMADURA INFERIOR DISPUESTA=	**0.85**	CM2/M

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
1	1	17.32	3.45	13.86	5.87	0.00	9.32	13.86	0.00	11.59	2.28	1.43
1	2	15.30	2.70	12.61	5.87	0.00	8.57	12.61	0.00	12.34	0.26	0.00
1	3	13.41	2.07	11.34	5.87	0.00	7.94	11.34	0.00	12.97	0.00	0.00
1	4	11.64	1.56	10.08	5.87	0.00	7.43	10.08	0.00	13.48	0.00	0.00
1	5	10.27	1.22	9.06	5.87	0.00	7.09	9.06	0.00	13.83	0.00	0.00
1	6	8.70	0.87	7.83	5.87	0.00	6.74	7.83	0.00	14.17	0.00	0.00
1	7	7.24	0.60	6.64	5.87	0.00	6.47	6.64	0.00	14.44	0.00	0.00
1	8	6.13	0.43	5.69	5.87	0.00	6.30	5.69	0.00	14.61	0.00	0.00
1	9	6.53	0.49	6.04	5.87	0.00	6.36	6.04	0.00	14.55	0.00	0.00
1	10	7.70	0.68	7.01	5.87	0.00	6.55	7.01	0.00	14.36	0.00	0.00
1	11	8.07	0.75	7.32	5.87	0.00	6.62	7.32	0.00	14.29	0.00	0.00
1	12	9.01	0.93	8.07	5.87	0.00	6.81	8.07	0.00	14.11	0.00	0.00
1	13	9.98	1.15	8.83	5.87	0.00	7.02	8.83	0.00	13.89	0.00	0.00
1	14	10.43	0.63	9.81	5.87	0.00	6.50	9.81	0.00	14.42	0.00	0.00
1	15	11.49	0.76	10.73	5.87	0.00	6.63	10.73	0.00	14.28	0.00	0.00
1	16	12.67	0.92	11.75	5.87	0.00	6.80	11.75	0.00	14.12	0.00	0.00
1	17	13.87	1.11	12.76	5.87	0.00	6.98	12.76	0.00	13.93	0.00	0.00
1	18	8.59	0.85	7.74	5.87	0.00	6.72	7.74	0.00	14.19	0.00	0.00
1	19	3.58	0.15	3.43	5.87	0.00	6.02	3.43	0.00	14.89	0.00	0.00
1	20	2.48	0.07	2.41	5.87	0.00	5.94	2.41	0.00	14.97	0.00	0.00
1	21	8.63	0.86	7.77	5.87	0.00	6.73	7.77	0.00	14.18	0.00	0.00

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
2	1	8.18	0.77	7.41	5.87	0.00	6.64	7.41	0.00	14.27	0.00	0.00
2	2	2.10	0.03	2.08	5.87	0.00	5.90	2.08	0.00	15.02	0.00	0.00
2	3	10.06	1.17	8.90	5.87	0.00	7.04	8.90	0.00	13.88	0.00	0.00
2	4	13.06	0.98	12.07	5.87	0.00	6.85	12.07	0.00	14.06	0.00	0.00
2	5	12.27	0.87	11.41	5.87	0.00	6.74	11.41	0.00	14.17	0.00	0.00
2	6	11.09	0.71	10.38	5.87	0.00	6.58	10.38	0.00	14.33	0.00	0.00
2	7	10.20	1.20	9.00	5.87	0.00	7.07	9.00	0.00	13.84	0.00	0.00
2	8	9.54	1.05	8.49	5.87	0.00	6.92	8.49	0.00	13.99	0.00	0.00
2	9	8.64	0.86	7.78	5.87	0.00	6.73	7.78	0.00	14.18	0.00	0.00
2	10	7.81	0.70	7.11	5.87	0.00	6.57	7.11	0.00	14.34	0.00	0.00
2	11	7.14	0.59	6.56	5.87	0.00	6.46	6.56	0.00	14.45	0.00	0.00
2	12	7.57	0.66	6.91	5.87	0.00	6.53	6.91	0.00	14.38	0.00	0.00
2	13	8.46	0.82	7.63	5.87	0.00	6.69	7.63	0.00	14.22	0.00	0.00
2	14	9.44	1.03	8.41	5.87	0.00	6.90	8.41	0.00	14.02	0.00	0.00
2	15	10.15	1.19	8.96	5.87	0.00	7.06	8.96	0.00	13.86	0.00	0.00
2	16	11.31	1.47	9.83	5.87	0.00	7.34	9.83	0.00	13.57	0.00	0.00
2	17	12.30	0.87	11.43	5.87	0.00	6.74	11.43	0.00	14.17	0.00	0.00
2	18	13.62	1.07	12.55	5.87	0.00	6.94	12.55	0.00	13.97	0.00	0.00

2	19	10.94	1.38	9.56	5.87	0.00	7.25	9.56	0.00	13.66	0.00	0.00
2	20	2.12	0.03	2.09	5.87	0.00	5.90	2.09	0.00	15.02	0.00	0.00
2	21	8.01	0.74	7.27	5.87	0.00	6.61	7.27	0.00	14.30	0.00	0.00

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
3	1	7.77	0.70	7.07	5.87	0.00	6.57	7.07	0.00	14.35	0.00	0.00
3	2	2.11	0.03	2.09	5.87	0.00	5.90	2.09	0.00	15.02	0.00	0.00
3	3	8.95	0.92	8.03	5.87	0.00	6.79	8.03	0.00	14.12	0.00	0.00
3	4	13.68	1.08	12.61	5.87	0.00	6.95	12.61	0.00	13.96	0.00	0.00
3	5	12.78	0.94	11.84	5.87	0.00	6.81	11.84	0.00	14.10	0.00	0.00
3	6	11.73	1.59	10.15	5.87	0.00	7.46	10.15	0.00	13.46	0.00	0.00
3	7	10.51	1.27	9.24	5.87	0.00	7.14	9.24	0.00	13.77	0.00	0.00
3	8	9.37	1.01	8.36	5.87	0.00	6.88	8.36	0.00	14.03	0.00	0.00
3	9	8.32	0.80	7.52	5.87	0.00	6.67	7.52	0.00	14.24	0.00	0.00
3	10	7.39	0.63	6.76	5.87	0.00	6.50	6.76	0.00	14.41	0.00	0.00
3	11	7.05	0.57	6.48	5.87	0.00	6.44	6.48	0.00	14.47	0.00	0.00
3	12	7.78	0.70	7.08	5.87	0.00	6.57	7.08	0.00	14.35	0.00	0.00
3	13	8.66	0.86	7.80	5.87	0.00	6.74	7.80	0.00	14.18	0.00	0.00
3	14	9.66	1.07	8.58	5.87	0.00	6.94	8.58	0.00	13.97	0.00	0.00
3	15	10.74	1.33	9.41	5.87	0.00	7.20	9.41	0.00	13.71	0.00	0.00
3	16	11.66	0.78	10.87	5.87	0.00	6.65	10.87	0.00	14.26	0.00	0.00
3	17	12.91	0.96	11.95	5.87	0.00	6.83	11.95	0.00	14.08	0.00	0.00
3	18	13.88	1.11	12.77	5.87	0.00	6.98	12.77	0.00	13.93	0.00	0.00
3	19	10.55	1.28	9.27	5.87	0.00	7.15	9.27	0.00	13.76	0.00	0.00
3	20	2.11	0.03	2.08	5.87	0.00	5.90	2.08	0.00	15.02	0.00	0.00
3	21	8.17	0.77	7.41	5.87	0.00	6.64	7.41	0.00	14.27	0.00	0.00

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
4	1	10.18	1.19	8.99	5.87	0.00	7.06	8.99	0.00	13.85	0.00	0.00
4	2	2.09	0.03	2.07	5.87	0.00	5.90	2.07	0.00	15.02	0.00	0.00
4	3	3.78	0.16	3.61	5.87	0.00	6.03	3.61	0.00	14.88	0.00	0.00
4	4	11.44	1.51	9.93	5.87	0.00	7.38	9.93	0.00	13.54	0.00	0.00
4	5	13.30	1.02	12.28	5.87	0.00	6.89	12.28	0.00	14.02	0.00	0.00
4	6	12.12	0.85	11.27	5.87	0.00	6.72	11.27	0.00	14.20	0.00	0.00
4	7	11.37	0.74	10.62	5.87	0.00	6.61	10.62	0.00	14.30	0.00	0.00
4	8	10.33	0.61	9.71	5.87	0.00	6.48	9.71	0.00	14.43	0.00	0.00
4	9	9.57	1.05	8.51	5.87	0.00	6.92	8.51	0.00	13.99	0.00	0.00
4	10	8.99	0.93	8.06	5.87	0.00	6.80	8.06	0.00	14.11	0.00	0.00
4	11	8.11	0.76	7.35	5.87	0.00	6.63	7.35	0.00	14.28	0.00	0.00
4	12	7.33	0.62	6.71	5.87	0.00	6.49	6.71	0.00	14.42	0.00	0.00
4	13	6.46	0.48	5.98	5.87	0.00	6.35	5.98	0.00	14.56	0.00	0.00
4	14	6.22	0.44	5.77	5.87	0.00	6.32	5.77	0.00	14.60	0.00	0.00
4	15	7.66	0.68	6.98	5.87	0.00	6.55	6.98	0.00	14.37	0.00	0.00
4	16	8.84	0.90	7.94	5.87	0.00	6.77	7.94	0.00	14.14	0.00	0.00
4	17	10.49	1.27	9.22	5.87	0.00	7.14	9.22	0.00	13.78	0.00	0.00
4	18	12.18	1.71	10.47	5.87	0.00	7.58	10.47	0.00	13.33	0.00	0.00
4	19	13.96	2.24	11.71	5.87	0.00	8.11	11.71	0.00	12.80	0.00	0.00
4	20	15.47	2.75	12.71	5.87	0.00	8.62	12.71	0.00	12.29	0.42	0.00
4	21	17.46	3.51	13.95	5.87	0.00	9.38	13.95	0.00	11.53	2.41	1.57

CÁLCULO DE ARMADURA DE TORSION . ART. 48.2 EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : ER1-1.4

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
1	1	0.00	362.79	6.142	0.183	1013.41	vale	6.66	7.03
1	2	0.69	328.32	6.142	0.183	1013.41	vale	6.03	6.36
1	3	1.38	297.49	6.142	0.183	1013.41	vale	5.46	5.77
1	4	2.07	270.28	6.142	0.183	1013.41	vale	4.96	5.24
1	5	2.76	246.70	6.142	0.183	1013.41	vale	4.53	4.78
1	6	3.45	226.74	6.142	0.183	1013.41	vale	4.16	4.39
1	7	4.14	210.42	6.142	0.183	1013.41	vale	3.86	4.08
1	8	4.83	197.72	6.142	0.183	1013.41	vale	3.63	3.83
1	9	5.52	188.65	6.142	0.183	1013.41	vale	3.46	3.66
1	10	6.21	183.21	6.142	0.183	1013.41	vale	3.36	3.55
1	11	6.90	181.39	6.142	0.183	1013.41	vale	3.33	3.52
1	12	6.21	183.21	6.142	0.183	1013.41	vale	3.36	3.55
1	13	5.52	188.65	6.142	0.183	1013.41	vale	3.46	3.66
1	14	4.83	197.72	6.142	0.183	1013.41	vale	3.63	3.83
1	15	4.14	210.42	6.142	0.183	1013.41	vale	3.86	4.08
1	16	3.45	226.74	6.142	0.183	1013.41	vale	4.16	4.39
1	17	2.76	246.70	6.142	0.183	1013.41	vale	4.53	4.78
1	18	2.07	270.28	6.142	0.183	1013.41	vale	4.96	5.24
1	19	1.38	297.49	6.142	0.183	1013.41	vale	5.46	5.77
1	20	0.69	328.32	6.142	0.183	1013.41	vale	6.03	6.36
1	21	0.00	362.79	6.142	0.183	1013.41	vale	6.66	7.03

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
2	1	0.00	457.43	6.142	0.183	1013.41	vale	8.40	8.87
2	2	0.87	413.97	6.142	0.183	1013.41	vale	7.60	8.02
2	3	1.74	375.09	6.142	0.183	1013.41	vale	6.88	7.27
2	4	2.61	340.78	6.142	0.183	1013.41	vale	6.26	6.60
2	5	3.48	311.05	6.142	0.183	1013.41	vale	5.71	6.03
2	6	4.35	285.89	6.142	0.183	1013.41	vale	5.25	5.54
2	7	5.22	265.31	6.142	0.183	1013.41	vale	4.87	5.14
2	8	6.09	249.30	6.142	0.183	1013.41	vale	4.58	4.83
2	9	6.96	237.86	6.142	0.183	1013.41	vale	4.37	4.61
2	10	7.83	231.00	6.142	0.183	1013.41	vale	4.24	4.48
2	11	8.70	228.71	6.142	0.183	1013.41	vale	4.20	4.43
2	12	7.83	231.00	6.142	0.183	1013.41	vale	4.24	4.48
2	13	6.96	237.86	6.142	0.183	1013.41	vale	4.37	4.61
2	14	6.09	249.30	6.142	0.183	1013.41	vale	4.58	4.83
2	15	5.22	265.31	6.142	0.183	1013.41	vale	4.87	5.14
2	16	4.35	285.89	6.142	0.183	1013.41	vale	5.25	5.54
2	17	3.48	311.05	6.142	0.183	1013.41	vale	5.71	6.03
2	18	2.61	340.78	6.142	0.183	1013.41	vale	6.26	6.60
2	19	1.74	375.09	6.142	0.183	1013.41	vale	6.88	7.27
2	20	0.87	413.97	6.142	0.183	1013.41	vale	7.60	8.02
2	21	0.00	457.43	6.142	0.183	1013.41	vale	8.40	8.87

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
3	1	0.00	457.43	6.142	0.183	1013.41	vale	8.40	8.87
3	2	0.87	413.97	6.142	0.183	1013.41	vale	7.60	8.02
3	3	1.74	375.09	6.142	0.183	1013.41	vale	6.88	7.27
3	4	2.61	340.78	6.142	0.183	1013.41	vale	6.26	6.60
3	5	3.48	311.05	6.142	0.183	1013.41	vale	5.71	6.03
3	6	4.35	285.89	6.142	0.183	1013.41	vale	5.25	5.54
3	7	5.22	265.31	6.142	0.183	1013.41	vale	4.87	5.14
3	8	6.09	249.30	6.142	0.183	1013.41	vale	4.58	4.83
3	9	6.96	237.86	6.142	0.183	1013.41	vale	4.37	4.61
3	10	7.83	231.00	6.142	0.183	1013.41	vale	4.24	4.48
3	11	8.70	228.71	6.142	0.183	1013.41	vale	4.20	4.43
3	12	7.83	231.00	6.142	0.183	1013.41	vale	4.24	4.48
3	13	6.96	237.86	6.142	0.183	1013.41	vale	4.37	4.61
3	14	6.09	249.30	6.142	0.183	1013.41	vale	4.58	4.83
3	15	5.22	265.31	6.142	0.183	1013.41	vale	4.87	5.14

CÁLCULO DE ARMADURA DE TORSION . ART. 48.2 EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : ER1-1.4

3	16	4.35	285.89	6.142	0.183	1013.41	vale	5.25	5.54
3	17	3.48	311.05	6.142	0.183	1013.41	vale	5.71	6.03
3	18	2.61	340.78	6.142	0.183	1013.41	vale	6.26	6.60
3	19	1.74	375.09	6.142	0.183	1013.41	vale	6.88	7.27
3	20	0.87	413.97	6.142	0.183	1013.41	vale	7.60	8.02
3	21	0.00	457.43	6.142	0.183	1013.41	vale	8.40	8.87

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
4	1	0.00	362.79	6.142	0.183	1013.41	vale	6.66	7.03
4	2	0.69	328.32	6.142	0.183	1013.41	vale	6.03	6.36
4	3	1.38	297.49	6.142	0.183	1013.41	vale	5.46	5.77
4	4	2.07	270.28	6.142	0.183	1013.41	vale	4.96	5.24
4	5	2.76	246.70	6.142	0.183	1013.41	vale	4.53	4.78
4	6	3.45	226.74	6.142	0.183	1013.41	vale	4.16	4.39
4	7	4.14	210.42	6.142	0.183	1013.41	vale	3.86	4.08
4	8	4.83	197.72	6.142	0.183	1013.41	vale	3.63	3.83
4	9	5.52	188.65	6.142	0.183	1013.41	vale	3.46	3.66
4	10	6.21	183.21	6.142	0.183	1013.41	vale	3.36	3.55
4	11	6.90	181.39	6.142	0.183	1013.41	vale	3.33	3.52
4	12	6.21	183.21	6.142	0.183	1013.41	vale	3.36	3.55
4	13	5.52	188.65	6.142	0.183	1013.41	vale	3.46	3.66
4	14	4.83	197.72	6.142	0.183	1013.41	vale	3.63	3.83
4	15	4.14	210.42	6.142	0.183	1013.41	vale	3.86	4.08
4	16	3.45	226.74	6.142	0.183	1013.41	vale	4.16	4.39
4	17	2.76	246.70	6.142	0.183	1013.41	vale	4.53	4.78
4	18	2.07	270.28	6.142	0.183	1013.41	vale	4.96	5.24
4	19	1.38	297.49	6.142	0.183	1013.41	vale	5.46	5.77
4	20	0.69	328.32	6.142	0.183	1013.41	vale	6.03	6.36
4	21	0.00	362.79	6.142	0.183	1013.41	vale	6.66	7.03

VERIFICACIÓN CONJUNTA A TORSIÓN Y FLEXIÓN .ART. 48.2.4.

PROYECTO : SUBTRAMO XV
OBRA : ER1-1.4

VANO	SECCIÓN	Tu1. Tm.	Td. Tm.	Vu1. ton.	Vrd. ton.	(Td/Tu1+Vrd/Vu1)<=1
1	1	1013.41	362.79	4788.38	506.81	0.46
1	2	1013.41	328.32	4788.38	447.88	0.42
1	3	1013.41	297.49	4788.38	392.53	0.38
1	4	1013.41	270.28	4788.38	340.66	0.34
1	5	1013.41	246.70	4788.38	300.66	0.31
1	6	1013.41	226.74	4788.38	254.63	0.28
1	7	1013.41	210.42	4788.38	212.02	0.25
1	8	1013.41	197.72	4788.38	179.25	0.23
1	9	1013.41	188.65	4788.38	191.14	0.23
1	10	1013.41	183.21	4788.38	225.23	0.23
1	11	1013.41	181.39	4769.69	236.08	0.23
1	12	1013.41	183.21	4769.69	263.66	0.24
1	13	1013.41	188.65	4769.69	292.12	0.25
1	14	1013.41	197.72	4769.69	312.29	0.26
1	15	1013.41	210.42	4769.69	344.06	0.28
1	16	1013.41	226.74	4769.69	379.34	0.30
1	17	1013.41	246.70	4769.69	415.17	0.33
1	18	1013.41	270.28	4769.69	442.25	0.36
1	19	1013.41	297.49	4746.08	649.62	0.43
1	20	1013.41	328.32	4746.08	891.76	0.51
1	21	1013.41	362.79	4746.08	1127.26	0.60

VANO	SECCIÓN	Tu1. Tm.	Td. Tm.	Vu1. ton.	Vrd. ton.	(Td/Tu1+Vrd/Vu1)<=1
2	1	1013.41	457.43	4729.57	1214.53	0.71
2	2	1013.41	413.97	4729.57	868.58	0.59
2	3	1013.41	375.09	4729.57	523.82	0.48
2	4	1013.41	340.78	4750.35	390.79	0.42
2	5	1013.41	311.05	4750.35	367.34	0.38
2	6	1013.41	285.89	4750.35	331.91	0.35
2	7	1013.41	265.31	4750.35	298.60	0.32
2	8	1013.41	249.30	4750.35	279.27	0.30
2	9	1013.41	237.86	4750.35	252.90	0.29
2	10	1013.41	231.00	4750.35	228.66	0.28
2	11	1013.41	228.71	4750.35	209.07	0.27
2	12	1013.41	231.00	4776.51	221.58	0.27
2	13	1013.41	237.86	4776.51	247.46	0.29
2	14	1013.41	249.30	4776.51	276.12	0.30
2	15	1013.41	265.31	4776.51	296.98	0.32
2	16	1013.41	285.89	4776.51	330.84	0.35
2	17	1013.41	311.05	4776.51	368.06	0.38
2	18	1013.41	340.78	4776.51	407.78	0.42
2	19	1013.41	375.09	4776.51	491.89	0.47
2	20	1013.41	413.97	4802.34	874.96	0.59
2	21	1013.41	457.43	4802.34	1203.81	0.70

VANO	SECCIÓN	Tu1. Tm.	Td. Tm.	Vu1. ton.	Vrd. ton.	(Td/Tu1+Vrd/Vu1)<=1
3	1	1013.41	457.43	4822.34	1196.85	0.70
3	2	1013.41	413.97	4822.34	872.11	0.59
3	3	1013.41	375.09	4822.34	560.54	0.49
3	4	1013.41	340.78	4802.34	409.60	0.42
3	5	1013.41	311.05	4802.34	382.48	0.39
3	6	1013.41	285.89	4802.34	343.41	0.35
3	7	1013.41	265.31	4802.34	307.55	0.33
3	8	1013.41	249.30	4802.34	274.32	0.30
3	9	1013.41	237.86	4802.34	243.50	0.29
3	10	1013.41	231.00	4802.34	216.37	0.27
3	11	1013.41	228.71	4802.34	206.42	0.27
3	12	1013.41	231.00	4776.51	227.54	0.28
3	13	1013.41	237.86	4776.51	253.56	0.29
3	14	1013.41	249.30	4776.51	282.63	0.31
3	15	1013.41	265.31	4776.51	314.26	0.33
3	16	1013.41	285.89	4776.51	348.93	0.36
3	17	1013.41	311.05	4776.51	386.35	0.39
3	18	1013.41	340.78	4776.51	415.44	0.42
3	19	1013.41	375.09	4776.51	506.31	0.48
3	20	1013.41	413.97	4750.35	870.50	0.59
3	21	1013.41	457.43	4750.35	1211.86	0.71

4	1	1013.41	362.79	4728.75	1176.51	0.61
4	2	1013.41	328.32	4728.75	864.64	0.51
4	3	1013.41	297.49	4728.75	647.90	0.43
4	4	1013.41	270.28	4728.75	362.62	0.34
4	5	1013.41	246.70	4746.08	398.02	0.33
4	6	1013.41	226.74	4746.08	362.80	0.30
4	7	1013.41	210.42	4746.08	340.20	0.28
4	8	1013.41	197.72	4746.08	309.06	0.26
4	9	1013.41	188.65	4746.08	279.95	0.25
4	10	1013.41	183.21	4746.08	263.10	0.24
4	11	1013.41	181.39	4746.08	237.27	0.23
4	12	1013.41	183.21	4746.08	214.46	0.23
4	13	1013.41	188.65	4769.69	189.16	0.23
4	14	1013.41	197.72	4769.69	181.89	0.23
4	15	1013.41	210.42	4769.69	224.11	0.25
4	16	1013.41	226.74	4769.69	258.56	0.28
4	17	1013.41	246.70	4769.69	306.90	0.31
4	18	1013.41	270.28	4769.69	356.44	0.34
4	19	1013.41	297.49	4769.69	408.42	0.38
4	20	1013.41	328.32	4769.69	452.59	0.42
4	21	1013.41	362.79	4769.69	510.85	0.47

ER1-1.4. PASO SOBRE N-II
REACCIONES EN APOYOS

																E.L.Servicio		E.L.Ultimo		
Node	PP	PP,rios	CM	PRET	GRAD	SC1	SC2	SC3	SC4	SC5	SC6	SC7	SC8	SC,max	SC,min	Rmax	Rmin	Rmax	Rmin	
93	65	29	39	7	4	-5	108	-20	-15	4	3	0	0	114	-40	258	99	384	65	POT 300 T
94	56	29	43	14	9	89	-7	-1	-1	1	1	-1	-1	91	-10	243	132	357	114	POT 300 T
95	199	0	131	1	-4	4	101	19	153	-19	-15	3	3	283	-35	614	292	920	240	POT 700 T
96	207	0	148	-5	-11	134	21	129	2	-5	-4	1	1	289	-10	638	328	959	282	"
97	206	0	136	-13	4	-5	-5	0	127	16	150	-13	-11	292	-35	625	292	944	241	"
98	206	0	147	-20	2	-9	-11	153	18	131	3	-4	-3	305	-27	639	302	969	253	"
99	206	0	136	-1	-9	1	1	-7	-8	0	128	16	126	271	-15	611	316	918	270	"
100	200	0	143	-2	-6	3	3	-13	-17	155	21	109	9	299	-29	640	304	961	252	"
101	58	29	35	13	8	0	0	0	1	-7	-7	-10	88	90	-24	234	110	344	86	POT 300 T
102	63	29	49	7	4	-1	-1	4	5	-10	-13	110	-1	118	-26	270	121	401	94	POT 300 T
SUMA	1464	114	1007	0	0	210	210	265	265	265	265	210	210							

Para las sobrecargas se ha tomado:

q= -15.24 t/m
mt= 35.05 mt/m

GINPROSA

ASUNTO: RIOSTRA DE ESTRIBOS EVN1 - 1.4

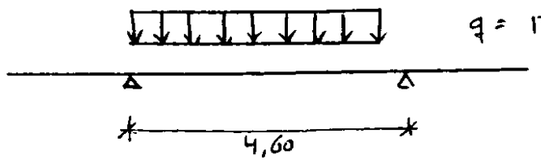
FECHA:

PAG. 1

La reacción máxima ponderada en apoyos de estribos es

$R_{d,max} = 401 \times 2 = 802$ ton.

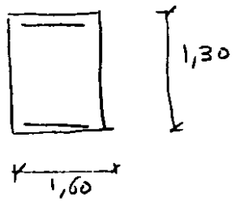
Para el calculo de la armadura inferior se supone la reacción concentrada entre apoyos.



$M_d = 174{,}3 \cdot \frac{4{,}6^2}{8} = 461$ mt

$V_d = 401$ ton.

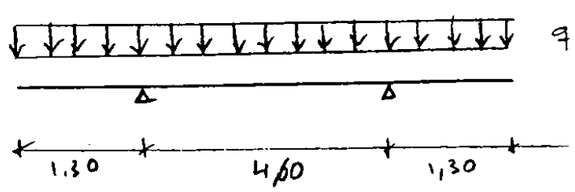
Sección



$A_{s,inf} = 91\ cm^2 \rightarrow$ 2 capas de 8 ϕ32

$A_{ao,cte} = 53{,}9\ cm^2/m \rightarrow 4c\ \phi 16/0{,}25$

Para el calculo de la armadura superior se supondrá la reacción extendida hasta el empotramiento de los voladizos



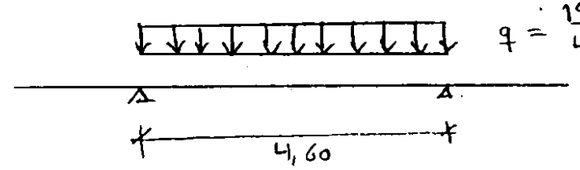
$M_d = 111{,}4 \times \frac{1{,}30^2}{2} = 94{,}1$ mt

$A_{s,sup} = 17\ cm^2 \rightarrow$ mínima.

La reacción máxima en apoyo de pilas es de:

$R_{d,max} = 969 \times 2 = 1938$ ton

Para el calculo de la armadura inferior se supondrá la reacción concentrada entre apoyos



$M_d = 421 \times \frac{4{,}60^2}{8} = 1113{,}2$ mt $\rightarrow$ $m_d = 318{,}0$ mt/m.

$A_s = 73{,}3\ cm^2$

2 capas ϕ32/0,20

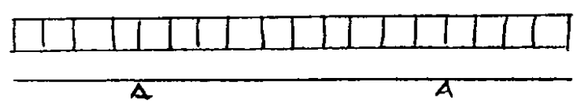
$V_d = 969$ ton. $\rightarrow$ $V_d = 276{,}8$ t/m

$V_{cu} = 81$ ton

$A_{90} = \frac{276{,}8 - 81}{0{,}9 \cdot 1 \cdot 4{,}2} = 51{,}8\ cm^2/m$

3c ϕ16/0,20

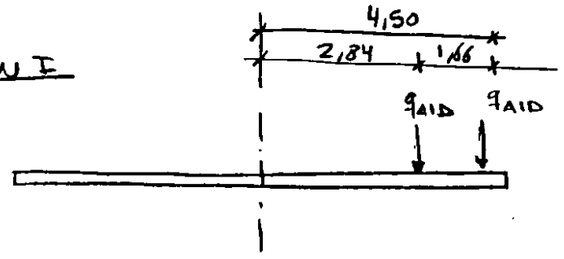
Para el calculo de la armadura superior se supondrá la reacción extendida hasta el empotramiento de los voladizos



$M_d = 268{,}9 \cdot \frac{1{,}30^2}{2} = 227{,}7$ mt $\rightarrow$ $m_d = 64{,}9$ mt/m.

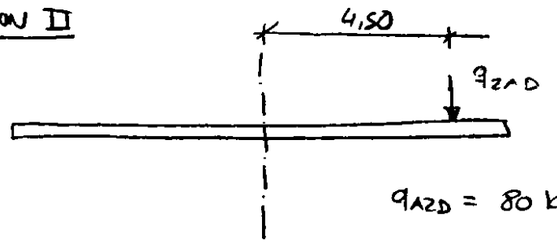
$A_s = 15\ cm^2/m \rightarrow \phi 25/0{,}20$.

SITUACION I



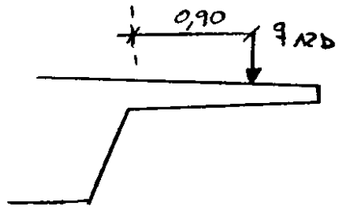
q_{A1D} = 80 KN/m y 6,40 m de Longitud.

SITUACION II



q_{A2D} = 80 KN/m y 20,00 m de Longitud

COMPROBACION DEL VOLADIZO



V_d = (2,30 + 0,75 + 1,40 + 8) = 12,45 t/m
V_{cu} = 25,0 t/m. } $V_{cu} > V_2$.

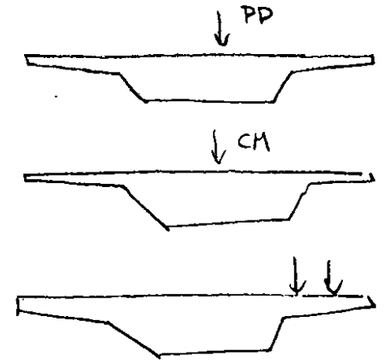
M_2 = (2,80 + 2,10 + 1,96 + 8×0,9) = 14,06 mt

M_u = 30 mt/m.

$M_u > M_2$ OK

ESTABILIDAD

Se aplican a la estructura las siguientes cargas:



(1) Peso Propio (γ = 2,5 t/m³)

(2) Carga muerta } q = 16,13 t/m.

(3) Sobrec. I { q = 10 t/m, mt = 36,7 mt/m

Las reacciones en apoyos de (1)+(2)+(3) son:

	Mt(+)		Mt(-)	
E1	67	175	188	75
P1	288	571	534	320
P2	288	582	564	305
P3	301	555	549	307
E2	62	201	165	81

No hay levantamiento.

El tiro máximo es T_d = 325 mt < T_4 = 2 · 6,142 · 20,9×9,2

T_4 = 1078 mt.

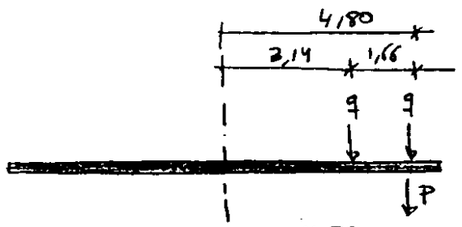
GINPROSA

ASUNTO: COMPROBACIONES FRENTE A DESCARRILAMIENTO SEGÚN UIC - 776 - I

FECHA

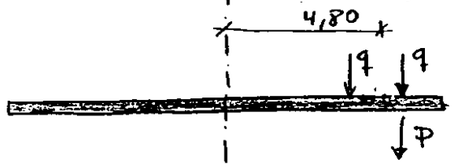
PAG. 1 /

CASO A



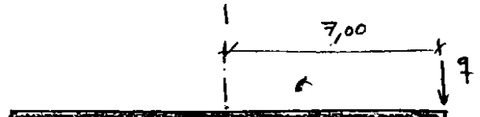
q = 1,5 t/m.
P = 10 t

CASO B



q = 5 t/m
P = 22 t

CASO C



q = 12 t/m
en L > 30 m.

Estabilidad del conjunto.

Se carga el modelo de viga continua con las siguientes hipotesis.

Peso propio ($\gamma = 2,5$ t/m³)
Carga muerta ($q = 16,13$ t/m)
Caso C { $q = 12$ t/m. ; $mf = 84$ mt/m. (en 30m)

GINPROSA

ASUNTO

PAG. 2 /

La reaccion en apoyos son:

	mf(+)		mf(-)	
Estribo	19	274	300	45
Pila lateral	162	754	716	180
Pila central	235	577	546	247

$T_d = 750$ mt $< T_u = 1078$ mt ok

COMPROBACION DE VOLADIZO CASO B

Carga uniforme.

$M_d = (2,80 + 2,1 + 1,96 + 1,20 \times 5) = 12,86$ t.m $< M_u$

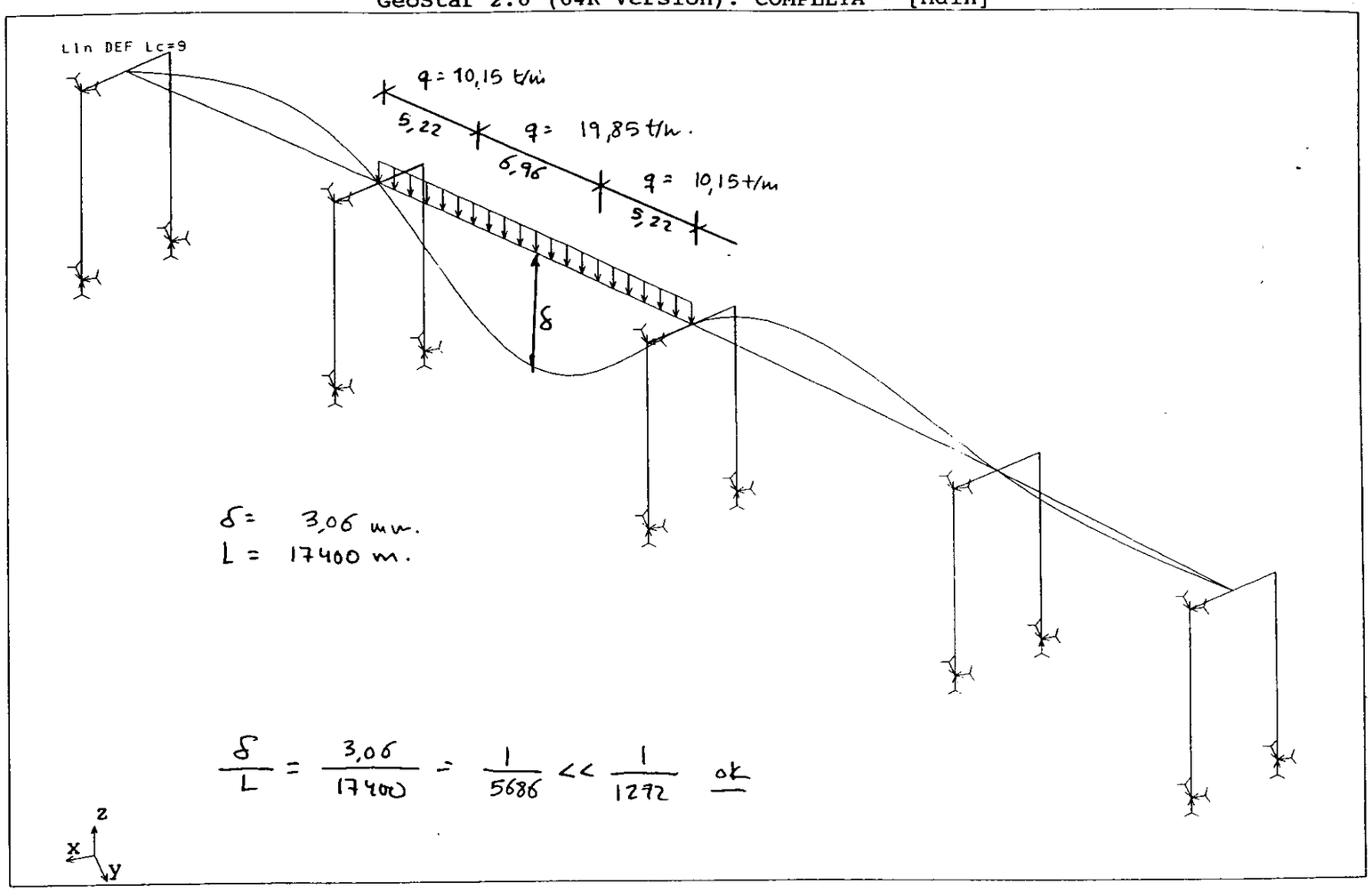
Carga Puntual

$M_d = (2,80 + 2,1 + 1,96 + 0,42 \times 22) = 16,1$ mt $< M_u = 30$ mt/m

FLECHAS

Load case 9

Node	UX	UY	UZ	RX	RY	RZ
1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	0.00000	0.00000	0.00000	0.00017	0.00007	0.00000
3	0.00000	0.00000	0.00013	0.00017	0.00008	0.00000
4	0.00000	0.00000	0.00025	0.00016	0.00008	0.00000
5	0.00000	0.00000	0.00037	0.00015	0.00008	0.00000
6	0.00000	0.00000	0.00048	0.00014	0.00008	0.00000
7	0.00000	0.00000	0.00059	0.00013	0.00008	0.00000
8	0.00000	0.00000	0.00069	0.00011	0.00008	0.00000
9	0.00000	0.00000	0.00078	0.00009	0.00008	0.00000
10	0.00000	0.00000	0.00085	0.00007	0.00007	0.00000
11	-0.00001	0.00000	0.00091	0.00005	0.00006	0.00000
12	-0.00001	0.00000	0.00096	0.00002	0.00005	0.00000
13	-0.00001	0.00000	0.00098	-0.00001	0.00004	0.00000
14	-0.00001	0.00000	0.00098	-0.00004	0.00003	0.00000
15	-0.00001	0.00000	0.00096	-0.00007	0.00001	0.00000
16	-0.00001	0.00000	0.00091	-0.00011	0.00000	0.00000
17	-0.00001	0.00000	0.00084	-0.00014	-0.00002	0.00000
18	-0.00001	0.00000	0.00073	-0.00018	-0.00004	0.00000
19	-0.00001	0.00000	0.00060	-0.00023	-0.00007	0.00000
20	0.00000	0.00000	0.00043	-0.00027	-0.00009	0.00000
21	0.00000	0.00001	0.00022	-0.00032	-0.00012	0.00000
22	0.00000	0.00001	-0.00002	-0.00037	-0.00015	0.00000
23	0.00000	0.00001	-0.00038	-0.00041	-0.00019	0.00000
24	0.00000	0.00001	-0.00079	-0.00043	-0.00022	0.00000
25	0.00001	0.00001	-0.00121	-0.00043	-0.00024	0.00000
26	0.00001	0.00001	-0.00162	-0.00041	-0.00023	0.00000
27	0.00001	0.00001	-0.00202	-0.00037	-0.00022	0.00000
28	0.00002	0.00002	-0.00237	-0.00032	-0.00019	0.00000
29	0.00002	0.00002	-0.00266	-0.00025	-0.00016	0.00000
30	0.00002	0.00002	-0.00288	-0.00017	-0.00011	0.00000
31	0.00002	0.00002	-0.00301	-0.00009	-0.00006	0.00000
32	0.00002	0.00002	-0.00306	0.00000	-0.00001	0.00000
33	0.00002	0.00002	-0.00302	0.00009	0.00004	0.00000
34	0.00002	0.00001	-0.00289	0.00018	0.00010	0.00000
35	0.00002	0.00001	-0.00268	0.00026	0.00014	0.00000
36	0.00002	0.00001	-0.00239	0.00032	0.00018	0.00000
37	0.00002	0.00001	-0.00204	0.00038	0.00021	0.00000
38	0.00001	0.00000	-0.00165	0.00042	0.00022	0.00001
39	0.00001	0.00000	-0.00123	0.00044	0.00023	0.00001
40	0.00001	0.00000	-0.00081	0.00044	0.00022	0.00000
41	0.00001	0.00000	-0.00039	0.00042	0.00019	0.00000
42	0.00000	-0.00001	-0.00002	0.00038	0.00015	0.00000
43	0.00000	-0.00001	0.00030	0.00032	0.00012	0.00000
44	0.00000	-0.00001	0.00056	0.00027	0.00009	0.00000
45	0.00000	-0.00001	0.00076	0.00022	0.00006	0.00000
46	0.00000	-0.00001	0.00092	0.00017	0.00003	0.00000
47	-0.00001	-0.00001	0.00104	0.00012	0.00001	0.00000
48	-0.00001	-0.00001	0.00111	0.00008	-0.00001	0.00000
49	-0.00001	-0.00001	0.00115	0.00005	-0.00003	0.00000
50	-0.00001	-0.00001	0.00115	0.00001	-0.00005	0.00000
51	-0.00001	-0.00001	0.00112	-0.00001	-0.00006	0.00000
52	-0.00001	-0.00001	0.00107	-0.00004	-0.00007	0.00000
53	-0.00001	-0.00001	0.00099	-0.00006	-0.00008	0.00000
54	0.00000	-0.00001	0.00090	-0.00008	-0.00008	0.00000
55	0.00000	-0.00001	0.00080	-0.00009	-0.00009	0.00000
56	0.00000	0.00000	0.00068	-0.00011	-0.00009	0.00000
57	0.00000	0.00000	0.00056	-0.00011	-0.00009	0.00000
58	0.00000	0.00000	0.00044	-0.00012	-0.00008	0.00000
59	0.00000	0.00000	0.00032	-0.00012	-0.00007	0.00000
60	0.00000	0.00000	0.00020	-0.00011	-0.00006	0.00000
61	0.00000	0.00000	0.00010	-0.00010	-0.00005	0.00000
62	0.00000	0.00000	0.00000	-0.00009	-0.00004	0.00000
63	0.00000	0.00000	-0.00006	-0.00008	-0.00003	0.00000
64	0.00000	0.00000	-0.00011	-0.00007	-0.00002	0.00000
65	0.00000	0.00000	-0.00015	-0.00006	-0.00002	0.00000
66	0.00000	0.00000	-0.00019	-0.00004	-0.00001	0.00000
67	0.00000	0.00000	-0.00022	-0.00003	-0.00001	0.00000
68	0.00000	0.00000	-0.00023	-0.00002	0.00000	0.00000
69	0.00000	0.00000	-0.00025	-0.00002	0.00000	0.00000
70	0.00000	0.00000	-0.00025	-0.00001	0.00000	0.00000
71	0.00000	0.00000	-0.00025	0.00000	0.00001	0.00000
72	0.00000	0.00000	-0.00025	0.00001	0.00001	0.00000
73	0.00000	0.00000	-0.00024	0.00001	0.00001	0.00000
74	0.00000	0.00000	-0.00022	0.00002	0.00002	0.00000
75	0.00000	0.00000	-0.00020	0.00003	0.00002	0.00000
76	0.00000	0.00000	-0.00018	0.00003	0.00002	0.00000
77	0.00000	0.00000	-0.00015	0.00003	0.00002	0.00000
78	0.00000	0.00000	-0.00013	0.00004	0.00002	0.00000
79	0.00000	0.00000	-0.00010	0.00004	0.00002	0.00000
80	0.00000	0.00000	-0.00006	0.00004	0.00002	0.00000
81	0.00000	0.00000	-0.00003	0.00004	0.00002	0.00000
82	0.00000	0.00000	0.00000	0.00004	0.00002	0.00000



EUNI – 1.4

PUENTE EVN1-1.4

3º CALCULO DE PILAS

Se calcula la pila central por resultar la mas desfavorable :

Coacron

$$F_c = (PP + Cm) \times 0,03 = 695 \times 0,03 = 21 \text{ tan.}$$

Viento

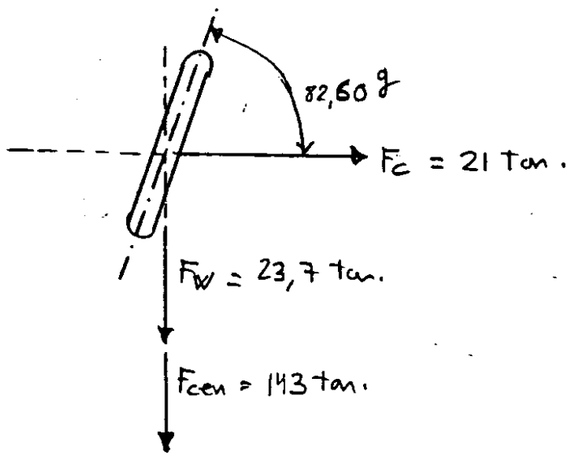
$$f_w = 150 + (2 - 0,7\lambda) = 200 \text{ Kp/m}^2$$
$$A = (1,1 + 0,70 + 3,50 + 1,50) = 6,80$$
$$W = 0,20 \times 6,80 = 1,36 \text{ T/m.}$$
$$F_w = 1,36 \times 17,40 = 23,7 \text{ Ton.}$$

Fcentrifuga

$$F_{cen} = Q \frac{V^2}{127 r}$$

$r = 600$ m.
$V = 160$ Km/h.
$Q = 12 \times 17,4 \times 2 = 418$ tan.

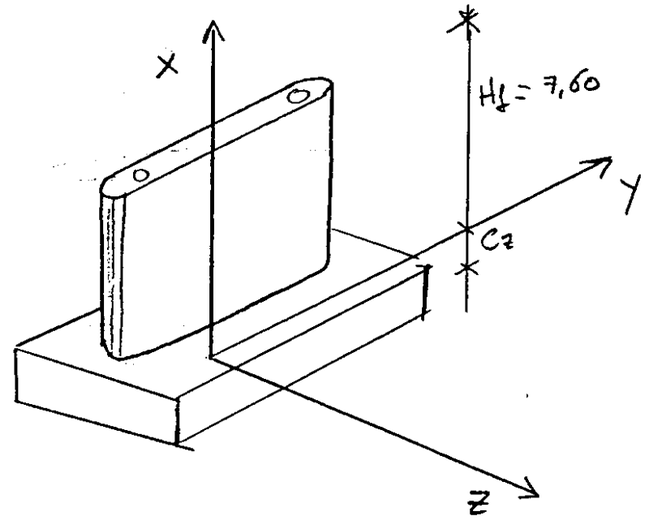
$F_{cen} = 743$ tan.



Las fuerzas actuantes en cabeza de pilas se descomponen según los ejes principales de la misma.

Fuerza normal $F_z = 21 \operatorname{sen}\alpha + (23,7 + 143) \cos\alpha = 65,3$ tan.
Fuerza paralela $F_y = -21 \cos\alpha + (23,7 + 143) \operatorname{sen}\alpha = 155$ tan.

$F_{x,max} = 695 + 602 = 1297$ tan.	$M_z = 0$	
$F_{x,min} = 666 - 61 = 605$ tan.	$M_z = 0$	
$F_{x,Mzmax} = 695 + 299 = 994$ tan.	$M_z = 699$ mt	



Esfuerzos a nivel de cara superior de zapata.

$F_{x,max} = 1457$ tan.	$M_y = 496$	$M_z = 1178$
$F_{x,min} = 765$ tan.	$M_y = 496$	$M_z = 1178$
$F_{x,Mzmax} = 1154$ tan.	$M_y = 496$	$M_z = 1877$ mt

GINPROSA

ASUNTO	FECHA
EVN1 - 1.4 CALCULO DE PILAS	PAG. 3 /

CALCULO DE ARMADURAS

HIPOTESIS I

F_{xd}= 2186 t
M_{yd}= 744 mt
M_{zd} = 1767 mt

HIPOTESIS II

F_{xd}= 688,5 t
M_{yd}= 744 mt
M_{zd} = 1767 mt

HIPOTESIS III

F_{xd} = 1731 t
M_{yd}= 744 mt
M_{zd} = 2816 mt

Introducendo estos esfuerzos en el programa FAGUS se obtiene una armadura. ϕ25/0,20 en el paramento de la pila.

ZAPATA

SUBTRAMO XV
EVN-1.4.

DIMENSIONAMIENTO DE ZAPATAS DE PILAS

HIPOTESIS DE FX,MAX

Dimensiones de zapata

A=	11.80	m.	Peso de zapata=	286	t.
B=	5.70	m.			
Cz=	1.70	m.			

Cargas de servicio

	En cara sup. de zapata	En cara infe. de zapata
Fx=	1457.0	1742.9
Fy=	155.0	155.0
Fz=	65.3	65.3
My=	496.0	607.0
Mz=	1178.0	1441.5

Tension cobaricentrica= 34 t/m2 Tension media= 26 t/m2

Armaduras de la zapata

Direcc. Z	Vuelo flexion	2.43 m.	Md,z=	152.0 m.t/m
			As,inf,z=	25.21 cm2/m
	Vuelo cortante	1.4 m.	Vd,z=	72.1 t/m
			Vcu=	103.3 t/m
				No necesita armadura de cortante
Direcc. Y	Vuelo flexion	3.45 m.	Md,y=	306.5 m.t/m
			As,inf,y=	50.81 cm2/m
	Vuelo cortante	1.55 m.	Vd,y=	79.8 t/m
			Vcu=	103.3 t/m
				No necesita armadura de cortante

HIPOTESIS DE FX,MMIN

Dimensiones de zapata

A=	11.80	m.	Peso de zapata=	286	t.
B=	5.70	m.			
Cz=	1.70	m.			

Cargas de servicio

	En cara sup. de zapata	En cara infe. de zapata
Fx=	765.0	1050.9
Fy=	155.0	155.0
Fz=	65.3	65.3
My=	496.0	607.0
Mz=	1178.0	1441.5

Tension cobaricentrica= 26 t/m2 Tension media= 16 t/m2

Armaduras de la zapata

Direcc. Z	Vuelo flexion	2.43 m.	Md,z=	113.1 m.t/m
			As,inf,z=	18.75 cm2/m

	Vuelo cortante	1.4 m.	Vd,z=	53.6 t/m
			Vcu=	103.3 t/m
				No necesita armadura de cortante
Direcc. Y	Vuelo flexion	3.45 m.	Md,y=	227.9 m.t/m
			As,inf,y=	37.79 cm2/m
	Vuelo cortante	1.55 m.	Vd,y=	59.4 t/m
			Vcu=	103.3 t/m
				No necesita armadura de cortante

HIPOTESIS DE MZ,max

Dimensiones de zapata

A=	11.80	m.	Peso de zapata=	286	t.
B=	5.70	m.			
Cz=	1.70	m.			

Cargas de servicio

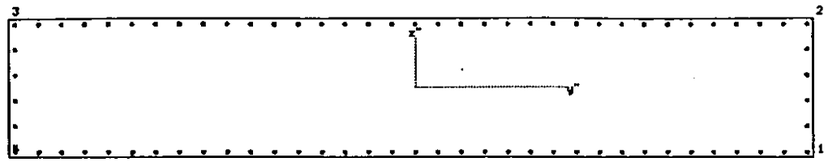
	En cara sup. de zapata	En cara infe. de zapata
Fx=	1154.0	1439.9
Fy=	155.0	155.0
Fz=	65.3	65.3
My=	496.0	607.0
Mz=	1877.0	2140.5

Tension cobaricentrica= 34 t/m2 Tension media= 21 t/m2

Armaduras de la zapata

Direcc. Z	Vuelo flexion	2.43 m.	Md,z=	148.7 m.t/m
			As,inf,z=	24.66 cm2/m
	Vuelo cortante	1.4 m.	Vd,z=	70.5 t/m
			Vcu=	103.3 t/m
				No necesita armadura de cortante
Direcc. Y	Vuelo flexion	3.45 m.	Md,y=	299.8 m.t/m
			As,inf,y=	49.71 cm2/m
	Vuelo cortante	1.55 m.	Vd,y=	78.1 t/m
			Vcu=	103.3 t/m
				No necesita armadura de cortante

Mstb. 1 : 50.0



Sección :"FUSTE" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H300PIL"

Ancho = 690.00 cm Canto = 120.00 cm

Características mecánicas de la sección:
Area : Ax= 8.280 [m2]
Momentos de inercia : Iy= 0.993599 [m4] Iz= 32.851 [m4]
Inercia a torsión : Ix= 3.539 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.600000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-3.450	-9.522	1.150
dch.	Iz	3.450	9.522	-1.150
abajo	Iy	-0.600	-1.656	0.200
arriba	Iy	0.600	1.656	-0.200

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	171.81	-340.00	5.00	340.00	5.00
2	AEH500	(2)	171.81	-340.00	115.00	340.00	115.00
3	AEH500	(2)	29.45	-340.00	115.00	-340.00	5.00
4	AEH500	(2)	29.45	340.00	115.00	340.00	5.00
	Total:		402.52	Cuantía de armadura: 0.486 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H300PIL")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	690.00 [cm]	116.00 [cm]	0.00
Vy	0.00 [cm2/m]	120.00 [cm]	686.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,min [kp/cm2]
"H300PIL"	210000.0	-153.000	-2.000	0.0	10.000	300.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Cálculo Resistencia Ultima: Viga "FUSTE"/"B1"

Solicitación Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
-2186.000				744.000	1767.000

Coeficiente de seguridad 2.948

Cálculo Resistencia Ultima: Viga "FUSTE"/"B1"

Solicitación Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
-688.500				744.000	1767.000

Coeficiente de seguridad 2.088

Cálculo Resistencia Ultima: Viga "FUSTE"/"B1"

Solicitación Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
-1731.000				744.000	2816.000

Coeficiente de seguridad 2.508

PUENTE EVN1-1.4

4º CALCULO DE ESTRIBOS

CALCULO ESTRIBOS CERRADOS

NOMBRE PROYECTO :	SUBTRAMO XV
NOMBRE OBRA :	ESTRIBO 1. EVN1-1.4

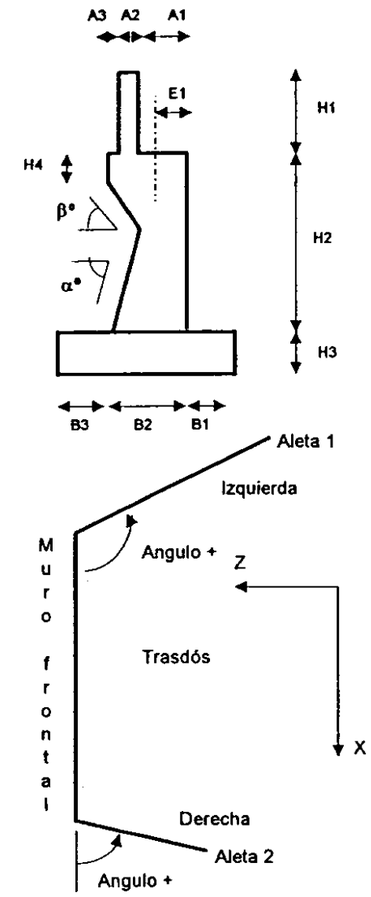
DATOS REQUERIDOS:

GESTION FICHEROS

Directorio fichero generación modelo (.GEO) :	G:\MAZAXV.2\ER1-1.4\ESTRIBOS\COSMOS
Directorio fichero listados (.LIS) :	G:\MAZAXV.2\ER1-1.4\ESTRIBOS\COSMOS

MURO FRONTAL

H1. Altura murete (m) :	1.800	
H2. Altura muro frontal (m) :	7.90	
H3. Canto zapata (m) :	1.50	
Altura tierras en trasdós (superior zapata)(m) :	9.70	
B1. Puntera zapata (m) :	2.00	Zapata tipo I
B2. Canto muro en base (m) :	1.30	
B3. Talón zapata (m) :	4.70	Zapata tipo III
A1 (m) :	1.90	
A2. Canto murete de guarda (m) :	0.50	
A3. Vuelo ménsula apoyo losa transición (m) :	0.00	
H4. Canto min. apoyo losa transición (m) :	0.30	
α . Angulo trasdós muro (°) :	90.00	
β . Angulo inferior apoyo losa transición (°) :	45.00	
E1. Distancia apoyo tablero (m) :	0.60	
Longitud (m) :	12.80	



MUROS EN VUELTA (Intradós vertical)

	Izquierdo (1)	Derecho (2)
Longitud (m) :	6.00	6.00
Canto en base (m) :	1.30	1.30
Canto coronación (m) :	0.50	0.50
Angulo (°) :	106.85	106.85

ALETAS

	Izquierda (1)	Derecha (2)
Canto aleta en empotramiento (m) :	4.17	4.17
Canto aleta en extremo (m) :	0.50	0.50
Longitud aleta (m) :	5.50	5.50
Espesor aleta (m) :	0.50	0.50

CARACTERISTICAS DE TERRENO

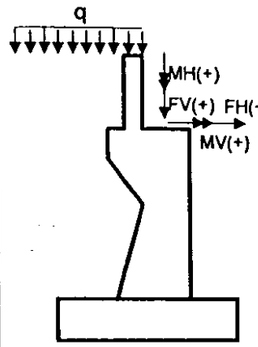
Peso específico (T/m³) :	2.00
Angulo rozamiento interno (°) :	30.00
Coeficiente rozamiento zapata-terreno :	0.58
Angulo. rozamiento tierras muro (°) :	0.00
Tension admisible (T / m²) :	30.00

CARACTERISTICAS DE LOS MATERIALES

Peso específico hormigón (T / m³) :	2.50
Límite elástico acero (T / m²) :	51000.00
Resistencia hormigón. cimientos (T / m²) :	2500.00
Resistencia hormigón. alzado (T / m²) :	2500.00
Mod. Elasticidad Hormigón alzado (T / m²) :	3000000

CARGAS SOBRE EL ESTRIBO (Carga total sobre el estribo sin mayorar)

q (Sobrecarga de tráfico (T / m²) :	3.00
Peso barrera en muros en vuelta y aletas (T / m) :	1.10



	FV (T)	MV (mT)	FH (T)	MH (mT)
Acciones permanentes (G)				
Peso propio y carga muerta tablero :	282.00	0.00	—	—
Acciones permanentes de valor no constante (G*)				
Pretensado tablero :	0.00	0.00	—	—
Retracción y fluencia tablero :	—	—	8.46	0.00
Asientos estructura :	0.00	0.00	—	—
Acciones Variables (Q)				
Sobrecarga de uso máxima tablero :	207.00	0.00	0.00	0.00
Sobrecarga de uso mínima tablero :	-39.00	0.00	3.48	0.00
Efectos térmicos tablero :	0.00	0.00	0.00	0.00

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento	Csd=	1.50
Seguridad al vuelco	Csv=	1.80
Minoracion acero	γs=	1.15
Minoracion hormigon	γc=	1.50

	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Pretensado :	0.00	1.00
Reológicas (retracción y fluencia) :	0.00	1.50
Terreno (pesopropio, empujes y asientos) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas, viento, temperatura :	0.00	1.50

Ψo (coeficiente valor de combinación variables) :	1.00	(poner 1 según antigua instrucción)

DATOS VARIOS

Número de apoyos :	2.00	
Separación apoyos (m) :	4.600	
Recubrimiento armadura (m) :	0.05	
Distancia sección 1-1 (a superior zapata) (m) :	4.00	Vale
Tamaño medio elementos mallado (m) :	0.60	
Vertical muros (o/oo)	0.900	
Horizontal muros (o/oo) :	1.600	
Longitudinal y transversal zapata (o/OO) :	1.447	

COMPROBACIONES

SEGURIDAD AL DESLIZAMIENTO (Planteamiento clásico)

$$C_{SD} = \frac{\sum_i \text{Fuerzas} - \text{opuestas}}{\sum_i \text{Fuerzas} - \text{deslizantes}}$$

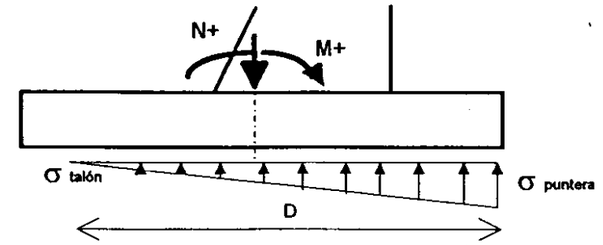
	Fuerzas en construcción (T / m) Opuestas	Deslizantes	Fuerzas en servicio (T / m) Opuestas	Deslizantes
Acciones permanentes (G)				
Peso propio estribo	34.952	—	34.952	—
Carga permanente tablero	—	—	12.778	—
Acciones permanentes de valor no constante (G*)				
Pretensado tablero	—	—	0.000	—
Retracción y fluencia tablero	—	—	—	0.661
Tierras	49.503	41.813	49.503	41.813
Asientos estructura	—	—	0.000	—
Acciones variables (Q)				
Sobrecarga de tráfico	—	—	7.134	11.200
Efectos térmicos tablero	—	—	0.000	0.000
Sobrecarga de uso tablero máxima	—	—	—	—
Sobrecarga de uso tablero mínima	—	—	0.000	2.039
TOTAL	**84.455**	**41.813**	**104.367**	**55.713**
Csd=	**2.0**	VALE	**1.9**	VALE

SEGURIDAD AL VUELCO (Planteamiento clásico)

$$C_{SV} = \frac{\sum_i \text{Momentos} - \text{estabilizadores}}{\sum_i \text{Momentos} - \text{volcadores}}$$

	Momentos construcción (mT / m) Estabilizadores	Volcadores	Momentos servicio (mT / m) Estabilizadores	Volcadores
Acciones permanentes (G)				
Peso propio estribo	206.098	—	206.098	—
Carga permanente tablero	—	—	57.281	—
Acciones permanentes de valor no constante (G*)				
Pretensado tablero	—	—	0.000	—
Retracción y fluencia tablero	—	—	—	6.213
Tierras	492.943	156.103	492.943	156.103
Asientos estructura	—	—	0.000	—
Acciones variables (Q)				
Sobrecarga de tráfico	—	—	0.000	0.000
Efectos térmicos tablero	—	—	0.000	0.000
Sobrecarga de uso tablero máxima	—	—	—	—
Sobrecarga de uso tablero mínima	—	—	0.000	10.478
TOTAL	**699.042**	**156.103**	**756.323**	**172.793**
Csv=	**4.5**	VALE	**4.4**	VALE

TENSIONES MAXIMAS Y MINIMAS EN CIMENTACION



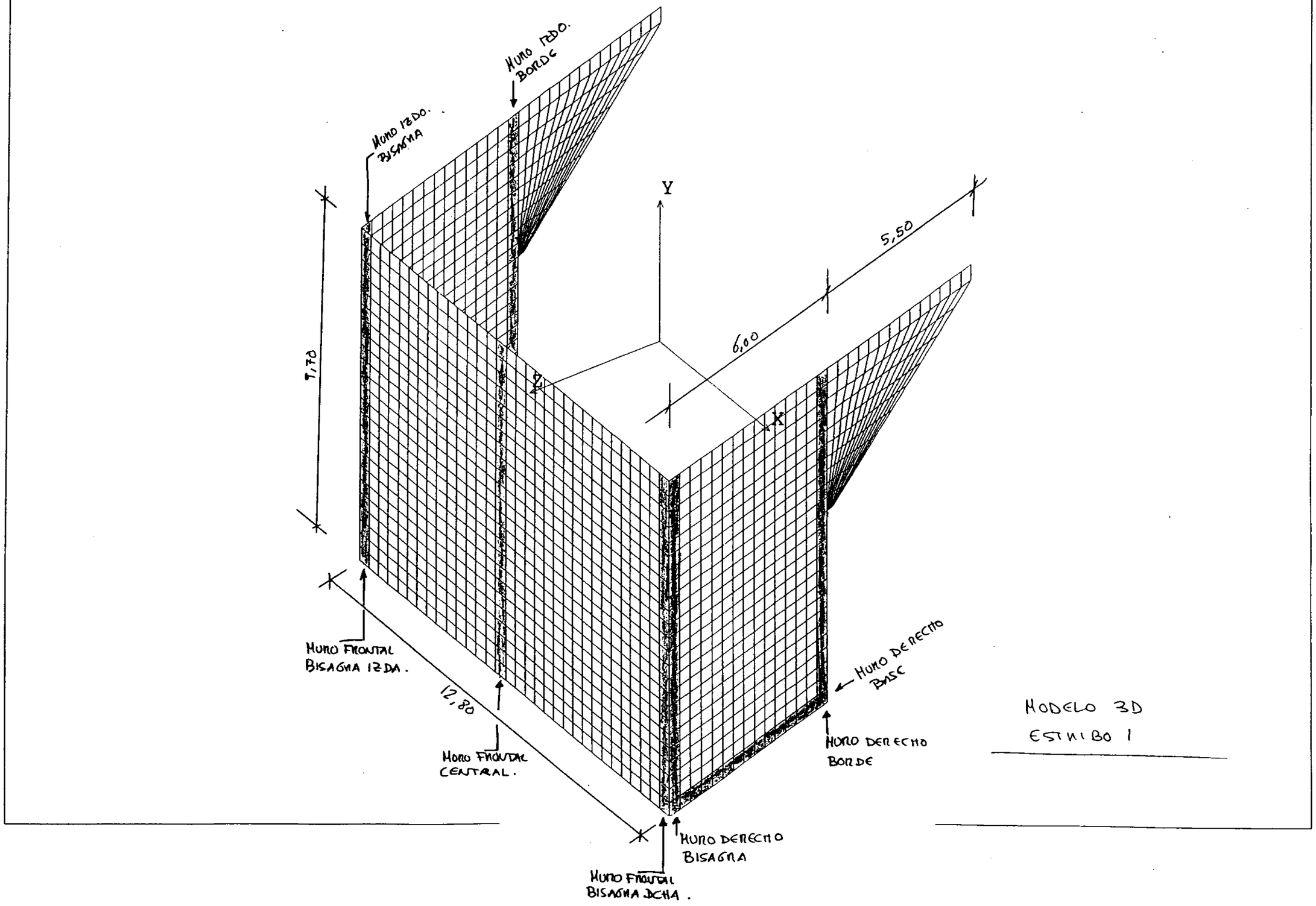
	Construcción N (T / m)	M (mT / m)	Servicio N (T / m)	M (mT / m)
Acciones permanentes (G)				
Peso propio estribo	60.263	34.952	60.263	34.952
Carga permanente tablero	—	—	22.031	30.844
Acciones permanentes de valor no constante (G*)				
Pretensado tablero	—	—	0.000	0.000
Retracción y fluencia tablero	—	—	0.000	6.213
Tierras	85.350	4.560	85.350	4.560
Asientos estructura	—	—	0.000	0.000
Acciones variables (Q)				
Sobrecarga de tráfico	—	—	12.300	38.735
Efectos térmicos tablero	—	—	0.000	0.000
Sobrecarga de uso tablero máxima	—	—	16.172	22.641
Sobrecarga de uso tablero mínima	—	—	—	—
TOTAL	**145.613**	**39.511**	**196.116**	**137.944**
D =	**8.00 (m)**		**8.00 (m)**	
σ puntera=	**21.91 (T / m²)**		**37.45 (T / m²)**	
σ talón=	**14.50 (T / m²)**		**11.58 (T / m²)**	
σmed=	**18.20 (T / m²)**		**24.51 (T / m²)**	
σcob=	**19.53 (T / m²)**		**29.74 (T / m²)**	
	VALE		VALE	

CALCULO DE ARMADURAS

Elemento	Sección		
	Designacion	Ancho (b)(m)	Canto (h)(m)
MURO	0-0	1.00	1.30
	1-1	1.00	1.30
MURETE	4-4	1.00	0.50
PUNTERA	2-2 (+)	1.00	1.50
	2-2 (-)	1.00	1.50
TALÓN	3-3 (+)	1.00	1.50
	3-3 (-)	1.00	1.50

Elemento	Sección	Armadura de flexión					
	Designacion	b cálculo(m)	h cálculo (m)	Nd (T)	Md (mT)	As (cm²/m)	Control cálcu
MURO	0-0	1.00	1.30	42.49	229.18	48.192	Vale Dor
	1-1	1.00	1.30	30.79	56.14	13.797	Vale Dor
MURETE	4-4	1.00	0.50	2.03	3.40	1.966	Vale Dor
PUNTERA	2-2 (+)	1.00	1.50	—	113.22	17.954	Vale
	2-2 (-)	1.00	1.50	—	25.10	3.920	Vale
TALÓN	3-3 (+)	1.00	1.50	—	-117.11	18.584	Vale
	3-3 (-)	1.00	1.50	—	-115.32	18.294	Vale

Elemento	Sección	Armadura de cortante				
	Designacion	b cálculo(m)	h cálculo (m)	Vd (T)	As (cm²/m²)	Control cálculo
MURO	0-0	1.00	1.30	62.99	0.00	Vale. As min = 7.94
	1-1	1.00	1.30	26.19	0.00	Vale. As min = 7.94
MURETE	4-4	1.00	0.50	4.32	0.00	Vale. As min = 7.94
PUNTERA	2-2 (+)	1.00	1.50	60.50	0.00	Vale. As min = 0.00
	2-2 (-)	1.00	1.50	13.45	0.00	Vale. As min = 0.00
TALÓN	3-3 (+)	1.00	1.50	17.37	0.00	Vale. As min = 7.94
	3-3 (-)	1.00	1.50	-53.64	0.00	Vale. As min = 7.94



MODELO 3D
ESTRIBO 1

```
**********************************************************
*****
**********************************************************
*****
**                                  **
**                                  **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS   / M    M **
** C    O  O  S     MM  MM  O  O  S      / MM  MM **
** C    O  O  SSSS  M M M M  O  O  SSSS  / M M M M **
** C    O  O     S  M  M  M  O  O     S / M  M  M **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS /  M    M **
**                                  **
**                                  **
**            VERSION: 2.00                **
**            DISTRIBUTED BY:              **
**    STRUCTURAL RESEARCH AND ANALYSIS CORPORATION
**
**        12121 WILSHIRE BLVD. SUITE 700          **
**       LOS ANGELES,  CALIFORNIA  90025          **
**         TEL. NO.  (310) 207-2800               **
**         COPYRIGHT  1988  S. R. A. C.           **
**                                  **
**********************************************************
*****
**********************************************************
*****
Problem name: E1
Date     : 10/27/1998    Time:  16:02:13
Title    :                                        |
Subtitle :


Element group data
------------------
 Element group number=   1
 Element name:
 SHELL4T  Four node thick shell elements
  Type of Shell element= . . . . . . . . . . . . .   1
    EQ. 0 ; QUAD 2  element
    EQ. 1 ; QUAD 4  element


Real constant data
------------------
 Real constant set   1
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.2837
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   2
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.2511
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   3
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.2186
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   4
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.1860
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   5
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.1534
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   6
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.1208
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   7
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.0882
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   8
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.0557
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   9
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.0231
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   10
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .99050
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   11
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .95790
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   12
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .92540
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   13
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .89280
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   14
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .86020
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   15
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .82760
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   16
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .79510
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   17
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .76250
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   18
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .72990
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   19
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .69730
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   20
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .66470
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   21
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .62990
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   22
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .59280
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   23
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .55570
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   24
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .51860
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   25
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.3000
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   26
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   .50000
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   27
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.2837
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   28
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.2511
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   29
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.2186
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   30
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.1860
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   31
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.1534
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   32
 Associated with :
 SHELL4T  Four node thick shell elements
  Thickness of the plate =   1.1208
  Temperature Gradient  =   .00000
  Prestress             =   .00000
  Prestrain             =   .00000
 Real constant set   33
 Associated with :
 SHELL4T  Four node thick shell elements
```

Thickness of the plate = 1.0882
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 34
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = 1.0557
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 35
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = 1.0231
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 36
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .99050
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 37
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .95790
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 38
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .92540
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 39
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .89280
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 40
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .86020
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 41
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .82760
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 42
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .79510
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 43
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .76250
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 44
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .72990
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 45
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .69730
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 46
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .66470
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 47
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .62990
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 48
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .59280
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 49
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .55570
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 50
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .51860
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 51
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .50000
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 52
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .50000
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 53
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .50000
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 54
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .50000
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 55
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .50000
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 56
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = .50000
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 57
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = 2.3886
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000
Real constant set 58
Associated with :
SHELL4T Four node thick shell elements
Thickness of the plate = 2.5785
Temperature Gradient = .00000
Prestress = .00000
Prestrain = .00000

Material propery data

Material property set 1

	Value	Temp curve no.
EX : X Elastic Modulus	.30000E+07	0
NUXY : Poisson Ratio	.20000	0
DENS : Mass Density	2.5000	0

Nodal input data

NODE	BOUNDARY CONDITION CODES (0 = FREE ; 1 = FIXED)						NODAL POINT COORDINATES		
	X	Y	Z	XX	YY	ZZ	X	Y	Z
1	1	1	1	1	1	1	1.5943	.00000	5.2639
2	1	1	1	1	1	1	1.7102	.00000	5.6467
3	1	1	1	1	1	1	1.8262	.00000	6.0296
4	1	1	1	1	1	1	1.9421	.00000	6.4124
5	1	1	1	1	1	1	2.0581	.00000	6.7952
6	1	1	1	1	1	1	2.1740	.00000	7.1780
7	1	1	1	1	1	1	2.2900	.00000	7.5609
8	1	1	1	1	1	1	2.4059	.00000	7.9437
9	1	1	1	1	1	1	2.5219	.00000	8.3265
10	1	1	1	1	1	1	2.6378	.00000	8.7093
11	1	1	1	1	1	1	2.7538	.00000	9.0922
12	1	1	1	1	1	1	2.8697	.00000	9.4750
13	1	1	1	1	1	1	2.9857	.00000	9.8578
14	1	1	1	1	1	1	3.1016	.00000	10.241
15	1	1	1	1	1	1	3.2176	.00000	10.623
16	1	1	1	1	1	1	3.3335	.00000	11.006
17	0	0	0	0	0	0	1.5943	.39500	5.2639
18	0	0	0	0	0	0	1.7102	.39500	5.6467
19	0	0	0	0	0	0	1.8262	.39500	6.0296
20	0	0	0	0	0	0	1.9421	.39500	6.4124
21	0	0	0	0	0	0	2.0581	.39500	6.7952
22	0	0	0	0	0	0	2.1740	.39500	7.1780
23	0	0	0	0	0	0	2.2900	.39500	7.5609
24	0	0	0	0	0	0	2.4059	.39500	7.9437
25	0	0	0	0	0	0	2.5219	.39500	8.3265
26	0	0	0	0	0	0	2.6378	.39500	8.7093
27	0	0	0	0	0	0	2.7538	.39500	9.0922
28	0	0	0	0	0	0	2.8697	.39500	9.4750
29	0	0	0	0	0	0	2.9857	.39500	9.8578
30	0	0	0	0	0	0	3.1016	.39500	10.241
31	0	0	0	0	0	0	3.2176	.39500	10.623
32	0	0	0	0	0	0	3.3335	.39500	11.006
33	0	0	0	0	0	0	1.5943	.79000	5.2639
34	0	0	0	0	0	0	1.7102	.79000	5.6467
35	0	0	0	0	0	0	1.8262	.79000	6.0296
36	0	0	0	0	0	0	1.9421	.79000	6.4124
37	0	0	0	0	0	0	2.0581	.79000	6.7952
38	0	0	0	0	0	0	2.1740	.79000	7.1780
39	0	0	0	0	0	0	2.2900	.79000	7.5609
40	0	0	0	0	0	0	2.4059	.79000	7.9437
41	0	0	0	0	0	0	2.5219	.79000	8.3265
42	0	0	0	0	0	0	2.6378	.79000	8.7093
43	0	0	0	0	0	0	2.7538	.79000	9.0922
44	0	0	0	0	0	0	2.8697	.79000	9.4750
45	0	0	0	0	0	0	2.9857	.79000	9.8578
46	0	0	0	0	0	0	3.1016	.79000	10.241
47	0	0	0	0	0	0	3.2176	.79000	10.623
48	0	0	0	0	0	0	3.3335	.79000	11.006
49	0	0	0	0	0	0	1.5943	1.1850	5.2639
50	0	0	0	0	0	0	1.7102	1.1850	5.6467
51	0	0	0	0	0	0	1.8262	1.1850	6.0296
52	0	0	0	0	0	0	1.9421	1.1850	6.4124
53	0	0	0	0	0	0	2.0581	1.1850	6.7952
54	0	0	0	0	0	0	2.1740	1.1850	7.1780
55	0	0	0	0	0	0	2.2900	1.1850	7.5609
56	0	0	0	0	0	0	2.4059	1.1850	7.9437
57	0	0	0	0	0	0	2.5219	1.1850	8.3265
58	0	0	0	0	0	0	2.6378	1.1850	8.7093
59	0	0	0	0	0	0	2.7538	1.1850	9.0922
60	0	0	0	0	0	0	2.8697	1.1850	9.4750
61	0	0	0	0	0	0	2.9857	1.1850	9.8578
62	0	0	0	0	0	0	3.1016	1.1850	10.241
63	0	0	0	0	0	0	3.2176	1.1850	10.623
64	0	0	0	0	0	0	3.3335	1.1850	11.006
65	0	0	0	0	0	0	1.5943	1.5800	5.2639
66	0	0	0	0	0	0	1.7102	1.5800	5.6467
67	0	0	0	0	0	0	1.8262	1.5800	6.0296
68	0	0	0	0	0	0	1.9421	1.5800	6.4124
69	0	0	0	0	0	0	2.0581	1.5800	6.7952
70	0	0	0	0	0	0	2.1740	1.5800	7.1780
71	0	0	0	0	0	0	2.2900	1.5800	7.5609
72	0	0	0	0	0	0	2.4059	1.5800	7.9437
73	0	0	0	0	0	0	2.5219	1.5800	8.3265
74	0	0	0	0	0	0	2.6378	1.5800	8.7093
75	0	0	0	0	0	0	2.7538	1.5800	9.0922
76	0	0	0	0	0	0	2.8697	1.5800	9.4750

77	0	0	0	0	0	0	2.9857	1.5800	9.8578
78	0	0	0	0	0	0	3.1016	1.5800	10.241
79	0	0	0	0	0	0	3.2176	1.5800	10.623
80	0	0	0	0	0	0	3.3335	1.5800	11.006
81	0	0	0	0	0	0	1.5943	1.9750	5.2639
82	0	0	0	0	0	0	1.7102	1.9750	5.6467
83	0	0	0	0	0	0	1.8262	1.9750	6.0296
84	0	0	0	0	0	0	1.9421	1.9750	6.4124
85	0	0	0	0	0	0	2.0581	1.9750	6.7952
86	0	0	0	0	0	0	2.1740	1.9750	7.1780
87	0	0	0	0	0	0	2.2900	1.9750	7.5609
88	0	0	0	0	0	0	2.4059	1.9750	7.9437
89	0	0	0	0	0	0	2.5219	1.9750	8.3265
90	0	0	0	0	0	0	2.6378	1.9750	8.7093
91	0	0	0	0	0	0	2.7538	1.9750	9.0922
92	0	0	0	0	0	0	2.8697	1.9750	9.4750
93	0	0	0	0	0	0	2.9857	1.9750	9.8578
94	0	0	0	0	0	0	3.1016	1.9750	10.241
95	0	0	0	0	0	0	3.2176	1.9750	10.623
96	0	0	0	0	0	0	3.3335	1.9750	11.006
97	0	0	0	0	0	0	1.5943	2.3700	5.2639
98	0	0	0	0	0	0	1.7102	2.3700	5.6467
99	0	0	0	0	0	0	1.8262	2.3700	6.0296
100	0	0	0	0	0	0	1.9421	2.3700	6.4124
101	0	0	0	0	0	0	2.0581	2.3700	6.7952
102	0	0	0	0	0	0	2.1740	2.3700	7.1780
103	0	0	0	0	0	0	2.2900	2.3700	7.5609
104	0	0	0	0	0	0	2.4059	2.3700	7.9437
105	0	0	0	0	0	0	2.5219	2.3700	8.3265
106	0	0	0	0	0	0	2.6378	2.3700	8.7093
107	0	0	0	0	0	0	2.7538	2.3700	9.0922
108	0	0	0	0	0	0	2.8697	2.3700	9.4750
109	0	0	0	0	0	0	2.9857	2.3700	9.8578
110	0	0	0	0	0	0	3.1016	2.3700	10.241
111	0	0	0	0	0	0	3.2176	2.3700	10.623
112	0	0	0	0	0	0	3.3335	2.3700	11.006
113	0	0	0	0	0	0	1.5943	2.7650	5.2639
114	0	0	0	0	0	0	1.7102	2.7650	5.6467
115	0	0	0	0	0	0	1.8262	2.7650	6.0296
116	0	0	0	0	0	0	1.9421	2.7650	6.4124
117	0	0	0	0	0	0	2.0581	2.7650	6.7952
118	0	0	0	0	0	0	2.1740	2.7650	7.1780
119	0	0	0	0	0	0	2.2900	2.7650	7.5609
120	0	0	0	0	0	0	2.4059	2.7650	7.9437
121	0	0	0	0	0	0	2.5219	2.7650	8.3265
122	0	0	0	0	0	0	2.6378	2.7650	8.7093
123	0	0	0	0	0	0	2.7538	2.7650	9.0922
124	0	0	0	0	0	0	2.8697	2.7650	9.4750
125	0	0	0	0	0	0	2.9857	2.7650	9.8578
126	0	0	0	0	0	0	3.1016	2.7650	10.241
127	0	0	0	0	0	0	3.2176	2.7650	10.623
128	0	0	0	0	0	0	3.3335	2.7650	11.006
129	0	0	0	0	0	0	1.5943	3.1600	5.2639
130	0	0	0	0	0	0	1.7102	3.1600	5.6467
131	0	0	0	0	0	0	1.8262	3.1600	6.0296
132	0	0	0	0	0	0	1.9421	3.1600	6.4124
133	0	0	0	0	0	0	2.0581	3.1600	6.7952
134	0	0	0	0	0	0	2.1740	3.1600	7.1780
135	0	0	0	0	0	0	2.2900	3.1600	7.5609
136	0	0	0	0	0	0	2.4059	3.1600	7.9437
137	0	0	0	0	0	0	2.5219	3.1600	8.3265
138	0	0	0	0	0	0	2.6378	3.1600	8.7093
139	0	0	0	0	0	0	2.7538	3.1600	9.0922
140	0	0	0	0	0	0	2.8697	3.1600	9.4750
141	0	0	0	0	0	0	2.9857	3.1600	9.8578
142	0	0	0	0	0	0	3.1016	3.1600	10.241
143	0	0	0	0	0	0	3.2176	3.1600	10.623
144	0	0	0	0	0	0	3.3335	3.1600	11.006
145	0	0	0	0	0	0	1.5943	3.5550	5.2639
146	0	0	0	0	0	0	1.7102	3.5550	5.6467
147	0	0	0	0	0	0	1.8262	3.5550	6.0296
148	0	0	0	0	0	0	1.9421	3.5550	6.4124
149	0	0	0	0	0	0	2.0581	3.5550	6.7952
150	0	0	0	0	0	0	2.1740	3.5550	7.1780
151	0	0	0	0	0	0	2.2900	3.5550	7.5609
152	0	0	0	0	0	0	2.4059	3.5550	7.9437
153	0	0	0	0	0	0	2.5219	3.5550	8.3265
154	0	0	0	0	0	0	2.6378	3.5550	8.7093
155	0	0	0	0	0	0	2.7538	3.5550	9.0922
156	0	0	0	0	0	0	2.8697	3.5550	9.4750
157	0	0	0	0	0	0	2.9857	3.5550	9.8578
158	0	0	0	0	0	0	3.1016	3.5550	10.241
159	0	0	0	0	0	0	3.2176	3.5550	10.623
160	0	0	0	0	0	0	3.3335	3.5550	11.006
161	0	0	0	0	0	0	1.5943	3.9500	5.2639
162	0	0	0	0	0	0	1.7102	3.9500	5.6467
163	0	0	0	0	0	0	1.8262	3.9500	6.0296
164	0	0	0	0	0	0	1.9421	3.9500	6.4124
165	0	0	0	0	0	0	2.0581	3.9500	6.7952
166	0	0	0	0	0	0	2.1740	3.9500	7.1780
167	0	0	0	0	0	0	2.2900	3.9500	7.5609
168	0	0	0	0	0	0	2.4059	3.9500	7.9437
169	0	0	0	0	0	0	2.5219	3.9500	8.3265
170	0	0	0	0	0	0	2.6378	3.9500	8.7093
171	0	0	0	0	0	0	2.7538	3.9500	9.0922
172	0	0	0	0	0	0	2.8697	3.9500	9.4750
173	0	0	0	0	0	0	2.9857	3.9500	9.8578
174	0	0	0	0	0	0	3.1016	3.9500	10.241
175	0	0	0	0	0	0	3.2176	3.9500	10.623
176	0	0	0	0	0	0	3.3335	3.9500	11.006
177	0	0	0	0	0	0	1.5943	4.3450	5.2639
178	0	0	0	0	0	0	1.7102	4.3450	5.6467
179	0	0	0	0	0	0	1.8262	4.3450	6.0296
180	0	0	0	0	0	0	1.9421	4.3450	6.4124
181	0	0	0	0	0	0	2.0581	4.3450	6.7952
182	0	0	0	0	0	0	2.1740	4.3450	7.1780
183	0	0	0	0	0	0	2.2900	4.3450	7.5609
184	0	0	0	0	0	0	2.4059	4.3450	7.9437
185	0	0	0	0	0	0	2.5219	4.3450	8.3265
186	0	0	0	0	0	0	2.6378	4.3450	8.7093
187	0	0	0	0	0	0	2.7538	4.3450	9.0922
188	0	0	0	0	0	0	2.8697	4.3450	9.4750
189	0	0	0	0	0	0	2.9857	4.3450	9.8578
190	0	0	0	0	0	0	3.1016	4.3450	10.241
191	0	0	0	0	0	0	3.2176	4.3450	10.623
192	0	0	0	0	0	0	3.3335	4.3450	11.006
193	0	0	0	0	0	0	1.5943	4.7400	5.2639
194	0	0	0	0	0	0	1.7102	4.7400	5.6467
195	0	0	0	0	0	0	1.8262	4.7400	6.0296
196	0	0	0	0	0	0	1.9421	4.7400	6.4124
197	0	0	0	0	0	0	2.0581	4.7400	6.7952
198	0	0	0	0	0	0	2.1740	4.7400	7.1780
199	0	0	0	0	0	0	2.2900	4.7400	7.5609
200	0	0	0	0	0	0	2.4059	4.7400	7.9437
201	0	0	0	0	0	0	2.5219	4.7400	8.3265
202	0	0	0	0	0	0	2.6378	4.7400	8.7093
203	0	0	0	0	0	0	2.7538	4.7400	9.0922
204	0	0	0	0	0	0	2.8697	4.7400	9.4750
205	0	0	0	0	0	0	2.9857	4.7400	9.8578
206	0	0	0	0	0	0	3.1016	4.7400	10.241
207	0	0	0	0	0	0	3.2176	4.7400	10.623
208	0	0	0	0	0	0	3.3335	4.7400	11.006
209	0	0	0	0	0	0	1.5943	5.1350	5.2639
210	0	0	0	0	0	0	1.7102	5.1350	5.6467
211	0	0	0	0	0	0	1.8262	5.1350	6.0296
212	0	0	0	0	0	0	1.9421	5.1350	6.4124
213	0	0	0	0	0	0	2.0581	5.1350	6.7952
214	0	0	0	0	0	0	2.1740	5.1350	7.1780
215	0	0	0	0	0	0	2.2900	5.1350	7.5609
216	0	0	0	0	0	0	2.4059	5.1350	7.9437
217	0	0	0	0	0	0	2.5219	5.1350	8.3265
218	0	0	0	0	0	0	2.6378	5.1350	8.7093
219	0	0	0	0	0	0	2.7538	5.1350	9.0922
220	0	0	0	0	0	0	2.8697	5.1350	9.4750
221	0	0	0	0	0	0	2.9857	5.1350	9.8578
222	0	0	0	0	0	0	3.1016	5.1350	10.241
223	0	0	0	0	0	0	3.2176	5.1350	10.623
224	0	0	0	0	0	0	3.3335	5.1350	11.006
225	0	0	0	0	0	0	1.5943	5.5300	5.2639
226	0	0	0	0	0	0	1.7102	5.5300	5.6467
227	0	0	0	0	0	0	1.8262	5.5300	6.0296
228	0	0	0	0	0	0	1.9421	5.5300	6.4124
229	0	0	0	0	0	0	2.0581	5.5300	6.7952
230	0	0	0	0	0	0	2.1740	5.5300	7.1780
231	0	0	0	0	0	0	2.2900	5.5300	7.5609
232	0	0	0	0	0	0	2.4059	5.5300	7.9437
233	0	0	0	0	0	0	2.5219	5.5300	8.3265
234	0	0	0	0	0	0	2.6378	5.5300	8.7093
235	0	0	0	0	0	0	2.7538	5.5300	9.0922
236	0	0	0	0	0	0	2.8697	5.5300	9.4750
237	0	0	0	0	0	0	2.9857	5.5300	9.8578
238	0	0	0	0	0	0	3.1016	5.5300	10.241
239	0	0	0	0	0	0	3.2176	5.5300	10.623
240	0	0	0	0	0	0	3.3335	5.5300	11.006
241	0	0	0	0	0	0	1.5943	5.9250	5.2639
242	0	0	0	0	0	0	1.7102	5.9250	5.6467
243	0	0	0	0	0	0	1.8262	5.9250	6.0296
244	0	0	0	0	0	0	1.9421	5.9250	6.4124
245	0	0	0	0	0	0	2.0581	5.9250	6.7952
246	0	0	0	0	0	0	2.1740	5.9250	7.1780
247	0	0	0	0	0	0	2.2900	5.9250	7.5609
248	0	0	0	0	0	0	2.4059	5.9250	7.9437
249	0	0	0	0	0	0	2.5219	5.9250	8.3265
250	0	0	0	0	0	0	2.6378	5.9250	8.7093
251	0	0	0	0	0	0	2.7538	5.9250	9.0922
252	0	0	0	0	0	0	2.8697	5.9250	9.4750
253	0	0	0	0	0	0	2.9857	5.9250	9.8578
254	0	0	0	0	0	0	3.1016	5.9250	10.241
255	0	0	0	0	0	0	3.2176	5.9250	10.623
256	0	0	0	0	0	0	3.3335	5.9250	11.006
257	0	0	0	0	0	0	1.5943	6.3200	5.2639
258	0	0	0	0	0	0	1.7102	6.3200	5.6467
259	0	0	0	0	0	0	1.8262	6.3200	6.0296
260	0	0	0	0	0	0	1.9421	6.3200	6.4124
261	0	0	0	0	0	0	2.0581	6.3200	6.7952
262	0	0	0	0	0	0	2.1740	6.3200	7.1780
263	0	0	0	0	0	0	2.2900	6.3200	7.5609
264	0	0	0	0	0	0	2.4059	6.3200	7.9437
265	0	0	0	0	0	0	2.5219	6.3200	8.3265
266	0	0	0	0	0	0	2.6378	6.3200	8.7093
267	0	0	0	0	0	0	2.7538	6.3200	9.0922
268	0	0	0	0	0	0	2.8697	6.3200	9.4750
269	0	0	0	0	0	0	2.9857	6.3200	9.8578
270	0	0	0	0	0	0	3.1016	6.3200	10.241
271	0	0	0	0	0	0	3.2176	6.3200	10.623
272	0	0	0	0	0	0	3.3335	6.3200	11.006
273	0	0	0	0	0	0	1.5943	6.7150	5.2639
274	0	0	0	0	0	0	1.7102	6.7150	5.6467
275	0	0	0	0	0	0	1.8262	6.7150	6.0296
276	0	0	0	0	0	0	1.9421	6.7150	6.4124
277	0	0	0	0	0	0	2.0581	6.7150	6.7952
278	0	0	0	0	0	0	2.1740	6.7150	7.1780
279	0	0	0	0	0	0	2.2900	6.7150	7.5609
280	0	0	0	0	0	0	2.4059	6.7150	7.9437
281	0	0	0	0	0	0	2.5219	6.7150	8.3265
282	0	0	0	0	0	0	2.6378	6.7150	8.7093
283	0	0	0	0	0	0	2.7538	6.7150	9.0922
284	0	0	0	0	0	0	2.8697	6.7150	9.4750
285	0	0	0	0	0	0	2.9857	6.7150	9.8578
286	0	0	0	0	0	0	3.1016	6.7150	10.241
287	0	0	0	0	0	0	3.2176	6.7150	10.623
288	0	0	0	0	0	0	3.3335	6.7150	11.006
289	0	0	0	0	0	0	1.5943	7.1100	5.2639
290	0	0	0	0	0	0	1.7102	7.1100	5.6467
291	0	0	0	0	0	0	1.8262	7.1100	6.0296
292	0	0	0	0	0	0	1.9421	7.1100	6.4124
293	0	0	0	0	0	0	2.0581	7.1100	6.7952
294	0	0	0	0	0	0	2.1740	7.1100	7.1780
295	0	0	0	0	0	0	2.2900	7.1100	7.5609
296	0	0	0	0	0	0	2.4059	7.1100	7.9437
297	0	0	0	0	0	0	2.5219	7.1100	8.3265
298	0	0	0	0	0	0	2.6378	7.1100	8.7093
299	0	0	0	0	0	0	2.7538	7.1100	9.0922
300	0	0	0	0	0	0	2.8697	7.1100	9.4750
301	0	0	0	0	0	0	2.9857	7.1100	9.8578
302	0	0	0	0	0	0	3.1016	7.1100	10.241
303	0	0	0	0	0	0	3.2176	7.1100	10.623
304	0	0	0	0	0	0	3.3335	7.1100	11.006
305	0	0	0	0	0	0	1.5943	7.5050	5.2639
306	0	0	0	0	0	0	1.7102	7.5050	5.6467
307	0	0	0	0	0	0	1.8262	7.5050	6.0296
308	0	0	0	0	0	0	1.9421	7.5050	6.4124
309	0	0	0	0	0	0	2.0581	7.5050	6.7952
310	0	0	0	0	0	0	2.1740	7.5050	7.1780
311	0	0	0	0	0	0	2.2900	7.5050	7.5609
312	0	0	0	0	0	0	2.4059	7.5050	7.9437
313	0	0	0	0	0	0	2.5219	7.5050	8.3265
314	0	0	0	0	0	0	2.6378	7.5050	8.7093
315	0	0	0	0	0	0	2.7538	7.5050	9.0922
316	0	0	0	0	0	0	2.8697	7.5050	9.4750
317	0	0	0	0	0	0	2.9857	7.5050	9.8578
318	0	0	0	0	0	0	3.1016	7.5050	10.241
319	0	0	0	0	0	0	3.2176	7.5050	10.623
320	0	0	0	0	0	0	3.3335	7.5050	11.006
321	0	0	0	0	0	0	1.5943	7.9000	5.2639
322	0	0	0	0	0	0	1.7102	7.9000	5.6467
323	0	0	0	0	0	0	1.8262	7.9000	6.0296
324	0	0	0	0	0	0	1.9421	7.9000	6.4124
325	0	0	0	0	0	0	2.0581	7.9000	6.7952
326	0	0	0	0	0	0	2.1740	7.9000	7.1780
327	0	0	0	0	0	0	2.2900	7.9000	7.5609
328	0	0	0	0	0	0	2.4059	7.9000	7.9437
329	0	0	0	0	0	0	2.5219	7.9000	8.3265
330	0	0	0	0	0	0	2.6378	7.9000	8.7093
331	0	0	0	0	0	0	2.7538	7.9000	9.0922
332	0	0	0	0	0	0	2.8697	7.9000	9.4750
333	0	0	0	0	0	0	2.9857	7.9000	9.8578
334	0	0	0	0	0	0	3.1016	7.9000	10.241
335	0	0	0	0	0	0	3.2176	7.9000	10.623
336	0	0	0	0	0	0	3.3335	7.9000	11.006
337	0	0	0	0	0	0	1.5943	8.3500	5.2639
338	0	0	0	0	0	0	1.7102	8.3500	5.6467
339	0	0	0	0	0	0	1.8262	8.3500	6.0296
340	0	0	0	0	0	0	1.9421	8.3500	6.4124
341	0	0	0	0	0	0	2.0581	8.3500	6.7952
342	0	0	0	0	0	0	2.1740	8.3500	7.1780
343	0	0	0	0	0	0	2.2900	8.3500	7.5609
344	0	0	0	0	0	0	2.4059	8.3500	7.9437
345	0	0	0	0	0	0	2.5219	8.3500	8.3265
346	0	0	0	0	0	0	2.6378	8.3500	8.7093
347	0	0	0	0	0	0	2.7538	8.3500	9.0922
348	0	0	0	0	0	0	2.8697	8.3500	9.4750

349	0	0	0	0	0	0	2.9857	8.3500	9.8578
350	0	0	0	0	0	0	3.1016	8.3500	10.241
351	0	0	0	0	0	0	3.2176	8.3500	10.623
352	0	0	0	0	0	0	3.3335	8.3500	11.006
353	0	0	0	0	0	0	1.5943	8.8000	5.2639
354	0	0	0	0	0	0	1.7102	8.8000	5.6467
355	0	0	0	0	0	0	1.8262	8.8000	6.0296
356	0	0	0	0	0	0	1.9421	8.8000	6.4124
357	0	0	0	0	0	0	2.0581	8.8000	6.7952
358	0	0	0	0	0	0	2.1740	8.8000	7.1780
359	0	0	0	0	0	0	2.2900	8.8000	7.5609
360	0	0	0	0	0	0	2.4059	8.8000	7.9437
361	0	0	0	0	0	0	2.5219	8.8000	8.3265
362	0	0	0	0	0	0	2.6378	8.8000	8.7093
363	0	0	0	0	0	0	2.7538	8.8000	9.0922
364	0	0	0	0	0	0	2.8697	8.8000	9.4750
365	0	0	0	0	0	0	2.9857	8.8000	9.8578
366	0	0	0	0	0	0	3.1016	8.8000	10.241
367	0	0	0	0	0	0	3.2176	8.8000	10.623
368	0	0	0	0	0	0	3.3335	8.8000	11.006
369	0	0	0	0	0	0	1.5943	9.2500	5.2639
370	0	0	0	0	0	0	1.7102	9.2500	5.6467
371	0	0	0	0	0	0	1.8262	9.2500	6.0296
372	0	0	0	0	0	0	1.9421	9.2500	6.4124
373	0	0	0	0	0	0	2.0581	9.2500	6.7952
374	0	0	0	0	0	0	2.1740	9.2500	7.1780
375	0	0	0	0	0	0	2.2900	9.2500	7.5609
376	0	0	0	0	0	0	2.4059	9.2500	7.9437
377	0	0	0	0	0	0	2.5219	9.2500	8.3265
378	0	0	0	0	0	0	2.6378	9.2500	8.7093
379	0	0	0	0	0	0	2.7538	9.2500	9.0922
380	0	0	0	0	0	0	2.8697	9.2500	9.4750
381	0	0	0	0	0	0	2.9857	9.2500	9.8578
382	0	0	0	0	0	0	3.1016	9.2500	10.241
383	0	0	0	0	0	0	3.2176	9.2500	10.623
384	0	0	0	0	0	0	3.3335	9.2500	11.006
385	0	0	0	0	0	0	1.5943	9.7000	5.2639
386	0	0	0	0	0	0	1.7102	9.7000	5.6467
387	0	0	0	0	0	0	1.8262	9.7000	6.0296
388	0	0	0	0	0	0	1.9421	9.7000	6.4124
389	0	0	0	0	0	0	2.0581	9.7000	6.7952
390	0	0	0	0	0	0	2.1740	9.7000	7.1780
391	0	0	0	0	0	0	2.2900	9.7000	7.5609
392	0	0	0	0	0	0	2.4059	9.7000	7.9437
393	0	0	0	0	0	0	2.5219	9.7000	8.3265
394	0	0	0	0	0	0	2.6378	9.7000	8.7093
395	0	0	0	0	0	0	2.7538	9.7000	9.0922
396	0	0	0	0	0	0	2.8697	9.7000	9.4750
397	0	0	0	0	0	0	2.9857	9.7000	9.8578
398	0	0	0	0	0	0	3.1016	9.7000	10.241
399	0	0	0	0	0	0	3.2176	9.7000	10.623
400	0	0	0	0	0	0	3.3335	9.7000	11.006
401	1	1	1	1	1	1	3.7335	.00000	11.006
402	1	1	1	1	1	1	4.1335	.00000	11.006
403	1	1	1	1	1	1	4.5335	.00000	11.006
404	1	1	1	1	1	1	4.9335	.00000	11.006
405	1	1	1	1	1	1	5.3335	.00000	11.006
406	1	1	1	1	1	1	5.7335	.00000	11.006
407	1	1	1	1	1	1	6.1335	.00000	11.006
408	1	1	1	1	1	1	6.5335	.00000	11.006
409	1	1	1	1	1	1	6.9335	.00000	11.006
410	1	1	1	1	1	1	7.3335	.00000	11.006
411	1	1	1	1	1	1	7.7335	.00000	11.006
412	1	1	1	1	1	1	8.1335	.00000	11.006
413	1	1	1	1	1	1	8.5335	.00000	11.006
414	1	1	1	1	1	1	8.9335	.00000	11.006
415	1	1	1	1	1	1	9.3335	.00000	11.006
416	1	1	1	1	1	1	9.7335	.00000	11.006
417	1	1	1	1	1	1	10.133	.00000	11.006
418	1	1	1	1	1	1	10.534	.00000	11.006
419	1	1	1	1	1	1	10.933	.00000	11.006
420	1	1	1	1	1	1	11.333	.00000	11.006
421	1	1	1	1	1	1	11.734	.00000	11.006
422	1	1	1	1	1	1	12.133	.00000	11.006
423	1	1	1	1	1	1	12.533	.00000	11.006
424	1	1	1	1	1	1	12.933	.00000	11.006
425	1	1	1	1	1	1	13.333	.00000	11.006
426	1	1	1	1	1	1	13.733	.00000	11.006
427	1	1	1	1	1	1	14.133	.00000	11.006
428	1	1	1	1	1	1	14.533	.00000	11.006
429	1	1	1	1	1	1	14.933	.00000	11.006
430	1	1	1	1	1	1	15.333	.00000	11.006
431	1	1	1	1	1	1	15.733	.00000	11.006
432	1	1	1	1	1	1	16.133	.00000	11.006
433	0	0	0	0	0	0	3.7335	.39500	11.006
434	0	0	0	0	0	0	4.1335	.39500	11.006
435	0	0	0	0	0	0	4.5335	.39500	11.006
436	0	0	0	0	0	0	4.9335	.39500	11.006
437	0	0	0	0	0	0	5.3335	.39500	11.006
438	0	0	0	0	0	0	5.7335	.39500	11.006
439	0	0	0	0	0	0	6.1335	.39500	11.006
440	0	0	0	0	0	0	6.5335	.39500	11.006
441	0	0	0	0	0	0	6.9335	.39500	11.006
442	0	0	0	0	0	0	7.3335	.39500	11.006
443	0	0	0	0	0	0	7.7335	.39500	11.006
444	0	0	0	0	0	0	8.1335	.39500	11.006
445	0	0	0	0	0	0	8.5335	.39500	11.006
446	0	0	0	0	0	0	8.9335	.39500	11.006
447	0	0	0	0	0	0	9.3335	.39500	11.006
448	0	0	0	0	0	0	9.7335	.39500	11.006
449	0	0	0	0	0	0	10.133	.39500	11.006
450	0	0	0	0	0	0	10.534	.39500	11.006
451	0	0	0	0	0	0	10.933	.39500	11.006
452	0	0	0	0	0	0	11.333	.39500	11.006
453	0	0	0	0	0	0	11.734	.39500	11.006
454	0	0	0	0	0	0	12.133	.39500	11.006
455	0	0	0	0	0	0	12.533	.39500	11.006
456	0	0	0	0	0	0	12.933	.39500	11.006
457	0	0	0	0	0	0	13.333	.39500	11.006
458	0	0	0	0	0	0	13.733	.39500	11.006
459	0	0	0	0	0	0	14.133	.39500	11.006
460	0	0	0	0	0	0	14.533	.39500	11.006
461	0	0	0	0	0	0	14.933	.39500	11.006
462	0	0	0	0	0	0	15.333	.39500	11.006
463	0	0	0	0	0	0	15.733	.39500	11.006
464	0	0	0	0	0	0	16.133	.39500	11.006
465	0	0	0	0	0	0	3.7335	.79000	11.006
466	0	0	0	0	0	0	4.1335	.79000	11.006
467	0	0	0	0	0	0	4.5335	.79000	11.006
468	0	0	0	0	0	0	4.9335	.79000	11.006
469	0	0	0	0	0	0	5.3335	.79000	11.006
470	0	0	0	0	0	0	5.7335	.79000	11.006
471	0	0	0	0	0	0	6.1335	.79000	11.006
472	0	0	0	0	0	0	6.5335	.79000	11.006
473	0	0	0	0	0	0	6.9335	.79000	11.006
474	0	0	0	0	0	0	7.3335	.79000	11.006
475	0	0	0	0	0	0	7.7335	.79000	11.006
476	0	0	0	0	0	0	8.1335	.79000	11.006
477	0	0	0	0	0	0	8.5335	.79000	11.006
478	0	0	0	0	0	0	8.9335	.79000	11.006
479	0	0	0	0	0	0	9.3335	.79000	11.006
480	0	0	0	0	0	0	9.7335	.79000	11.006
481	0	0	0	0	0	0	10.133	.79000	11.006
482	0	0	0	0	0	0	10.534	.79000	11.006
483	0	0	0	0	0	0	10.933	.79000	11.006
484	0	0	0	0	0	0	11.333	.79000	11.006
485	0	0	0	0	0	0	11.734	.79000	11.006
486	0	0	0	0	0	0	12.133	.79000	11.006
487	0	0	0	0	0	0	12.533	.79000	11.006
488	0	0	0	0	0	0	12.933	.79000	11.006
489	0	0	0	0	0	0	13.333	.79000	11.006
490	0	0	0	0	0	0	13.733	.79000	11.006
491	0	0	0	0	0	0	14.133	.79000	11.006
492	0	0	0	0	0	0	14.533	.79000	11.006
493	0	0	0	0	0	0	14.933	.79000	11.006
494	0	0	0	0	0	0	15.333	.79000	11.006
495	0	0	0	0	0	0	15.733	.79000	11.006
496	0	0	0	0	0	0	16.133	.79000	11.006
497	0	0	0	0	0	0	3.7335	1.1850	11.006
498	0	0	0	0	0	0	4.1335	1.1850	11.006
499	0	0	0	0	0	0	4.5335	1.1850	11.006
500	0	0	0	0	0	0	4.9335	1.1850	11.006
501	0	0	0	0	0	0	5.3335	1.1850	11.006
502	0	0	0	0	0	0	5.7335	1.1850	11.006
503	0	0	0	0	0	0	6.1335	1.1850	11.006
504	0	0	0	0	0	0	6.5335	1.1850	11.006
505	0	0	0	0	0	0	6.9335	1.1850	11.006
506	0	0	0	0	0	0	7.3335	1.1850	11.006
507	0	0	0	0	0	0	7.7335	1.1850	11.006
508	0	0	0	0	0	0	8.1335	1.1850	11.006
509	0	0	0	0	0	0	8.5335	1.1850	11.006
510	0	0	0	0	0	0	8.9335	1.1850	11.006
511	0	0	0	0	0	0	9.3335	1.1850	11.006
512	0	0	0	0	0	0	9.7335	1.1850	11.006
513	0	0	0	0	0	0	10.133	1.1850	11.006
514	0	0	0	0	0	0	10.534	1.1850	11.006
515	0	0	0	0	0	0	10.933	1.1850	11.006
516	0	0	0	0	0	0	11.333	1.1850	11.006
517	0	0	0	0	0	0	11.734	1.1850	11.006
518	0	0	0	0	0	0	12.133	1.1850	11.006
519	0	0	0	0	0	0	12.533	1.1850	11.006
520	0	0	0	0	0	0	12.933	1.1850	11.006
521	0	0	0	0	0	0	13.333	1.1850	11.006
522	0	0	0	0	0	0	13.733	1.1850	11.006
523	0	0	0	0	0	0	14.133	1.1850	11.006
524	0	0	0	0	0	0	14.533	1.1850	11.006
525	0	0	0	0	0	0	14.933	1.1850	11.006
526	0	0	0	0	0	0	15.333	1.1850	11.006
527	0	0	0	0	0	0	15.733	1.1850	11.006
528	0	0	0	0	0	0	16.133	1.1850	11.006
529	0	0	0	0	0	0	3.7335	1.5800	11.006
530	0	0	0	0	0	0	4.1335	1.5800	11.006
531	0	0	0	0	0	0	4.5335	1.5800	11.006
532	0	0	0	0	0	0	4.9335	1.5800	11.006
533	0	0	0	0	0	0	5.3335	1.5800	11.006
534	0	0	0	0	0	0	5.7335	1.5800	11.006
535	0	0	0	0	0	0	6.1335	1.5800	11.006
536	0	0	0	0	0	0	6.5335	1.5800	11.006
537	0	0	0	0	0	0	6.9335	1.5800	11.006
538	0	0	0	0	0	0	7.3335	1.5800	11.006
539	0	0	0	0	0	0	7.7335	1.5800	11.006
540	0	0	0	0	0	0	8.1335	1.5800	11.006
541	0	0	0	0	0	0	8.5335	1.5800	11.006
542	0	0	0	0	0	0	8.9335	1.5800	11.006
543	0	0	0	0	0	0	9.3335	1.5800	11.006
544	0	0	0	0	0	0	9.7335	1.5800	11.006
545	0	0	0	0	0	0	10.133	1.5800	11.006
546	0	0	0	0	0	0	10.534	1.5800	11.006
547	0	0	0	0	0	0	10.933	1.5800	11.006
548	0	0	0	0	0	0	11.333	1.5800	11.006
549	0	0	0	0	0	0	11.734	1.5800	11.006
550	0	0	0	0	0	0	12.133	1.5800	11.006
551	0	0	0	0	0	0	12.533	1.5800	11.006
552	0	0	0	0	0	0	12.933	1.5800	11.006
553	0	0	0	0	0	0	13.333	1.5800	11.006
554	0	0	0	0	0	0	13.733	1.5800	11.006
555	0	0	0	0	0	0	14.133	1.5800	11.006
556	0	0	0	0	0	0	14.533	1.5800	11.006
557	0	0	0	0	0	0	14.933	1.5800	11.006
558	0	0	0	0	0	0	15.333	1.5800	11.006
559	0	0	0	0	0	0	15.733	1.5800	11.006
560	0	0	0	0	0	0	16.133	1.5800	11.006
561	0	0	0	0	0	0	3.7335	1.9750	11.006
562	0	0	0	0	0	0	4.1335	1.9750	11.006
563	0	0	0	0	0	0	4.5335	1.9750	11.006
564	0	0	0	0	0	0	4.9335	1.9750	11.006
565	0	0	0	0	0	0	5.3335	1.9750	11.006
566	0	0	0	0	0	0	5.7335	1.9750	11.006
567	0	0	0	0	0	0	6.1335	1.9750	11.006
568	0	0	0	0	0	0	6.5335	1.9750	11.006
569	0	0	0	0	0	0	6.9335	1.9750	11.006
570	0	0	0	0	0	0	7.3335	1.9750	11.006
571	0	0	0	0	0	0	7.7335	1.9750	11.006
572	0	0	0	0	0	0	8.1335	1.9750	11.006
573	0	0	0	0	0	0	8.5335	1.9750	11.006
574	0	0	0	0	0	0	8.9335	1.9750	11.006
575	0	0	0	0	0	0	9.3335	1.9750	11.006
576	0	0	0	0	0	0	9.7335	1.9750	11.006
577	0	0	0	0	0	0	10.133	1.9750	11.006
578	0	0	0	0	0	0	10.534	1.9750	11.006
579	0	0	0	0	0	0	10.933	1.9750	11.006
580	0	0	0	0	0	0	11.333	1.9750	11.006
581	0	0	0	0	0	0	11.734	1.9750	11.006
582	0	0	0	0	0	0	12.133	1.9750	11.006
583	0	0	0	0	0	0	12.533	1.9750	11.006
584	0	0	0	0	0	0	12.933	1.9750	11.006
585	0	0	0	0	0	0	13.333	1.9750	11.006
586	0	0	0	0	0	0	13.733	1.9750	11.006
587	0	0	0	0	0	0	14.133	1.9750	11.006
588	0	0	0	0	0	0	14.533	1.9750	11.006
589	0	0	0	0	0	0	14.933	1.9750	11.006
590	0	0	0	0	0	0	15.333	1.9750	11.006
591	0	0	0	0	0	0	15.733	1.9750	11.006
592	0	0	0	0	0	0	16.133	1.9750	11.006
593	0	0	0	0	0	0	3.7335	2.3700	11.006
594	0	0	0	0	0	0	4.1335	2.3700	11.006
595	0	0	0	0	0	0	4.5335	2.3700	11.006
596	0	0	0	0	0	0	4.9335	2.3700	11.006
597	0	0	0	0	0	0	5.3335	2.3700	11.006
598	0	0	0	0	0	0	5.7335	2.3700	11.006
599	0	0	0	0	0	0	6.1335	2.3700	11.006
600	0	0	0	0	0	0	6.5335	2.3700	11.006
601	0	0	0	0	0	0	6.9335	2.3700	11.006
602	0	0	0	0	0	0	7.3335	2.3700	11.006
603	0	0	0	0	0	0	7.7335	2.3700	11.006
604	0	0	0	0	0	0	8.1335	2.3700	11.006
605	0	0	0	0	0	0	8.5335	2.3700	11.006
606	0	0	0	0	0	0	8.9335	2.3700	11.006
607	0	0	0	0	0	0	9.3335	2.3700	11.006
608	0	0	0	0	0	0	9.7335	2.3700	11.006
609	0	0	0	0	0	0	10.133	2.3700	11.006
610	0	0	0	0	0	0	10.534	2.3700	11.006
611	0	0	0	0	0	0	10.933	2.3700	11.006
612	0	0	0	0	0	0	11.333	2.3700	11.006
613	0	0	0	0	0	0	11.734	2.3700	11.006
614	0	0	0	0	0	0	12.133	2.3700	11.006
615	0	0	0	0	0	0	12.533	2.3700	11.006
616	0	0	0	0	0	0	12.933	2.3700	11.006
617	0	0	0	0	0	0	13.333	2.3700	11.006
618	0	0	0	0	0	0	13.733	2.3700	11.006
619	0	0	0	0	0	0	14.133	2.3700	11.006
620	0	0	0	0	0	0	14.533	2.3700	11.006

621	0	0	0	0	0	0	14.933	2.3700	11.006
622	0	0	0	0	0	0	15.333	2.3700	11.006
623	0	0	0	0	0	0	15.733	2.3700	11.006
624	0	0	0	0	0	0	16.133	2.3700	11.006
625	0	0	0	0	0	0	3.7335	2.7650	11.006
626	0	0	0	0	0	0	4.1335	2.7650	11.006
627	0	0	0	0	0	0	4.5335	2.7650	11.006
628	0	0	0	0	0	0	4.9335	2.7650	11.006
629	0	0	0	0	0	0	5.3335	2.7650	11.006
630	0	0	0	0	0	0	5.7335	2.7650	11.006
631	0	0	0	0	0	0	6.1335	2.7650	11.006
632	0	0	0	0	0	0	6.5335	2.7650	11.006
633	0	0	0	0	0	0	6.9335	2.7650	11.006
634	0	0	0	0	0	0	7.3335	2.7650	11.006
635	0	0	0	0	0	0	7.7335	2.7650	11.006
636	0	0	0	0	0	0	8.1335	2.7650	11.006
637	0	0	0	0	0	0	8.5335	2.7650	11.006
638	0	0	0	0	0	0	8.9335	2.7650	11.006
639	0	0	0	0	0	0	9.3335	2.7650	11.006
640	0	0	0	0	0	0	9.7335	2.7650	11.006
641	0	0	0	0	0	0	10.133	2.7650	11.006
642	0	0	0	0	0	0	10.534	2.7650	11.006
643	0	0	0	0	0	0	10.933	2.7650	11.006
644	0	0	0	0	0	0	11.333	2.7650	11.006
645	0	0	0	0	0	0	11.734	2.7650	11.006
646	0	0	0	0	0	0	12.133	2.7650	11.006
647	0	0	0	0	0	0	12.533	2.7650	11.006
648	0	0	0	0	0	0	12.933	2.7650	11.006
649	0	0	0	0	0	0	13.333	2.7650	11.006
650	0	0	0	0	0	0	13.733	2.7650	11.006
651	0	0	0	0	0	0	14.133	2.7650	11.006
652	0	0	0	0	0	0	14.533	2.7650	11.006
653	0	0	0	0	0	0	14.933	2.7650	11.006
654	0	0	0	0	0	0	15.333	2.7650	11.006
655	0	0	0	0	0	0	15.733	2.7650	11.006
656	0	0	0	0	0	0	16.133	2.7650	11.006
657	0	0	0	0	0	0	3.7335	3.1600	11.006
658	0	0	0	0	0	0	4.1335	3.1600	11.006
659	0	0	0	0	0	0	4.5335	3.1600	11.006
660	0	0	0	0	0	0	4.9335	3.1600	11.006
661	0	0	0	0	0	0	5.3335	3.1600	11.006
662	0	0	0	0	0	0	5.7335	3.1600	11.006
663	0	0	0	0	0	0	6.1335	3.1600	11.006
664	0	0	0	0	0	0	6.5335	3.1600	11.006
665	0	0	0	0	0	0	6.9335	3.1600	11.006
666	0	0	0	0	0	0	7.3335	3.1600	11.006
667	0	0	0	0	0	0	7.7335	3.1600	11.006
668	0	0	0	0	0	0	8.1335	3.1600	11.006
669	0	0	0	0	0	0	8.5335	3.1600	11.006
670	0	0	0	0	0	0	8.9335	3.1600	11.006
671	0	0	0	0	0	0	9.3335	3.1600	11.006
672	0	0	0	0	0	0	9.7335	3.1600	11.006
673	0	0	0	0	0	0	10.133	3.1600	11.006
674	0	0	0	0	0	0	10.534	3.1600	11.006
675	0	0	0	0	0	0	10.933	3.1600	11.006
676	0	0	0	0	0	0	11.333	3.1600	11.006
677	0	0	0	0	0	0	11.734	3.1600	11.006
678	0	0	0	0	0	0	12.133	3.1600	11.006
679	0	0	0	0	0	0	12.533	3.1600	11.006
680	0	0	0	0	0	0	12.933	3.1600	11.006
681	0	0	0	0	0	0	13.333	3.1600	11.006
682	0	0	0	0	0	0	13.733	3.1600	11.006
683	0	0	0	0	0	0	14.133	3.1600	11.006
684	0	0	0	0	0	0	14.533	3.1600	11.006
685	0	0	0	0	0	0	14.933	3.1600	11.006
686	0	0	0	0	0	0	15.333	3.1600	11.006
687	0	0	0	0	0	0	15.733	3.1600	11.006
688	0	0	0	0	0	0	16.133	3.1600	11.006
689	0	0	0	0	0	0	3.7335	3.5550	11.006
690	0	0	0	0	0	0	4.1335	3.5550	11.006
691	0	0	0	0	0	0	4.5335	3.5550	11.006
692	0	0	0	0	0	0	4.9335	3.5550	11.006
693	0	0	0	0	0	0	5.3335	3.5550	11.006
694	0	0	0	0	0	0	5.7335	3.5550	11.006
695	0	0	0	0	0	0	6.1335	3.5550	11.006
696	0	0	0	0	0	0	6.5335	3.5550	11.006
697	0	0	0	0	0	0	6.9335	3.5550	11.006
698	0	0	0	0	0	0	7.3335	3.5550	11.006
699	0	0	0	0	0	0	7.7335	3.5550	11.006
700	0	0	0	0	0	0	8.1335	3.5550	11.006
701	0	0	0	0	0	0	8.5335	3.5550	11.006
702	0	0	0	0	0	0	8.9335	3.5550	11.006
703	0	0	0	0	0	0	9.3335	3.5550	11.006
704	0	0	0	0	0	0	9.7335	3.5550	11.006
705	0	0	0	0	0	0	10.133	3.5550	11.006
706	0	0	0	0	0	0	10.534	3.5550	11.006
707	0	0	0	0	0	0	10.933	3.5550	11.006
708	0	0	0	0	0	0	11.333	3.5550	11.006
709	0	0	0	0	0	0	11.734	3.5550	11.006
710	0	0	0	0	0	0	12.133	3.5550	11.006
711	0	0	0	0	0	0	12.533	3.5550	11.006
712	0	0	0	0	0	0	12.933	3.5550	11.006
713	0	0	0	0	0	0	13.333	3.5550	11.006
714	0	0	0	0	0	0	13.733	3.5550	11.006
715	0	0	0	0	0	0	14.133	3.5550	11.006
716	0	0	0	0	0	0	14.533	3.5550	11.006
717	0	0	0	0	0	0	14.933	3.5550	11.006
718	0	0	0	0	0	0	15.333	3.5550	11.006
719	0	0	0	0	0	0	15.733	3.5550	11.006
720	0	0	0	0	0	0	16.133	3.5550	11.006
721	0	0	0	0	0	0	3.7335	3.9500	11.006
722	0	0	0	0	0	0	4.1335	3.9500	11.006
723	0	0	0	0	0	0	4.5335	3.9500	11.006
724	0	0	0	0	0	0	4.9335	3.9500	11.006
725	0	0	0	0	0	0	5.3335	3.9500	11.006
726	0	0	0	0	0	0	5.7335	3.9500	11.006
727	0	0	0	0	0	0	6.1335	3.9500	11.006
728	0	0	0	0	0	0	6.5335	3.9500	11.006
729	0	0	0	0	0	0	6.9335	3.9500	11.006
730	0	0	0	0	0	0	7.3335	3.9500	11.006
731	0	0	0	0	0	0	7.7335	3.9500	11.006
732	0	0	0	0	0	0	8.1335	3.9500	11.006
733	0	0	0	0	0	0	8.5335	3.9500	11.006
734	0	0	0	0	0	0	8.9335	3.9500	11.006
735	0	0	0	0	0	0	9.3335	3.9500	11.006
736	0	0	0	0	0	0	9.7335	3.9500	11.006
737	0	0	0	0	0	0	10.133	3.9500	11.006
738	0	0	0	0	0	0	10.533	3.9500	11.006
739	0	0	0	0	0	0	10.933	3.9500	11.006
740	0	0	0	0	0	0	11.333	3.9500	11.006
741	0	0	0	0	0	0	11.733	3.9500	11.006
742	0	0	0	0	0	0	12.133	3.9500	11.006
743	0	0	0	0	0	0	12.533	3.9500	11.006
744	0	0	0	0	0	0	12.933	3.9500	11.006
745	0	0	0	0	0	0	13.333	3.9500	11.006
746	0	0	0	0	0	0	13.733	3.9500	11.006
747	0	0	0	0	0	0	14.133	3.9500	11.006
748	0	0	0	0	0	0	14.533	3.9500	11.006
749	0	0	0	0	0	0	14.933	3.9500	11.006
750	0	0	0	0	0	0	15.333	3.9500	11.006
751	0	0	0	0	0	0	15.733	3.9500	11.006
752	0	0	0	0	0	0	16.133	3.9500	11.006
753	0	0	0	0	0	0	3.7335	4.3450	11.006
754	0	0	0	0	0	0	4.1335	4.3450	11.006
755	0	0	0	0	0	0	4.5335	4.3450	11.006
756	0	0	0	0	0	0	4.9335	4.3450	11.006
757	0	0	0	0	0	0	5.3335	4.3450	11.006
758	0	0	0	0	0	0	5.7335	4.3450	11.006
759	0	0	0	0	0	0	6.1335	4.3450	11.006
760	0	0	0	0	0	0	6.5335	4.3450	11.006
761	0	0	0	0	0	0	6.9335	4.3450	11.006
762	0	0	0	0	0	0	7.3335	4.3450	11.006
763	0	0	0	0	0	0	7.7335	4.3450	11.006
764	0	0	0	0	0	0	8.1335	4.3450	11.006
765	0	0	0	0	0	0	8.5335	4.3450	11.006
766	0	0	0	0	0	0	8.9335	4.3450	11.006
767	0	0	0	0	0	0	9.3335	4.3450	11.006
768	0	0	0	0	0	0	9.7335	4.3450	11.006
769	0	0	0	0	0	0	10.133	4.3450	11.006
770	0	0	0	0	0	0	10.533	4.3450	11.006
771	0	0	0	0	0	0	10.933	4.3450	11.006
772	0	0	0	0	0	0	11.333	4.3450	11.006
773	0	0	0	0	0	0	11.734	4.3450	11.006
774	0	0	0	0	0	0	12.133	4.3450	11.006
775	0	0	0	0	0	0	12.533	4.3450	11.006
776	0	0	0	0	0	0	12.933	4.3450	11.006
777	0	0	0	0	0	0	13.333	4.3450	11.006
778	0	0	0	0	0	0	13.733	4.3450	11.006
779	0	0	0	0	0	0	14.133	4.3450	11.006
780	0	0	0	0	0	0	14.533	4.3450	11.006
781	0	0	0	0	0	0	14.933	4.3450	11.006
782	0	0	0	0	0	0	15.333	4.3450	11.006
783	0	0	0	0	0	0	15.733	4.3450	11.006
784	0	0	0	0	0	0	16.133	4.3450	11.006
785	0	0	0	0	0	0	3.7335	4.7400	11.006
786	0	0	0	0	0	0	4.1335	4.7400	11.006
787	0	0	0	0	0	0	4.5335	4.7400	11.006
788	0	0	0	0	0	0	4.9335	4.7400	11.006
789	0	0	0	0	0	0	5.3335	4.7400	11.006
790	0	0	0	0	0	0	5.7335	4.7400	11.006
791	0	0	0	0	0	0	6.1335	4.7400	11.006
792	0	0	0	0	0	0	6.5335	4.7400	11.006
793	0	0	0	0	0	0	6.9335	4.7400	11.006
794	0	0	0	0	0	0	7.3335	4.7400	11.006
795	0	0	0	0	0	0	7.7335	4.7400	11.006
796	0	0	0	0	0	0	8.1335	4.7400	11.006
797	0	0	0	0	0	0	8.5335	4.7400	11.006
798	0	0	0	0	0	0	8.9335	4.7400	11.006
799	0	0	0	0	0	0	9.3335	4.7400	11.006
800	0	0	0	0	0	0	9.7335	4.7400	11.006
801	0	0	0	0	0	0	10.133	4.7400	11.006
802	0	0	0	0	0	0	10.534	4.7400	11.006
803	0	0	0	0	0	0	10.933	4.7400	11.006
804	0	0	0	0	0	0	11.333	4.7400	11.006
805	0	0	0	0	0	0	11.734	4.7400	11.006
806	0	0	0	0	0	0	12.133	4.7400	11.006
807	0	0	0	0	0	0	12.533	4.7400	11.006
808	0	0	0	0	0	0	12.933	4.7400	11.006
809	0	0	0	0	0	0	13.333	4.7400	11.006
810	0	0	0	0	0	0	13.733	4.7400	11.006
811	0	0	0	0	0	0	14.133	4.7400	11.006
812	0	0	0	0	0	0	14.533	4.7400	11.006
813	0	0	0	0	0	0	14.933	4.7400	11.006
814	0	0	0	0	0	0	15.333	4.7400	11.006
815	0	0	0	0	0	0	15.733	4.7400	11.006
816	0	0	0	0	0	0	16.133	4.7400	11.006
817	0	0	0	0	0	0	3.7335	5.1350	11.006
818	0	0	0	0	0	0	4.1335	5.1350	11.006
819	0	0	0	0	0	0	4.5335	5.1350	11.006
820	0	0	0	0	0	0	4.9335	5.1350	11.006
821	0	0	0	0	0	0	5.3335	5.1350	11.006
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823	0	0	0	0	0	0	6.1335	5.1350	11.006
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825	0	0	0	0	0	0	6.9335	5.1350	11.006
826	0	0	0	0	0	0	7.3335	5.1350	11.006
827	0	0	0	0	0	0	7.7335	5.1350	11.006
828	0	0	0	0	0	0	8.1335	5.1350	11.006
829	0	0	0	0	0	0	8.5335	5.1350	11.006
830	0	0	0	0	0	0	8.9335	5.1350	11.006
831	0	0	0	0	0	0	9.3335	5.1350	11.006
832	0	0	0	0	0	0	9.7335	5.1350	11.006
833	0	0	0	0	0	0	10.133	5.1350	11.006
834	0	0	0	0	0	0	10.534	5.1350	11.006
835	0	0	0	0	0	0	10.933	5.1350	11.006
836	0	0	0	0	0	0	11.333	5.1350	11.006
837	0	0	0	0	0	0	11.734	5.1350	11.006
838	0	0	0	0	0	0	12.133	5.1350	11.006
839	0	0	0	0	0	0	12.533	5.1350	11.006
840	0	0	0	0	0	0	12.933	5.1350	11.006
841	0	0	0	0	0	0	13.333	5.1350	11.006
842	0	0	0	0	0	0	13.733	5.1350	11.006
843	0	0	0	0	0	0	14.133	5.1350	11.006
844	0	0	0	0	0	0	14.533	5.1350	11.006
845	0	0	0	0	0	0	14.933	5.1350	11.006
846	0	0	0	0	0	0	15.333	5.1350	11.006
847	0	0	0	0	0	0	15.733	5.1350	11.006
848	0	0	0	0	0	0	16.133	5.1350	11.006
849	0	0	0	0	0	0	3.7335	5.5300	11.006
850	0	0	0	0	0	0	4.1335	5.5300	11.006
851	0	0	0	0	0	0	4.5335	5.5300	11.006
852	0	0	0	0	0	0	4.9335	5.5300	11.006
853	0	0	0	0	0	0	5.3335	5.5300	11.006
854	0	0	0	0	0	0	5.7335	5.5300	11.006
855	0	0	0	0	0	0	6.1335	5.5300	11.006
856	0	0	0	0	0	0	6.5335	5.5300	11.006
857	0	0	0	0	0	0	6.9335	5.5300	11.006
858	0	0	0	0	0	0	7.3335	5.5300	11.006
859	0	0	0	0	0	0	7.7335	5.5300	11.006
860	0	0	0	0	0	0	8.1335	5.5300	11.006
861	0	0	0	0	0	0	8.5335	5.5300	11.006
862	0	0	0	0	0	0	8.9335	5.5300	11.006
863	0	0	0	0	0	0	9.3335	5.5300	11.006
864	0	0	0	0	0	0	9.7335	5.5300	11.006
865	0	0	0	0	0	0	10.133	5.5300	11.006
866	0	0	0	0	0	0	10.534	5.5300	11.006
867	0	0	0	0	0	0	10.933	5.5300	11.006
868	0	0	0	0	0	0	11.333	5.5300	11.006
869	0	0	0	0	0	0	11.734	5.5300	11.006
870	0	0	0	0	0	0	12.133	5.5300	11.006
871	0	0	0	0	0	0	12.533	5.5300	11.006
872	0	0	0	0	0	0	12.933	5.5300	11.006
873	0	0	0	0	0	0	13.333	5.5300	11.006
874	0	0	0	0	0	0	13.733	5.5300	11.006
875	0	0	0	0	0	0	14.133	5.5300	11.006
876	0	0	0	0	0	0	14.533	5.5300	11.006
877	0	0	0	0	0	0	14.933	5.5300	11.006
878	0	0	0	0	0	0	15.333	5.5300	11.006
879	0	0	0	0	0	0	15.733	5.5300	11.006
880	0	0	0	0	0	0	16.133	5.5300	11.006
881	0	0	0	0	0	0	3.7335	5.9250	11.006
882	0	0	0	0	0	0	4.1335	5.9250	11.006
883	0	0	0	0	0	0	4.5335	5.9250	11.006
884	0	0	0	0	0	0	4.9335	5.9250	11.006
885	0	0	0	0	0	0	5.3335	5.9250	11.006
886	0	0	0	0	0	0	5.7335	5.9250	11.006
887	0	0	0	0	0	0	6.1335	5.9250	11.006
888	0	0	0	0	0	0	6.5335	5.9250	11.006
889	0	0	0	0	0	0	6.9335	5.9250	11.006
890	0	0	0	0	0	0	7.3335	5.9250	11.006
891	0	0	0	0	0	0	7.7335	5.9250	11.006
892	0	0	0	0	0	0	8.1335	5.9250	11.006

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1709	0	0	0	0	0	0	1.4751	5.9327	4.8706
1710	0	0	0	0	0	0	1.4571	5.9241	4.8111
1711	0	0	0	0	0	0	1.4392	5.9170	4.7520
1712	0	0	0	0	0	0	1.4216	5.9125	4.6939
1713	0	0	0	0	0	0	1.4046	5.9116	4.6377
1714	0	0	0	0	0	0	1.3884	5.9154	4.5841
1715	0	0	0	0	0	0	1.3732	5.9250	4.5339
1716	0	0	0	0	0	0	1.5902	5.5300	5.2502
1717	0	0	0	0	0	0	1.5860	5.5300	5.2366
1718	0	0	0	0	0	0	1.5819	5.5300	5.2229
1719	0	0	0	0	0	0	1.5777	5.5300	5.2092
1720	0	0	0	0	0	0	1.5736	5.5300	5.1955
1721	0	0	0	0	0	0	1.5694	5.5300	5.1819
1722	0	0	0	0	0	0	1.5653	5.5300	5.1682
1723	0	0	0	0	0	0	1.5612	5.5300	5.1545
1724	0	0	0	0	0	0	1.5570	5.5300	5.1409
1725	0	0	0	0	0	0	1.5529	5.5300	5.1272
1726	0	0	0	0	0	0	1.5487	5.5300	5.1135
1727	0	0	0	0	0	0	1.5446	5.5300	5.0998
1728	0	0	0	0	0	0	1.5404	5.5300	5.0862
1729	0	0	0	0	0	0	1.5363	5.5300	5.0725
1730	0	0	0	0	0	0	14.280	9.7000	4.8879
1731	0	0	0	0	0	0	14.167	9.7000	4.5119
1732	0	0	0	0	0	0	14.053	9.7000	4.1359
1733	0	0	0	0	0	0	13.939	9.7000	3.7599
1734	0	0	0	0	0	0	13.825	9.7000	3.3839
1735	0	0	0	0	0	0	13.711	9.7000	3.0079
1736	0	0	0	0	0	0	13.597	9.7000	2.6319
1737	0	0	0	0	0	0	13.483	9.7000	2.2560
1738	0	0	0	0	0	0	13.369	9.7000	1.8800
1739	0	0	0	0	0	0	13.256	9.7000	1.5040
1740	0	0	0	0	0	0	13.142	9.7000	1.1280
1741	0	0	0	0	0	0	13.028	9.7000	.75198
1742	0	0	0	0	0	0	12.914	9.7000	.37599
1743	0	0	0	0	0	0	12.800	9.7000	-.62751E-06
1744	0	0	0	0	0	0	14.280	9.2500	4.8879
1745	0	0	0	0	0	0	14.167	9.2500	4.5119
1746	0	0	0	0	0	0	14.053	9.2500	4.1359
1747	0	0	0	0	0	0	13.939	9.2500	3.7599
1748	0	0	0	0	0	0	13.825	9.2500	3.3839
1749	0	0	0	0	0	0	13.711	9.2500	3.0079
1750	0	0	0	0	0	0	13.597	9.2500	2.6319
1751	0	0	0	0	0	0	13.483	9.2500	2.2560
1752	0	0	0	0	0	0	13.369	9.2500	1.8800
1753	0	0	0	0	0	0	13.256	9.2500	1.5040
1754	0	0	0	0	0	0	13.142	9.2500	1.1280
1755	0	0	0	0	0	0	13.028	9.2500	.75198
1756	0	0	0	0	0	0	12.914	9.2500	.37599
1757	0	0	0	0	0	0	12.800	9.2500	-.62751E-06
1758	0	0	0	0	0	0	14.291	8.7916	4.9235
1759	0	0	0	0	0	0	14.189	8.7865	4.5857
1760	0	0	0	0	0	0	14.087	8.7841	4.2503
1761	0	0	0	0	0	0	13.986	8.7840	3.9168
1762	0	0	0	0	0	0	13.886	8.7857	3.5850
1763	0	0	0	0	0	0	13.786	8.7887	3.2544
1764	0	0	0	0	0	0	13.686	8.7924	2.9248
1765	0	0	0	0	0	0	13.586	8.7965	2.5957
1766	0	0	0	0	0	0	13.487	8.8004	2.2669
1767	0	0	0	0	0	0	13.387	8.8036	1.9379
1768	0	0	0	0	0	0	13.287	8.8057	1.6084
1769	0	0	0	0	0	0	13.187	8.8061	1.2781
1770	0	0	0	0	0	0	13.087	8.8044	.94664
1771	0	0	0	0	0	0	12.986	8.8000	.61360
1772	0	0	0	0	0	0	14.309	8.3584	4.9838
1773	0	0	0	0	0	0	14.224	8.3635	4.7011
1774	0	0	0	0	0	0	14.137	8.3659	4.4160
1775	0	0	0	0	0	0	14.051	8.3660	4.1290
1776	0	0	0	0	0	0	13.963	8.3643	3.8403
1777	0	0	0	0	0	0	13.875	8.3613	3.5504
1778	0	0	0	0	0	0	13.787	8.3576	3.2595
1779	0	0	0	0	0	0	13.699	8.3535	2.9681
1780	0	0	0	0	0	0	13.611	8.3496	2.6764
1781	0	0	0	0	0	0	13.522	8.3464	2.3849
1782	0	0	0	0	0	0	13.434	8.3443	2.0939
1783	0	0	0	0	0	0	13.346	8.3439	1.8037
1784	0	0	0	0	0	0	13.259	8.3456	1.5147
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1788	0	0	0	0	0	0	14.172	7.9000	4.5304
1789	0	0	0	0	0	0	14.098	7.9000	4.2859
1790	0	0	0	0	0	0	14.024	7.9000	4.0414
1791	0	0	0	0	0	0	13.950	7.9000	3.7969
1792	0	0	0	0	0	0	13.876	7.9000	3.5524
1793	0	0	0	0	0	0	13.802	7.9000	3.3078
1794	0	0	0	0	0	0	13.728	7.9000	3.0633
1795	0	0	0	0	0	0	13.654	7.9000	2.8188
1796	0	0	0	0	0	0	13.580	7.9000	2.5743
1797	0	0	0	0	0	0	13.506	7.9000	2.3298
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1799	0	0	0	0	0	0	13.358	7.9000	1.8408
1800	0	0	0	0	0	0	14.326	7.4866	5.0397
1801	0	0	0	0	0	0	14.260	7.4753	4.8214
1802	0	0	0	0	0	0	14.196	7.4701	4.6082
1803	0	0	0	0	0	0	14.132	7.4699	4.3993
1804	0	0	0	0	0	0	14.070	7.4736	4.1940
1805	0	0	0	0	0	0	14.009	7.4801	3.9915
1806	0	0	0	0	0	0	13.948	7.4884	3.7910
1807	0	0	0	0	0	0	13.888	7.4973	3.5918
1808	0	0	0	0	0	0	13.828	7.5059	3.3931
1809	0	0	0	0	0	0	13.767	7.5130	3.1940
1810	0	0	0	0	0	0	13.707	7.5175	2.9939
1811	0	0	0	0	0	0	13.646	7.5184	2.7920
1812	0	0	0	0	0	0	13.584	7.5146	2.5874
1813	0	0	0	0	0	0	13.521	7.5050	2.3794
1814	0	0	0	0	0	0	14.339	7.0953	5.0818
1815	0	0	0	0	0	0	14.285	7.0863	4.9044
1816	0	0	0	0	0	0	14.233	7.0821	4.7311
1817	0	0	0	0	0	0	14.181	7.0819	4.5613
1818	0	0	0	0	0	0	14.131	7.0849	4.3943
1819	0	0	0	0	0	0	14.081	7.0901	4.2296
1820	0	0	0	0	0	0	14.032	7.0967	4.0665
1821	0	0	0	0	0	0	13.983	7.1039	3.9044
1822	0	0	0	0	0	0	13.934	7.1107	3.7426
1823	0	0	0	0	0	0	13.884	7.1164	3.5807
1824	0	0	0	0	0	0	13.835	7.1200	3.4178
1825	0	0	0	0	0	0	13.785	7.1207	3.2535
1826	0	0	0	0	0	0	13.735	7.1177	3.0871
1827	0	0	0	0	0	0	13.684	7.1100	2.9180
1828	0	0	0	0	0	0	14.355	6.7150	5.1348
1829	0	0	0	0	0	0	14.316	6.7150	5.0057
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1833	0	0	0	0	0	0	14.160	6.7150	4.4894
1834	0	0	0	0	0	0	14.121	6.7150	4.3603
1835	0	0	0	0	0	0	14.082	6.7150	4.2312
1836	0	0	0	0	0	0	14.042	6.7150	4.1021
1837	0	0	0	0	0	0	14.003	6.7150	3.9730
1838	0	0	0	0	0	0	13.964	6.7150	3.8439
1839	0	0	0	0	0	0	13.925	6.7150	3.7148
1840	0	0	0	0	0	0	13.886	6.7150	3.5857
1841	0	0	0	0	0	0	13.847	6.7150	3.4567
1842	0	0	0	0	0	0	14.371	6.3347	5.1878
1843	0	0	0	0	0	0	14.347	6.3437	5.1070
1844	0	0	0	0	0	0	14.321	6.3479	5.0222
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1846	0	0	0	0	0	0	14.267	6.3451	4.8426
1847	0	0	0	0	0	0	14.238	6.3399	4.7491
1848	0	0	0	0	0	0	14.210	6.3333	4.6541
1849	0	0	0	0	0	0	14.180	6.3261	4.5580
1850	0	0	0	0	0	0	14.151	6.3193	4.4616
1851	0	0	0	0	0	0	14.122	6.3136	4.3654
1852	0	0	0	0	0	0	14.093	6.3100	4.2700
1853	0	0	0	0	0	0	14.065	6.3093	4.1761
1854	0	0	0	0	0	0	14.037	6.3123	4.0843
1855	0	0	0	0	0	0	14.010	6.3200	3.9953
1856	0	0	0	0	0	0	14.384	5.9434	5.2299
1857	0	0	0	0	0	0	14.372	5.9547	5.1901
1858	0	0	0	0	0	0	14.358	5.9599	5.1451
1859	0	0	0	0	0	0	14.343	5.9601	5.0958
1860	0	0	0	0	0	0	14.327	5.9564	5.0429
1861	0	0	0	0	0	0	14.310	5.9499	4.9872
1862	0	0	0	0	0	0	14.293	5.9416	4.9295
1863	0	0	0	0	0	0	14.275	5.9327	4.8706
1864	0	0	0	0	0	0	14.257	5.9241	4.8111
1865	0	0	0	0	0	0	14.239	5.9170	4.7520
1866	0	0	0	0	0	0	14.222	5.9125	4.6939
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1868	0	0	0	0	0	0	14.188	5.9154	4.5841
1869	0	0	0	0	0	0	14.173	5.9250	4.5339
1870	0	0	0	0	0	0	14.390	5.5300	5.2502
1871	0	0	0	0	0	0	14.386	5.5300	5.2366
1872	0	0	0	0	0	0	14.382	5.5300	5.2229
1873	0	0	0	0	0	0	14.378	5.5300	5.2092
1874	0	0	0	0	0	0	14.374	5.5300	5.1955
1875	0	0	0	0	0	0	14.369	5.5300	5.1819
1876	0	0	0	0	0	0	14.365	5.5300	5.1682
1877	0	0	0	0	0	0	14.361	5.5300	5.1545
1878	0	0	0	0	0	0	14.357	5.5300	5.1409
1879	0	0	0	0	0	0	14.353	5.5300	5.1272
1880	0	0	0	0	0	0	14.349	5.5300	5.1135
1881	0	0	0	0	0	0	14.345	5.5300	5.0998
1882	0	0	0	0	0	0	14.340	5.5300	5.0862
1883	0	0	0	0	0	0	14.336	5.5300	5.0725

Element input data

ELEM EGRP MP REAL ECS NODE 1 NODE 2 NODE 3 NODE 4 NODE 5 NODE 6
NODE 7 NODE 8 NODE 9 NODE10 NODE11 NODE12
NODE13 NODE14 NODE15 NODE16 NODE17 NODE18
NODE19 NODE20

1	1	1	1	-1	1	2	18	17	
2	1	1	1	-1	2	3	19	18	
3	1	1	1	-1	3	4	20	19	
4	1	1	1	-1	4	5	21	20	
5	1	1	1	-1	5	6	22	21	
6	1	1	1	-1	6	7	23	22	
7	1	1	1	-1	7	8	24	23	
8	1	1	1	-1	8	9	25	24	
9	1	1	1	-1	9	10	26	25	
10	1	1	1	-1	10	11	27	26	
11	1	1	1	-1	11	12	28	27	
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17	1	1	2	-1	18	19	35	34	
18	1	1	2	-1	19	20	36	35	
19	1	1	2	-1	20	21	37	36	
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21	1	1	2	-1	22	23	39	38	
22	1	1	2	-1	23	24	40	39	
23	1	1	2	-1	24	25	41	40	
24	1	1	2	-1	25	26	42	41	
25	1	1	2	-1	26	27	43	42	
26	1	1	2	-1	27	28	44	43	
27	1	1	2	-1	28	29	45	44	
28	1	1	2	-1	29	30	46	45	
29	1	1	2	-1	30	31	47	46	
30	1	1	2	-1	31	32	48	47	
31	1	1	3	-1	33	34	50	49	
32	1	1	3	-1	34	35	51	50	
33	1	1	3	-1	35	36	52	51	
34	1	1	3	-1	36	37	53	52	
35	1	1	3	-1	37	38	54	53	
36	1	1	3	-1	38	39	55	54	
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40	1	1	3	-1	42	43	59	58	
41	1	1	3	-1	43	44	60	59	
42	1	1	3	-1	44	45	61	60	
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44	1	1	3	-1	46	47	63	62	
45	1	1	3	-1	47	48	64	63	
46	1	1	4	-1	49	50	66	65	
47	1	1	4	-1	50	51	67	66	
48	1	1	4	-1	51	52	68	67	
49	1	1	4	-1	52	53	69	68	
50	1	1	4	-1	53	54	70	69	
51	1	1	4	-1	54	55	71	70	
52	1	1	4	-1	55	56	72	71	
53	1	1	4	-1	56	57	73	72	
54	1	1	4	-1	57	58	74	73	
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57	1	1	4	-1	60	61	77	76	
58	1	1	4	-1	61	62	78	77	
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62	1	1	5	-1	66	67	83	82	
63	1	1	5	-1	67	68	84	83	
64	1	1	5	-1	68	69	85	84	
65	1	1	5	-1	69	70	86	85	
66	1	1	5	-1	70	71	87	86	
67	1	1	5	-1	71	72	88	87	
68	1	1	5	-1	72	73	89	88	
69	1	1	5	-1	73	74	90	89	
70	1	1	5	-1	74	75	91	90	
71	1	1	5	-1	75	76	92	91	
72	1	1	5	-1	76	77	93	92	
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74	1	1	5	-1	78	79	95	94	
75	1	1	5	-1	79	80	96	95	
76	1	1	6	-1	81	82	98	97	
77	1	1	6	-1	82	83	99	98	
78	1	1	6	-1	83	84	100	99	
79	1	1	6	-1	84	85	101	100	
80	1	1	6	-1	85	86	102	101	
81	1	1	6	-1	86	87	103	102	
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83	1	1	6	-1	88	89	105	104	
84	1	1	6	-1	89	90	106	105	
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89	1	1	6	-1	94	95	111	110
90	1	1	6	-1	95	96	112	111
91	1	1	7	-1	97	98	114	113
92	1	1	7	-1	98	99	115	114
93	1	1	7	-1	99	100	116	115
94	1	1	7	-1	100	101	117	116
95	1	1	7	-1	101	102	118	117
96	1	1	7	-1	102	103	119	118
97	1	1	7	-1	103	104	120	119
98	1	1	7	-1	104	105	121	120
99	1	1	7	-1	105	106	122	121
100	1	1	7	-1	106	107	123	122
101	1	1	7	-1	107	108	124	123
102	1	1	7	-1	108	109	125	124
103	1	1	7	-1	109	110	126	125
104	1	1	7	-1	110	111	127	126
105	1	1	7	-1	111	112	128	127
106	1	1	8	-1	113	114	130	129
107	1	1	8	-1	114	115	131	130
108	1	1	8	-1	115	116	132	131
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112	1	1	8	-1	119	120	136	135
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114	1	1	8	-1	121	122	138	137
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116	1	1	8	-1	123	124	140	139
117	1	1	8	-1	124	125	141	140
118	1	1	8	-1	125	126	142	141
119	1	1	8	-1	126	127	143	142
120	1	1	8	-1	127	128	144	143
121	1	1	9	-1	129	130	146	145
122	1	1	9	-1	130	131	147	146
123	1	1	9	-1	131	132	148	147
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125	1	1	9	-1	133	134	150	149
126	1	1	9	-1	134	135	151	150
127	1	1	9	-1	135	136	152	151
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129	1	1	9	-1	137	138	154	153
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131	1	1	9	-1	139	140	156	155
132	1	1	9	-1	140	141	157	156
133	1	1	9	-1	141	142	158	157
134	1	1	9	-1	142	143	159	158
135	1	1	9	-1	143	144	160	159
136	1	1	10	-1	145	146	162	161
137	1	1	10	-1	146	147	163	162
138	1	1	10	-1	147	148	164	163
139	1	1	10	-1	148	149	165	164
140	1	1	10	-1	149	150	166	165
141	1	1	10	-1	150	151	167	166
142	1	1	10	-1	151	152	168	167
143	1	1	10	-1	152	153	169	168
144	1	1	10	-1	153	154	170	169
145	1	1	10	-1	154	155	171	170
146	1	1	10	-1	155	156	172	171
147	1	1	10	-1	156	157	173	172
148	1	1	10	-1	157	158	174	173
149	1	1	10	-1	158	159	175	174
150	1	1	10	-1	159	160	176	175
151	1	1	11	-1	161	162	178	177
152	1	1	11	-1	162	163	179	178
153	1	1	11	-1	163	164	180	179
154	1	1	11	-1	164	165	181	180
155	1	1	11	-1	165	166	182	181
156	1	1	11	-1	166	167	183	182
157	1	1	11	-1	167	168	184	183
158	1	1	11	-1	168	169	185	184
159	1	1	11	-1	169	170	186	185
160	1	1	11	-1	170	171	187	186
161	1	1	11	-1	171	172	188	187
162	1	1	11	-1	172	173	189	188
163	1	1	11	-1	173	174	190	189
164	1	1	11	-1	174	175	191	190
165	1	1	11	-1	175	176	192	191
166	1	1	12	-1	177	178	194	193
167	1	1	12	-1	178	179	195	194
168	1	1	12	-1	179	180	196	195
169	1	1	12	-1	180	181	197	196
170	1	1	12	-1	181	182	198	197
171	1	1	12	-1	182	183	199	198
172	1	1	12	-1	183	184	200	199
173	1	1	12	-1	184	185	201	200
174	1	1	12	-1	185	186	202	201
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1615	1	1	53	-1	241	1702	1716	225
1616	1	1	53	-1	1702	1703	1717	1716
1617	1	1	53	-1	1703	1704	1718	1717
1618	1	1	53	-1	1704	1705	1719	1718
1619	1	1	53	-1	1705	1706	1720	1719
1620	1	1	53	-1	1706	1707	1721	1720
1621	1	1	53	-1	1707	1708	1722	1721
1622	1	1	53	-1	1708	1709	1723	1722
1623	1	1	53	-1	1709	1710	1724	1723
1624	1	1	53	-1	1710	1711	1725	1724
1625	1	1	53	-1	1711	1712	1726	1725
1626	1	1	53	-1	1712	1713	1727	1726
1627	1	1	53	-1	1713	1714	1728	1727
1628	1	1	53	-1	1714	1715	1729	1728
1629	1	1	54	-1	1575	1730	1744	1560
1630	1	1	54	-1	1730	1731	1745	1744
1631	1	1	54	-1	1731	1732	1746	1745
1632	1	1	54	-1	1732	1733	1747	1746
1633	1	1	54	-1	1733	1734	1748	1747
1634	1	1	54	-1	1734	1735	1749	1748
1635	1	1	54	-1	1735	1736	1750	1749
1636	1	1	54	-1	1736	1737	1751	1750
1637	1	1	54	-1	1737	1738	1752	1751
1638	1	1	54	-1	1738	1739	1753	1752
1639	1	1	54	-1	1739	1740	1754	1753
1640	1	1	54	-1	1740	1741	1755	1754
1641	1	1	54	-1	1741	1742	1756	1755
1642	1	1	54	-1	1742	1743	1757	1756
1643	1	1	55	-1	1560	1744	1758	1545
1644	1	1	55	-1	1744	1745	1759	1758
1645	1	1	55	-1	1745	1746	1760	1759
1646	1	1	55	-1	1746	1747	1761	1760
1647	1	1	55	-1	1747	1748	1762	1761
1648	1	1	55	-1	1748	1749	1763	1762
1649	1	1	55	-1	1749	1750	1764	1763
1650	1	1	55	-1	1750	1751	1765	1764
1651	1	1	55	-1	1751	1752	1766	1765
1652	1	1	55	-1	1752	1753	1767	1766
1653	1	1	55	-1	1753	1754	1768	1767
1654	1	1	55	-1	1754	1755	1769	1768
1655	1	1	55	-1	1755	1756	1770	1769
1656	1	1	55	-1	1756	1757	1771	1770
1657	1	1	55	-1	1545	1758	1772	1530
1658	1	1	55	-1	1758	1759	1773	1772
1659	1	1	55	-1	1759	1760	1774	1773
1660	1	1	55	-1	1760	1761	1775	1774
1661	1	1	55	-1	1761	1762	1776	1775
1662	1	1	55	-1	1762	1763	1777	1776
1663	1	1	55	-1	1763	1764	1778	1777
1664	1	1	55	-1	1764	1765	1779	1778
1665	1	1	55	-1	1765	1766	1780	1779
1666	1	1	55	-1	1766	1767	1781	1780
1667	1	1	55	-1	1767	1768	1782	1781
1668	1	1	55	-1	1768	1769	1783	1782
1669	1	1	55	-1	1769	1770	1784	1783
1670	1	1	55	-1	1770	1771	1785	1784
1671	1	1	55	-1	1530	1772	1786	1515
1672	1	1	55	-1	1772	1773	1787	1786
1673	1	1	55	-1	1773	1774	1788	1787
1674	1	1	55	-1	1774	1775	1789	1788
1675	1	1	55	-1	1775	1776	1790	1789
1676	1	1	55	-1	1776	1777	1791	1790
1677	1	1	55	-1	1777	1778	1792	1791
1678	1	1	55	-1	1778	1779	1793	1792
1679	1	1	55	-1	1779	1780	1794	1793
1680	1	1	55	-1	1780	1781	1795	1794
1681	1	1	55	-1	1781	1782	1796	1795
1682	1	1	55	-1	1782	1783	1797	1796
1683	1	1	55	-1	1783	1784	1798	1797
1684	1	1	55	-1	1784	1785	1799	1798
1685	1	1	56	-1	1515	1786	1800	1500
1686	1	1	56	-1	1786	1787	1801	1800
1687	1	1	56	-1	1787	1788	1802	1801
1688	1	1	56	-1	1788	1789	1803	1802
1689	1	1	56	-1	1789	1790	1804	1803
1690	1	1	56	-1	1790	1791	1805	1804
1691	1	1	56	-1	1791	1792	1806	1805
1692	1	1	56	-1	1792	1793	1807	1806
1693	1	1	56	-1	1793	1794	1808	1807
1694	1	1	56	-1	1794	1795	1809	1808
1695	1	1	56	-1	1795	1796	1810	1809
1696	1	1	56	-1	1796	1797	1811	1810
1697	1	1	56	-1	1797	1798	1812	1811
1698	1	1	56	-1	1798	1799	1813	1812
1699	1	1	56	-1	1500	1800	1814	1485
1700	1	1	56	-1	1800	1801	1815	1814
1701	1	1	56	-1	1801	1802	1816	1815
1702	1	1	56	-1	1802	1803	1817	1816
1703	1	1	56	-1	1803	1804	1818	1817
1704	1	1	56	-1	1804	1805	1819	1818
1705	1	1	56	-1	1805	1806	1820	1819
1706	1	1	56	-1	1806	1807	1821	1820
1707	1	1	56	-1	1807	1808	1822	1821
1708	1	1	56	-1	1808	1809	1823	1822
1709	1	1	56	-1	1809	1810	1824	1823
1710	1	1	56	-1	1810	1811	1825	1824
1711	1	1	56	-1	1811	1812	1826	1825
1712	1	1	56	-1	1812	1813	1827	1826
1713	1	1	56	-1	1485	1814	1828	1470
1714	1	1	56	-1	1814	1815	1829	1828
1715	1	1	56	-1	1815	1816	1830	1829
1716	1	1	56	-1	1816	1817	1831	1830
1717	1	1	56	-1	1817	1818	1832	1831
1718	1	1	56	-1	1818	1819	1833	1832

1719	1	1	56	-1	1819	1820	1834	1833
1720	1	1	56	-1	1820	1821	1835	1834
1721	1	1	56	-1	1821	1822	1836	1835
1722	1	1	56	-1	1822	1823	1837	1836
1723	1	1	56	-1	1823	1824	1838	1837
1724	1	1	56	-1	1824	1825	1839	1838
1725	1	1	56	-1	1825	1826	1840	1839
1726	1	1	56	-1	1826	1827	1841	1840
1727	1	1	56	-1	1470	1828	1842	1455
1728	1	1	56	-1	1828	1829	1843	1842
1729	1	1	56	-1	1829	1830	1844	1843
1730	1	1	56	-1	1830	1831	1845	1844
1731	1	1	56	-1	1831	1832	1846	1845
1732	1	1	56	-1	1832	1833	1847	1846
1733	1	1	56	-1	1833	1834	1848	1847
1734	1	1	56	-1	1834	1835	1849	1848
1735	1	1	56	-1	1835	1836	1850	1849
1736	1	1	56	-1	1836	1837	1851	1850
1737	1	1	56	-1	1837	1838	1852	1851
1738	1	1	56	-1	1838	1839	1853	1852
1739	1	1	56	-1	1839	1840	1854	1853
1740	1	1	56	-1	1840	1841	1855	1854
1741	1	1	56	-1	1455	1842	1856	1440
1742	1	1	56	-1	1842	1843	1857	1856
1743	1	1	56	-1	1843	1844	1858	1857
1744	1	1	56	-1	1844	1845	1859	1858
1745	1	1	56	-1	1845	1846	1860	1859
1746	1	1	56	-1	1846	1847	1861	1860
1747	1	1	56	-1	1847	1848	1862	1861
1748	1	1	56	-1	1848	1849	1863	1862
1749	1	1	56	-1	1849	1850	1864	1863
1750	1	1	56	-1	1850	1851	1865	1864
1751	1	1	56	-1	1851	1852	1866	1865
1752	1	1	56	-1	1852	1853	1867	1866
1753	1	1	56	-1	1853	1854	1868	1867
1754	1	1	56	-1	1854	1855	1869	1868
1755	1	1	56	-1	1440	1856	1870	1425
1756	1	1	56	-1	1856	1857	1871	1870
1757	1	1	56	-1	1857	1858	1872	1871
1758	1	1	56	-1	1858	1859	1873	1872
1759	1	1	56	-1	1859	1860	1874	1873
1760	1	1	56	-1	1860	1861	1875	1874
1761	1	1	56	-1	1861	1862	1876	1875
1762	1	1	56	-1	1862	1863	1877	1876
1763	1	1	56	-1	1863	1864	1878	1877
1764	1	1	56	-1	1864	1865	1879	1878
1765	1	1	56	-1	1865	1866	1880	1879
1766	1	1	56	-1	1866	1867	1881	1880
1767	1	1	56	-1	1867	1868	1882	1881
1768	1	1	56	-1	1868	1869	1883	1882

CALCULO DE ARMADURAS EN ESTRIBOS (modelo 3-D)

Proyecto : SUBTRAMO XV
Nombre obra : ESTRIBO 1. EVN1-1.4

---->(ver espacio a la derecha para pasar a FAGUS2)

Directorio del grupo:	G:\MAZAXV.2\fagus
Nombre obra:	EVN1-1-4

CALCULO ARMADURAS VERTICALES

ZONA	FAJA	Elemento N°	Ny,d (T/m)	My,d (mT/m)	Vy,d (T/m)	Canto elemento (m.)	Armadura cortante (cm2/m)	Vu1>Vd	Armadura interior (cm2/m)	Armadura exterior (cm2/m)
MURO IZQUIERDO	BORDE	1	188.40	-165.40	89.76	1.28	2.17	Vale	52.59	1.00
		16	155.30	-135.90	89.14	1.25	2.56	Vale	43.97	1.00
		31	131.60	-113.30	89.15	1.22	3.11	Vale	37.51	1.00
		46	113.10	-95.04	88.62	1.19	3.56	Vale	32.32	1.00
		61	97.29	-80.12	87.68	1.15	3.95	Vale	27.96	1.00
		76	83.08	-67.89	86.54	1.12	4.30	Vale	24.21	1.00
		91	69.99	-57.87	85.42	1.09	4.69	Vale	20.94	1.00
		106	57.76	-49.65	84.44	1.06	5.14	Vale	18.07	1.00
		121	46.27	-42.87	83.75	1.02	5.69	Vale	15.52	1.00
		136	35.41	-37.21	83.52	0.99	6.42	Vale	13.24	1.00
		151	25.03	-32.40	83.94	0.96	7.38	Vale	11.15	1.00
		166	14.83	-28.27	85.22	0.93	8.68	Vale	9.19	1.00
		181	3.99	-24.93	87.33	0.89	10.34	Vale	7.31	1.00
		196	-9.09	-23.63	88.90	0.86	11.95	Vale	5.71	1.00
		211	-10.03	-15.01	56.79	0.83	2.24	Vale	3.28	1.00
		226	-8.72	-8.29	42.47	0.80	0.00	Vale	1.52	1.00
		241	-7.59	-4.56	32.78	0.76	0.00	Vale	1.00	1.00
		256	-6.68	-2.29	25.18	0.73	0.00	Vale	1.00	1.00
		271	-5.82	-0.86	18.89	0.70	0.00	Vale	1.00	1.00
		286	-4.95	-0.02	13.66	0.66	0.00	Vale	1.00	1.00
MURO IZQUIERDO	BASE	1	188.40	-165.40	89.76	1.28	2.17	Vale	52.59	1.00
		2	122.30	-162.00	85.59	1.28	1.28	Vale	44.53	1.00
		3	87.18	-152.90	75.74	1.28	0.00	Vale	38.88	1.00
		4	62.75	-141.00	65.51	1.28	0.00	Vale	33.86	1.00
		5	43.64	-127.70	56.26	1.28	0.00	Vale	29.17	1.00
		6	27.67	-114.10	48.19	1.28	0.00	Vale	24.76	1.00
		7	13.57	-100.60	41.12	1.28	0.00	Vale	20.59	1.00
		8	0.45	-87.51	34.81	1.28	0.00	Vale	16.60	1.00
		9	-12.45	-75.07	29.07	1.28	0.00	Vale	12.77	1.00
		10	-25.85	-63.44	23.81	1.28	0.00	Vale	9.03	1.00
		11	-40.65	-52.84	19.01	1.28	0.00	Vale	5.34	1.00
		12	-58.01	-43.51	14.77	1.28	0.00	Vale	1.61	1.00
		13	-79.85	-35.77	11.36	1.28	0.00	Vale	1.00	1.00
		14	-110.20	-30.22	9.24	1.28	0.00	Vale	1.00	1.00
		15	-160.60	-28.38	9.21	1.28	0.00	Vale	1.00	1.00
MURO DERECHO	BORDE	1143	87.49	-158.70	92.85	1.28	2.83	Vale	40.03	1.00
		1158	69.77	-129.40	91.67	1.25	3.11	Vale	33.09	1.00
		1173	56.69	-107.10	91.01	1.22	3.53	Vale	27.83	1.00
		1188	46.35	-89.22	89.94	1.19	3.87	Vale	23.57	1.00
		1203	37.55	-74.83	88.57	1.15	4.16	Vale	20.06	1.00
		1218	29.72	-63.22	87.12	1.12	4.45	Vale	17.11	1.00
		1233	22.60	-53.85	85.75	1.09	4.77	Vale	14.63	1.00
		1248	16.03	-46.26	84.59	1.06	5.18	Vale	12.51	1.00
		1263	9.90	-40.07	83.75	1.02	5.69	Vale	10.68	1.00

CALCULO DE ARMADURAS HORIZONTALES

ZONA MURO FRONTAL	FAJA BIS.IZDA	Elemento	Nx (T/m)	Mx (mT/m)	Vx (T/m)	Canto elemento (m.)	Armadura cortante (cm2/m)	Vu1>Vd	Armadura interior (cm2/m)	Armadura exterior (cm2/m)
MURO IZQUIERDO	BISAGRA	15	-27.23	-7.25	3.64	1.28	0.00	Vale	1.00	1.00
		30	-13.63	-8.81	7.70	1.25	0.00	Vale	1.00	1.00
		45	-5.35	-11.16	6.76	1.22	0.00	Vale	1.56	1.00
		60	2.17	-14.63	3.52	1.19	0.00	Vale	3.20	1.00
		75	9.32	-19.00	-0.78	1.15	0.00	Vale	5.02	1.00
		90	15.92	-23.96	-5.46	1.12	0.00	Vale	6.98	1.00
		105	21.84	-29.20	-10.10	1.09	0.00	Vale	8.99	1.00
		120	27.01	-34.44	-14.45	1.06	0.00	Vale	11.02	1.00
		135	31.39	-39.46	-18.32	1.02	0.00	Vale	13.00	1.00
		150	35.00	-44.08	-21.63	0.99	0.00	Vale	14.90	1.00
		165	37.91	-48.17	-24.31	0.96	0.00	Vale	16.69	1.00
		180	40.21	-51.63	-26.33	0.93	0.00	Vale	18.37	1.00
		195	41.96	-54.40	-27.69	0.89	0.00	Vale	19.81	1.00
		210	43.25	-56.47	-28.37	0.86	0.00	Vale	21.30	1.00
		225	44.04	-57.91	-28.42	0.83	0.00	Vale	22.55	1.00
		240	44.09	-58.96	-28.19	0.80	0.00	Vale	23.71	1.00
		255	42.90	-60.27	-29.36	0.76	0.00	Vale	24.93	1.00
		270	39.33	-64.36	-39.28	0.73	0.00	Vale	27.03	1.00
		285	35.17	-66.26	-49.73	0.70	3.25	Vale	28.54	1.00
		300	32.45	-63.12	-54.28	0.66	6.28	Vale	28.38	1.00
MURO IZQUIERDO	BISAGRA	315	36.01	-43.82	-25.72	0.63	0.00	Vale	22.12	1.00
		330	32.12	-26.45	-1.06	0.59	0.00	Vale	15.23	1.00
		345	26.00	-22.50	-6.71	0.56	0.00	Vale	13.53	1.00
		360	11.63	-19.04	-12.00	0.52	0.00	Vale	10.95	1.00
MURO DERECHO	BISAGRA	1129	-12.77	-4.03	-1.27	1.28	0.00	Vale	1.00	1.00
		1144	-4.57	-8.07	-2.15	1.25	0.00	Vale	1.00	1.00
		1159	0.68	-12.08	-0.21	1.22	0.00	Vale	2.44	1.00
		1174	5.32	-16.85	3.24	1.19	0.00	Vale	4.01	1.00
		1189	9.51	-22.28	7.39	1.15	0.00	Vale	5.73	1.00
		1204	13.18	-28.08	11.72	1.12	0.00	Vale	7.55	1.00
		1219	16.29	-33.95	15.92	1.09	0.00	Vale	9.42	1.00
		1234	18.87	-39.64	19.78	1.06	0.00	Vale	11.29	1.00
		1249	20.94	-44.94	23.15	1.02	0.00	Vale	13.12	1.00
		1264	22.59	-49.67	25.96	0.99	0.00	Vale	14.88	1.00
		1279	23.90	-53.74	28.17	0.96	0.00	Vale	16.55	1.00
		1294	24.94	-57.08	29.76	0.93	0.00	Vale	18.11	1.00
		1309	25.77	-59.63	30.73	0.89	0.00	Vale	19.55	1.00
		1324	26.40	-61.41	31.09	0.86	0.00	Vale	20.86	1.00
		1339	26.71	-62.50	30.90	0.83	0.00	Vale	22.02	1.00
		1354	26.26	-63.18	30.48	0.80	0.00	Vale	23.08	1.00
		1369	24.02	-64.10	31.37	0.76	0.00	Vale	24.13	1.00
		1384	17.09	-67.96	40.31	0.73	0.00	Vale	25.89	1.00
		1399	10.82	-69.27	49.57	0.70	3.18	Vale	27.05	1.00
		1414	11.52	-65.47	53.76	0.66	6.06	Vale	27.07	1.00

CALCULO DE ARMADURAS EN ESTRIBOS (modelo 3-D)

Proyecto : SUBTRAMO XV
Nombre obra : ESTRIBO 1. EVN1-1.4

—>(ver espacio a la derecha para pasar a FAGUS2)

Directorio del grupo:	G:\MAZAXV.2\fagus
Nombre obra:	EVN1-1-4

CALCULO ARMADURAS VERTICALES

ZONA	FAJA	Elemento Nº	Ny,d (T/m)	My,d (mT/m)	Vy,d (T/m)	Canto elemento (m.)	Armadura cortante (cm2/m)	Vu1>Vd	Armadura interior (cm2/m)	Armadura exterior (cm2/m)
		1278	4.07	-34.95	83.40	0.99	6.38	Vale	9.08	1.00
		1293	-1.61	-30.61	83.73	0.96	7.32	Vale	7.62	1.00
		1308	-7.52	-26.89	84.95	0.93	8.60	Vale	6.25	1.00
		1323	-14.54	-23.90	87.03	0.89	10.24	Vale	4.89	1.00
		1338	-24.36	-22.87	88.59	0.86	11.85	Vale	3.73	1.00
		1353	-19.80	-14.52	56.44	0.83	2.12	Vale	2.00	1.00
		1368	-15.45	-7.99	42.17	0.80	0.00	Vale	1.00	1.00
		1383	-12.34	-4.40	32.54	0.76	0.00	Vale	1.00	1.00
		1398.00	-10.02	-2.21	25.00	0.73	0.00	Vale	1.00	1.00
		1413.00	-8.11	-0.84	18.76	0.70	0.00	Vale	1.00	1.00
		1428.00	-6.46	-0.03	13.57	0.66	0.00	Vale	1.00	1.00
MURO DERECHO	BASE	1129.00	-74.51	-7.72	-10.94	1.28	0.00	Vale	1.00	1.00
		1130.00	-50.77	-10.40	-5.69	1.28	0.00	Vale	1.00	1.00
		1131.00	-37.59	-17.16	-0.09	1.28	0.00	Vale	1.00	1.00
		1132.00	-28.62	-26.20	5.80	1.28	0.00	Vale	1.61	1.00
		1133.00	-21.74	-36.84	11.85	1.28	0.00	Vale	4.41	1.00
		1134.00	-15.99	-48.70	18.02	1.28	0.00	Vale	7.32	1.00
		1135.00	-10.77	-61.51	24.31	1.28	0.00	Vale	10.35	1.00
		1136.00	-5.65	-75.05	30.84	1.28	0.00	Vale	13.52	1.00
		1137.00	-0.26	-89.16	37.78	1.28	0.00	Vale	16.84	1.00
		1138.00	5.82	-103.60	45.38	1.28	0.00	Vale	20.31	1.00
		1139.00	13.04	-118.20	53.95	1.28	0.00	Vale	23.94	1.00
		1140.00	22.11	-132.40	63.77	1.28	0.00	Vale	27.71	1.00
		1141.00	34.26	-145.40	74.83	1.28	0.00	Vale	31.58	1.00
		1142.00	52.45	-155.30	86.04	1.28	1.37	Vale	35.51	1.00
		1143.00	87.49	-158.70	92.85	1.28	2.83	Vale	40.03	1.00

CALCULO DE ARMADURAS HORIZONTALES

ZONA MURO FRONTAL	FAJA BIS.IZDA	Elemento	Nx (T/m)	Mx (mT/m)	Vx (T/m)	Canto elemento (m.)	Armadura cortante (cm2/m)	Vu1>Vd	Armadura interior (cm2/m)	Armadura exterior (cm2/m)
MURO DERECHO	BISAGRA	1429	25.00	-45.34	26.38	0.63	0.00	Vale	21.52	1.00
		1444	26.04	-27.16	1.73	0.59	0.00	Vale	14.83	1.00
		1459	19.32	-23.04	6.78	0.56	0.00	Vale	13.01	1.00
		1474	3.65	-19.51	10.16	0.52	0.00	Vale	10.25	1.00
MURO FRONTAL	BIS.IZDA	361	-28.72	-7.85	-2.59	1.30	0.00	Vale	1.00	1.00
		393	-17.18	-8.18	-4.17	1.30	0.00	Vale	1.00	1.00
		425	-11.00	-10.21	-1.27	1.30	0.00	Vale	1.00	1.00
		457	-4.54	-13.48	2.98	1.30	0.00	Vale	1.94	1.00
		489	2.51	-17.72	7.56	1.30	0.00	Vale	3.53	1.00
		521	9.73	-22.61	12.04	1.30	0.00	Vale	5.26	1.00
		553	16.67	-27.83	16.19	1.30	0.00	Vale	7.02	1.00
		585	23.05	-33.09	19.91	1.30	0.00	Vale	8.72	1.00
		617	28.66	-38.15	23.15	1.30	0.00	Vale	10.30	1.00
		649	33.40	-42.81	25.92	1.30	0.00	Vale	11.71	1.00
		681	37.23	-46.92	28.25	1.30	0.00	Vale	12.90	1.00
		713	40.14	-50.36	30.21	1.30	0.00	Vale	13.87	1.00
		745	42.16	-53.06	31.91	1.30	0.00	Vale	14.61	1.00
		777	43.34	-54.97	33.49	1.30	0.00	Vale	15.10	1.00
		809	43.79	-56.08	35.03	1.30	0.00	Vale	15.35	1.00
		841	43.77	-56.16	36.21	1.30	0.00	Vale	15.37	1.00
		873	43.48	-53.37	34.65	1.30	0.00	Vale	14.81	1.00
		905.00	40.58	-33.69	19.86	1.30	0.00	Vale	10.85	1.00
		937.00	66.33	-123.00	16.24	2.58	0.00	Vale	18.63	1.00
		969.00	73.99	-109.50	17.20	2.39	0.00	Vale	19.10	1.00
MURO FRONTAL	BIS.IZDA	1001.00	19.52	-8.59	19.86	0.50	0.00	Vale	6.78	1.00
		1033.00	19.17	-17.82	30.65	0.50	0.94	Vale	11.61	1.00
		1065.00	20.98	-18.95	22.19	0.50	0.00	Vale	12.42	1.00
		1097.00	19.88	-18.84	12.99	0.50	0.00	Vale	12.23	1.00
MURO FRONTAL	BIS.DCHA	392.00	-12.00	-5.56	1.56	1.30	0.00	Vale	1.00	1.00
		424.00	-4.16	-7.98	1.74	1.30	0.00	Vale	1.00	1.00
		456.00	-1.05	-11.66	-1.58	1.30	0.00	Vale	2.01	1.00
		488.00	1.89	-16.24	-6.04	1.30	0.00	Vale	3.19	1.00
		520.00	5.24	-21.50	-10.79	1.30	0.00	Vale	4.54	1.00
		552.00	8.85	-27.17	-15.39	1.30	0.00	Vale	6.00	1.00
		584.00	12.45	-32.96	-19.63	1.30	0.00	Vale	7.49	1.00
		616.00	15.82	-38.60	-23.39	1.30	0.00	Vale	8.92	1.00
		648.00	18.79	-43.87	-26.62	1.30	0.00	Vale	10.23	1.00
		680.00	21.25	-48.60	-29.31	1.30	0.00	Vale	11.39	1.00
		712.00	23.15	-52.65	-31.52	1.30	0.00	Vale	12.36	1.00
		744.00	24.46	-55.94	-33.30	1.30	0.00	Vale	13.13	1.00
		776.00	25.17	-58.41	-34.76	1.30	0.00	Vale	13.67	1.00
		808.00	25.33	-60.04	-36.02	1.30	0.00	Vale	13.99	1.00

CALCULO DE ARMADURAS EN ESTRIBOS (modelo 3-D)

Proyecto : SUBTRAMO XV
Nombre obra : ESTRIBO 1. EVN1-1.4

----->(ver espacio a la derecha para pasar a FAGUS2)

Directorio del grupo:	G:\MAZAXV.2\fagus
Nombre obra:	EVN1-1-4

CALCULO ARMADURAS VERTICALES

ZONA	FAJA	Elemento Nº	Ny,d (T/m)	My,d (mT/m)	Vy,d (T/m)	Canto elemento (m.)	Armadura cortante (cm2/m)	Vu1>Vd	Armadura interior (cm2/m)	Armadura exterior (cm2/m)

CALCULO DE ARMADURAS HORIZONTALES

ZONA MURO FRONTAL	FAJA BIS.IZDA	Elemento	Nx (T/m)	Mx (mT/m)	Vx (T/m)	Canto elemento (m.)	Armadura cortante (cm2/m)	Vu1>Vd	Armadura interior (cm2/m)	Armadura exterior (cm2/m)
		840.00	25.10	-60.81	-37.17	1.30	**0.00**	Vale	**14.11**	**1.00**
		872.00	24.96	-60.47	-37.81	1.30	**0.00**	Vale	**14.03**	**1.00**
		904.00	25.80	-57.02	-35.51	1.30	**0.00**	Vale	**13.48**	**1.00**
		936.00	27.37	-35.79	-19.82	1.30	**0.00**	Vale	**9.72**	**1.00**
		968.00	46.90	-127.80	-18.40	2.58	**0.00**	Vale	**16.88**	**1.00**
		1000.00	50.75	-111.60	-24.51	2.39	**0.00**	Vale	**16.67**	**1.00**
MURO FRONTAL	BIS.DCHA	1032.00	9.30	-8.96	-20.44	0.50	**0.00**	Vale	**5.74**	**1.00**
		1064.00	3.94	-18.55	-30.98	0.50	**1.14**	Vale	**10.20**	**1.00**
		1096.00	7.83	-19.54	-22.67	0.50	**0.00**	Vale	**11.19**	**1.00**
		1128.00	10.89	-19.21	-13.05	0.50	**0.00**	Vale	**11.37**	**1.00**
MURO FRONTAL	CENTRAL	376.00	-5.46	-10.68	0.21	1.30	**0.00**	Vale	**1.32**	**1.00**
		408.00	-4.64	-6.99	0.47	1.30	**0.00**	Vale	**1.00**	**1.00**
		440.00	-3.40	-3.70	0.58	1.30	**0.00**	Vale	**1.00**	**1.00**
		472.00	-1.73	-0.68	0.61	1.30	**0.00**	Vale	**1.00**	**1.00**
		504.00	0.32	2.11	0.62	1.30	**0.00**	Vale	**1.00**	**1.00**
		536.00	2.70	4.66	0.61	1.30	**0.00**	Vale	**1.00**	**1.16**
		568.00	5.36	6.97	0.60	1.30	**0.00**	Vale	**1.00**	**1.89**
		600.00	8.24	9.03	0.58	1.30	**0.00**	Vale	**1.00**	**2.60**
		632.00	11.27	10.84	0.56	1.30	**0.00**	Vale	**1.00**	**3.28**
		664.00	14.40	12.39	0.53	1.30	**0.00**	Vale	**1.00**	**3.92**
		696.00	17.58	13.69	0.51	1.30	**0.00**	Vale	**1.00**	**4.53**
		728.00	20.79	14.76	0.48	1.30	**0.00**	Vale	**1.00**	**5.10**
		760.00	23.99	15.60	0.46	1.30	**0.00**	Vale	**1.00**	**5.62**
		792.00	27.19	16.24	0.44	1.30	**0.00**	Vale	**1.00**	**6.11**
		824.00	30.39	16.69	0.46	1.30	**0.00**	Vale	**1.00**	**6.56**
		856.00	33.60	16.95	0.55	1.30	**0.00**	Vale	**1.00**	**6.97**
		888.00	36.86	17.01	0.84	1.30	**0.00**	Vale		
		920.00	40.21	16.74	1.67	1.30	**0.00**	Vale		
		952.00	88.63	126.70	2.38	2.58	**0.00**	Vale		
		984.00	89.49	97.32	-2.03	2.39	**0.00**	Vale		

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **EVN1-1.4. ALETAS ESTRIBO 1**

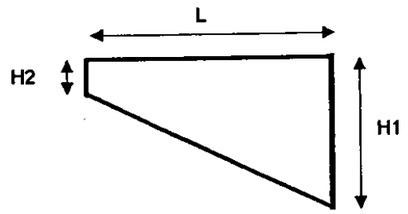
HOJA DE CALCULO DE ALETAS DE ESTRIBOS

DATOS REQUERIDOS:

DIMENSIONES(en metros)

H1= 4.17
H2= 0.50
L= 5.50

Espesor= 0.5
Recubrim.= 0.05



CARACTERISTICAS DE TERRENO

Peso tierras(T/m3)	γ= 2
Angulo rozamiento interno (°)	φ= 30
Ang. rozamiento tierras muro (°)	δ= 0

COEFICIENTES DE SEGURIDAD

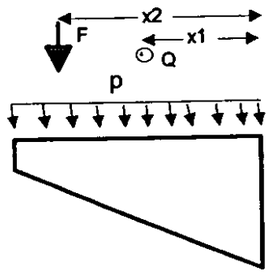
Mayoracion de cargas	γf= 1.5
Minoracion acero	gs= 1.15
Minoracion hormigon	gc= 1.5

CARACTERISTICAS DE LOS MATERIALES

Peso especifico hgon(T/m3)	γη= 2.5
Resistencia acero (T/m2)	Fyk= 51000
Resistencia hormigon (T/m2)	Fck= 2500

CARGAS (valores sin mayorar)

Cargas verticales	
Sobrecarga vertical (t/m)	p= 1
Carga vertical (t.)	F= 0.00
Situacion x2 (m)	x2= 0
Cargas horizontales	
Carga horizontal (t.)	Q= 0
Posicion x1 (m)	x1= 0
Sobrecarga sobre terreno (ton/m2)	
	q= 3



CUANTIAS MINIMAS

LONGITUDINAL SUPERIOR	0.400 o/oo
LONGITUDINAL INFERIOR	0.400 o/oo
CORTANTE	3.968 CM2/M
HORIZONTAL MUROS ALETA	0.900 o/oo
VERTICAL MUROS ALETA	1.600 o/oo
CORTANTE MUROS	0.000 CM2/M

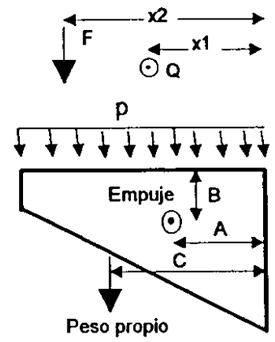
Alet-e1.xls CALCULOS

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **EVN1-1.4. ALETAS ESTRIBO 1**

HOJA DE CALCULO DE ALETAS DE ESTRIBOS

CARGAS DE PESO PROPIO Y EMPUJES DE TIERRAS SOBRE ESTRIBO(ton/m. sin mayorar)



COEFICIENTES EMPUJE ACTIVO ALETA

Coef. empuje activo λh=	0.333
Coef. empuje activo λv=	0.000

PESO PROPIO

	Peso	Dist.emp.	Dist. vert.
Peso aux. 1	3.438	2.750	0.250
Peso aux. 2	12.604	1.833	1.722
Peso propio	**16.042**	**2.030**	**1.407**

EMPUJE DE TIERRAS

HORIZONTAL

	Empuje.	Dist.emp.	Dist. vert.
Auxiliar	0.153	4.125	-
Auxiliar	1.273	2.750	-
Auxiliar	10.610	1.375	-
Auxiliar	1.375	3.667	-
Auxiliar	11.458	1.833	-
Empuje hor.	**24.869**	**1.800**	**1.736**

VERTICAL

	Empuje.	Dist.emp.
Empuje aux.1	0.000	4.125
Empuje aux.2	0.000	2.750
Empuje aux.3	0.000	1.375
Empuje aux.4	0.000	3.667
Empuje aux.5	0.000	1.833
Empuje vert.	**0.000**	**0.000**

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **EVN1-1.4. ALETAS ESTRIBO 1**

HOJA DE CALCULO DE ALETAS DE ESTRIBOS

CALCULOS

ESFUERZOS DE DISEÑO

(Para cargas verticales, momentos positivos implica tracciones en cara superior)

Acciones	Verticales	Horizontales
M peso propio	32.561	0.000
M empuje hor.	0.000	44.768
M empuje vert.	0.000	0.000
M sobrec.vert.	15.125	0.000
M carga vert.	0.000	0.000
M carga hor.	0.000	0.000
Md (mt)	**71.529**	**67.152**
V peso propio	16.042	0.000
V empuje hor.	0.000	24.869
V empuje vert.	0.000	0.000
V sobrec.vert.	5.500	0.000
V carga vert.	0.000	0.000
V carga hor.	0.000	0.000
Vd (mt)	**32.313**	**37.303**

Alet-e1.xls CALCULOS

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **EVN1-1.4. ALETAS ESTRIBO 1**

HOJA DE CALCULO DE ALETAS DE ESTRIBOS

CALCULO DE SECCIONES

Fcd	1666.67	
0,85*Fcd	1416.67	
Fcv	64.55	
Es	21000000	
Fyd	44347.83	
FYAD	42000.00	
Acciones	Verticales	Horizontales
Md(m.t)	71.529	67.152
Md max/Md med	1.000	1.537
Md a usar calculo	71.529	103.184
Canto seccion	4.167	0.500
Canto util	4.117	0.450
ancho seccion	0.500	4.167
Ancho calculo	0.500	4.117
Def acero	0.010	0.010
Tension acero	44348	44348
X	0.025	0.041
As (cm.2)	**3.930**	**54.185**
Prof. fibra neutra	0.292	0.068
Def. hormigon	0.001	0.002
Comentarios	VALE	VALE
Vd	32.313	37.303
Vd compuesto		49.352
Vu1		926.428
Vsu		0.000
Vcu		119.601
Vu2		119.601
Comentarios		
As (cm.2)		**0.000**

NOMBRE PROYECTO : SUBTRAMO XV

DESIGNACION ESTRIBO: EVN1-1.4. ALETAS ESTRIBO 1

HOJA DE CALCULO DE ALETAS DE ESTRIBOS

ARMADO

	Calculo	Minima	total
Long. superior	3.930	8.333	**8.333**
Long inferior	0.000	8.333	**8.333**
Cortante	0.000	21.825	**21.825**
Horizontal trasdos	54.185	12.500	**54.185**
Vertical trasdos	0.000	22.000	**22.000**
Horizontal intrados	0.000	6.250	**6.250**
Vertical intrados	0.000	22.000	**22.000**
Cortante transversal		NO	

TOTAL ENVOLVENTE ARMADURA (CM.2)

	CM2	CM2/M
Long. superior	**8.333**	–
Long inferior	**8.333**	–
Horizontal trasdos	**54.185**	**13.00**
Horizontal intrados	**6.250**	**1.50**
Estribos por rama (2 ramas)	**32.913**	–

DATOS ARMADO

Separacion maxima barras	0.3
Separacion minima barras	0.1

TOTAL ARMADURAS

	TOTAL	DIAMETRO	A.REAL	AREAL/ANEC	
Long. superior	3.0	20	9.42	1.13	VALE
Long inferior	3.0	20	9.42	1.13	VALE
Horizontal trasdos	48.0	12	54.29	1.00	VALE
Horizontal intrados	19.0	10	14.92	2.39	VALE
Estribos	42.0	10	32.99	1.00	VALE

NOMBRE PROYECTO : **SUBTRAMO XV. EVN1-1.4**

DESIGNACION ESTRIBO: **ESTRIBO 2**

CALCULO ESTRIBOS CERRADOS

DATOS REQUERIDOS:

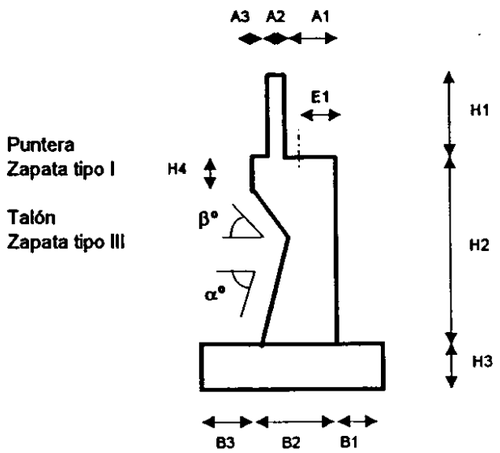
DIMENSIONES(en metros)

H1= 1.8
H2= 6.7
H3= 1.5
Htierras= 8.5
B1= 2.3
B2= 2.5
B3= 4

A1= 2
A2= 0.5
A3= 0.3

H4= 0.3
α(grados)= 90
β(grados)= 45
E1= 0.6

Longitud= 12.8
Recubrim.= 0.05



Puntera
Zapata tipo I

Talón
Zapata tipo III

CARACTERISTICAS DE TERRENO

Peso tierras(T/m3)	γ= 2
Angulo rozamiento interno	φ= 30
Coef.rozamiento zapata-terreno	μ= 0.58
Angulo. rozamiento tierras muro	δ= 0
Tension admisible.(T/m2)	σ= 35

COEFICIENTES DE SEGURIDAD

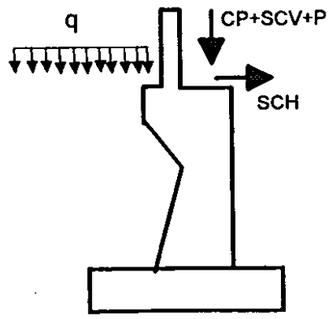
Mayoracion de cargas	γf= 1.5
Seguridad al deslizamiento	Csd= 1.5
Seguridad al vuelco	Csv= 1.8
Minoracion acero	gs= 1.15
Minoracion hormigon	gc= 1.5

CARACTERISTICAS DE LOS MATERIALES

Peso especifico hgon(T/m3)	γη= 2.5
Resistencia acero (T/m2)	Fyk= 51000
Resistencia hgon. ciment. (T/m2)	Fck1= 2500
Resistencia hgon. alzado (T/m2)	Fck2= 2500

CARGAS TRANSMITIDAS POR LA ESTRUCTURA(valores sin mayorar)

Cargas verticales(ton/m)	
Cargas permanentes	CP= 22.03
Sobrecargas	SCV= 15.16
Pretensado	P= 0
Cargas horizontales(ton/m)	
Sobrecargas horizontales	SCH= 19.21875
Sobrecarga(ton/m2)	q= 3



NOMBRE PROYECTO : **SUBTRAMO XV. EVN1-1.4**

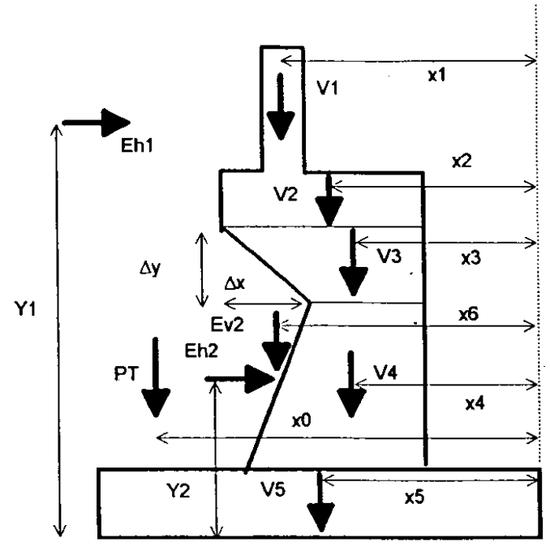
DESIGNACION ESTRIBO: **ESTRIBO 2**

CALCULO ESTRIBOS CERRADOS

CARGAS DE PESO PROPIO Y EMPUJES DE TIERRAS SOBRE ESTRIBO(ton/m. sin mayorar)

Resultados intermedios:

Δx= 0.300
Δy= 0.300



COEFICIENTES EMPUJE ACTIVO ALZADO MURO

Coef. empuje activo λh= 0.333
Coef. empuje activo λv= 0.000

COEFICIENTES EMPUJE ACTIVO MURETE

Coef. empuje activo λh= 0.333
Coef. empuje activo λv= 0.000

PESO TIERRAS TRASDOS

PT=	**67.732**	x0=	6.807

PESO PROPIO

V1=	2.250	x1=	4.550
V2=	2.100	x2=	3.700
V3=	1.988	x3=	3.626
V4=	38.125	x4=	3.550
V5=	33.000	x5=	4.400
TOTAL PP=	**77.463**		**3.947**

EMPUJES

Eh1=	4.320	Y1=	8.622
Eh2=	28.263	Y2=	4.104
Eh3=	10.750	Y3=	0.733
Empuje hor.	**43.333**		**3.718**
Ev2=	**0.000**	x6=	4.800

NOMBRE PROYECTO : **SUBTRAMO XV. EVN1-1.4**

DESIGNACION ESTRIBO: **ESTRIBO 2**

CALCULO ESTRIBOS CERRADOS

COMPROBACIONES

1) SEGURIDAD AL DESLIZAMIENTO

$$C_{SD} = \frac{\sum_i \text{Fuerzas} - \text{opuestas}}{\sum_i \text{Fuerzas} - \text{deslizantes}}$$

1,A) En construccion:

Fuerzas opuestas			
	Peso propio	44.928	
	Peso tierras	39.284	
	Ev2	0.000	
	TOTAL		84.213
Fuerzas deslizantes			
	Empuje horizontal	43.333	
	TOTAL		43.333

Csd= 1.94

1,B) En Servicio:

Fuerzas opuestas			
	Peso propio	44.928	
	Peso tierras	39.284	
	Ev2	0.000	
	Carga perma	12.778	
	TOTAL		96.991
Fuerzas deslizantes			
	Empuje horiz	43.333	
	Sobrecarga h	19.219	
	TOTAL		62.552

Csd= 1.55

2) SEGURIDAD AL VUELCO

$$C_{SV} = \frac{\sum_i \text{Momentos} - \text{estabilizadores}}{\sum_i \text{Momentos} - \text{volcadores}}$$

2,A) En construccion:

Mom.estabilizadores			
	Peso propio	305.759	
	Peso tierras	461.076	
	M Ev2	0.000	
	TOTAL		766.835
Mom. volcadores			
	Empuje horizontal	161.111	
	TOTAL		161.111

Csv= 4.76

2.B.) En Servicio:

Mom.estabilizadores			
	Peso propio	305.759	
	Peso tierras	461.076	
	M Ev2	0.000	
	Carga perma	63.891	
	TOTAL		830.726
Mom. volcadores			
	Empuje horiz	161.111	
	Sobrecarga h	157.594	
	TOTAL		318.705

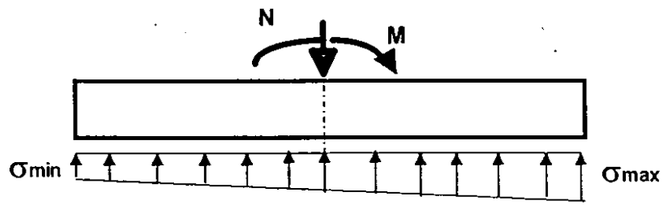
Csv= 2.61

NOMBRE PROYECTO : **SUBTRAMO XV. EVN1-1.4**

DESIGNACION ESTRIBO: **ESTRIBO 2**

CALCULO ESTRIBOS CERRADOS

3) TENSIONES MAXIMAS Y MINIMAS EN CIMENTACION



3,A) En construccion:

Carga vertical N. (t/m)			
	Peso propio	77.463	
	Peso tierras	67.732	
	Ev2	0.000	
	TOTAL		145.194
Momento M. (m.t/m)			
	Peso propio	35.076	
	Peso tierras	-163.057	
	M Ev2	0.000	
	Empuje horizontal	161.111	
	TOTAL		33.131

Ancho zapata=	**8.80**
σmax=	**19.07 (ton/m2)**
σmin=	**13.93 (ton/m2)**
σcob=	**17.40 (ton/m2)**
σmed=	**16.50 (ton/m2)**

3,B) En Servicio:

Carga vertical N. (t/m)			
	Peso propio	77.463	
	Peso tierras	67.732	
	Ev2	0.000	
	Carga perma	22.031	
	Sc. vertical	15.156	
	Pretensado	0.000	
	TOTAL		182.382
Momento M. (m.t/m)			
	Peso propio	35.076	
	Peso tierras	-163.057	
	M Ev2	0.000	
	Carga perma	33.047	
	Sc. vertical	22.734	
	Pretensado	0.000	
	Empuje horiz	161.111	
	Sobrecarga h	157.594	
	TOTAL		246.506

Ancho zapata (m)=	**8.80**
σmax=	**39.82 (ton/m2)**
σmin=	**1.63 (ton/m2)**
σcob=	**29.91 (ton/m2)**
σmed=	**20.73 (ton/m2)**

NOMBRE PROYECTO : SUBTRAMO XV. EVN1-1.4

DESIGNACION ESTRIBO: ESTRIBO 2

CALCULO ESTRIBOS CERRADOS

CALCULOS

4) ESFUERZOS DE DISEÑO

4,A) Esfuerzos en el muro.

Seccion	Base	1/3 H2
h(m)	0	2.23
Canto (m.)	2.5	2.5
M cargas verti	24.172	24.172
M cargas horiz	128.766	85.844
M peso propio	-2.717	-2.717
M empuje hori	104.361	46.980
M empuje vert	0.000	0.000
Md (mt/m)	**381.873**	**231.418**
V cargas horiz	19.219	19.219
V empuje hori	43.333	19.357
Vd (t/m)	**93.828**	**57.864**
Ndmax(t/m)	122.48	101.54
Ndmin(t/m)	40.02	27.45

4,B) Esfuerzos en el murete.

Seccion	Base murete
h(m)	6.70
Canto (m.)	0.5
M empuje horizontal	2.268
Md (mt/m)	**3.402**
V empuje horizontal	2.880
Vd (t/m)	**4.320**
Nd (t/m)	2.25

4,C) Esfuerzos en la puntera.

(momentos (+) implica tracciones en cara inferior)

Seccion	Cara intrados
Distancia a vuelco	2.3
M peso propio	-9.919
M tens.terreno	96.533
Md puntera(mt/m)	**129.921**
Posicion seccion S2 cortante	1.575
Canto util seccion S2	1.450
V peso propio	-5.906
V tens.terreno	57.339
Vd en puntera(t/m)	**77.150**

4,D) Esfuerzos en el talon

(momentos (+) implica tracciones en cara superior)

Seccion	Cara trasdos
Distancia a vuelco	4.8
M tierras	135.96
M peso propio	30.00
M tens.terreno	-59.310
Md talon(mt/m)	**159.982**
Posicion seccion S2 cortant	6.250
Canto util seccion S2	1.450
V tierras	43.18
V peso propio	9.56
V tens.terreno	-18.259
Vd en talon(t/m)	**51.723**
Cortante base	93.828
Area comp.cim.talon/total	0.416
Traccion superior d. (t/m)	**39.030**

NOMBRE PROYECTO : SUBTRAMO XV. EVN1-1.4

DESIGNACION ESTRIBO: ESTRIBO 2

CALCULO ESTRIBOS CERRADOS

5) CALCULO DE SECCIONES

Elementos	Seccion: Designacion	b(m.)	d(m.)	Esfuerzos de diseño: Md(m.ton)	Nd(ton.)	Vd(ton.)
MURO	0-0	1.00	2.50	381.87	-	93.83
	1-1	1.00	2.50	231.42	-	57.86
PUNTERA	2-2	1.00	1.50	129.92	-	77.15
TALÓN	3-3	1.00	1.50	159.98	-	51.72
MURETE	4-4	1.00	0.50	3.40	-	4.32

Elementos	Designacion armaduras	Nombre Seccion	ARMADURA(cm2/m): Necesaria	Minima	Adoptada
MURO	Asv1	0-0	31.28	15.00	31.28
	Asv1	1-1	18.78	15.00	18.78
	Asv3	-	0.00	7.50	7.50
	Ash1	-	0.00	20.00	20.00
	Ash2	-	0.00	20.00	20.00
	Cortante	0-0	0.00	0.00	0.00
PUNTERA	As inf L.	2-2	3.59	10.85	10.85
	As inf T.	-	17.97	10.85	17.97
	Cortante	S2	0.00	0.00	0.00
TALÓN	As sup L.	3-3	5.98	10.85	10.85
	As sup T.	-	29.90	10.85	29.90
	Cortante	S2	0.00	0.00	0.00
MURETE	Asv2	4-4	1.49	2.25	2.25
	Asv4	-	0.00	2.25	2.25
	Ash3	-	0.00	4.00	4.00
	Ash4	-	0.00	4.00	4.00

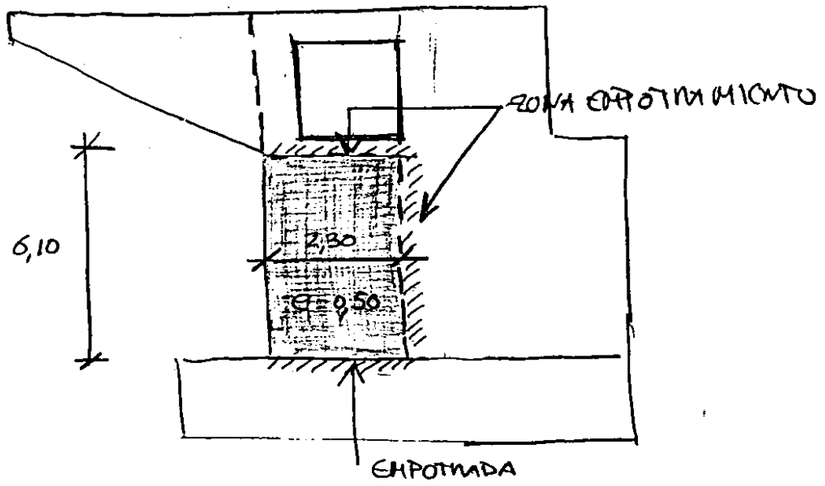
NOTA: las armaduras longitudinales en talón y puntera que aparecen en las casillas de armadura "necesaria" han sido obtenidas multiplicando la armadura transversal por el coeficiente de poisson.

GINPROSA

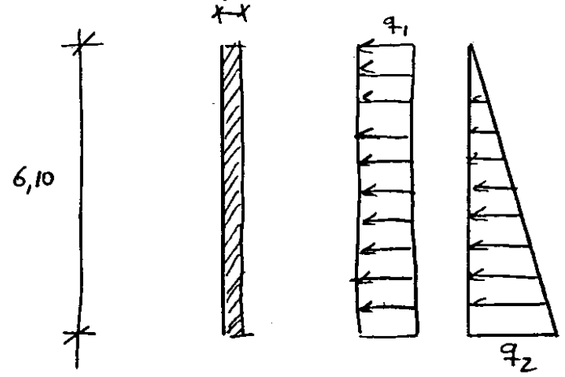
ASUNTO: EVN1 – 1.4 (ESTRIBO 2)
PLACAS EN MUROS LATERALES

FECHA:

PAG. 1 /



CARGAS



$q_1 = 2,60 \times 2 \times 0,33 + 3 \times 0,33 = 2,71\ T/m^2$

$q_2 = 6,1 \times 2 \times 0,33 = 4,05\ T/m^2$

$L_x = 6,10$ | $L_y = 2,30$ | $\frac{L_y}{L_x} = 0,37$

$K = p \cdot L_x L_y \rightarrow K = 94,85 \rightarrow M = \frac{K}{m}$

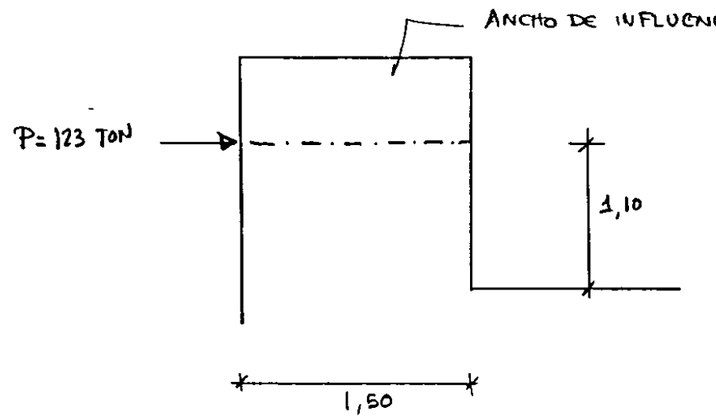
$M_x = \frac{K}{6,80} = 14\ mt/m.$

$M_y = \frac{K}{9,02} = 19,6\ mt/m.$

GINPROSA

ASUNTO: EVN1 – 1.4
MENSULA DE ANCLAJE. ESTRIBO 2

PAG. /



$M_d = 123 \times 1,50 \times 1,1 = 203\ mt \rightarrow A_{sf} = 33,6\ cm^2$

$V_d = 123 \times 1,50 = 185\ t. \rightarrow A_{sv} = \frac{V_d}{f_y \cot\varphi} = 41,7\ cm^2$

Tenemos que $A_{sf} > 2/3\ A_{sv} \rightarrow A_{sc} = 0,5\ A_{sf}$ en 1,00

$A_{sc} = 16,8\ cm^2$ en 1,00 m.

$A_{sf} \rightarrow 33,6/0,60 = 56\ cm^2/m \rightarrow$ 2 capas ϕ 25/0,15

$A_{sc} \rightarrow$ horquilla ϕ 20/0,20 /TENDÓN

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **EVN1-1.4. ALETAS ESTRIBO 2**

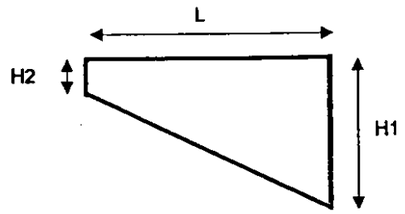
HOJA DE CALCULO DE ALETAS DE ESTRIBOS

DATOS REQUERIDOS:

DIMENSIONES(en metros)

H1= 3.83
H2= 0.50
L= 5.00

Espesor= 0.5
Recubrim.= 0.05



CARACTERISTICAS DE TERRENO

Peso tierras(T/m3)	γ= 2
Angulo rozamiento interno (°)	φ= 30
Ang. rozamiento tierras muro (°)	δ= 0

COEFICIENTES DE SEGURIDAD

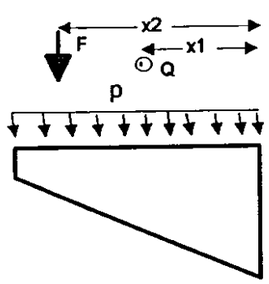
Mayoracion de cargas	γf= 1.5
Minoracion acero	gs= 1.15
Minoracion hormigon	gc= 1.5

CARACTERISTICAS DE LOS MATERIALES

Peso especifico hgon(T/m3)	γη= 2.5
Resistencia acero (T/m2)	Fyk= 51000
Resistencia hormigon (T/m2)	Fck= 2500

CARGAS (valores sin mayorar)

Cargas verticales	
Sobrecarga vertical (t/m)	p= 1
Carga vertical (t.)	F= 0.00
Situacion x2 (m)	x2= 0
Cargas horizontales	
Carga horizontal (t.)	Q= 0
Posicion x1 (m)	x1= 0
Sobrecarga sobre terreno (ton/m2)	
	q= 3



CUANTIAS MINIMAS

LONGITUDINAL SUPERIOR	0.400 o/oo
LONGITUDINAL INFERIOR	0.400 o/oo
CORTANTE	3.968 CM2/M
HORIZONTAL MUROS ALETA	0.900 o/oo
VERTICAL MUROS ALETA	1.600 o/oo
CORTANTE MUROS	0.000 CM2/M

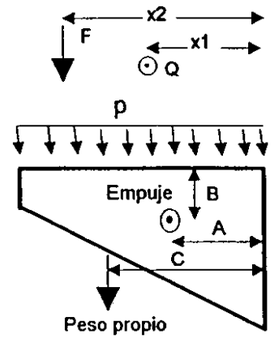
Alet-e2.xls CALCULOS

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **EVN1-1.4. ALETAS ESTRIBO 2**

HOJA DE CALCULO DE ALETAS DE ESTRIBOS

CARGAS DE PESO PROPIO Y EMPUJES DE TIERRAS SOBRE ESTRIBO(ton/m. sin mayorar)



COEFICIENTES EMPUJE ACTIVO ALETA

Coef. empuje activo λh=	0.333
Coef. empuje activo λv=	0.000

PESO PROPIO

	Peso	Dist.emp.	Dist. vert.
Peso aux. 1	3.125	2.500	0.250
Peso aux. 2	10.417	1.667	1.611
Peso propio	**13.542**	**1.859**	**1.297**

EMPUJE DE TIERRAS

HORIZONTAL

	Empuje.	Dist.emp.	Dist. vert.
Auxiliar	0.139	3.750	-
Auxiliar	1.065	2.500	-
Auxiliar	8.164	1.250	-
Auxiliar	1.250	3.333	-
Auxiliar	9.583	1.667	-
Empuje hor.	**20.201**	**1.660**	**1.586**

VERTICAL

	Empuje.	Dist.emp.
Empuje aux.1	0.000	3.750
Empuje aux.2	0.000	2.500
Empuje aux.3	0.000	1.250
Empuje aux.4	0.000	3.333
Empuje aux.5	0.000	1.667
Empuje vert.	**0.000**	**0.000**

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **EVN1-1.4. ALETAS ESTRIBO 2**

HOJA DE CALCULO DE ALETAS DE ESTRIBOS

CALCULOS

ESFUERZOS DE DISEÑO

(Para cargas verticales, momentos positivos implica tracciones en cara superior)

Acciones	Verticales	Horizontales
M peso propio	25.174	0.000
M empuje hor.	0.000	33.526
M empuje vert.	0.000	0.000
M sobrec.vert.	12.500	0.000
M carga vert.	0.000	0.000
M carga hor.	0.000	0.000
Md (mt)	**56.510**	**50.289**
V peso propio	13.542	0.000
V empuje hor.	0.000	20.201
V empuje vert.	0.000	0.000
V sobrec.vert.	5.000	0.000
V carga vert.	0.000	0.000
V carga hor.	0.000	0.000
Vd (mt)	**27.813**	**30.301**

Alet-e2.xls CALCULOS

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **EVN1-1.4. ALETAS ESTRIBO 2**

HOJA DE CALCULO DE ALETAS DE ESTRIBOS

CALCULO DE SECCIONES

Fcd	1666.67	
0,85*Fcd	1416.67	
Fcv	64.55	
Es	21000000	
Fyd	44347.83	
FYAD	42000.00	
Acciones	Verticales	Horizontales
Md(m.t)	56.510	50.289
Md max/Md med	1.000	1.545
Md a usar calculo	56.510	77.715
Canto seccion	3.833	0.500
Canto util	3.783	0.450
ancho seccion	0.500	3.833
Ancho calculo	0.500	3.791
Def acero	0.010	0.010
Tension acero	44348	44348
X	0.021	0.033
As (cm.2)	**3.378**	**40.443**
Prof. fibra neutra	0.267	0.061
Def. hormigon	0.001	0.002
Comentarios	VALE	VALE
Vd	27.813	30.301
Vd compuesto	41.130	
Vu1	852.984	
Vsu	0.000	
Vcu	110.120	
Vu2	110.120	
Comentarios		
As (cm.2)	**0.000**	

NOMBRE PROYECTO : SUBTRAMO XV

DESIGNACION ESTRIBO: EVN1-1.4. ALETAS ESTRIBO 2

HOJA DE CALCULO DE ALETAS DE ESTRIBOS

ARMADO

	Calculo	Minima	total
Long. superior	3.378	7.667	**7.667**
Long inferior	0.000	7.667	**7.667**
Cortante	0.000	19.841	**19.841**
Horizontal trasdos	40.443	11.500	**40.443**
Vertical trasdos	0.000	20.000	**20.000**
Horizontal intrados	0.000	5.750	**5.750**
Vertical intrados	0.000	20.000	**20.000**
Cortante transversal			NO

TOTAL ENVOLVENTE ARMADURA (CM.2)

	CM2	CM2/M
Long. superior	**7.667**	--
Long inferior	**7.667**	--
Horizontal trasdos	**40.443**	**10.55**
Horizontal intrados	**5.750**	**1.50**
Estribos por rama (2 ramas)	**29.921**	--

DATOS ARMADO

Separacion maxima barras	0.3
Separacion minima barras	0.1

TOTAL ARMADURAS

	TOTAL	DIAMETRO	A.REAL	AREAL/ANEC	
Long. superior	4.0	16	8.04	1.05	VALE
Long inferior	4.0	16	8.04	1.05	VALE
Horizontal trasdos	36.0	12	40.72	1.01	VALE
Horizontal intrados	18.0	10	14.14	2.46	VALE
Estribos	27.0	12	30.54	1.02	VALE

PUENTE EVN1-1.4

5º PROYECTO DE PRUEBA DE CARGA

PRUEBA DE CARGA

OBJETO DE LA PRUEBA

El objeto de la prueba es comprobar la respuesta estructural, frente a situaciones de carga estática, de manera tal que confrontando la respuesta real con la teórica, determinar la fiabilidad del comportamiento en servicio del puente.

Esta prueba de carga se realizará antes de la colocación del balasto, carriles, etc., mediante el empleo de camiones cargados con arena, y servirá para obtener una recepción provisional de la obra. Para la recepción definitiva de la estructura será necesario realizar otra prueba de carga con locomotoras, una vez colocada la infraestructura ferroviaria, que no es objeto del presente documento.

CARGA DE PRUEBA

La prueba se realizará empleando camiones, el la disposición que se adjunta a continuación, de tres ejes separados 3.825 y 1.36 m. con cargas por eje de 7.6, 13.7 y 13.7 T.

APARATOS DE MEDIDA Y MEDICIONES

Para la realización de las mediciones se colocarán flexímetros en el centro del vano (medidas f1) y apoyos (medidas f2). Los valores de los desplazamientos que se adjuntan son los descensos relativos esperados entre los puntos de los vanos y los fijos de los apoyos. Estos valores deben ser del orden de la magnitud del valor f1-f2 medido en obra.

La apreciación mínima de cualquiera de los flexímetros será del orden del 3% de los valores máximos esperados de las magnitudes a medir.

El rango de los aparatos deberá ser como mínimo superior en un 50% a los esperados de dicha magnitud.

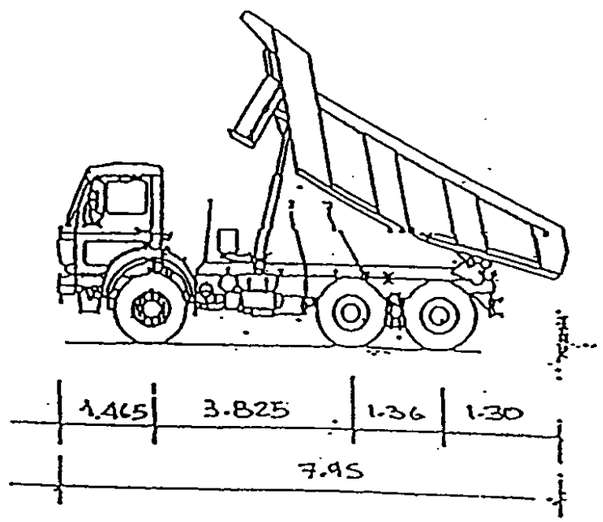
Las medidas se realizarán inmediatamente antes de la carga, inmediatamente después de su colocación y a los quince minutos de haberla retirado.

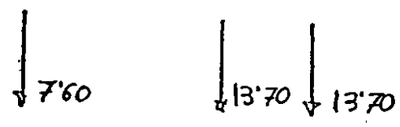
Durante la realización de la prueba se deberá anotar las condiciones climatológicas existentes a lo largo de la misma.

ANALISIS

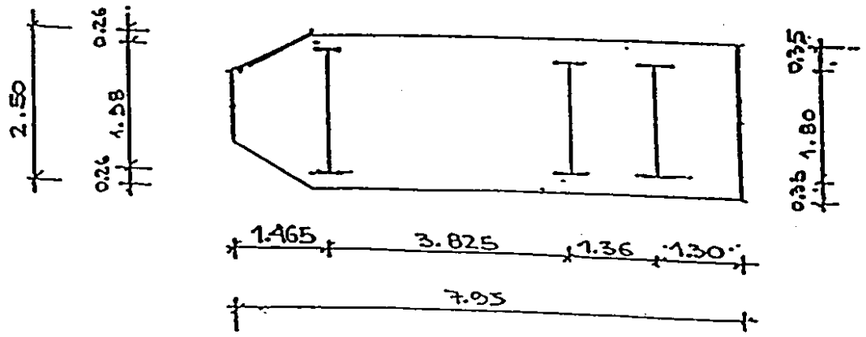
Para obtener las solicitaciones y desplazamientos verticales en los puntos a medir se procesó la estructura mediante el programa COSMOS/M. El modelo es el mismo usado en el cálculo del tablero. Los esfuerzos que se consiguen son del orden del 30 % de los obtenidos en la realización de una prueba de carga con locomotoras y la infraestructura ferroviaria colocada.

CAMION VOLQUETE DE 35 Ton.

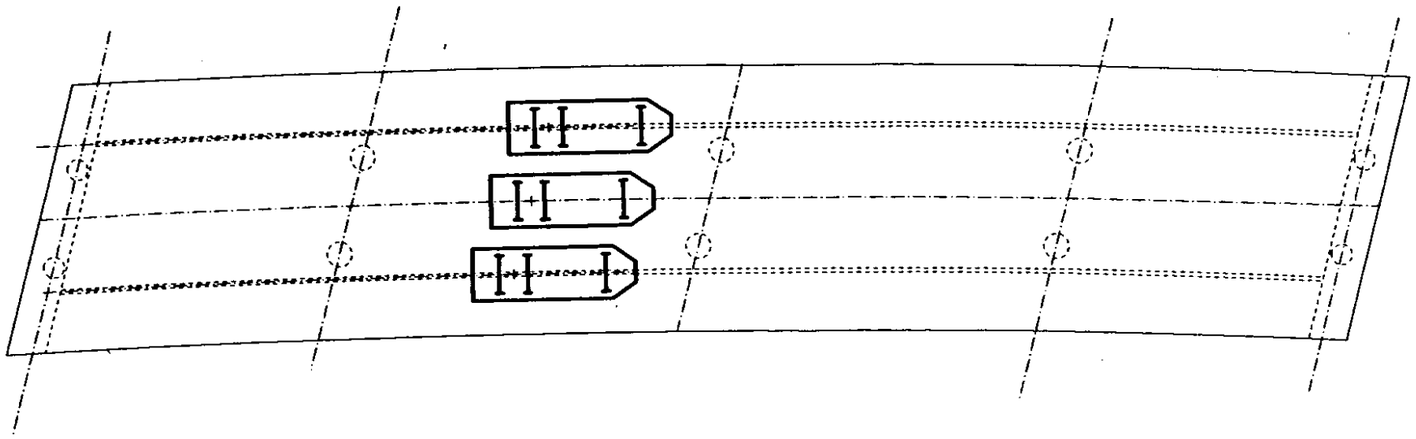




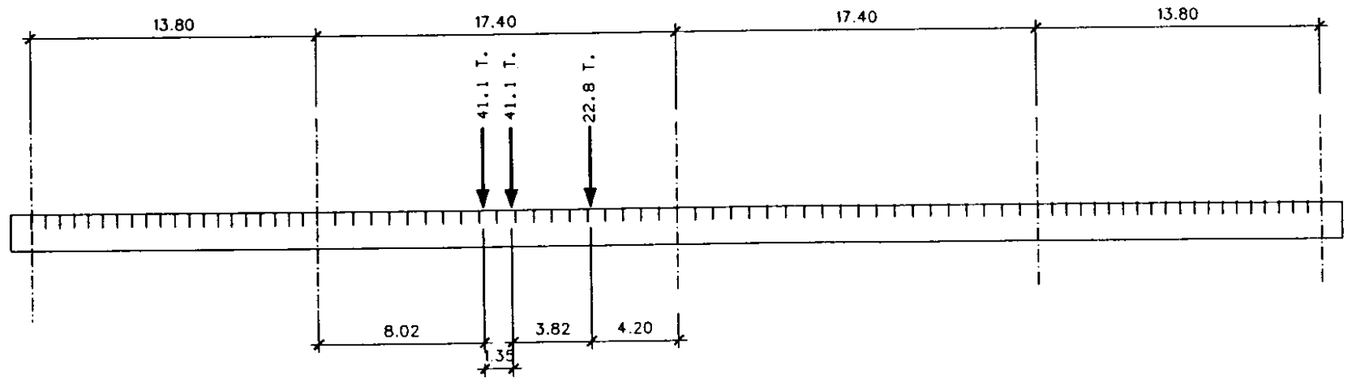
ALZADO



PLANTA



SITUACION EN PLANTA DE CAMIONES EN PRUEBA DE CARGA

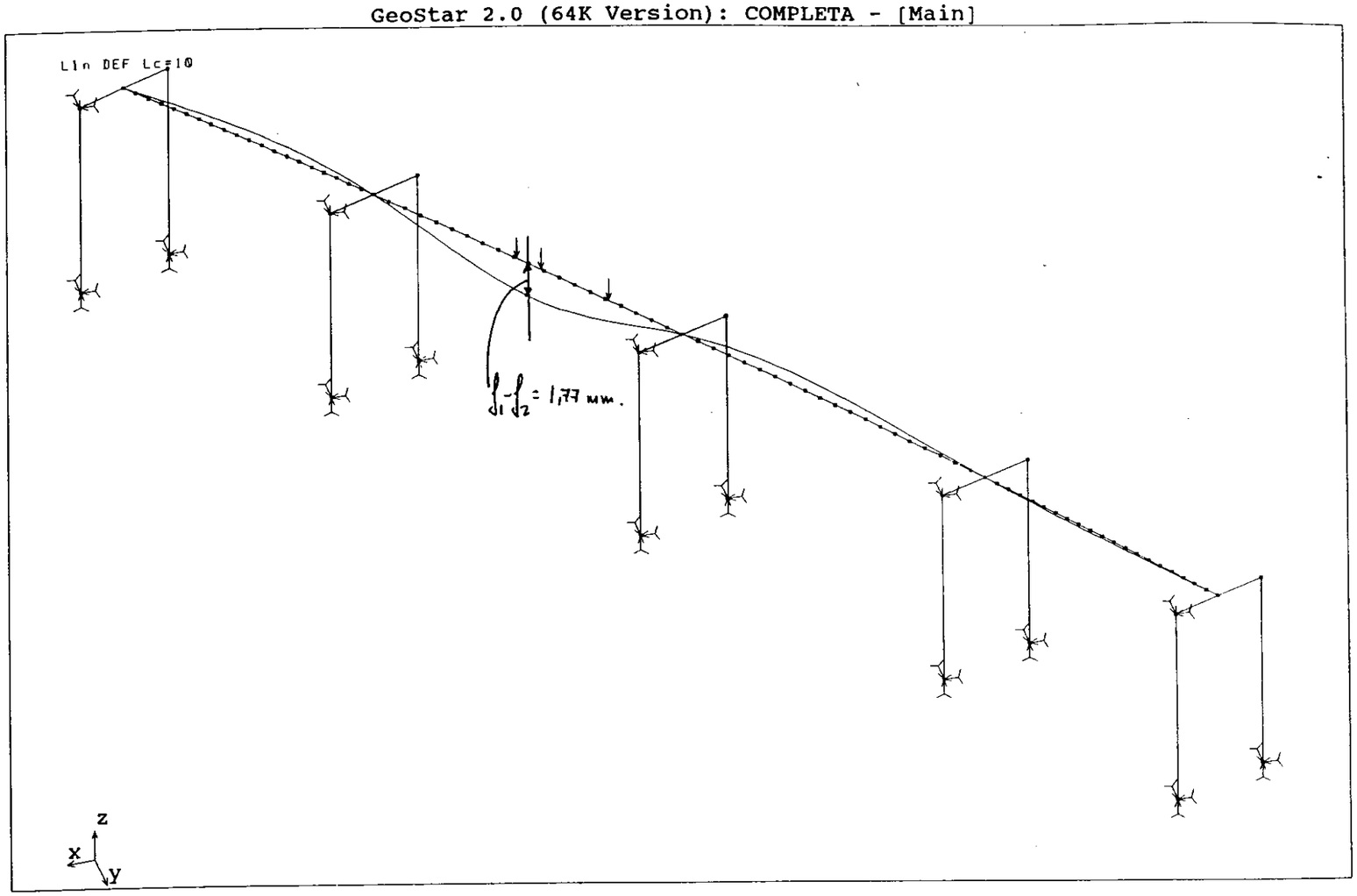


SITUACION EN ALZADO DE EJES DE CAMIONES

EVN1 - 1

PCARGA

Load case	10					
Node	UX	UY	UZ	RX	RY	RZ
1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	0.00000	0.00000	0.00000	0.00009	0.00004	0.00000
3	0.00000	0.00000	0.00006	0.00009	0.00004	0.00000
4	0.00000	0.00000	0.00013	0.00008	0.00004	0.00000
5	0.00000	0.00000	0.00019	0.00008	0.00004	0.00000
6	0.00000	0.00000	0.00025	0.00007	0.00004	0.00000
7	0.00000	0.00000	0.00030	0.00006	0.00004	0.00000
8	0.00000	0.00000	0.00035	0.00006	0.00004	0.00000
9	0.00000	0.00000	0.00040	0.00005	0.00004	0.00000
10	0.00000	0.00000	0.00044	0.00004	0.00004	0.00000
11	0.00000	0.00000	0.00047	0.00002	0.00003	0.00000
12	0.00000	0.00000	0.00049	0.00001	0.00003	0.00000
13	0.00000	0.00000	0.00050	0.00000	0.00002	0.00000
14	0.00000	0.00000	0.00050	-0.00002	0.00001	0.00000
15	0.00000	0.00000	0.00049	-0.00004	0.00001	0.00000
16	0.00000	0.00000	0.00047	-0.00005	0.00000	0.00000
17	0.00000	0.00000	0.00043	-0.00007	-0.00001	0.00000
18	0.00000	0.00000	0.00038	-0.00009	-0.00002	0.00000
19	0.00000	0.00000	0.00031	-0.00012	-0.00003	0.00000
20	0.00000	0.00000	0.00022	-0.00014	-0.00005	0.00000
21	0.00000	0.00000	0.00012	-0.00016	-0.00006	0.00000
22	0.00000	0.00000	-0.00001	-0.00019	-0.00007	0.00000
23	0.00000	0.00000	-0.00019	-0.00021	-0.00010	0.00000
24	0.00000	0.00000	-0.00040	-0.00023	-0.00012	0.00000
25	0.00000	0.00001	-0.00063	-0.00023	-0.00013	0.00000
26	0.00001	0.00001	-0.00086	-0.00023	-0.00013	0.00000
27	0.00001	0.00001	-0.00108	-0.00021	-0.00013	0.00000
28	0.00001	0.00001	-0.00129	-0.00019	-0.00012	0.00000
29	0.00001	0.00001	-0.00148	-0.00016	-0.00011	0.00000
30	0.00001	0.00001	-0.00162	-0.00012	-0.00008	0.00000
31	0.00001	0.00001	-0.00172	-0.00007	-0.00005	0.00000
32	**0.00001**	**0.00001**	**-0.00177**	**-0.00001**	**-0.00002**	**0.00000**
33	0.00001	0.00001	-0.00175	0.00005	0.00002	0.00000
34	0.00001	0.00001	-0.00168	0.00010	0.00005	0.00000
35	0.00001	0.00001	-0.00155	0.00015	0.00008	0.00000
36	0.00001	0.00001	-0.00138	0.00019	0.00010	0.00000
37	0.00001	0.00000	-0.00118	0.00022	0.00012	0.00000
38	0.00001	0.00000	-0.00095	0.00024	0.00013	0.00000
39	0.00001	0.00000	-0.00071	0.00026	0.00013	0.00000
40	0.00000	0.00000	-0.00046	0.00026	0.00013	0.00000
41	0.00000	0.00000	-0.00022	0.00024	0.00011	0.00000
42	0.00000	0.00000	-0.00001	0.00022	0.00009	0.00000
43	0.00000	-0.00001	0.00017	0.00018	0.00007	0.00000
44	0.00000	-0.00001	0.00032	0.00015	0.00005	0.00000
45	0.00000	-0.00001	0.00044	0.00012	0.00003	0.00000
46	0.00000	-0.00001	0.00053	0.00010	0.00002	0.00000
47	0.00000	-0.00001	0.00059	0.00007	0.00000	0.00000
48	0.00000	-0.00001	0.00063	0.00005	-0.00001	0.00000
49	0.00000	-0.00001	0.00065	0.00003	-0.00002	0.00000
50	0.00000	-0.00001	0.00065	0.00001	-0.00003	0.00000
51	0.00000	-0.00001	0.00064	-0.00001	-0.00003	0.00000
52	0.00000	0.00000	0.00061	-0.00002	-0.00004	0.00000
53	0.00000	0.00000	0.00057	-0.00004	-0.00004	0.00000
54	0.00000	0.00000	0.00052	-0.00005	-0.00005	0.00000
55	0.00000	0.00000	0.00045	-0.00005	-0.00005	0.00000
56	0.00000	0.00000	0.00039	-0.00006	-0.00005	0.00000
57	0.00000	0.00000	0.00032	-0.00006	-0.00005	0.00000
58	0.00000	0.00000	0.00025	-0.00007	-0.00005	0.00000
59	0.00000	0.00000	0.00018	-0.00007	-0.00004	0.00000
60	0.00000	0.00000	0.00011	-0.00006	-0.00004	0.00000
61	0.00000	0.00000	0.00005	-0.00006	-0.00003	0.00000
62	0.00000	0.00000	0.00000	-0.00005	-0.00002	0.00000
63	0.00000	0.00000	-0.00003	-0.00005	-0.00002	0.00000
64	0.00000	0.00000	-0.00006	-0.00004	-0.00001	0.00000
65	0.00000	0.00000	-0.00009	-0.00003	-0.00001	0.00000
66	0.00000	0.00000	-0.00011	-0.00003	-0.00001	0.00000
67	0.00000	0.00000	-0.00012	-0.00002	0.00000	0.00000
68	0.00000	0.00000	-0.00013	-0.00001	0.00000	0.00000
69	0.00000	0.00000	-0.00014	-0.00001	0.00000	0.00000
70	0.00000	0.00000	-0.00014	0.00000	0.00000	0.00000
71	0.00000	0.00000	-0.00014	0.00000	0.00000	0.00000
72	0.00000	0.00000	-0.00014	0.00000	0.00001	0.00000
73	0.00000	0.00000	-0.00013	0.00001	0.00001	0.00000
74	0.00000	0.00000	-0.00013	0.00001	0.00001	0.00000
75	0.00000	0.00000	-0.00012	0.00001	0.00001	0.00000
76	0.00000	0.00000	-0.00010	0.00002	0.00001	0.00000
77	0.00000	0.00000	-0.00009	0.00002	0.00001	0.00000
78	0.00000	0.00000	-0.00007	0.00002	0.00001	0.00000
79	0.00000	0.00000	-0.00005	0.00002	0.00001	0.00000
80	0.00000	0.00000	-0.00004	0.00002	0.00001	0.00000
81	0.00000	0.00000	-0.00002	0.00002	0.00001	0.00000
82	0.00000	0.00000	0.00000	0.00003	0.00001	0.00000



PRUEBA DE CARGA DINAMICA

El objeto de la prueba de carga dinámica es el de obtener el valor de los principales parámetros dinámicos de cálculo que presenta la estructura. Es el caso de las frecuencias propias de vibración libre.

La valoración del período o frecuencia de vibración vertical correspondiente al modo fundamental, tiene especial repercusión en el coeficiente de amplificación dinámico al paso de la sobrecarga, utilizado en el cálculo.

Para la obtención de estos parámetros es necesaria la excitación dinámica de la estructura. Esto se obtiene mediante el paso de un camión, a distintas velocidades, sobre un obstáculo colocado en el tablero. Las características del mismo serán las de un tablón de forma redondeada de 50cm por 300cm con un espesor de 6 cm.

Se utilizará un solo vehículo pudiendo ser un camión de 2 o 3 ejes con un peso total suficiente para provocar la respuesta de la estructura con la debida amplitud.

El ensayo consistirá en efectuar algunas pasadas a muy baja velocidad, e ir incrementando la velocidad en escalones de 10 km/h.

La instrumentación a disponer consistirá en anillos extensométricos, para la medida de flechas, para registrar los desplazamientos de cada vano y en dos acelerómetros piezoeléctricos, para la medida de vibraciones, colocados en una de los centros de vanos del puente, de manera de determinar las frecuencias principales de vibración vertical, que deberán coincidir con los valores calculados a continuación.

```
**********************************************************
*****
**********************************************************
*****
**                                    **
**                                    **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS   / M    M **
** C    O  O  S     MM  MM  O  O  S      / MM  MM **
** C    O  O  SSSS  M MM M  O  O  SSSS  / M MM M **
** C    O  O     S  M    M  O  O     S / M    M **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS/  M    M **
**                                    **
**                                    **
**              VERSION: 2.00                **
**            DISTRIBUTED BY:                **
**     STRUCTURAL RESEARCH AND ANALYSIS CORPORATION
**
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**          LOS ANGELES,  CALIFORNIA  90025         **
**          TEL. NO.  (310) 207-2800                **
**          COPYRIGHT 1988  S. R. A. C.             **
**                                    **
**********************************************************
*****
**********************************************************
*****
Problem name: P-CARGA
Date     : 11/16/1998   Time:  18:58:37
Title    :                                          |
Subtitle :
```

Element group data

Element group number= 1
Element name:
BEAM3D Three dimensional Elastic Beam elements
Type of beam element = ... 0
EQ. 0 ; Symmetric beam element
EQ. 1 ; Unsymmetric beam element
EQ. 2 ; Symmetric tapered beam element

Real constant data

Real constant set 1
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 2
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 3
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 4
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 5
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 6
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 7
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 8
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 9
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 10
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 11
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 12
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 13
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 14
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
```
```

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 15
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 16
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 17
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 18
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 19
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 20
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 21
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 22
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 23
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 24
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 25
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 26
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 27
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 28
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 29
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 30
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 31
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 32
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 33
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 34
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 35
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 36
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 37
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 38
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 39
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 40
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 41
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 42
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 43
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 44
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 45
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 46
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 47
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 48
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 49
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 50
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 51
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 52
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 53
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 54
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 55
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 56
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 57
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 58
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 59
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 60
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 61
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 62
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 63
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 64
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 65
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 66
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 67
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 68
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 69
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 70
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 71
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 72
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 73
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 74
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 75
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 76
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 77
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 78
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881

Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 79
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 80
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.3832
Moment of Inertia about element Y-axis = 74.881
Moment of Inertia about element Z-axis = .85612
Depth of beam (y-axis) = 1.1000
Width of beam (z-axis) = 12.800
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1.6778
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 81
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 1000.0
Moment of Inertia about element Y-axis = 1000.0
Moment of Inertia about element Z-axis = 1000.0
Depth of beam (y-axis) = 10.000
Width of beam (z-axis) = 10.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1000.0
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 82
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.000
Moment of Inertia about element Y-axis = .10000E-03
Moment of Inertia about element Z-axis = .10000E-03
Depth of beam (y-axis) = 1.0000
Width of beam (z-axis) = 1.0000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = .10000E-03
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000

Material propery data

Material property set 1

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0
ALPX : X thermal expansion	.10000E-04	0
DENS : Mass Density	.25500	0

Material property set 2

	Value	Temp curve no.
EX : X Elastic Modulus	1.0000	0
NUXY : Poisson Ratio	.20000	0

Material property set 3

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0

Nodal input data

NODE	BOUNDARY CONDITION CODES (0 = FREE ; 1 = FIXED)						NODAL POINT COORDINATES		
	X	Y	Z	XX	YY	ZZ	X	Y	Z
1	1	1	1	1	1	1	.00000	.00000	.10000E+07
2	0	0	0	0	0	0	7165.1	10711.	.00000
3	0	0	0	0	0	0	7164.7	10711.	.00000
4	0	0	0	0	0	0	7164.3	10712.	.00000
5	0	0	0	0	0	0	7163.8	10713.	.00000
6	0	0	0	0	0	0	7163.4	10713.	.00000
7	0	0	0	0	0	0	7163.0	10714.	.00000
8	0	0	0	0	0	0	7162.6	10714.	.00000
9	0	0	0	0	0	0	7162.1	10715.	.00000
10	0	0	0	0	0	0	7161.7	10715.	.00000
11	0	0	0	0	0	0	7161.3	10716.	.00000
12	0	0	0	0	0	0	7160.9	10716.	.00000
13	0	0	0	0	0	0	7160.4	10717.	.00000
14	0	0	0	0	0	0	7160.0	10717.	.00000
15	0	0	0	0	0	0	7159.6	10718.	.00000
16	0	0	0	0	0	0	7159.2	10719.	.00000
17	0	0	0	0	0	0	7158.8	10719.	.00000
18	0	0	0	0	0	0	7158.3	10720.	.00000
19	0	0	0	0	0	0	7157.9	10720.	.00000
20	0	0	0	0	0	0	7157.5	10721.	.00000
21	0	0	0	0	0	0	7157.1	10721.	.00000
22	0	0	0	0	0	0	7156.7	10722.	.00000
23	0	0	0	0	0	0	7156.1	10722.	.00000
24	0	0	0	0	0	0	7155.6	10723.	.00000
25	0	0	0	0	0	0	7155.1	10724.	.00000
26	0	0	0	0	0	0	7154.6	10725.	.00000
27	0	0	0	0	0	0	7154.1	10725.	.00000
28	0	0	0	0	0	0	7153.5	10726.	.00000
29	0	0	0	0	0	0	7153.0	10727.	.00000
30	0	0	0	0	0	0	7152.5	10727.	.00000
31	0	0	0	0	0	0	7152.0	10728.	.00000
32	0	0	0	0	0	0	7151.5	10729.	.00000
33	0	0	0	0	0	0	7150.9	10729.	.00000
34	0	0	0	0	0	0	7150.4	10730.	.00000
35	0	0	0	0	0	0	7149.9	10731.	.00000
36	0	0	0	0	0	0	7149.4	10732.	.00000
37	0	0	0	0	0	0	7148.9	10732.	.00000
38	0	0	0	0	0	0	7148.4	10733.	.00000
39	0	0	0	0	0	0	7147.9	10734.	.00000
40	0	0	0	0	0	0	7147.4	10734.	.00000
41	0	0	0	0	0	0	7146.9	10735.	.00000
42	0	0	0	0	0	0	7146.3	10736.	.00000
43	0	0	0	0	0	0	7145.8	10737.	.00000
44	0	0	0	0	0	0	7145.3	10737.	.00000
45	0	0	0	0	0	0	7144.8	10738.	.00000
46	0	0	0	0	0	0	7144.3	10739.	.00000
47	0	0	0	0	0	0	7143.8	10739.	.00000
48	0	0	0	0	0	0	7143.3	10740.	.00000
49	0	0	0	0	0	0	7142.8	10741.	.00000
50	0	0	0	0	0	0	7142.3	10741.	.00000
51	0	0	0	0	0	0	7141.8	10742.	.00000
52	0	0	0	0	0	0	7141.3	10743.	.00000
53	0	0	0	0	0	0	7140.8	10744.	.00000
54	0	0	0	0	0	0	7140.3	10744.	.00000
55	0	0	0	0	0	0	7139.8	10745.	.00000
56	0	0	0	0	0	0	7139.3	10746.	.00000
57	0	0	0	0	0	0	7138.9	10746.	.00000
58	0	0	0	0	0	0	7138.4	10747.	.00000
59	0	0	0	0	0	0	7137.9	10748.	.00000
60	0	0	0	0	0	0	7137.4	10749.	.00000
61	0	0	0	0	0	0	7136.9	10749.	.00000
62	0	0	0	0	0	0	7136.4	10750.	.00000
63	0	0	0	0	0	0	7136.0	10751.	.00000
64	0	0	0	0	0	0	7135.6	10751.	.00000
65	0	0	0	0	0	0	7135.3	10752.	.00000
66	0	0	0	0	0	0	7134.9	10752.	.00000
67	0	0	0	0	0	0	7134.5	10753.	.00000
68	0	0	0	0	0	0	7134.1	10754.	.00000
69	0	0	0	0	0	0	7133.7	10754.	.00000
70	0	0	0	0	0	0	7133.3	10755.	.00000
71	0	0	0	0	0	0	7133.0	10755.	.00000
72	0	0	0	0	0	0	7132.6	10756.	.00000
73	0	0	0	0	0	0	7132.2	10756.	.00000
74	0	0	0	0	0	0	7131.8	10757.	.00000
75	0	0	0	0	0	0	7131.5	10758.	.00000
76	0	0	0	0	0	0	7131.1	10758.	.00000
77	0	0	0	0	0	0	7130.7	10759.	.00000
78	0	0	0	0	0	0	7130.3	10759.	.00000
79	0	0	0	0	0	0	7129.9	10760.	.00000
80	0	0	0	0	0	0	7129.6	10760.	.00000
81	0	0	0	0	0	0	7129.2	10761.	.00000
82	0	0	0	0	0	0	7128.8	10762.	.00000
83	0	0	0	0	0	0	7162.9	10710.	.00000
84	1	1	0	0	0	0	7167.3	10712.	.00000
85	0	0	0	0	0	0	7154.4	10721.	.00000
86	1	1	0	0	0	0	7158.9	10723.	.00000
87	0	0	0	0	0	0	7144.1	10735.	.00000
88	1	1	0	0	0	0	7148.6	10737.	.00000
89	0	0	0	0	0	0	7134.2	10749.	.00000
90	1	1	0	0	0	0	7138.6	10751.	.00000
91	0	0	0	0	0	0	7126.6	10761.	.00000
92	1	1	0	0	0	0	7131.0	10762.	.00000
93	1	1	1	0	0	0	7162.9	10710.	-10.000
94	1	1	1	0	0	0	7167.3	10712.	-10.000
95	1	1	1	0	0	0	7154.4	10721.	-10.000
96	1	1	1	0	0	0	7158.9	10723.	-10.000
97	1	1	1	0	0	0	7144.1	10735.	-10.000
98	1	1	1	0	0	0	7148.6	10737.	-10.000
99	1	1	1	0	0	0	7134.2	10749.	-10.000
100	1	1	1	0	0	0	7138.6	10751.	-10.000
101	1	1	1	0	0	0	7126.6	10761.	-10.000
102	1	1	1	0	0	0	7131.0	10762.	-10.000

Element input data

ELEM EGRP MP REAL ECS NODE 1 NODE 2 NODE 3 NODE 4 NODE 5 NODE 6
NODE 7 NODE 8 NODE 9 NODE10 NODE11 NODE12
NODE13 NODE14 NODE15 NODE16 NODE17 NODE18
NODE19 NODE20

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

```
 54  1 1 54 -1   55   56    1
 55  1 1 55 -1   56   57    1
 56  1 1 56 -1   57   58    1
 57  1 1 57 -1   58   59    1
 58  1 1 58 -1   59   60    1
 59  1 1 59 -1   60   61    1
 60  1 1 60 -1   61   62    1
 61  1 1 61 -1   62   63    1
 62  1 1 62 -1   63   64    1
 63  1 1 63 -1   64   65    1
 64  1 1 64 -1   65   66    1
 65  1 1 65 -1   66   67    1
 66  1 1 66 -1   67   68    1
 67  1 1 67 -1   68   69    1
 68  1 1 68 -1   69   70    1
 69  1 1 69 -1   70   71    1
 70  1 1 70 -1   71   72    1
 71  1 1 71 -1   72   73    1
 72  1 1 72 -1   73   74    1
 73  1 1 73 -1   74   75    1
 74  1 1 74 -1   75   76    1
 75  1 1 75 -1   76   77    1
 76  1 1 76 -1   77   78    1
 77  1 1 77 -1   78   79    1
 78  1 1 78 -1   79   80    1
 79  1 1 79 -1   80   81    1
 80  1 1 80 -1   81   82    1
 81  1 3 81 -1   83    2    1
 82  1 3 81 -1    2   84    1
 83  1 3 81 -1   85   22    1
 84  1 3 81 -1   22   86    1
 85  1 3 81 -1   87   42    1
 86  1 3 81 -1   42   88    1
 87  1 3 81 -1   89   62    1
 88  1 3 81 -1   62   90    1
 89  1 3 81 -1   91   82    1
 90  1 3 81 -1   82   92    1
 91  1 3 82 -1   83   93    1
 92  1 3 82 -1   84   94    1
 93  1 3 82 -1   85   95    1
 94  1 3 82 -1   86   96    1
 95  1 3 82 -1   87   97    1
 96  1 3 82 -1   88   98    1
 97  1 3 82 -1   89   99    1
 98  1 3 82 -1   90  100    1
 99  1 3 82 -1   91  101    1
100  1 3 82 -1   92  102    1

CONTROL INFORMATION
 NUMBER OF LOAD CASES .....(NLCASE) =     1
 SOLUTION MODE .....(MODEX) =     2
   EQ. 0, STATIC ANALYSIS
   EQ. 1, BUCKLING ANALYSIS
   EQ. 2, DYNAMIC ANALYSIS
 THERMAL LOADING FLAG .....(ITHERM) =     0
   EQ. 0, NO THERMAL EFFECTS CONSIDERED
   EQ. 1, ADD TEMPERATURE EFFECT
 GRAVITY LOADING FLAG .....(IGRAV) =     0
   EQ. 0, NO GRAVITY LOADING CONSIDERED
   EQ. 1, ADD GRAVITY LOADING EFFECT
 CENTRIFUGAL LOADING FLAG .....(ICNTRF) =     0
   EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
   EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
 IN-PLANE STIFFENING FLAG .....(INPLN) =     0
   EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
   EQ. 1, IN-PLANE EFFECTS CONSIDERED
 SOFT SPRING ADDITION FLAG .....(ISOFT) =     0
   EQ. 0, NO SOFT SPRING OPTION
   EQ. 1, SOFT SPRING ADDED

 SAVE DECOMPOSED STIFFNESS MATRIX FLAG ...(ISAVK) =
0
   EQ. 0, DO NOT SAVE DECOMPOSED K
   EQ. 1, SAVE DECOMPOSED K
 FORM STIFFNESS MATRIX FLAG .....(IFORMK) =     0
   EQ. 0, FORM STIFFNESS MATRIX
   EQ. 1, USE EXISTING DECOMPOSED STIFFNESS MATRIX

 SPIN SOFTENING FLAG .....(ISPIN) =     0
   EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
   EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
 INERTIA RELIEF FLAG .....(IFORMK) =     0
   EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
   EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
 RIGID CONNECTIONS FLAG .....(IRIGID) =     0
   EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS & SHELLS
   EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS & SHELLS


TOTAL SYSTEM DATA
 NUMBER OF EQUATIONS .....(NEQ) =     566
 NUMBER OF MATRIX ELEMENTS .....(NWK) =    5864
 MAXIMUM HALF BANDWIDTH .....(MK ) =      34
 MEAN HALF BANDWIDTH .....(MM ) =      10
 NUMBER OF ELEMENTS.....(NUME) =     100
 NUMBER OF NODAL POINTS.....(NUMNP)=     102
 ADJUSTED BLOCK SIZE .....(MTBLK)=    5865
 EXTRA MEMORY AVAILABLE (in 8-byte words) ...(XMTBLK)=
4753263
 NUMBER OF STIFFNESS BLOCKS..... (NBLK) =     1
  MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE =
.146038E+11 (   435)
  MINIMUM DIAGONAL STIFFNESS MATRIX VALUE =  .145833E+02
(     3)
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MASS MOMENT INFORMATION		
MASS .149321E+03	VOLUME .253166E+05	WEIGHT .000000E+00
MASS MOMENT OF INERTIA W.R.T. C.G.		
IX .238452E+05	IY .158145E+05	IZ .440334E+05
MASS PRODUCT OF INERTIA W.R.T. C.G.		
PXY -.251025E+05	PXZ .000000E+00	PYZ .000000E+00
RADII OF GYRATION W.R.T. C.G.		
RX .126369E+02	RY .102912E+02	RZ .171724E+02
CENTER OF GRAVITY		
CGx .714656E+04	CGy .107360E+05	CGz .000000E+00
PRINCIPAL MASS MOMENT OF INERTIA		
P1 .452514E+05	P2 .440334E+05	P3 .559173E+04
PRINCIPAL RADII OF GYRATION		
R1 .174083E+02	R2 .171724E+02	R3 .611946E+01
PRINCIPAL AXES (DIRECTION COSINES IN ROWS W.R.T C.G)		
N_11 .760905E+00	N_12 .648864E+00	N_13 .000000E+00
N_21 .747159E+00	N_22 .664645E+00	N_23 .000000E+00
N_31 .000000E+00	N_32 .000000E+00	N_33 .209265E-01

Note: In the above table, WEIGHT is computed based on the user
defined acceleration for the first active Load Case

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SOLUTION PARAMETERS
 NUMBER OF EIGENVALUES.....(NFR)=       2
 MASS TYPE: 1-LUMPED,2-CONSISTENT....(MASS)=       1
 MODE SHAPE PRINT FLAG.....(MPRNT)=       1
 INTERMEDIATE SOLUTION PRINT FLAG....(IFPR)=       0
 STURM SEQUENCE CHECK FLAG.....(IFSS)=       0
 MAXIMUM NUMBER OF ITERATIONS .....(ITMAX)=      16
 FREQUENCY SHIFT FLAG .....(IFRSH)=       0
 FREQUENCY SHIFT.....(FRSH)= .0000000E+00
 CONVERGENCE TOLERANCE.....(RTOL)= .1000000E-04
 COMPOSITE MODAL DAMPING CALC. FLAG...(IMDC)=       0
 MODAL ACCELERATION FLAG.....(IMAM)=       0

SUBSPACE ITERATION

 ITERATION NUMBER   1

 ITERATION NUMBER   2

 ITERATION NUMBER   3

 ITERATION NUMBER   4


CONVERGENCE REACHED FOR RTOL .1000E-04

FREQUENCY ANALYSIS
        by
SUBSPACE ALGORITHM
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FREQUENCY NUMBER	FREQUENCY (RAD/SEC)	FREQUENCY (CYCLES/SEC)	PERIOD (SECONDS)
1	.4310970E+02	.6861122E+01	.1457488E+00
2	.5793131E+02	.9220054E+01	.1084592E+00

MODE SHAPE NO. 1

NODE	X-DISPLACEMENT	Y-DISPLACEMENT	Z-DISPLACEMENT	X - ROTATION	Y - ROTATION	Z - ROTATION
1	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
2	.5109794E-04	-.1304369E-03	.2637627E-03	.1231023E-01	.4883279E-02	.5888719E-04
3	.3670103E-05	-.1397125E-03	.9024791E-02	.1200726E-01	.5239194E-02	.6544634E-04
4	-.4659497E-04	-.1511903E-03	.1769605E-01	.1148400E-01	.5423409E-02	.6893747E-04
5	-.9789230E-04	-.1634008E-03	.2605944E-01	.1074740E-01	.5439022E-02	.6941345E-04
6	-.1487163E-03	-.1751237E-03	.3394581E-01	.9804362E-02	.5293082E-02	.6700922E-04
7	-.1974766E-03	-.1852075E-03	.4116848E-01	.8667104E-02	.4994956E-02	.6190597E-04
8	-.2427504E-03	-.1925290E-03	.4756156E-01	.7350950E-02	.4556362E-02	.5433373E-04
9	-.2833520E-03	-.1961517E-03	.5298795E-01	.5869332E-02	.3989662E-02	.4453467E-04
10	-.3180740E-03	-.1951057E-03	.5730165E-01	.4244361E-02	.3310296E-02	.3282273E-04
11	-.3459506E-03	-.1887605E-03	.6038559E-01	.2496179E-02	.2535490E-02	.1951755E-04
12	-.3661933E-03	-.1765109E-03	.6214127E-01	.6484970E-03	.1683087E-02	.4976547E-05
13	-.3782257E-03	-.1579268E-03	.6249275E-01	-.1274958E-02	.7715037E-03	-.1043614E-04
14	-.3816395E-03	-.1327071E-03	.6138227E-01	-.3250976E-02	-.1817180E-03	-.2635764E-04
15	-.3762602E-03	-.1007830E-03	.5877696E-01	-.5253773E-02	-.1156733E-02	-.4240940E-04
16	-.3621096E-03	-.6207056E-04	.5465360E-01	-.7266350E-02	-.2137973E-02	-.5828801E-04
17	-.3393389E-03	-.1691665E-04	.4902665E-01	-.9258403E-02	-.3105896E-02	-.7358996E-04
18	-.3083266E-03	.3454755E-04	.4190436E-01	-.1121705E-01	-.4047609E-02	-.8806979E-04
19	-.2696409E-03	.9180267E-04	.3333697E-01	-.1312061E-01	-.4947829E-02	-.1014282E-03
20	-.2239466E-03	.1542645E-03	.2338244E-01	-.1495355E-01	-.5795349E-02	-.1134391E-03
21	-.1719125E-03	.2213451E-03	.1209202E-01	-.1670665E-01	-.6583163E-02	-.1239508E-03
22	-.1145239E-03	.2924640E-03	-.4535883E-03	-.1837311E-01	-.7305267E-02	-.1328651E-03
23	.1323029E-04	.3373252E-03	-.1796948E-01	-.1955092E-01	-.8999264E-02	-.1615906E-03
24	.1570226E-03	.3941398E-03	-.3676085E-01	-.1995734E-01	-.1011046E-01	-.1791798E-03
25	.3094074E-03	.4570748E-03	-.5601509E-01	-.1961404E-01	-.1065724E-01	-.1859781E-03
26	.4628899E-03	.5206613E-03	-.7491374E-01	-.1855741E-01	-.1066736E-01	-.1825444E-03
27	.6109570E-03	.5796615E-03	-.9274119E-01	-.1683596E-01	-.1017957E-01	-.1696423E-03
28	.7468262E-03	.6295751E-03	-.1087588E+00	-.1451906E-01	-.9245591E-02	-.1483046E-03

29	.8654900E-03	.6663344E-03	-.1224115E+00	-.1167793E-01	-.7920954E-02	-.1196557E-03
30	.9619335E-03	.6864003E-03	-.1331374E+00	-.8411378E-02	-.6277234E-02	-.8514990E-04
31	.1032768E-02	.6872711E-03	-.1405526E+00	-.4808704E-02	-.4384366E-02	-.4618412E-04
32	.1075207E-02	.6671452E-03	-.1443314E+00	-.9854007E-03	-.2326788E-02	-.4459760E-05
33	.1087888E-02	.6252060E-03	-.1443015E+00	.2938221E-02	-.1912440E-03	.3824820E-04
34	.1070684E-02	.5612303E-03	-.1404059E+00	.6867671E-02	.1948126E-02	.8045216E-04
35	.1024436E-02	.4760874E-03	-.1326986E+00	.1068288E-01	.4005545E-02	.1203879E-03
36	.9512252E-03	.3714405E-03	-.1213571E+00	.1427584E-01	.5902229E-02	.1564515E-03
37	.8543900E-03	.2498786E-03	-.1066927E+00	.1754207E-01	.7563031E-02	.1871199E-03
38	.7380309E-03	.1143484E-03	-.8908087E-01	.2039667E-01	.8925307E-02	.2111145E-03
39	.6072165E-03	-.3140792E-04	-.6900307E-01	.2276116E-01	.9932659E-02	.2272812E-03
40	.4679596E-03	-.1828507E-03	-.4705246E-01	.2456913E-01	.1053903E-01	.2346818E-03
41	.3266794E-03	-.3353170E-03	-.2385271E-01	.2577591E-01	.1071309E-01	.2326769E-03
42	.1897416E-03	-.4841286E-03	-.7076638E-05	.2635506E-01	.1043586E-01	.2208658E-03
43	.6161955E-05	-.5637561E-03	.2388523E-01	.2582407E-01	.1080414E-01	.2270428E-03
44	-.1788081E-03	-.6434398E-03	.4726512E-01	.2464791E-01	.1071069E-01	.2238475E-03
45	-.3580802E-03	-.7190327E-03	.6939809E-01	.2285677E-01	.1017815E-01	.2117320E-03
46	-.5262170E-03	-.7862751E-03	.8972604E-01	.2049091E-01	.9237674E-02	.1913417E-03
47	-.6771559E-03	-.8409864E-03	.1076073E+00	.1762035E-01	.7937227E-02	.1636720E-03
48	-.8064767E-03	-.8800760E-03	.1225895E+00	.1431392E-01	.6329104E-02	.1297877E-03
49	-.9098158E-03	-.9006631E-03	.1342127E+00	.1067353E-01	.4483003E-02	.9114480E-04
50	-.9843492E-03	-.9009557E-03	.1421838E+00	.6799587E-02	.2471456E-02	.4922199E-04
51	-.1028375E-02	-.8797071E-03	.1463220E+00	.2792971E-02	.3666845E-03	.5533017E-05
52	-.1041072E-02	-.8366756E-03	.1465385E+00	-.1214862E-02	-.1742018E-02	-.3806567E-04
53	-.1023023E-02	-.7722670E-03	.1428900E+00	-.5119410E-02	-.3780884E-02	-.8000278E-04
54	-.9757107E-03	-.6874893E-03	.1355073E+00	-.8815068E-02	-.5674160E-02	-.1187108E-03
55	-.9024631E-03	-.5851811E-03	.1247429E+00	-.1215945E-01	-.7329040E-02	-.1522578E-03
56	-.8075230E-03	-.4681501E-03	.1110155E+00	-.1505719E-01	-.8678221E-02	-.1792493E-03
57	-.6955906E-03	-.3396975E-03	.9479434E-01	-.1742263E-01	-.9662180E-02	-.1984089E-03
58	-.5730173E-03	-.2043082E-03	.7672658E-01	-.1916634E-01	-.1022192E-01	-.2085050E-03
59	-.4465531E-03	-.6625110E-04	.5746476E-01	-.2022273E-01	-.1031113E-01	-.2085699E-03
60	-.3235577E-03	.6874800E-04	.3779295E-01	-.2053388E-01	-.9893530E-02	-.1978363E-03
61	-.2122457E-03	.1954622E-03	.1852388E-01	-.2006233E-01	-.8945661E-02	-.1758028E-03
62	-.1207723E-03	.3085592E-03	.4629201E-03	-.1878445E-01	-.7451714E-02	-.1421289E-03
63	-.2801234E-04	.3389513E-03	-.1257002E-01	-.1708541E-01	-.6761637E-02	-.1293494E-03
64	.5696674E-04	.3639375E-03	-.2431226E-01	-.1528984E-01	-.6005196E-02	-.1151550E-03
65	.1334137E-03	.3831362E-03	-.3469294E-01	-.1340361E-01	-.5187441E-02	-.9963730E-04
66	.2004985E-03	.3960420E-03	-.4362672E-01	-.1144277E-01	-.4318117E-02	-.8300376E-04
67	.2579969E-03	.4022606E-03	-.5110601E-01	-.9411911E-02	-.3402198E-02	-.6538842E-04
68	.3050973E-03	.4016034E-03	-.5703812E-01	-.7339497E-02	-.2458056E-02	-.4713173E-04
69	.3416191E-03	.3938225E-03	-.6141283E-01	-.5243205E-02	-.1497510E-02	-.2851528E-04
70	.3673712E-03	.3789381E-03	-.6421028E-01	-.3152478E-02	-.5395608E-03	-.9922632E-05
71	.3825087E-03	.3569413E-03	-.6545425E-01	-.1085239E-02	.4033698E-03	.8345880E-05
72	.3872743E-03	.3280855E-03	-.6516862E-01	.9297660E-03	.1312385E-02	.2590322E-04
73	.3822111E-03	.2928298E-03	-.6341099E-01	.2860797E-02	.2167209E-02	.4233588E-04
74	.3679451E-03	.2515830E-03	-.6025293E-01	.4687692E-02	.2954651E-02	.5732038E-04
75	.3455552E-03	.2051091E-03	-.5580366E-01	.6379461E-02	.3654810E-02	.7046996E-04
76	.3160986E-03	.1540322E-03	-.5016866E-01	.7917740E-02	.4254698E-02	.8149441E-04
77	.2809237E-03	.9933932E-04	-.4349454E-01	.9277631E-02	.4739238E-02	.9006883E-04
78	.2414656E-03	.4188821E-04	-.3592138E-01	.1044254E-01	.5096885E-02	.9594518E-04
79	.1994037E-03	-.1712559E-04	-.2763110E-01	.1139364E-01	.5316565E-02	.9888591E-04
80	.1563914E-03	-.7659814E-04	-.1879333E-01	.1211888E-01	.5390573E-02	.9872035E-04
81	.1144034E-03	-.1353989E-03	-.9603427E-02	.1260844E-01	.5312620E-02	.9531875E-04
82	.7526037E-04	-.1921215E-03	-.2678302E-03	.1285593E-01	.5079771E-02	.8862204E-04
83	.1028543E-03	-.2620419E-03	.3560390E-03	.1231061E-01	.4882323E-02	.5888731E-04
84	.0000000E+00	.0000000E+00	.1499746E-03	.1231007E-01	.4883682E-02	.5802121E-04
85	-.2305215E-03	.5879723E-03	-.6578133E-03	-.1837379E-01	-.7303518E-02	-.1328653E-03
86	.0000000E+00	.0000000E+00	-.2452571E-03	-.1837285E-01	-.7305918E-02	-.1307482E-03
87	.3810581E-03	-.9720180E-03	.2155805E-03	.2635528E-01	.1043530E-01	.2208660E-03
88	.0000000E+00	.0000000E+00	-.1939023E-03	.2635526E-01	.1043535E-01	.2183656E-03
89	-.2430532E-03	.6204378E-03	.2714012E-03	-.1878417E-01	-.7452415E-02	-.1421290E-03
90	.0000000E+00	.0000000E+00	.6212865E-03	-.1878508E-01	-.7450108E-02	-.1399018E-03
91	.1511604E-03	-.3855929E-03	-.1877474E-03	.1285574E-01	.5080251E-02	.8862216E-04
92	.0000000E+00	.0000000E+00	-.3331186E-03	.1285626E-01	.5078917E-02	.8764879E-04
93	.0000000E+00	.0000000E+00	.0000000E+00	-.6115998E-02	-.2425733E-02	.5888731E-04
94	.0000000E+00	.0000000E+00	.0000000E+00	-.6155037E-02	-.2441841E-02	.5802121E-04
95	.0000000E+00	.0000000E+00	.0000000E+00	.9098699E-02	.3617181E-02	-.1328653E-03
96	.0000000E+00	.0000000E+00	.0000000E+00	.9186424E-02	.3652959E-02	-.1307482E-03
97	.0000000E+00	.0000000E+00	.0000000E+00	-.1303184E-01	-.5160489E-02	.2208660E-03
98	.0000000E+00	.0000000E+00	.0000000E+00	-.1317763E-01	-.5217677E-02	.2183656E-03
99	.0000000E+00	.0000000E+00	.0000000E+00	.9299020E-02	.3689749E-02	-.1421290E-03
100	.0000000E+00	.0000000E+00	.0000000E+00	.9392538E-02	.3725054E-02	-.1399018E-03
101	.0000000E+00	.0000000E+00	.0000000E+00	-.6370030E-02	-.2517451E-02	.8862216E-04
102	.0000000E+00	.0000000E+00	.0000000E+00	-.6428131E-02	-.2539459E-02	.8764879E-04

MODE SHAPE NO. 2

NODE	X-DISPLACEMENT	Y-DISPLACEMENT	Z-DISPLACEMENT	X - ROTATION	Y - ROTATION	Z - ROTATION
1	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
2	-.1443055E-03	.3690692E-03	-.6006689E-03	-.2394285E-01	-.9483013E-02	-.1660888E-03
3	-.2199687E-04	.4058717E-03	-.1761046E-01	-.2337861E-01	-.1000558E-01	-.1776283E-03
4	.1046993E-03	.4460500E-03	-.3435356E-01	-.2231174E-01	-.1013543E-01	-.1811956E-03
5	.2311342E-03	.4858022E-03	-.5034459E-01	-.2076379E-01	-.9885547E-02	-.1770331E-03
6	.3534599E-03	.5220465E-03	-.6520156E-01	-.1876102E-01	-.9279453E-02	-.1655978E-03
7	.4677068E-03	.5518972E-03	-.7852247E-01	-.1634497E-01	-.8349629E-02	-.1475217E-03
8	.5704346E-03	.5726535E-03	-.8996400E-01	-.1356741E-01	-.7136047E-02	-.1235981E-03
9	.6588906E-03	.5821540E-03	-.9925525E-01	-.1047923E-01	-.5681704E-02	-.9466551E-04
10	.7304351E-03	.5783243E-03	-.1061379E+00	-.7152085E-02	-.4038946E-02	-.6179243E-04
11	.7832019E-03	.5599479E-03	-.1104302E+00	-.3655280E-02	-.2264766E-02	-.2605757E-04
12	.8159125E-03	.5260656E-03	-.1120166E+00	-.6625227E-04	-.4181365E-03	.1135499E-04
13	.8279728E-03	.4762609E-03	-.1108518E+00	.3537436E-02	.1440895E-02	.4925202E-04
14	.8193351E-03	.4105892E-03	-.1069533E+00	.7079624E-02	.3254595E-02	.8645739E-04
15	.7907332E-03	.3297346E-03	-.1004137E+00	.1048104E-01	.4962137E-02	.1217803E-03
16	.7434690E-03	.2344332E-03	-.9136311E-01	.1367945E-01	.6511678E-02	.1542193E-03
17	.6793420E-03	.1266545E-03	-.8004010E-01	.1659437E-01	.7847683E-02	.1826164E-03
18	.6007656E-03	.7832107E-05	-.6667953E-01	.1917620E-01	.8927925E-02	.2061669E-03
19	.5107325E-03	-.1195610E-03	-.5161957E-01	.2136765E-01	.9710791E-02	.2240328E-03
20	.4125042E-03	-.2528714E-03	-.3522351E-01	.2312668E-01	.1016537E-01	.2355910E-03
21	.3094312E-03	-.3894040E-03	-.1785667E-01	.2442454E-01	.1027005E-01	.2404103E-03
22	.2055950E-03	-.5264429E-03	.6041055E-04	.2524232E-01	.1001062E-01	.2382085E-03
23	.1626664E-04	-.6315999E-03	.2293055E-01	.2501387E-01	.1035325E-01	.2521616E-03
24	-.1778955E-03	-.7400827E-03	.4534848E-01	.2394156E-01	.1005801E-01	.2521677E-03
25	-.3676746E-03	-.8447367E-03	.6644061E-01	.2207266E-01	.9162040E-02	.2389775E-03
26	-.5440465E-03	-.9390178E-03	.8535774E-01	.1948732E-01	.7726702E-02	.2138132E-03
27	-.6995903E-03	-.1017072E-02	.1014115E+00	.1628765E-01	.5829573E-02	.1782676E-03
28	-.8271823E-03	-.1074172E-02	.1139556E+00	.1261277E-01	.3576406E-02	.1344203E-03
29	-.9222177E-03	-.1106663E-02	.1225938E+00	.8603124E-02	.1072638E-02	.8444695E-04
30	-.9809637E-03	-.1112009E-02	.1270301E+00	.4438343E-02	-.1549685E-02	.3103569E-04
31	-.1001963E-02	-.1089219E-02	.1271924E+00	.2820758E-03	-.4166821E-02	-.2331799E-04
32	-.9854008E-03	-.1038660E-02	.1231851E+00	-.3675117E-02	-.6638393E-02	-.7577109E-04
33	-.9336225E-03	-.9623249E-03	.1153442E+00	-.7248828E-02	-.8830484E-02	-.1235612E-03
34	-.8504718E-03	-.8629135E-03	.1041281E+00	-.1028694E-01	-.1062879E-01	-.1643897E-03
35	-.7416618E-03	-.7449215E-03	.9021912E-01	-.1262491E-01	-.1191493E-01	-.1958144E-03
36	-.6144744E-03	-.6137929E-03	.7444702E-01	-.1412306E-01	-.1258802E-01	-.2157689E-03
37	-.4777682E-03	-.4760617E-03	.5780140E-01	-.1466247E-01	-.1256323E-01	-.2225048E-03
38	-.3411573E-03	-.3386297E-03	.4133925E-01	-.1414956E-01	-.1177321E-01	-.2146471E-03
39	-.2153255E-03	-.2092415E-03	.2623415E-01	-.1251096E-01	-.1016610E-01	-.1911292E-03
40	-.1117414E-03	-.9626431E-04	.1374482E-01	-.9700894E-02	-.7710928E-02	-.1513007E-03
41	-.4204229E-04	-.7993850E-05	.5136980E-02	-.5693396E-02	-.4390832E-02	-.9480765E-04
42	-.1797497E-04	.4728634E-04	.1689960E-02	-.4653158E-03	-.1895183E-03	-.2137667E-04
43	-.4302520E-04	.5768237E-04	.4287522E-02	.4818593E-02	.3944141E-02	.5152516E-04
44	-.1139837E-03	.3548974E-04	.1208225E-01	.8912179E-02	.7232940E-02	.1081894E-03
45	-.2192570E-03	-.1116483E-04	.2378755E-01	.1182329E-01	.9679651E-02	.1488305E-03
46	-.3480960E-03	-.7432204E-04	.3819756E-01	.1358621E-01	.1131208E-01	.1739472E-03
47	-.4893543E-03	-.1459846E-03	.5406089E-01	.1423795E-01	.1215768E-01	.1841123E-03
48	-.6331677E-03	-.2191671E-03	.7027684E-01	.1384540E-01	.1226677E-01	.1803437E-03
49	-.7696617E-03	-.2869029E-03	.8572647E-01	.1249785E-01	.1170281E-01	.1639704E-03
50	-.8904615E-03	-.3435201E-03	.9946549E-01	.1030881E-01	.1054763E-01	.1366744E-03
51	-.9887058E-03	-.3841451E-03	.1106952E+00	.7405072E-02	.8891751E-02	.1003401E-03
52	-.1058345E-02	-.4047739E-03	.1186970E+00	.3949984E-02	.6848827E-02	.5734076E-04
53	-.1095657E-02	-.4027774E-03	.1229933E+00	.9885212E-04	.4528086E-02	.9984146E-05
54	-.1098203E-02	-.3766008E-03	.1232406E+00	-.3987654E-02	.2043568E-02	-.3934935E-04
55	-.1065527E-02	-.3263182E-03	.1192959E+00	-.8097666E-02	-.4605304E-03	-.8766167E-04

56	-.9993526E-03	-.2531458E-03	.1112411E+00	-.1206285E-01	-.2866515E-02	-.1325119E-03
57	-.9026550E-03	-.1592558E-03	.9928049E-01	-.1572836E-01	-.5068403E-02	-.1716133E-03
58	-.7805880E-03	-.4833400E-04	.8384462E-01	-.1893180E-01	-.6955832E-02	-.2026684E-03
59	-.6394340E-03	.7554569E-04	.6545860E-01	-.2154694E-01	-.8440920E-02	-.2238392E-03
60	-.4868130E-03	.2064829E-03	.4482543E-01	-.2345774E-01	-.9448619E-02	-.2334913E-03
61	-.3316563E-03	.3386980E-03	.2274490E-01	-.2458464E-01	-.9925751E-02	-.2305301E-03
62	-.1831178E-03	.4661054E-03	.3464788E-04	-.2488004E-01	-.9840633E-02	-.2142668E-03
63	-.3292682E-04	.5090693E-03	-.1792495E-01	-.2422306E-01	-.1009249E-01	-.2144356E-03
64	.1153181E-03	.5504078E-03	-.3537545E-01	-.2305276E-01	-.9997952E-02	-.2077500E-03
65	.2578252E-03	.5877606E-03	-.5190661E-01	-.2138836E-01	-.9571490E-02	-.1945038E-03
66	.3907193E-03	.6186019E-03	-.6709338E-01	-.1926687E-01	-.8836787E-02	-.1752074E-03
67	.5114578E-03	.6407300E-03	-.8065804E-01	-.1671870E-01	-.7818174E-02	-.1503688E-03
68	.6163709E-03	.6524053E-03	-.9219395E-01	-.1380835E-01	-.6557567E-02	-.1208511E-03
69	.7032759E-03	.6518888E-03	-.1014549E+00	-.1059351E-01	-.5093775E-02	-.8751047E-04
70	.7700421E-03	.6380705E-03	-.1081962E+00	-.7153714E-02	-.3478998E-02	-.5144132E-04
71	.8155824E-03	.6099721E-03	-.1122845E+00	-.3553271E-02	-.1756878E-02	-.1361755E-04
72	.8390745E-03	.5672611E-03	-.1136070E+00	.1236273E-03	.1666681E-04	.2478680E-04
73	.8405188E-03	.5101619E-03	-.1121371E+00	.3784315E-02	.1781270E-02	.6250585E-04
74	.8204607E-03	.4389990E-03	-.1079112E+00	.7357131E-02	.3490312E-02	.9846805E-04
75	.7804610E-03	.3549609E-03	-.1010555E+00	.1074980E-01	.5083308E-02	.1314464E-03
76	.7223726E-03	.2591460E-03	-.9172550E-01	.1389589E-01	.6515433E-02	.1604599E-03
77	.6488411E-03	.1534918E-03	-.8017242E-01	.1671776E-01	.7737987E-02	.1844512E-03
78	.5628916E-03	.3984220E-04	-.6666389E-01	.1915727E-01	.8711973E-02	.2025829E-03
79	.4682543E-03	-.7916971E-04	-.5156357E-01	.2115483E-01	.9400655E-02	.2140598E-03
80	.3687472E-03	-.2009793E-03	-.3523203E-01	.2266872E-01	.9777544E-02	.2182964E-03
81	.2689695E-03	-.3229124E-03	-.1809163E-01	.2366616E-01	.9821436E-02	.2148521E-03
82	.1733238E-03	-.4416416E-03	-.5945531E-03	.2412635E-01	.9521151E-02	.2034885E-03
83	-.2902820E-03	.7402552E-03	-.7469392E-03	-.2394363E-01	-.9481006E-02	-.1660890E-03
84	.0000000E+00	.0000000E+00	-.4117741E-03	-.2394241E-01	-.9484117E-02	-.1643731E-03
85	.4135624E-03	-.1056248E-02	.2862147E-03	.2524261E-01	.1000986E-01	.2382087E-03
86	.0000000E+00	.0000000E+00	-.1659405E-03	.2524249E-01	.1001018E-01	.2356999E-03
87	-.3649167E-04	.9450706E-04	.1666957E-02	-.4636027E-03	-.1938868E-03	-.2137667E-04
88	.0000000E+00	.0000000E+00	.1697350E-02	-.4670615E-03	-.1850730E-03	-.2129752E-04
89	-.3674627E-03	.9362790E-03	-.1527613E-03	-.2488019E-01	-.9840236E-02	-.2142670E-03
90	.0000000E+00	.0000000E+00	.1832133E-03	-.2488022E-01	-.9840158E-02	-.2117078E-03
91	.3476008E-03	-.8858788E-03	-.4697597E-03	.2412588E-01	.9522352E-02	.2034888E-03
92	.0000000E+00	.0000000E+00	-.6907951E-03	.2412705E-01	.9519381E-02	.2016743E-03
93	.0000000E+00	.0000000E+00	.0000000E+00	.1186078E-01	.4696961E-02	-.1660890E-03
94	.0000000E+00	.0000000E+00	.0000000E+00	.1197120E-01	.4742059E-02	-.1643731E-03
95	.0000000E+00	.0000000E+00	.0000000E+00	-.1246287E-01	-.4942895E-02	.2382087E-03
96	.0000000E+00	.0000000E+00	.0000000E+00	-.1262124E-01	-.5005089E-02	.2356999E-03
97	.0000000E+00	.0000000E+00	.0000000E+00	.2176253E-03	.9146966E-04	-.2137667E-04
98	.0000000E+00	.0000000E+00	.0000000E+00	.2335308E-03	.9253652E-04	-.2129752E-04
99	.0000000E+00	.0000000E+00	.0000000E+00	.1229965E-01	.4864999E-02	-.2142670E-03
100	.0000000E+00	.0000000E+00	.0000000E+00	.1244011E-01	.4920079E-02	-.2117078E-03
101	.0000000E+00	.0000000E+00	.0000000E+00	-.1193006E-01	-.4709036E-02	.2034888E-03
102	.0000000E+00	.0000000E+00	.0000000E+00	-.1206352E-01	-.4759691E-02	.2016743E-03

SOLUTION TIME LOG (sec)

INPUT PHASE	2
ASSEMBLAGE OF THE STIFFNESS MATRIX	0
ASSEMBLAGE OF THE MASS MATRIX	0
DECOMPOSITION OF THE STIFFNESS MATRIX	0
EIGENVALUE SOLUTION	0
OUTPUT PHASE	0
TOTAL SOLUTION TIME	2

4.2.4 Puente E-1508.5

INDICE

1º DEFINICION GEOMETRICA

2º CALCULO DEL TABLERO
- 2.1.- Tablero derecho
- 2.2.- Tablero izquierdo

3º CALCULO DE PILAS
- 3.1.- Tablero derecho
- 3.2.- Tablero izquierdo

4º CALCULO DE ESTRIBOS

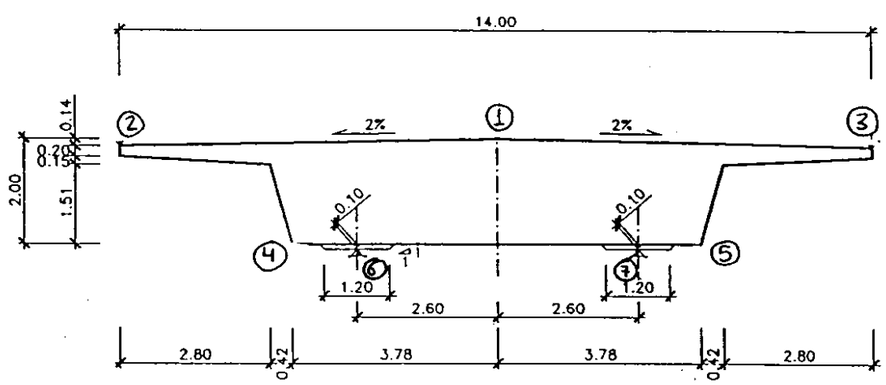
5º PROYECTO DE PRUEBA DE CARGA
- 5.1.- Tablero derecho
- 5.2.- Tablero izquierdo

PUENTE E-1508.5

1º DEFINICION GEOMETRICA

CALZADA DERECHA

NOMBRE del EJE : T0022
TRAMO donde se situa la estructura: 10
CASO en que se encuentra la estructura(0-1-2)
0 ... La seccion de la carretera tiene calzada unica
1 .... La estructura se situa en la calzada DERECHA
2 .... La estructura se situa en la calzada IZQUIERDA
CASO= 0
NUMERO de VANOS del tablero: 5
PK Estribo n§1 : 1508509.802
PK Pila n§ 1 : 1508533.802
PK Pila n§ 2 : 1508564.802
PK Pila n§ 3 : 1508595.802
PK Pila n§ 4 : 1508626.802
PK Estribo n§2 : 1508650.802
Distancia eje REP.PLANTA al de la ESTRUCTURA: .000
ESPESOR del pavimento (en metros): .000
NUMERO puntos DE REPLANTEO: 7
PUNTO n§.. 1 X= .000 Y= -.245
PUNTO n§.. 2 X= -7.000 Y= -.105
PUNTO n§.. 3 X= 7.000 Y= -.105
PUNTO n§.. 4 X= -3.780 Y= 1.755
PUNTO n§.. 5 X= 3.780 Y= 1.755
PUNTO n§.. 6 X= -2.600 Y= 1.855
PUNTO n§.. 7 X= 2.600 Y= 1.855
NUMERO de puntos que acompanan a los bordes: 0
VANO n§.. 1 NUMERO de secciones NORMALES: 10
VANO n§.. 2 NUMERO de secciones NORMALES: 10
VANO n§.. 3 NUMERO de secciones NORMALES: 10
VANO n§.. 4 NUMERO de secciones NORMALES: 10
VANO n§.. 5 NUMERO de secciones NORMALES: 10
NUMERO de secciones ESVIADAS a calcular: 0
TIPO de tablero (1-2-3-4): 1
VANO.. 1 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 7 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 7 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 7 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 7 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 7 Variac. HORIZONTAL tipo: 1



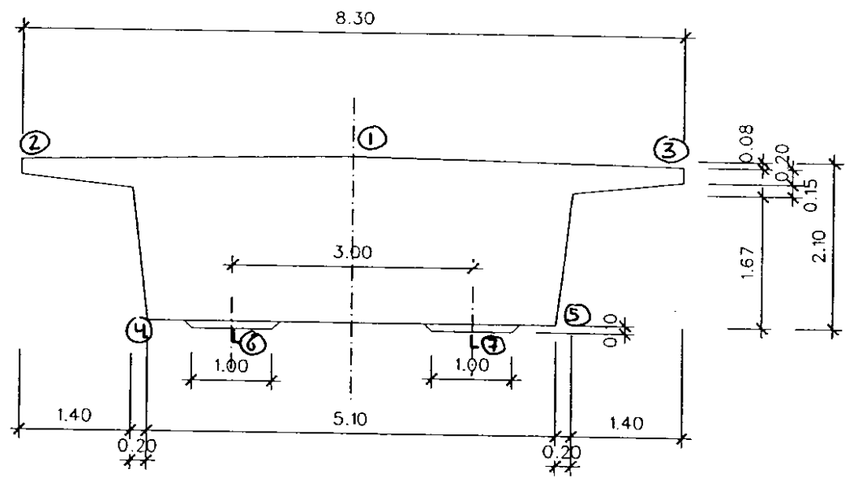
RESULTADOS

VAN	SEC	PUNTO	P.K.	AZ(g)	X	Y	Z
1	1	1	1508509.802	215.276	672199.499	4608872.713	299.317
1	1	2	1508509.802	215.276	672201.162	4608879.513	299.177
1	1	3	1508509.802	215.276	672197.835	4608865.914	299.177
1	1	4	1508509.802	215.276	672200.397	4608876.385	297.317
1	1	5	1508509.802	215.276	672198.600	4608869.042	297.317
1	1	6	1508509.802	215.276	672200.116	4608875.239	297.217
1	1	7	1508509.802	215.276	672198.881	4608870.188	297.217
1	2	1	1508512.469	215.276	672202.089	4608872.080	299.303
1	2	2	1508512.469	215.276	672203.752	4608878.879	299.163
1	2	3	1508512.469	215.276	672200.425	4608865.280	299.163
1	2	4	1508512.469	215.276	672202.987	4608875.751	297.303
1	2	5	1508512.469	215.276	672201.191	4608868.408	297.303
1	2	6	1508512.469	215.276	672202.707	4608874.605	297.203
1	2	7	1508512.469	215.276	672201.471	4608869.554	297.203
1	3	1	1508515.135	215.276	672204.679	4608871.446	299.288
1	3	2	1508515.135	215.276	672206.343	4608878.245	299.148
1	3	3	1508515.135	215.276	672203.016	4608864.646	299.148
1	3	4	1508515.135	215.276	672205.578	4608875.118	297.288
1	3	5	1508515.135	215.276	672203.781	4608867.774	297.288
1	3	6	1508515.135	215.276	672205.297	4608873.971	297.188
1	3	7	1508515.135	215.276	672204.061	4608868.920	297.188
1	4	1	1508517.802	215.276	672207.270	4608870.812	299.273
1	4	2	1508517.802	215.276	672208.933	4608877.612	299.133
1	4	3	1508517.802	215.276	672205.606	4608864.013	299.133
1	4	4	1508517.802	215.276	672208.168	4608874.484	297.273
1	4	5	1508517.802	215.276	672206.371	4608867.140	297.273
1	4	6	1508517.802	215.276	672207.887	4608873.338	297.173
1	4	7	1508517.802	215.276	672206.652	4608868.287	297.173
1	5	1	1508520.469	215.276	672209.860	4608870.178	299.259
1	5	2	1508520.469	215.276	672211.523	4608876.978	299.119
1	5	3	1508520.469	215.276	672208.196	4608863.379	299.119
1	5	4	1508520.469	215.276	672210.758	4608873.850	297.259
1	5	5	1508520.469	215.276	672208.961	4608866.507	297.259
1	5	6	1508520.469	215.276	672210.478	4608872.704	297.159
1	5	7	1508520.469	215.276	672209.242	4608867.653	297.159
1	6	1	1508523.135	215.276	672212.450	4608869.545	299.244
1	6	2	1508523.135	215.276	672214.113	4608876.344	299.104
1	6	3	1508523.135	215.276	672210.786	4608862.745	299.104
1	6	4	1508523.135	215.276	672213.348	4608873.216	297.244
1	6	5	1508523.135	215.276	672211.552	4608865.873	297.244
1	6	6	1508523.135	215.276	672213.068	4608872.070	297.144
1	6	7	1508523.135	215.276	672211.832	4608867.019	297.144
1	7	1	1508525.802	215.276	672215.040	4608868.911	299.229
1	7	2	1508525.802	215.276	672216.704	4608875.710	299.089
1	7	3	1508525.802	215.276	672213.377	4608862.111	299.089
1	7	4	1508525.802	215.276	672215.939	4608872.583	297.229
1	7	5	1508525.802	215.276	672214.142	4608865.239	297.229
1	7	6	1508525.802	215.276	672215.658	4608871.436	297.129
1	7	7	1508525.802	215.276	672214.422	4608866.385	297.129
1	8	1	1508528.469	215.276	672217.631	4608868.277	299.215
1	8	2	1508528.469	215.276	672219.294	4608875.077	299.075
1	8	3	1508528.469	215.276	672215.967	4608861.478	299.075
1	8	4	1508528.469	215.276	672218.529	4608871.949	297.215
1	8	5	1508528.469	215.276	672216.732	4608864.605	297.215
1	8	6	1508528.469	215.276	672218.249	4608870.803	297.115
1	8	7	1508528.469	215.276	672217.013	4608865.752	297.115
1	9	1	1508531.135	215.276	672220.221	4608867.643	299.200
1	9	2	1508531.135	215.276	672221.884	4608874.443	299.060
1	9	3	1508531.135	215.276	672218.557	4608860.844	299.060
1	9	4	1508531.135	215.276	672221.119	4608871.315	297.200
1	9	5	1508531.135	215.276	672219.322	4608863.972	297.200
1	9	6	1508531.135	215.276	672220.839	4608870.169	297.100
1	9	7	1508531.135	215.276	672219.603	4608865.118	297.100
1	10	1	1508533.802	215.276	672222.811	4608867.010	299.185
1	10	2	1508533.802	215.276	672224.475	4608873.809	299.045
1	10	3	1508533.802	215.276	672221.147	4608860.210	299.045
1	10	4	1508533.802	215.276	672223.709	4608870.681	297.185
1	10	5	1508533.802	215.276	672221.913	4608863.338	297.185
1	10	6	1508533.802	215.276	672223.429	4608869.535	297.085
1	10	7	1508533.802	215.276	672222.193	4608864.484	297.085
2	1	1	1508533.802	215.276	672222.811	4608867.010	299.185
2	1	2	1508533.802	215.276	672224.475	4608873.809	299.045
2	1	3	1508533.802	215.276	672221.147	4608860.210	299.045
2	1	4	1508533.802	215.276	672223.709	4608870.681	297.185
2	1	5	1508533.802	215.276	672221.913	4608863.338	297.185
2	1	6	1508533.802	215.276	672223.429	4608869.535	297.085
2	1	7	1508533.802	215.276	672222.193	4608864.484	297.085
2	2	1	1508537.246	215.276	672226.157	4608866.191	299.166
2	2	2	1508537.246	215.276	672227.820	4608872.991	299.026
2	2	3	1508537.246	215.276	672224.495	4608859.392	299.026
2	2	4	1508537.246	215.276	672227.055	4608869.863	297.166
2	2	5	1508537.246	215.276	672225.258	4608862.519	297.166
2	2	6	1508537.246	215.276	672226.775	4608868.717	297.066
2	2	7	1508537.246	215.276	672225.539	4608863.666	297.066
2	3	1	1508540.691	215.276	672229.503	4608865.373	299.147
2	3	2	1508540.691	215.276	672231.166	4608872.172	299.007
2	3	3	1508540.691	215.276	672227.839	4608858.573	299.007
2	3	4	1508540.691	215.276	672230.401	4608869.044	297.147
2	3	5	1508540.691	215.276	672228.604	4608861.701	297.147
2	3	6	1508540.691	215.276	672230.121	4608867.898	297.047
2	3	7	1508540.691	215.276	672228.885	4608862.847	297.047
2	4	1	1508544.135	215.276	672232.848	4608864.554	299.128
2	4	2	1508544.135	215.276	672234.512	4608871.353	298.988
2	4	3	1508544.135	215.276	672231.185	4608857.755	298.988
2	4	4	1508544.135	215.276	672233.747	4608868.226	297.128
2	4	5	1508544.135	215.276	672231.950	4608860.882	297.128
2	4	6	1508544.135	215.276	672233.466	4608867.079	297.028
2	4	7	1508544.135	215.276	672232.231	4608862.028	297.028
2	5	1	1508547.580	215.276	672236.194	4608863.735	299.110
2	5	2	1508547.580	215.276	672237.858	4608870.535	298.970
2	5	3	1508547.580	215.276	672234.531	4608856.936	298.970
2	5	4	1508547.580	215.276	672237.092	4608867.407	297.110
2	5	5	1508547.580	215.276	672235.296	4608860.064	297.110
2	5	6	1508547.580	215.276	672236.812	4608866.261	297.010
2	5	7	1508547.580	215.276	672235.576	4608861.210	297.010
2	6	1	1508551.024	215.276	672239.540	4608862.917	299.091
2	6	2	1508551.024	215.276	672241.203	4608869.716	298.951
2	6	3	1508551.024	215.276	672237.876	4608856.117	298.951
2	6	4	1508551.024	215.276	672240.438	4608866.589	297.091
2	6	5	1508551.024	215.276	672238.641	4608859.245	297.091
2	6	6	1508551.024	215.276	672240.158	4608865.442	296.991
2	6	7	1508551.024	215.276	672238.922	4608860.391	296.991
2	7	1	1508554.469	215.276	672242.886	4608862.098	299.072
2	7	2	1508554.469	215.276	672244.549	4608868.898	298.932
2	7	3	1508554.469	215.276	672241.222	4608855.299	298.932
2	7	4	1508554.469	215.276	672243.784	4608865.770	297.072
2	7	5	1508554.469	215.276	672241.987	4608858.427	297.072
2	7	6	1508554.469	215.276	672243.504	4608864.624	296.972
2	7	7	1508554.469	215.276	672242.268	4608859.573	296.972
2	8	1	1508557.913	215.276	672246.231	4608861.280	299.053
2	8	2	1508557.913	215.276	672247.895	4608868.079	298.913
2	8	3	1508557.913	215.276	672244.568	4608854.480	298.913
2	8	4	1508557.913	215.276	672247.130	4608864.951	297.053
2	8	5	1508557.913	215.276	672245.333	4608857.608	297.053
2	8	6	1508557.913	215.276	672246.849	4608863.805	296.953
2	8	7	1508557.913	215.276	672245.614	4608858.754	296.953
2	9	1	1508561.358	215.276	672249.577	4608860.461	299.034
2	9	2	1508561.358	215.276	672251.241	4608867.261	298.894
2	9	3	1508561.358	215.276	672247.914	4608853.662	298.894
2	9	4	1508561.358	215.276	672250.475	4608864.133	297.034
2	9	5	1508561.358	215.276	672248.679	4608856.789	297.034
2	9	6	1508561.358	215.276	672250.195	4608862.987	296.934
2	9	7	1508561.358	215.276	672248.959	4608857.936	296.934
2	10	1	1508564.802	215.276	672252.923	4608859.643	299.015
2	10	2	1508564.802	215.276	672254.586	4608866.442	298.875
2	10	3	1508564.802	215.276	672251.259	4608852.843	298.875
2	10	4	1508564.802	215.276	672253.821	4608863.314	297.015
2	10	5	1508564.802	215.276	672252.025	4608855.971	297.015
2	10	6	1508564.802	215.276	672253.541	4608862.168	296.915
2	10	7	1508564.802	215.276	672252.305	4608857.117	296.915
3	1	1	1508564.802	215.276	672252.923	4608859.643	299.015
3	1	2	1508564.802	215.276	672254.586	4608866.442	298.875
3	1	3	1508564.802	215.276	672251.259	4608852.843	298.875
3	1	4	1508564.802	215.276	672253.821	4608863.314	297.015
3	1	5	1508564.802	215.276	672252.025	4608855.971	297.015
3	1	6	1508564.802	215.276	672253.541	4608862.168	296.915
3	1	7	1508564.802	215.276	672252.305	4608857.117	296.915
3	2	1	1508568.246	215.276	672256.269	4608858.824	298.996
3	2	2	1508568.246	215.276	672257.932	4608865.623	298.856
3	2	3	1508568.246	215.276	672254.605	4608852.024	298.856
3	2	4	1508568.246	215.276	672257.167	4608862.496	296.996
3	2	5	1508568.246	215.276	672255.370	4608855.152	296.996
3	2	6	1508568.246	215.276	672256.887	4608861.349	296.896
3	2	7	1508568.246	215.276	672255.651	4608856.298	296.896
3	3	1	1508571.691	215.276	672259.615	4608858.005	298.977
3	3	2	1508571.691	215.276	672261.278	4608864.805	298.837
3	3	3	1508571.691	215.276	672257.951	4608851.206	298.837
3	3	4	1508571.691	215.276	672260.513	4608861.677	296.977
3	3	5	1508571.691	215.276	672258.716	4608854.334	296.977
3	3	6	1508571.691	215.276	672260.232	4608860.531	296.877
3	3	7	1508571.691	215.276	672258.997	4608855.480	296.877
3	4	1	1508575.135	215.276	672262.960	4608857.187	298.958
3	4	2	1508575.135	215.276	672264.624	4608863.986	298.818
3	4	3	1508575.135	215.276	672261.297	4608850.387	298.818
3	4	4	1508575.135	215.276	672263.859	4608860.858	296.958
3	4	5	1508575.135	215.276	672262.062	4608853.515	296.958
3	4	6	1508575.135	215.276	672263.578	4608859.712	296.858
3	4	7	1508575.135	215.276	672262.342	4608854.661	296.858
3	5	1	1508578.580	215.276	672266.306	4608856.368	298.939
3	5	2	1508578.580	215.276	672267.969	4608863.168	298.799
3	5	3	1508578.580	215.276	672264.642	4608849.569	298.799
3	5	4	1508578.580	215.276	672267.204	4608860.040	296.939
3	5	5	1508578.580	215.276	672265.408	4608852.697	296.939
3	5	6	1508578.580	215.276	672266.924	4608858.894	296.839
3	5	7	1508578.580	215.276	672265.688	4608853.843	296.839
3	6	1	1508582.024	215.276	672269.652	4608855.550	298.920
3	6	2	1508582.024	215.276	672271.315	4608862.349	298.780
3	6	3	1508582.024	215.276	672267.988	4608848.750	298.780
3	6	4	1508582.024	215.276	672270.550	4608859.221	296.920
3	6	5	1508582.024	215.276	672268.754	4608851.878	296.920
3	6	6	1508582.024	215.276	672270.270	4608858.075	296.820
3	6	7	1508582.024	215.276	672269.034	4608853.024	296.820
3	7	1	1508585.469	215.276	672272.998	4608854.731	298.901
3	7	2	1508585.469	215.276	672274.661	4608861.531	298.761
3	7	3	1508585.469	215.276	672271.334	4608847.932	298.761
3	7	4	1508585.469	215.276	672273.896	4608858.403	296.901
3	7	5	1508585.469	215.276	672272.099	4608851.059	296.901
3	7	6	1508585.469	215.276	672273.615	4608857.257	296.801
3	7	7	1508585.469	215.276	672272.380	4608852.206	296.801
3	8	1	1508588.913	215.276	672276.343	4608853.912	298.882
3	8	2	1508588.913	215.276	672278.007	4608860.712	298.742
3	8	3	1508588.913	215.276	672274.680	4608847.113	298.742
3	8	4	1508588.913	215.276	672277.242	4608857.584	296.882
3	8	5	1508588.913	215.276	672275.445	4608850.241	296.882
3	8	6	1508588.913	215.276	672276.961	4608856.438	296.782
3	8	7	1508588.913	215.276	672275.725	4608851.387	296.782
3	9	1	1508592.358	215.276	672279.689	4608853.094	298.863
3	9	2	1508592.358	215.276	672281.353	4608859.893	298.723
3	9	3	1508592.358	215.276	672278.025	4608846.294	298.723
3	9	4	1508592.358	215.276	672280.587	4608856.766	296.863
3	9	5	1508592.358	215.276	672278.791	4608849.422	296.863
3	9	6	1508592.358	215.276	672280.307	4608855.619	296.763
3	9	7	1508592.358	215.276	672279.071	4608850.568	296.763
3	10	1	1508595.802	215.276	672283.035	4608852.275	298.844
3	10	2	1508595.802	215.276	672284.698	4608859.075	298.704
3	10	3	1508595.802	215.276	672281.371	4608845.476	298.704
3	10	4	1508595.802	215.276	672283.933	4608855.947	296.844
3	10	5	1508595.802	215.276	672282.137	4608848.604	296.844
3	10	6	1508595.802	215.276	672283.653	4608854.801	296.744
3	10	7	1508595.802	215.276	672282.417	4608849.750	296.744
4	1	1	1508595.802	215.276	672283.035	4608852.275	298.844
4	1	2	1508595.802	215.276	672284.698	4608859.075	298.704
4	1	3	1508595.802	215.276	672281.371	4608845.476	298.704
4	1	4	1508595.802	215.276	672283.933	4608855.947	296.844
4	1	5	1508595.802	215.276	672282.137	4608848.604	296.844
4	1	6	1508595.802	215.276	672283.653	4608854.801	296.744
4	1	7	1508595.802	215.276	672282.417	4608849.750	296.744
4	2	1	1508599.246	215.276	672286.381	4608851.457	298.825
4	2	2	1508599.246	215.276	672288.044	4608858.256	298.685
4	2	3	1508599.246	215.276	672284.717	4608844.657	298.685
4	2	4	1508599.246	215.276	672287.279	4608855.128	296.825
4	2	5	1508599.246	215.276	672285.482	4608847.785	296.825
4	2	6	1508599.246	215.276	672286.999	4608853.982	296.725
4	2	7	1508599.246	215.276	672285.763	4608848.931	296.725
4	3	1	1508602.691	215.276	672289.726	4608850.638	298.806

4	3	2	1508602.691	215.276	672291.390	4608857.438	298.666
4	3	3	1508602.691	215.276	672288.063	4608843.839	298.666
4	3	4	1508602.691	215.276	672290.625	4608854.310	296.806
4	3	5	1508602.691	215.276	672288.828	4608846.966	296.806
4	3	6	1508602.691	215.276	672290.344	4608853.164	296.706
4	3	7	1508602.691	215.276	672289.108	4608848.113	296.706
4	4	1	1508606.135	215.276	672293.072	4608849.820	298.788
4	4	2	1508606.135	215.276	672294.736	4608856.619	298.648
4	4	3	1508606.135	215.276	672291.408	4608843.020	298.648
4	4	4	1508606.135	215.276	672293.970	4608853.491	296.788
4	4	5	1508606.135	215.276	672292.174	4608846.148	296.788
4	4	6	1508606.135	215.276	672293.690	4608852.345	296.688
4	4	7	1508606.135	215.276	672292.454	4608847.294	296.688
4	5	1	1508609.580	215.276	672296.418	4608849.001	298.769
4	5	2	1508609.580	215.276	672298.081	4608855.800	298.629
4	5	3	1508609.580	215.276	672294.754	4608842.202	298.629
4	5	4	1508609.580	215.276	672297.316	4608852.673	296.769
4	5	5	1508609.580	215.276	672295.519	4608845.329	296.769
4	5	6	1508609.580	215.276	672297.036	4608851.527	296.669
4	5	7	1508609.580	215.276	672295.800	4608846.476	296.669
4	6	1	1508613.024	215.276	672299.764	4608848.182	298.750
4	6	2	1508613.024	215.276	672301.427	4608854.982	298.610
4	6	3	1508613.024	215.276	672298.100	4608841.383	298.610
4	6	4	1508613.024	215.276	672300.662	4608851.854	296.750
4	6	5	1508613.024	215.276	672298.865	4608844.511	296.750
4	6	6	1508613.024	215.276	672300.382	4608850.708	296.650
4	6	7	1508613.024	215.276	672299.146	4608845.657	296.650
4	7	1	1508616.469	215.276	672303.109	4608847.364	298.731
4	7	2	1508616.469	215.276	672304.773	4608854.163	298.591
4	7	3	1508616.469	215.276	672301.446	4608840.564	298.591
4	7	4	1508616.469	215.276	672304.008	4608851.036	296.731
4	7	5	1508616.469	215.276	672302.211	4608843.692	296.731
4	7	6	1508616.469	215.276	672303.727	4608849.889	296.631
4	7	7	1508616.469	215.276	672302.491	4608844.838	296.631
4	8	1	1508619.913	215.276	672306.455	4608846.545	298.712
4	8	2	1508619.913	215.276	672308.119	4608853.345	298.572
4	8	3	1508619.913	215.276	672304.792	4608839.746	298.572
4	8	4	1508619.913	215.276	672307.353	4608850.217	296.712
4	8	5	1508619.913	215.276	672305.557	4608842.874	296.712
4	8	6	1508619.913	215.276	672307.073	4608849.071	296.612
4	8	7	1508619.913	215.276	672305.837	4608844.020	296.612
4	9	1	1508623.358	215.276	672309.801	4608845.727	298.693
4	9	2	1508623.358	215.276	672311.464	4608852.526	298.553
4	9	3	1508623.358	215.276	672308.137	4608838.927	298.553
4	9	4	1508623.358	215.276	672310.699	4608849.398	296.693
4	9	5	1508623.358	215.276	672308.902	4608842.055	296.693
4	9	6	1508623.358	215.276	672310.419	4608848.252	296.593
4	9	7	1508623.358	215.276	672309.183	4608843.201	296.593
4	10	1	1508626.802	215.276	672313.147	4608844.908	298.674
4	10	2	1508626.802	215.276	672314.810	4608851.708	298.534
4	10	3	1508626.802	215.276	672311.483	4608838.109	298.534
4	10	4	1508626.802	215.276	672314.045	4608848.580	296.674
4	10	5	1508626.802	215.276	672312.248	4608841.236	296.674
4	10	6	1508626.802	215.276	672313.765	4608847.434	296.574
4	10	7	1508626.802	215.276	672312.529	4608842.383	296.574
5	1	1	1508626.802	215.276	672313.147	4608844.908	298.674
5	1	2	1508626.802	215.276	672314.810	4608851.708	298.534
5	1	3	1508626.802	215.276	672311.483	4608838.109	298.534
5	1	4	1508626.802	215.276	672314.045	4608848.580	296.674
5	1	5	1508626.802	215.276	672312.248	4608841.236	296.674
5	1	6	1508626.802	215.276	672313.765	4608847.434	296.574
5	1	7	1508626.802	215.276	672312.529	4608842.383	296.574
5	2	1	1508629.469	215.276	672315.737	4608844.274	298.659
5	2	2	1508629.469	215.276	672317.401	4608851.074	298.519
5	2	3	1508629.469	215.276	672314.074	4608837.475	298.519
5	2	4	1508629.469	215.276	672316.635	4608847.946	296.659
5	2	5	1508629.469	215.276	672314.839	4608840.603	296.659
5	2	6	1508629.469	215.276	672316.355	4608846.800	296.559
5	2	7	1508629.469	215.276	672315.119	4608841.749	296.559
5	3	1	1508632.135	215.276	672318.327	4608843.641	298.645
5	3	2	1508632.135	215.276	672319.991	4608850.440	298.505
5	3	3	1508632.135	215.276	672316.664	4608836.841	298.505
5	3	4	1508632.135	215.276	672319.225	4608847.312	296.645
5	3	5	1508632.135	215.276	672317.429	4608839.969	296.645
5	3	6	1508632.135	215.276	672318.945	4608846.166	296.545
5	3	7	1508632.135	215.276	672317.709	4608841.115	296.545
5	4	1	1508634.802	215.276	672320.917	4608843.007	298.630
5	4	2	1508634.802	215.276	672322.581	4608849.806	298.490
5	4	3	1508634.802	215.276	672319.254	4608836.207	298.490
5	4	4	1508634.802	215.276	672321.816	4608846.679	296.630
5	4	5	1508634.802	215.276	672320.019	4608839.335	296.630
5	4	6	1508634.802	215.276	672321.535	4608845.532	296.530
5	4	7	1508634.802	215.276	672320.300	4608840.481	296.530
5	5	1	1508637.469	215.276	672323.508	4608842.373	298.615
5	5	2	1508637.469	215.276	672325.171	4608849.173	298.475
5	5	3	1508637.469	215.276	672321.844	4608835.574	298.475
5	5	4	1508637.469	215.276	672324.406	4608846.045	296.615
5	5	5	1508637.469	215.276	672322.610	4608838.701	296.615
5	5	6	1508637.469	215.276	672324.126	4608844.899	296.515
5	5	7	1508637.469	215.276	672322.890	4608839.848	296.515
5	6	1	1508640.135	215.276	672326.098	4608841.739	298.600
5	6	2	1508640.135	215.276	672327.761	4608848.539	298.460
5	6	3	1508640.135	215.276	672324.434	4608834.940	298.460
5	6	4	1508640.135	215.276	672326.996	4608845.411	296.600
5	6	5	1508640.135	215.276	672325.200	4608838.068	296.600
5	6	6	1508640.135	215.276	672326.716	4608844.265	296.500
5	6	7	1508640.135	215.276	672325.480	4608839.214	296.500
5	7	1	1508642.802	215.276	672328.688	4608841.106	298.586
5	7	2	1508642.802	215.276	672330.352	4608847.905	298.446
5	7	3	1508642.802	215.276	672327.025	4608834.306	298.446
5	7	4	1508642.802	215.276	672329.587	4608844.777	296.586
5	7	5	1508642.802	215.276	672327.790	4608837.434	296.586
5	7	6	1508642.802	215.276	672329.306	4608843.631	296.486
5	7	7	1508642.802	215.276	672328.070	4608838.580	296.486
5	8	1	1508645.469	215.276	672331.279	4608840.472	298.571
5	8	2	1508645.469	215.276	672332.942	4608847.271	298.431
5	8	3	1508645.469	215.276	672329.615	4608833.673	298.431
5	8	4	1508645.469	215.276	672332.177	4608844.144	296.571
5	8	5	1508645.469	215.276	672330.380	4608836.800	296.571
5	8	6	1508645.469	215.276	672331.896	4608842.997	296.471
5	8	7	1508645.469	215.276	672330.661	4608837.946	296.471
5	9	1	1508648.135	215.276	672333.869	4608839.838	298.556
5	9	2	1508648.135	215.276	672335.532	4608846.638	298.416
5	9	3	1508648.135	215.276	672332.205	4608833.039	298.416
5	9	4	1508648.135	215.276	672334.767	4608843.510	296.556
5	9	5	1508648.135	215.276	672332.971	4608836.167	296.556
5	9	6	1508648.135	215.276	672334.487	4608842.364	296.456
5	9	7	1508648.135	215.276	672333.251	4608837.313	296.456
5	10	1	1508650.802	215.276	672336.459	4608839.205	298.542
5	10	2	1508650.802	215.276	672338.123	4608846.004	298.402
5	10	3	1508650.802	215.276	672334.795	4608832.405	298.402
5	10	4	1508650.802	215.276	672337.357	4608842.876	296.542
5	10	5	1508650.802	215.276	672335.561	4608835.533	296.542
5	10	6	1508650.802	215.276	672337.077	4608841.730	296.442
5	10	7	1508650.802	215.276	672335.841	4608836.679	296.442

CALZADA IZQUIERDA

NOMBRE del EJE : T0022
TRAMO donde se situa la estructura: 10
CASO en que se encuentra la estructura(0-1-2)
0 .... La seccion de la carretera tiene calzada unica
1 .... La estructura se situa en la calzada DERECHA
2 .... La estructura se situa en la calzada IZQUIERDA
CASO= 0
NUMERO de VANOS del tablero: 5
PK Estribo n§1 : 1508509.802
PK Pila n§ 1 : 1508533.572
PK Pila n§ 2 : 1508565.982
PK Pila n§ 3 : 1508598.392
PK Pila n§ 4 : 1508630.802
PK Estribo n§2 : 1508650.802
Distancia eje REP.PLANTA al de la ESTRUCTURA: .000
ESPESOR del pavimento (en metros): .000
NUMERO puntos DE REPLANTEO: 7
PUNTO n§.. 1 X= -11.750 Y= -.245
PUNTO n§.. 2 X= -15.900 Y= -.162
PUNTO n§.. 3 X= -7.600 Y= -.162
PUNTO n§.. 4 X= -14.300 Y= 1.855
PUNTO n§.. 5 X= -9.200 Y= 1.855
PUNTO n§.. 6 X= -13.250 Y= 1.955
PUNTO n§.. 7 X= -10.250 Y= 1.955
NUMERO de puntos que acompañan a los bordes: 0
VANO n§.. 1 NUMERO de secciones NORMALES: 10
VANO n§.. 2 NUMERO de secciones NORMALES: 10
VANO n§.. 3 NUMERO de secciones NORMALES: 10
VANO n§.. 4 NUMERO de secciones NORMALES: 10
VANO n§.. 5 NUMERO de secciones NORMALES: 10
NUMERO de secciones ESVIADAS a calcular: 0
TIPO de tablero (1-2-3-4): 1
VANO.. 1 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 1 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 1 PUNTO.. 7 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 2 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 2 PUNTO.. 7 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 3 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 3 PUNTO.. 7 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 4 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 4 PUNTO.. 7 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 1 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 2 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 3 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 4 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 5 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 6 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 7 Variacion VERTICAL tipo: 1
VANO.. 5 PUNTO.. 1 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 2 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 3 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 4 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 5 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 6 Variac. HORIZONTAL tipo: 1
VANO.. 5 PUNTO.. 7 Variac. HORIZONTAL tipo: 1



RESULTADOS

VAN-SEC-PUNTO	P.K.	AZ(g)	X	Y	Z
1 1 1	1508509.802	215.276	672202.291	4608884.127	299.317
1 1 2	1508509.802	215.276	672203.277	4608888.158	299.234
1 1 3	1508509.802	215.276	672201.305	4608880.096	299.234
1 1 4	1508509.802	215.276	672202.897	4608886.604	297.217
1 1 5	1508509.802	215.276	672201.685	4608881.650	297.217
1 1 6	1508509.802	215.276	672202.647	4608885.584	297.117
1 1 7	1508509.802	215.276	672201.934	4608882.670	297.117
1 2 1	1508512.443	215.276	672204.857	4608883.499	299.303
1 2 2	1508512.443	215.276	672205.843	4608887.530	299.220
1 2 3	1508512.443	215.276	672203.870	4608879.468	299.220
1 2 4	1508512.443	215.276	672205.463	4608885.976	297.203
1 2 5	1508512.443	215.276	672204.251	4608881.022	297.203
1 2 6	1508512.443	215.276	672205.213	4608884.956	297.103
1 2 7	1508512.443	215.276	672204.500	4608882.042	297.103
1 3 1	1508515.084	215.276	672207.422	4608882.871	299.288
1 3 2	1508515.084	215.276	672208.408	4608886.902	299.205
1 3 3	1508515.084	215.276	672206.436	4608878.840	299.205
1 3 4	1508515.084	215.276	672208.028	4608885.348	297.188
1 3 5	1508515.084	215.276	672206.816	4608880.394	297.188
1 3 6	1508515.084	215.276	672207.778	4608884.328	297.088
1 3 7	1508515.084	215.276	672207.066	4608881.414	297.088
1 4 1	1508517.725	215.276	672209.987	4608882.244	299.274
1 4 2	1508517.725	215.276	672210.974	4608886.275	299.191
1 4 3	1508517.725	215.276	672209.001	4608878.213	299.191
1 4 4	1508517.725	215.276	672210.593	4608884.721	297.174
1 4 5	1508517.725	215.276	672209.381	4608879.767	297.174
1 4 6	1508517.725	215.276	672210.344	4608883.701	297.074
1 4 7	1508517.725	215.276	672209.631	4608880.787	297.074
1 5 1	1508520.366	215.276	672212.553	4608881.616	299.259
1 5 2	1508520.366	215.276	672213.539	4608885.647	299.176
1 5 3	1508520.366	215.276	672211.567	4608877.585	299.176
1 5 4	1508520.366	215.276	672213.159	4608884.093	297.159
1 5 5	1508520.366	215.276	672211.947	4608879.139	297.159
1 5 6	1508520.366	215.276	672212.909	4608883.073	297.059
1 5 7	1508520.366	215.276	672212.196	4608880.159	297.059
1 6 1	1508523.008	215.276	672215.118	4608880.988	299.245
1 6 2	1508523.008	215.276	672216.105	4608885.019	299.162
1 6 3	1508523.008	215.276	672214.132	4608876.957	299.162
1 6 4	1508523.008	215.276	672215.724	4608883.465	297.145
1 6 5	1508523.008	215.276	672214.512	4608878.511	297.145
1 6 6	1508523.008	215.276	672215.475	4608882.445	297.045
1 6 7	1508523.008	215.276	672214.762	4608879.531	297.045
1 7 1	1508525.649	215.276	672217.684	4608880.361	299.230
1 7 2	1508525.649	215.276	672218.670	4608884.392	299.147
1 7 3	1508525.649	215.276	672216.697	4608876.330	299.147
1 7 4	1508525.649	215.276	672218.290	4608882.838	297.130
1 7 5	1508525.649	215.276	672217.078	4608877.884	297.130
1 7 6	1508525.649	215.276	672218.040	4608881.818	297.030
1 7 7	1508525.649	215.276	672217.327	4608878.904	297.030
1 8 1	1508528.290	215.276	672220.249	4608879.733	299.216
1 8 2	1508528.290	215.276	672221.235	4608883.764	299.133
1 8 3	1508528.290	215.276	672219.263	4608875.702	299.133
1 8 4	1508528.290	215.276	672220.855	4608882.210	297.116
1 8 5	1508528.290	215.276	672219.643	4608877.256	297.116
1 8 6	1508528.290	215.276	672220.606	4608881.190	297.016
1 8 7	1508528.290	215.276	672219.893	4608878.276	297.016
1 9 1	1508530.931	215.276	672222.815	4608879.105	299.201
1 9 2	1508530.931	215.276	672223.801	4608883.136	299.118
1 9 3	1508530.931	215.276	672221.828	4608875.074	299.118
1 9 4	1508530.931	215.276	672223.421	4608881.582	297.101
1 9 5	1508530.931	215.276	672222.209	4608876.628	297.101
1 9 6	1508530.931	215.276	672223.171	4608880.562	297.001
1 9 7	1508530.931	215.276	672222.458	4608877.648	297.001
1 10 1	1508533.572	215.276	672225.380	4608878.478	299.187
1 10 2	1508533.572	215.276	672226.366	4608882.509	299.104
1 10 3	1508533.572	215.276	672224.394	4608874.447	299.104
1 10 4	1508533.572	215.276	672225.986	4608880.955	297.087
1 10 5	1508533.572	215.276	672224.774	4608876.001	297.087
1 10 6	1508533.572	215.276	672225.736	4608879.935	296.987
1 10 7	1508533.572	215.276	672225.024	4608877.021	296.987
2 1 1	1508533.572	215.276	672225.380	4608878.478	299.187
2 1 2	1508533.572	215.276	672226.366	4608882.509	299.104
2 1 3	1508533.572	215.276	672224.394	4608874.447	299.104
2 1 4	1508533.572	215.276	672225.986	4608880.955	297.087
2 1 5	1508533.572	215.276	672224.774	4608876.001	297.087
2 1 6	1508533.572	215.276	672225.736	4608879.935	296.987
2 1 7	1508533.572	215.276	672225.024	4608877.021	296.987
2 2 1	1508537.173	215.276	672228.878	4608877.622	299.167
2 2 2	1508537.173	215.276	672229.864	4608881.653	299.084
2 2 3	1508537.173	215.276	672227.892	4608873.591	299.084
2 2 4	1508537.173	215.276	672229.484	4608880.099	297.067
2 2 5	1508537.173	215.276	672228.272	4608875.145	297.067
2 2 6	1508537.173	215.276	672229.234	4608879.079	296.967
2 2 7	1508537.173	215.276	672228.521	4608876.165	296.967
2 3 1	1508540.774	215.276	672232.376	4608876.766	299.147
2 3 2	1508540.774	215.276	672233.362	4608880.797	299.064
2 3 3	1508540.774	215.276	672231.390	4608872.735	299.064
2 3 4	1508540.774	215.276	672232.982	4608879.243	297.047
2 3 5	1508540.774	215.276	672231.770	4608874.289	297.047
2 3 6	1508540.774	215.276	672232.732	4608878.223	296.947
2 3 7	1508540.774	215.276	672232.019	4608875.309	296.947
2 4 1	1508544.375	215.276	672235.874	4608875.910	299.127
2 4 2	1508544.375	215.276	672236.860	4608879.941	299.044
2 4 3	1508544.375	215.276	672234.888	4608871.879	299.044
2 4 4	1508544.375	215.276	672236.480	4608878.387	297.027
2 4 5	1508544.375	215.276	672235.268	4608873.433	297.027
2 4 6	1508544.375	215.276	672236.230	4608877.367	296.927
2 4 7	1508544.375	215.276	672235.517	4608874.453	296.927
2 5 1	1508547.976	215.276	672239.372	4608875.055	299.107
2 5 2	1508547.976	215.276	672240.358	4608879.086	299.024
2 5 3	1508547.976	215.276	672238.385	4608871.023	299.024
2 5 4	1508547.976	215.276	672239.978	4608877.531	297.007
2 5 5	1508547.976	215.276	672238.766	4608872.578	297.007
2 5 6	1508547.976	215.276	672239.728	4608876.512	296.907
2 5 7	1508547.976	215.276	672239.015	4608873.597	296.907
2 6 1	1508551.578	215.276	672242.870	4608874.199	299.088
2 6 2	1508551.578	215.276	672243.856	4608878.230	299.005
2 6 3	1508551.578	215.276	672241.884	4608870.168	299.005
2 6 4	1508551.578	215.276	672243.476	4608876.676	296.988
2 6 5	1508551.578	215.276	672242.264	4608871.722	296.988
2 6 6	1508551.578	215.276	672243.226	4608875.656	296.888
2 6 7	1508551.578	215.276	672242.513	4608872.742	296.888
2 7 1	1508555.179	215.276	672246.368	4608873.343	299.068
2 7 2	1508555.179	215.276	672247.354	4608877.374	298.985
2 7 3	1508555.179	215.276	672245.381	4608869.312	298.985
2 7 4	1508555.179	215.276	672246.974	4608875.820	296.968
2 7 5	1508555.179	215.276	672245.762	4608870.866	296.968
2 7 6	1508555.179	215.276	672246.724	4608874.800	296.868
2 7 7	1508555.179	215.276	672246.011	4608871.886	296.868
2 8 1	1508558.780	215.276	672249.866	4608872.487	299.048
2 8 2	1508558.780	215.276	672250.852	4608876.518	298.965
2 8 3	1508558.780	215.276	672248.879	4608868.456	298.965
2 8 4	1508558.780	215.276	672250.472	4608874.964	296.948
2 8 5	1508558.780	215.276	672249.260	4608870.010	296.948
2 8 6	1508558.780	215.276	672250.222	4608873.944	296.848
2 8 7	1508558.780	215.276	672249.509	4608871.030	296.848
2 9 1	1508562.381	215.276	672253.363	4608871.631	299.028
2 9 2	1508562.381	215.276	672254.350	4608875.662	298.945
2 9 3	1508562.381	215.276	672252.377	4608867.600	298.945
2 9 4	1508562.381	215.276	672253.969	4608874.108	296.928
2 9 5	1508562.381	215.276	672252.757	4608869.154	296.928
2 9 6	1508562.381	215.276	672253.720	4608873.088	296.828
2 9 7	1508562.381	215.276	672253.007	4608870.174	296.828
2 10 1	1508565.982	215.276	672256.861	4608870.775	299.008
2 10 2	1508565.982	215.276	672257.848	4608874.807	298.925
2 10 3	1508565.982	215.276	672255.875	4608866.744	298.925
2 10 4	1508565.982	215.276	672257.467	4608873.252	296.908
2 10 5	1508565.982	215.276	672256.255	4608868.299	296.908
2 10 6	1508565.982	215.276	672257.218	4608872.232	296.808
2 10 7	1508565.982	215.276	672256.505	4608869.318	296.808
3 1 1	1508565.982	215.276	672256.861	4608870.775	299.008
3 1 2	1508565.982	215.276	672257.848	4608874.807	298.925
3 1 3	1508565.982	215.276	672255.875	4608866.744	298.925
3 1 4	1508565.982	215.276	672257.467	4608873.252	296.908
3 1 5	1508565.982	215.276	672256.255	4608868.299	296.908
3 1 6	1508565.982	215.276	672257.218	4608872.232	296.808
3 1 7	1508565.982	215.276	672256.505	4608869.318	296.808
3 2 1	1508569.583	215.276	672260.360	4608869.920	298.989
3 2 2	1508569.583	215.276	672261.346	4608873.951	298.906
3 2 3	1508569.583	215.276	672259.373	4608865.889	298.906
3 2 4	1508569.583	215.276	672260.966	4608872.397	296.889
3 2 5	1508569.583	215.276	672259.754	4608867.443	296.889
3 2 6	1508569.583	215.276	672260.716	4608871.377	296.789
3 2 7	1508569.583	215.276	672260.003	4608868.463	296.789
3 3 1	1508573.184	215.276	672263.857	4608869.064	298.969
3 3 2	1508573.184	215.276	672264.844	4608873.095	298.886
3 3 3	1508573.184	215.276	672262.871	4608865.033	298.886
3 3 4	1508573.184	215.276	672264.463	4608871.541	296.869
3 3 5	1508573.184	215.276	672263.251	4608866.587	296.869
3 3 6	1508573.184	215.276	672264.214	4608870.521	296.769
3 3 7	1508573.184	215.276	672263.501	4608867.607	296.769
3 4 1	1508576.785	215.276	672267.355	4608868.208	298.949
3 4 2	1508576.785	215.276	672268.342	4608872.239	298.866
3 4 3	1508576.785	215.276	672266.369	4608864.177	298.866
3 4 4	1508576.785	215.276	672267.961	4608870.685	296.849
3 4 5	1508576.785	215.276	672266.749	4608865.731	296.849
3 4 6	1508576.785	215.276	672267.712	4608869.665	296.749
3 4 7	1508576.785	215.276	672266.999	4608866.751	296.749
3 5 1	1508580.386	215.276	672270.853	4608867.352	298.929
3 5 2	1508580.386	215.276	672271.839	4608871.383	298.846
3 5 3	1508580.386	215.276	672269.867	4608863.321	298.846
3 5 4	1508580.386	215.276	672271.459	4608869.829	296.829
3 5 5	1508580.386	215.276	672270.247	4608864.875	296.829
3 5 6	1508580.386	215.276	672271.210	4608868.809	296.729
3 5 7	1508580.386	215.276	672270.497	4608865.895	296.729
3 6 1	1508583.988	215.276	672274.351	4608866.496	298.909
3 6 2	1508583.988	215.276	672275.337	4608870.528	298.826
3 6 3	1508583.988	215.276	672273.365	4608862.465	298.826
3 6 4	1508583.988	215.276	672274.957	4608868.973	296.809
3 6 5	1508583.988	215.276	672273.745	4608864.019	296.809
3 6 6	1508583.988	215.276	672274.708	4608867.953	296.709
3 6 7	1508583.988	215.276	672273.995	4608865.039	296.709
3 7 1	1508587.589	215.276	672277.849	4608865.641	298.890
3 7 2	1508587.589	215.276	672278.835	4608869.672	298.807
3 7 3	1508587.589	215.276	672276.863	4608861.610	298.807
3 7 4	1508587.589	215.276	672278.455	4608868.118	296.790
3 7 5	1508587.589	215.276	672277.243	4608863.164	296.790
3 7 6	1508587.589	215.276	672278.206	4608867.098	296.690
3 7 7	1508587.589	215.276	672277.493	4608864.184	296.690
3 8 1	1508591.190	215.276	672281.347	4608864.785	298.870
3 8 2	1508591.190	215.276	672282.333	4608868.816	298.787
3 8 3	1508591.190	215.276	672280.361	4608860.754	298.787
3 8 4	1508591.190	215.276	672281.953	4608867.262	296.770
3 8 5	1508591.190	215.276	672280.741	4608862.308	296.770
3 8 6	1508591.190	215.276	672281.704	4608866.242	296.670
3 8 7	1508591.190	215.276	672280.991	4608863.328	296.670
3 9 1	1508594.791	215.276	672284.845	4608863.929	298.850
3 9 2	1508594.791	215.276	672285.831	4608867.960	298.767
3 9 3	1508594.791	215.276	672283.859	4608859.898	298.767
3 9 4	1508594.791	215.276	672285.451	4608866.406	296.750
3 9 5	1508594.791	215.276	672284.239	4608861.452	296.750
3 9 6	1508594.791	215.276	672285.202	4608865.386	296.650
3 9 7	1508594.791	215.276	672284.489	4608862.472	296.650
3 10 1	1508598.392	215.276	672288.343	4608863.073	298.830
3 10 2	1508598.392	215.276	672289.329	4608867.104	298.747
3 10 3	1508598.392	215.276	672287.357	4608859.042	298.747
3 10 4	1508598.392	215.276	672288.949	4608865.550	296.730
3 10 5	1508598.392	215.276	672287.737	4608860.596	296.730
3 10 6	1508598.392	215.276	672288.699	4608864.530	296.630
3 10 7	1508598.392	215.276	672287.986	4608861.616	296.630
4 1 1	1508598.392	215.276	672288.343	4608863.073	298.830
4 1 2	1508598.392	215.276	672289.329	4608867.104	298.747
4 1 3	1508598.392	215.276	672287.357	4608859.042	298.747
4 1 4	1508598.392	215.276	672288.949	4608865.550	296.730
4 1 5	1508598.392	215.276	672287.737	4608860.596	296.730
4 1 6	1508598.392	215.276	672288.699	4608864.530	296.630
4 1 7	1508598.392	215.276	672287.986	4608861.616	296.630
4 2 1	1508601.993	215.276	672291.841	4608862.217	298.810
4 2 2	1508601.993	215.276	672292.827	4608866.248	298.727
4 2 3	1508601.993	215.276	672290.855	4608858.186	298.727
4 2 4	1508601.993	215.276	672292.447	4608864.694	296.710
4 2 5	1508601.993	215.276	672291.235	4608859.740	296.710
4 2 6	1508601.993	215.276	672292.197	4608863.674	296.610
4 2 7	1508601.993	215.276	672291.484	4608860.760	296.610
4 3 1	1508605.594	215.276	672295.339	4608861.362	298.790

4	3	2	1508605.594	215.276	672296.325	4608865.393	298.707
4	3	3	1508605.594	215.276	672294.353	4608857.330	298.707
4	3	4	1508605.594	215.276	672295.945	4608863.839	296.690
4	3	5	1508605.594	215.276	672294.733	4608858.885	296.690
4	3	6	1508605.594	215.276	672295.695	4608862.819	296.590
4	3	7	1508605.594	215.276	672294.982	4608859.905	296.590
4	4	1	1508609.195	215.276	672298.837	4608860.506	298.771
4	4	2	1508609.195	215.276	672299.823	4608864.537	298.688
4	4	3	1508609.195	215.276	672297.851	4608856.475	298.688
4	4	4	1508609.195	215.276	672299.443	4608862.983	296.671
4	4	5	1508609.195	215.276	672298.231	4608858.029	296.671
4	4	6	1508609.195	215.276	672299.193	4608861.963	296.571
4	4	7	1508609.195	215.276	672298.480	4608859.049	296.571
4	5	1	1508612.796	215.276	672302.335	4608859.650	298.751
4	5	2	1508612.796	215.276	672303.321	4608863.681	298.668
4	5	3	1508612.796	215.276	672301.348	4608855.619	298.668
4	5	4	1508612.796	215.276	672302.941	4608862.127	296.651
4	5	5	1508612.796	215.276	672301.729	4608857.173	296.651
4	5	6	1508612.796	215.276	672302.691	4608861.107	296.551
4	5	7	1508612.796	215.276	672301.978	4608858.193	296.551
4	6	1	1508616.398	215.276	672305.833	4608858.794	298.731
4	6	2	1508616.398	215.276	672306.819	4608862.825	298.648
4	6	3	1508616.398	215.276	672304.846	4608854.763	298.648
4	6	4	1508616.398	215.276	672306.439	4608861.271	296.631
4	6	5	1508616.398	215.276	672305.227	4608856.317	296.631
4	6	6	1508616.398	215.276	672306.189	4608860.251	296.531
4	6	7	1508616.398	215.276	672305.476	4608857.337	296.531
4	7	1	1508619.999	215.276	672309.331	4608857.938	298.711
4	7	2	1508619.999	215.276	672310.317	4608861.969	298.628
4	7	3	1508619.999	215.276	672308.344	4608853.907	298.628
4	7	4	1508619.999	215.276	672309.937	4608860.415	296.611
4	7	5	1508619.999	215.276	672308.725	4608855.461	296.611
4	7	6	1508619.999	215.276	672309.687	4608859.395	296.511
4	7	7	1508619.999	215.276	672308.974	4608856.481	296.511
4	8	1	1508623.600	215.276	672312.829	4608857.083	298.691
4	8	2	1508623.600	215.276	672313.815	4608861.114	298.608
4	8	3	1508623.600	215.276	672311.842	4608853.051	298.608
4	8	4	1508623.600	215.276	672313.435	4608859.559	296.591
4	8	5	1508623.600	215.276	672312.223	4608854.606	296.591
4	8	6	1508623.600	215.276	672313.185	4608858.540	296.491
4	8	7	1508623.600	215.276	672312.472	4608855.626	296.491
4	9	1	1508627.201	215.276	672316.327	4608856.227	298.672
4	9	2	1508627.201	215.276	672317.313	4608860.258	298.589
4	9	3	1508627.201	215.276	672315.340	4608852.196	298.589
4	9	4	1508627.201	215.276	672316.933	4608858.704	296.572
4	9	5	1508627.201	215.276	672315.721	4608853.750	296.572
4	9	6	1508627.201	215.276	672316.683	4608857.684	296.472
4	9	7	1508627.201	215.276	672315.970	4608854.770	296.472
4	10	1	1508630.802	215.276	672319.824	4608855.371	298.652
4	10	2	1508630.802	215.276	672320.811	4608859.402	298.569
4	10	3	1508630.802	215.276	672318.838	4608851.340	298.569
4	10	4	1508630.802	215.276	672320.430	4608857.848	296.552
4	10	5	1508630.802	215.276	672319.218	4608852.894	296.552
4	10	6	1508630.802	215.276	672320.181	4608856.828	296.452
4	10	7	1508630.802	215.276	672319.468	4608853.914	296.452
5	1	1	1508630.802	215.276	672319.824	4608855.371	298.652
5	1	2	1508630.802	215.276	672320.811	4608859.402	298.569
5	1	3	1508630.802	215.276	672318.838	4608851.340	298.569
5	1	4	1508630.802	215.276	672320.430	4608857.848	296.552
5	1	5	1508630.802	215.276	672319.218	4608852.894	296.552
5	1	6	1508630.802	215.276	672320.181	4608856.828	296.452
5	1	7	1508630.802	215.276	672319.468	4608853.914	296.452
5	2	1	1508633.024	215.276	672321.983	4608854.843	298.640
5	2	2	1508633.024	215.276	672322.969	4608858.874	298.557
5	2	3	1508633.024	215.276	672320.997	4608850.812	298.557
5	2	4	1508633.024	215.276	672322.589	4608857.320	296.540
5	2	5	1508633.024	215.276	672321.377	4608852.366	296.540
5	2	6	1508633.024	215.276	672322.340	4608856.300	296.440
5	2	7	1508633.024	215.276	672321.627	4608853.386	296.440
5	3	1	1508635.246	215.276	672324.141	4608854.315	298.627
5	3	2	1508635.246	215.276	672325.128	4608858.346	298.544
5	3	3	1508635.246	215.276	672323.155	4608850.284	298.544
5	3	4	1508635.246	215.276	672324.747	4608856.792	296.527
5	3	5	1508635.246	215.276	672323.535	4608851.838	296.527
5	3	6	1508635.246	215.276	672324.498	4608855.772	296.427
5	3	7	1508635.246	215.276	672323.785	4608852.858	296.427
5	4	1	1508637.469	215.276	672326.300	4608853.787	298.615
5	4	2	1508637.469	215.276	672327.286	4608857.818	298.532
5	4	3	1508637.469	215.276	672325.314	4608849.755	298.532
5	4	4	1508637.469	215.276	672326.906	4608856.264	296.515
5	4	5	1508637.469	215.276	672325.694	4608851.310	296.515
5	4	6	1508637.469	215.276	672326.657	4608855.244	296.415
5	4	7	1508637.469	215.276	672325.944	4608852.330	296.415
5	5	1	1508639.691	215.276	672328.459	4608853.258	298.603
5	5	2	1508639.691	215.276	672329.445	4608857.290	298.520
5	5	3	1508639.691	215.276	672327.472	4608849.227	298.520
5	5	4	1508639.691	215.276	672329.065	4608855.735	296.503
5	5	5	1508639.691	215.276	672327.853	4608850.782	296.503
5	5	6	1508639.691	215.276	672328.815	4608854.715	296.403
5	5	7	1508639.691	215.276	672328.102	4608851.801	296.403
5	6	1	1508641.913	215.276	672330.617	4608852.730	298.591
5	6	2	1508641.913	215.276	672331.603	4608856.761	298.508
5	6	3	1508641.913	215.276	672329.631	4608848.699	298.508
5	6	4	1508641.913	215.276	672331.223	4608855.207	296.491
5	6	5	1508641.913	215.276	672330.011	4608850.253	296.491
5	6	6	1508641.913	215.276	672330.974	4608854.187	296.391
5	6	7	1508641.913	215.276	672330.261	4608851.273	296.391
5	7	1	1508644.135	215.276	672332.776	4608852.202	298.578
5	7	2	1508644.135	215.276	672333.762	4608856.233	298.495
5	7	3	1508644.135	215.276	672331.790	4608848.171	298.495
5	7	4	1508644.135	215.276	672333.382	4608854.679	296.478
5	7	5	1508644.135	215.276	672332.170	4608849.725	296.478
5	7	6	1508644.135	215.276	672333.132	4608853.659	296.378
5	7	7	1508644.135	215.276	672332.419	4608850.745	296.378
5	8	1	1508646.358	215.276	672334.934	4608851.674	298.566
5	8	2	1508646.358	215.276	672335.920	4608855.705	298.483
5	8	3	1508646.358	215.276	672333.948	4608847.643	298.483
5	8	4	1508646.358	215.276	672335.540	4608854.151	296.466
5	8	5	1508646.358	215.276	672334.328	4608849.197	296.466
5	8	6	1508646.358	215.276	672335.291	4608853.131	296.366
5	8	7	1508646.358	215.276	672334.578	4608850.217	296.366
5	9	1	1508648.580	215.276	672337.093	4608851.146	298.554
5	9	2	1508648.580	215.276	672338.079	4608855.177	298.471
5	9	3	1508648.580	215.276	672336.107	4608847.115	298.471
5	9	4	1508648.580	215.276	672337.699	4608853.623	296.454
5	9	5	1508648.580	215.276	672336.487	4608848.669	296.454
5	9	6	1508648.580	215.276	672337.449	4608852.603	296.354
5	9	7	1508648.580	215.276	672336.736	4608849.689	296.354
5	10	1	1508650.802	215.276	672339.251	4608850.618	298.542
5	10	2	1508650.802	215.276	672340.238	4608854.649	298.459
5	10	3	1508650.802	215.276	672338.265	4608846.587	298.459
5	10	4	1508650.802	215.276	672339.857	4608853.095	296.442
5	10	5	1508650.802	215.276	672338.645	4608848.141	296.442
5	10	6	1508650.802	215.276	672339.608	4608852.075	296.342
5	10	7	1508650.802	215.276	672338.895	4608849.161	296.342

PUENTE E-1508.5

2º CALCULO DEL TABLERO

PUENTE E-1508.5

2.1.- Tablero derecho

La masa vibrante esta constituida por:

peso propio $\gamma = 2,5\ t/m^3$

carga muerta $q = 12,00\ t/m.$

Adoptaremos un peso especifico ficticio para el hormigón

$$\gamma' = 2,5 + \frac{12,00}{Area} = 3,43\ t/m^3$$

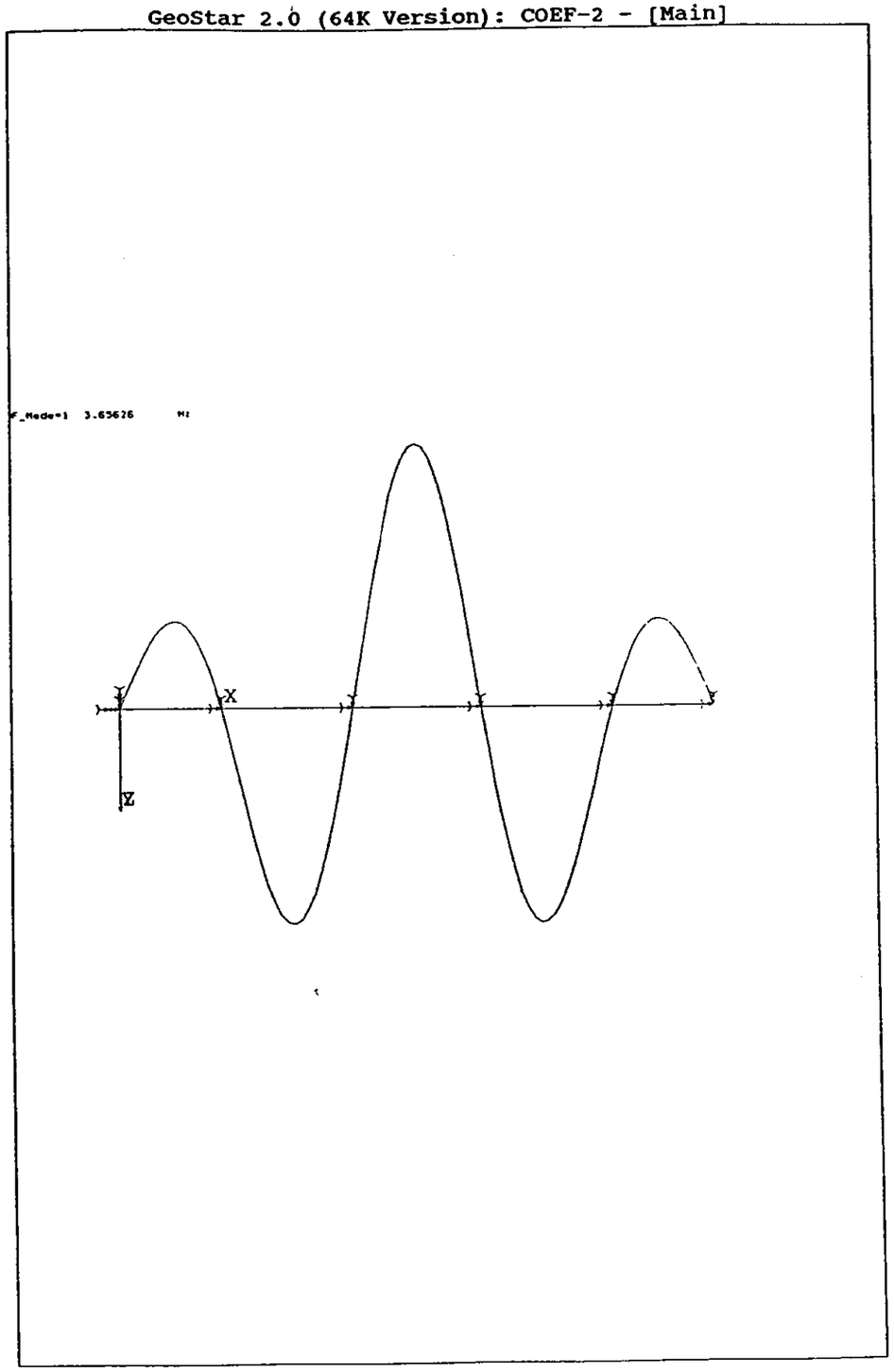
El periodo mayor da $T = \frac{1}{3,65} = 0,274$ seg.

$$\nu = \frac{55.5 \cdot 0,274}{2 \times 31} = 0,245$$

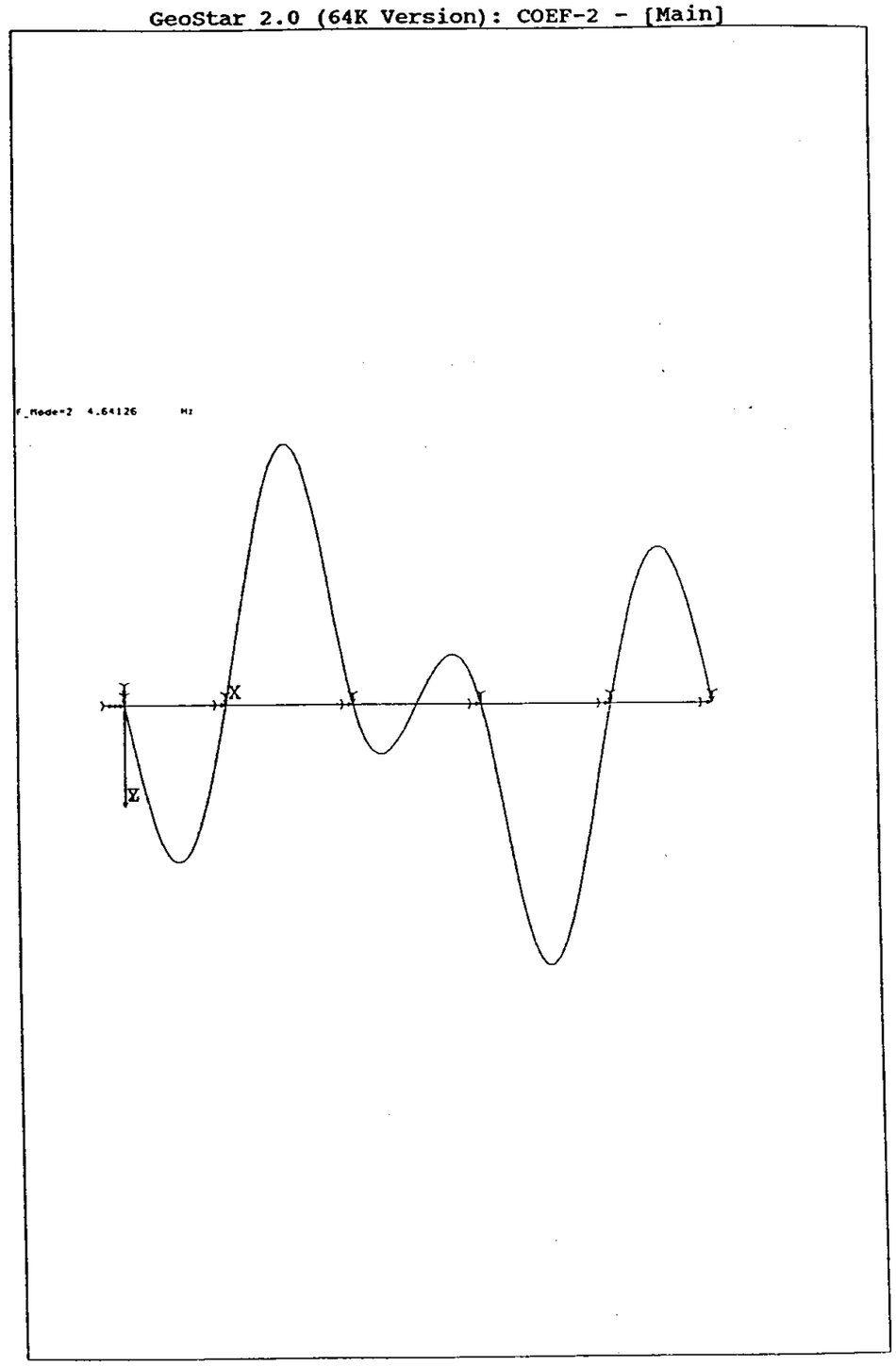
$$\nu = \frac{55.5 \cdot 0,274}{2 \times 24} = 0,317$$

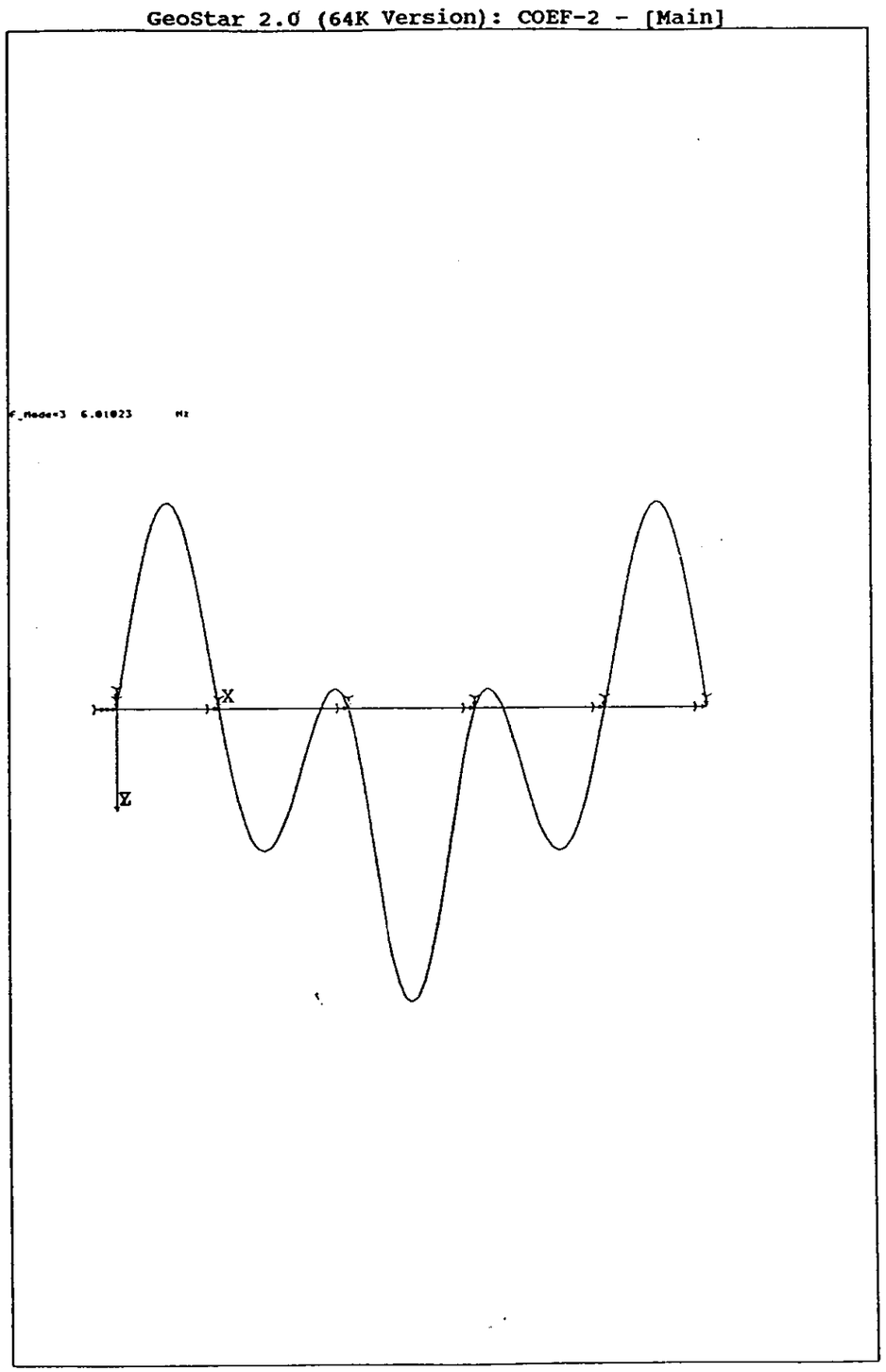
$$I = 65 \cdot \frac{\nu}{1-\nu+\nu^2} = \begin{cases} L = 31\ m & I = 1,19 \\ L = 24\ m \rightarrow & \underline{\underline{I = 1,26}} \end{cases}$$

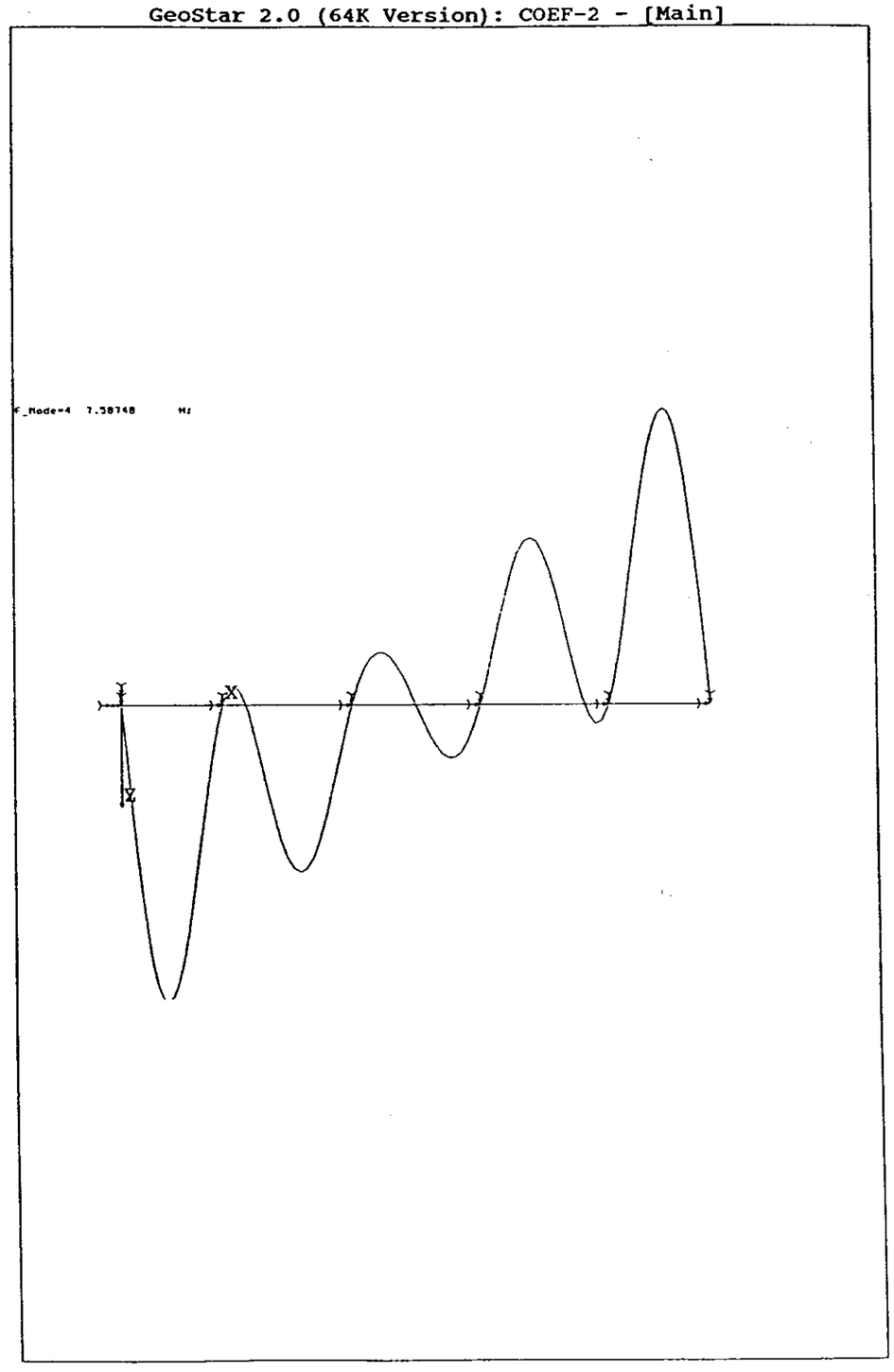
GeoStar 2.0 (64K Version): COEF-2 - [Main]



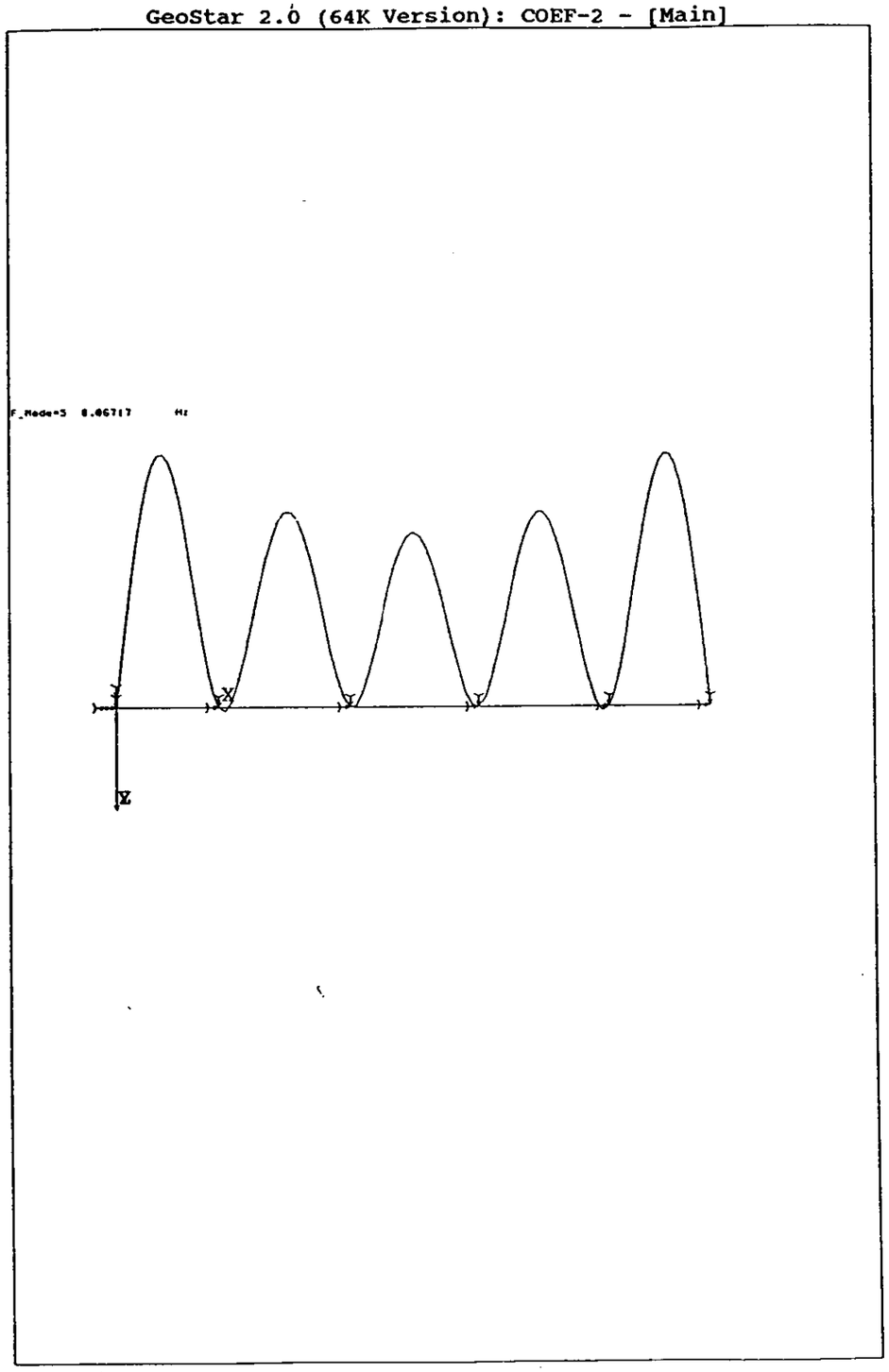
GeoStar 2.0 (64K Version): COEF-2 - [Main]



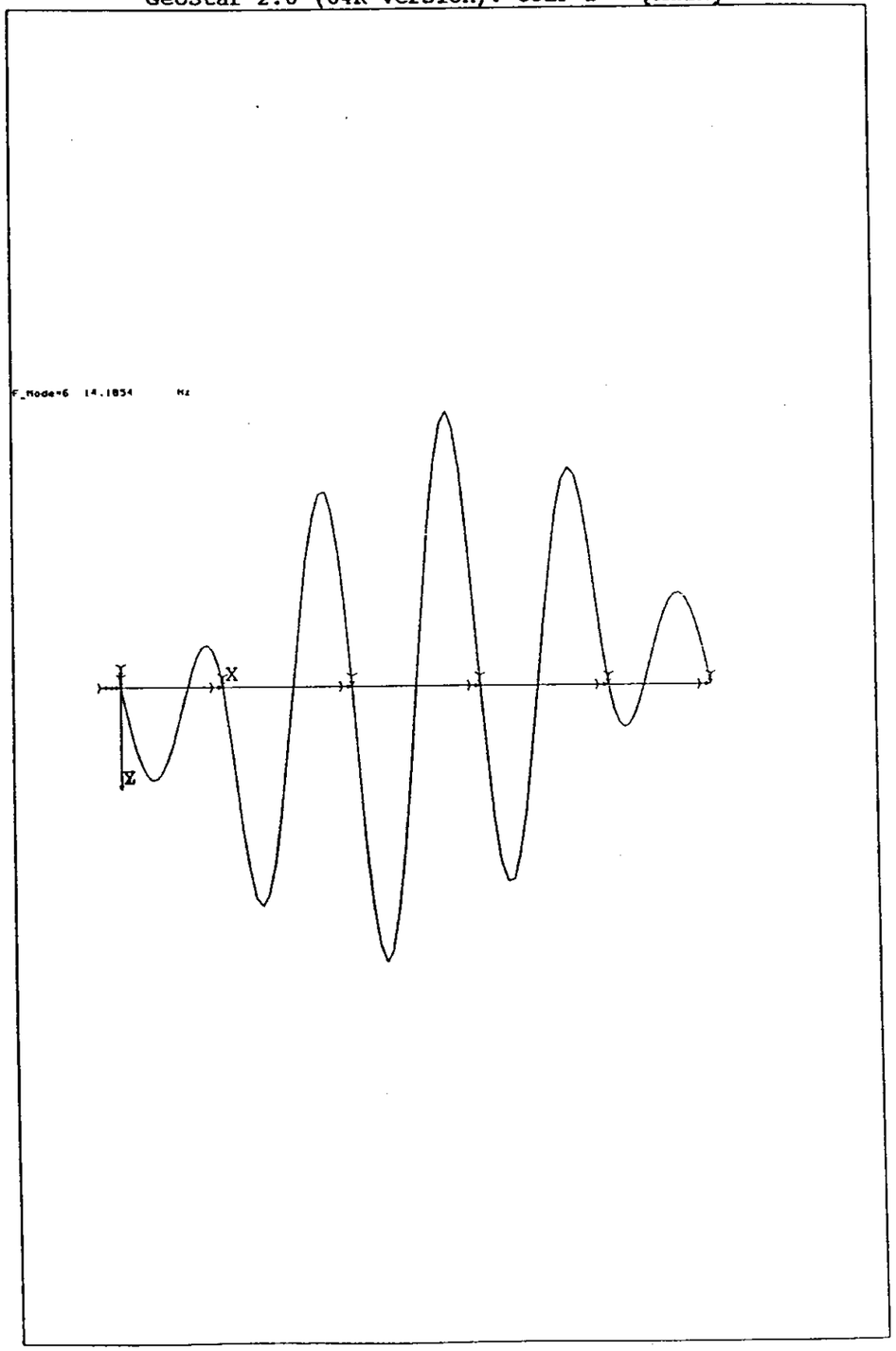

GeoStar 2.0 (64K Version): COEF-2 - [Main]
F_Mode=3 6.81823 Hz
Y
X
Z


GeoStar 2.0 (64K Version): COEF-2 - [Main]
F_Mode=4 7.58748 Hz
Y
X
Z

GeoStar 2.0 (64K Version): COEF-2 - [Main]



GeoStar 2.0 (64K Version): COEF-2 - [Main]



****
****
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** **
** **
** CCCC OOOO SSSS M M OOOO SSSS / M M **
** C O O S MM MM O O S / MM MM **
** C O O SSSS M M M M O O SSSS / M M M M **
** C O O S M M M O O S / M M M **
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** CCCC OOOO SSSS M M OOOO SSSS / M M **
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****
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Problem name: COEF-2
Date : 07/24/1998 Time: 12:26:30
Title :
|
Subtitle :

Element group data

Element group number= 1
Element name:
BEAM3D Three dimensional Elastic Beam elements
Type of beam element = ... 0
EQ. 0 ; Symmetric beam element
EQ. 1 ; Unsymmetric beam element
EQ. 2 ; Symmetric tapered beam element

Real constant data

Real constant set 1
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 2
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 3
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 4
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 5
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 6
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 7
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 8
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 9
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 10
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 11
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000

Torsion const for max shear stress = .00000
Real constant set 12
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 13
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 14
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 15
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 16
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 17
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 18
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 19
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 20
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 21
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 22
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = 00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 23
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 24
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 25
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 26

Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 27
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 28
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 29
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 30
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 31
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 32
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 33
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 34
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 35
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 36
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 37
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 38
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 39
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 40
Associated with :
BEAM3D Three dimensional Elastic Beam elements

Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 41
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 42
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 43
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 44
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 45
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 46
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 47
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 48
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 49
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 50
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 51
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 52
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 53
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 54
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50

Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 55
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 56
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 57
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 58
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 59
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 60
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 61
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 62
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 63
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 64
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 65
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 66
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 67
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 68
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000

Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 69
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 70
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 71
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 72
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 73
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 74
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 75
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 76
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 77
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 78
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 79
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 80
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 81
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 82
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0

End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 83
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 84
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 85
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 86
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 87
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 88
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 89
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 90
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 91
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 92
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 93
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 94
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 95
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 96
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456

Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = '10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 97
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 98
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50

Nodal input data

NODE BOUNDARY CONDITION CODES
NODAL POINT COORDINATES
(0 = FREE ; 1 = FIXED)

	X	Y	Z	XX	YY	ZZ	X	Y	Z
1	1	1	1	1	1	1	.00000	.00000	.10000E+07
2	1	1	1	1	0	1	.00000	.00000	.00000
3	0	0	0	0	0	0	1.2000	.00000	.00000
4	0	0	0	0	0	0	2.4000	.00000	.00000
5	0	0	0	0	0	0	3.6000	.00000	.00000
6	0	0	0	0	0	0	4.8000	.00000	.00000
7	0	0	0	0	0	0	6.0000	.00000	.00000
8	0	0	0	0	0	0	7.2000	.00000	.00000
9	0	0	0	0	0	0	8.4000	.00000	.00000
10	0	0	0	0	0	0	9.6000	.00000	.00000
11	0	0	0	0	0	0	10.800	.00000	.00000
12	0	0	0	0	0	0	12.000	.00000	.00000
13	0	0	0	0	0	0	13.200	.00000	.00000
14	0	0	0	0	0	0	14.400	.00000	.00000
15	0	0	0	0	0	0	15.600	.00000	.00000
16	0	0	0	0	0	0	16.800	.00000	.00000
17	0	0	0	0	0	0	18.000	.00000	.00000
18	0	0	0	0	0	0	19.200	.00000	.00000
19	0	0	0	0	0	0	20.400	.00000	.00000
20	0	0	0	0	0	0	21.600	.00000	.00000
21	0	0	0	0	0	0	22.800	.00000	.00000
22	1	1	1	0	0	0	24.000	.00000	.00000
23	0	0	0	0	0	0	25.550	.00000	.00000
24	0	0	0	0	0	0	27.100	.00000	.00000

Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 99
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000

25	0	0	0	0	0	0	28.650	.00000	.00000
26	0	0	0	0	0	0	30.200	.00000	.00000
27	0	0	0	0	0	0	31.750	.00000	.00000
28	0	0	0	0	0	0	33.300	.00000	.00000
29	0	0	0	0	0	0	34.850	.00000	.00000
30	0	0	0	0	0	0	36.400	.00000	.00000
31	0	0	0	0	0	0	37.950	.00000	.00000
32	0	0	0	0	0	0	39.500	.00000	.00000
33	0	0	0	0	0	0	41.050	.00000	.00000
34	0	0	0	0	0	0	42.600	.00000	.00000
35	0	0	0	0	0	0	44.150	.00000	.00000
36	0	0	0	0	0	0	45.700	.00000	.00000
37	0	0	0	0	0	0	47.250	.00000	.00000
38	0	0	0	0	0	0	48.800	.00000	.00000
39	0	0	0	0	0	0	50.350	.00000	.00000
40	0	0	0	0	0	0	51.900	.00000	.00000
41	0	0	0	0	0	0	53.450	.00000	.00000
42	1	1	1	0	0	0	55.000	.00000	.00000
43	0	0	0	0	0	0	56.550	.00000	.00000
44	0	0	0	0	0	0	58.100	.00000	.00000
45	0	0	0	0	0	0	59.650	.00000	.00000
46	0	0	0	0	0	0	61.200	.00000	.00000
47	0	0	0	0	0	0	62.750	.00000	.00000
48	0	0	0	0	0	0	64.300	.00000	.00000
49	0	0	0	0	0	0	65.850	.00000	.00000
50	0	0	0	0	0	0	67.400	.00000	.00000
51	0	0	0	0	0	0	68.950	.00000	.00000
52	0	0	0	0	0	0	70.500	.00000	.00000
53	0	0	0	0	0	0	72.050	.00000	.00000
54	0	0	0	0	0	0	73.600	.00000	.00000
55	0	0	0	0	0	0	75.150	.00000	.00000
56	0	0	0	0	0	0	76.700	.00000	.00000

Torsion const for max shear stress = .00000
Real constant set 100
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 10.000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 101
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 1000.0
Moment of Inertia about element Y-axis = 1000.0
Moment of Inertia about element Z-axis = 1000.0
Depth of beam (y-axis) = 10.000
Width of beam (z-axis) = 10.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0

57	0	0	0	0	0	0	78.250	.00000	.00000
58	0	0	0	0	0	0	79.800	.00000	.00000
59	0	0	0	0	0	0	81.350	.00000	.00000
60	0	0	0	0	0	0	82.900	.00000	.00000
61	0	0	0	0	0	0	84.450	.00000	.00000
62	1	1	1	0	0	0	86.000	.00000	.00000
63	0	0	0	0	0	0	87.550	.00000	.00000
64	0	0	0	0	0	0	89.100	.00000	.00000
65	0	0	0	0	0	0	90.650	.00000	.00000
66	0	0	0	0	0	0	92.200	.00000	.00000
67	0	0	0	0	0	0	93.750	.00000	.00000
68	0	0	0	0	0	0	95.300	.00000	.00000
69	0	0	0	0	0	0	96.850	.00000	.00000
70	0	0	0	0	0	0	98.400	.00000	.00000
71	0	0	0	0	0	0	99.950	.00000	.00000
72	0	0	0	0	0	0	101.50	.00000	.00000
73	0	0	0	0	0	0	103.05	.00000	.00000
74	0	0	0	0	0	0	104.60	.00000	.00000
75	0	0	0	0	0	0	106.15	.00000	.00000
76	0	0	0	0	0	0	107.70	.00000	.00000
77	0	0	0	0	0	0	109.25	.00000	.00000
78	0	0	0	0	0	0	110.80	.00000	.00000
79	0	0	0	0	0	0	112.35	.00000	.00000
80	0	0	0	0	0	0	113.90	.00000	.00000
81	0	0	0	0	0	0	115.45	.00000	.00000
82	1	1	1	0	0	0	117.00	.00000	.00000
83	0	0	0	0	0	0	118.20	.00000	.00000
84	0	0	0	0	0	0	119.40	.00000	.00000
85	0	0	0	0	0	0	120.60	.00000	.00000
86	0	0	0	0	0	0	121.80	.00000	00000
87	0	0	0	0	0	0	123.00	.00000	.00000
88	0	0	0	0	0	0	124.20	.00000	.00000

Moment of inertia about element x-axis = 1000.0
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000

Material propery data

Material property set 1

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0
ALPX : X thermal expansion	.10000E-04	0
DENS : Mass Density	.35000	0

Material property set 2

	Value	Temp curve no.
EX : X Elastic Modulus	1.0000	0
NUXY : Poisson Ratio	.20000	0

Material property set 3

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0

89	0	0	0	0	0	0	125.40	.00000	.00000
90	0	0	0	0	0	0	126.60	.00000	.00000
91	0	0	0	0	0	0	127.80	.00000	.00000
92	0	0	0	0	0	0	129.00	.00000	.00000
93	0	0	0	0	0	0	130.20	.00000	.00000
94	0	0	0	0	0	0	131.40	.00000	.00000
95	0	0	0	0	0	0	132.60	.00000	.00000
96	0	0	0	0	0	0	133.80	.00000	.00000
97	0	0	0	0	0	0	135.00	.00000	.00000
98	0	0	0	0	0	0	136.20	.00000	.00000
99	0	0	0	0	0	0	137.40	.00000	.00000
100	0	0	0	0	0	0	138.60	.00000	.00000
101	0	0	0	0	0	0	139.80	.00000	.00000
102	1	1	1	0	0	0	141.00	.00000	.00000

Element input data

ELEM EGRP MP REAL ECS NODE 1 NODE 2 NODE 3 NODE 4 NODE 5 NODE 6 NODE 7 NODE 8 NODE 9 NODE10 NODE11 NODE12 NODE13 NODE14 NODE15 NODE16 NODE17 NODE18 NODE19 NODE20

1	1	1	-1	2	3	1	
2	1	1	2	-1	3	4	1
3	1	1	3	-1	4	5	1
4	1	1	4	-1	5	6	1

```
  5   1 1  5 -1    6    7    1
  6   1 1  6 -1    7    8    1
  7   1 1  7 -1    8    9    1
  8   1 1  8 -1    9   10    1
  9   1 1  9 -1   10   11    1
 10   1 1 10 -1   11   12    1
 11   1 1 11 -1   12   13    1
 12   1 1 12 -1   13   14    1
 13   1 1 13 -1   14   15    1
 14   1 1 14 -1   15   16    1
 15   1 1 15 -1   16   17    1
 16   1 1 16 -1   17   18    1
 17   1 1 17 -1   18   19    1
 18   1 1 18 -1   19   20    1
 19   1 1 19 -1   20   21    1
 20   1 1 20 -1   21   22    1
 21   1 1 21 -1   22   23    1
 22   1 1 22 -1   23   24    1
 23   1 1 23 -1   24   25    1
 24   1 1 24 -1   25   26    1
 25   1 1 25 -1   26   27    1
 26   1 1 26 -1   27   28    1
 27   1 1 27 -1   28   29    1
 28   1 1 28 -1   29   30    1

 CONTROL INFORMATION
  NUMBER OF LOAD CASES .....
(NLCASE) =      1
  SOLUTION MODE ..... (MODEX) =
2
    EQ. 0, STATIC ANALYSIS
    EQ. 1, BUCKLING ANALYSIS
    EQ. 2, DYNAMIC ANALYSIS
  THERMAL LOADING FLAG .....
.(ITHERM) =      0
    EQ. 0, NO THERMAL EFFECTS CONSIDERED
    EQ. 1, ADD TEMPERATURE EFFECT
  GRAVITY LOADING FLAG ..... .(IGRAV)
=      0
    EQ. 0, NO GRAVITY LOADING CONSIDERED
    EQ. 1, ADD GRAVITY LOADING EFFECT
  CENTRIFUGAL LOADING FLAG .....
.(ICNTRF) =      0
    EQ. 0, NO CENTRIFUGAL LOADING
CONSIDERED
    EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
  IN-PLANE STIFFENING FLAG ..... .(INPLN)
=      0
    EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
    EQ. 1, IN-PLANE EFFECTS CONSIDERED
  SOFT SPRING ADDITION FLAG ..... (ISOFT)
=      0
    EQ. 0, NO SOFT SPRING OPTION
    EQ. 1, SOFT SPRING ADDED

  SAVE DECOMPOSED STIFFNESS MATRIX FLAG
... (ISAVK) =      0
    EQ. 0, DO NOT SAVE DECOMPOSED K
    EQ. 1, SAVE DECOMPOSED K

 29   1 1 29 -1   30   31    1
 30   1 1 30 -1   31   32    1
 31   1 1 31 -1   32   33    1
 32   1 1 32 -1   33   34    1
 33   1 1 33 -1   34   35    1
 34   1 1 34 -1   35   36    1
 35   1 1 35 -1   36   37    1
 36   1 1 36 -1   37   38    1
 37   1 1 37 -1   38   39    1
 38   1 1 38 -1   39   40    1
 39   1 1 39 -1   40   41    1
 40   1 1 40 -1   41   42    1
 41   1 1 41 -1   42   43    1
 42   1 1 42 -1   43   44    1
 43   1 1 43 -1   44   45    1
 44   1 1 44 -1   45   46    1
 45   1 1 45 -1   46   47    1
 46   1 1 46 -1   47   48    1
 47   1 1 47 -1   48   49    1
 48   1 1 48 -1   49   50    1
 49   1 1 49 -1   50   51    1
 50   1 1 50 -1   51   52    1
 51   1 1 51 -1   52   53    1
 52   1 1 52 -1   53   54    1
  FORM STIFFNESS MATRIX FLAG .....
.(IFORMK) =      0
    EQ. 0, FORM STIFFNESS MATRIX
    EQ. 1, USE EXISTING DECOMPOSED
STIFFNESS MATRIX

  SPIN SOFTENING FLAG ..... (ISPIN) =
0
    EQ. 0, NO SPIN SOFTENING EFFECTS
CONSIDERED
    EQ. 1, SPIN SOFTENING EFFECTS
CONSIDERED
  INERTIA RELIEF FLAG ..... .(IFORMK) =
0
    EQ. 0, NO INERITA RELIEF EFFECTS
CONSIDERED
    EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
  RIGID CONNECTIONS FLAG ..... (IRIGID)
=      0
    EQ. 0, HINGE CONNECTIONS BETWEEN
SOLIDS & SHELLS
    EQ. 1, RIGID CONNECTIONS BETWEEN
SOLIDS & SHELLS


 TOTAL SYSTEM DATA
  NUMBER OF EQUATIONS ..... .(NEQ) =
586
  NUMBER OF MATRIX ELEMENTS .....
.(NWK) =     5434
  MAXIMUM HALF BANDWIDTH .....
(MK ) =      12
  MEAN HALF BANDWIDTH ..... .(MM )
=      9
  NUMBER OF ELEMENTS. ..... .(NUME)
=     100

 53   1 1 53 -1   54   55    1
 54   1 1 54 -1   55   56    1
 55   1 1 55 -1   56   57    1
 56   1 1 56 -1   57   58    1
 57   1 1 57 -1   58   59    1
 58   1 1 58 -1   59   60    1
 59   1 1 59 -1   60   61    1
 60   1 1 60 -1   61   62    1
 61   1 1 61 -1   62   63    1
 62   1 1 62 -1   63   64    1
 63   1 1 63 -1   64   65    1
 64   1 1 64 -1   65   66    1
 65   1 1 65 -1   66   67    1
 66   1 1 66 -1   67   68    1
 67   1 1 67 -1   68   69    1
 68   1 1 68 -1   69   70    1
 69   1 1 69 -1   70   71    1
 70   1 1 70 -1   71   72    1
 71   1 1 71 -1   72   73    1
 72   1 1 72 -1   73   74    1
 73   1 1 73 -1   74   75    1
 74   1 1 74 -1   75   76    1
 75   1 1 75 -1   76   77    1
 76   1 1 76 -1   77   78    1
  NUMBER OF NODAL POINTS. .....
.(NUMNP)=     102
  ADJUSTED BLOCK SIZE .....
.(MTBLK)=     5435
  EXTRA MEMORY AVAILABLE (in 8-byte words) . .
.(XMTBLK)=  4287773
  NUMBER OF STIFFNESS BLOCKS. .....
(NBLK) =      1


  MAXIMUM DIAGONAL STIFFNESS MATRIX
VALUE =  .585788E+10 (    495)
  MINIMUM DIAGONAL STIFFNESS MATRIX
VALUE =  .122545E+08 (    584)
1

  ---------------------------------------------
--
  |      MASS MOMENT INFORMATI
ON       |
  |-------------------------------------------
-|
  |MASS    .666510E+03 |VOLUME  .190431E+04
|WEIGHT  .000000E+00 |
  |-------------------------------------------
-|
  | MASS MOMENT OF INERTIA W.R.T. C.G.
|
  |-------------------------------------------
-|
  |IX      .000000E+00 |IY      .109554E+07 |IZ
.109554E+07 |
  |-------------------------------------------
-|

 77   1 1 77 -1   78   79    1
 78   1 1 78 -1   79   80    1
 79   1 1 79 -1   80   81    1
 80   1 1 80 -1   81   82    1
 81   1 1 81 -1   82   83    1
 82   1 1 82 -1   83   84    1
 83   1 1 83 -1   84   85    1
 84   1 1 84 -1   85   86    1
 85   1 1 85 -1   86   87    1
 86   1 1 86 -1   87   88    1
 87   1 1 87 -1   88   89    1
 88   1 1 88 -1   89   90    1
 89   1 1 89 -1   90   91    1
 90   1 1 90 -1   91   92    1
 91   1 1 91 -1   92   93    1
 92   1 1 92 -1   93   94    1
 93   1 1 93 -1   94   95    1
 94   1 1 94 -1   95   96    1
 95   1 1 95 -1   96   97    1
 96   1 1 96 -1   97   98    1
 97   1 1 97 -1   98   99    1
 98   1 1 98 -1   99  100    1
 99   1 1 99 -1  100  101    1
100   1 1 100 -1  101  102    1
| MASS PRODUCT OF INERTIA W.R.T. C.G.
|
  |-------------------------------------------
-|
  |PXY     .000000E+00 |PXZ     .000000E+00 |PYZ
.000000E+00 |
  |-------------------------------------------
-|
  | RADII OF GYRATION W.R.T. C.G.
|
  |-------------------------------------------
-|
  |RX      .000000E+00 |RY      .405425E+02 |RZ
.405425E+02 |
  |-------------------------------------------
-|
  | CENTER OF GRAVITY
|
  |-------------------------------------------
-|
  |CGx     .705000E+02 |CGy     .000000E+00 |CGz
.000000E+00 |
  |-------------------------------------------
-|
```

Note: In the above table, WEIGHT is computed based on the user
defined acceleration for the first active Load Case

SOLUTION PARAMETERS

NUMBER OF EIGENVALUES.....(NFR)=
10
MASS TYPE: 1-LUMPED,2-CONSISTENT....
(MASS)= 1
MODE SHAPE PRINT FLAG.....(MPRNT)=
1
INTERMEDIATE SOLUTION PRINT FLAG..
.(IFPR)= 0
STURM SEQUENCE CHECK FLAG.....
.(IFSS)= 0
MAXIMUM NUMBER OF ITERATIONS.....
(ITMAX)= 30
FREQUENCY SHIFT FLAG.....(IFRSH)=
0
FREQUENCY SHIFT.....(FRSH)=
.0000000E+00
CONVERGENCE TOLERANCE.....(RTOL)=
.1000000E-04
COMPOSITE MODAL DAMPING CALC. FLAG..
.(IMDC)= 0
MODAL ACCELERATION FLAG.....
.(IMAM)= 0

SUBSPACE ITERATION

ITERATION NUMBER 1

ITERATION NUMBER 2

ITERATION NUMBER 3

ITERATION NUMBER 4

ITERATION NUMBER 5

ITERATION NUMBER 6

ITERATION NUMBER 7

ITERATION NUMBER 8

ITERATION NUMBER 9

ITERATION NUMBER 10

ITERATION NUMBER 11

ITERATION NUMBER 12

ITERATION NUMBER 13

ITERATION NUMBER 14

ITERATION NUMBER 15

ITERATION NUMBER 16

ITERATION NUMBER 17

CONVERGENCE REACHED FOR RTOL .1000E-04

FREQUENCY ANALYSIS
by
SUBSPACE ALGORITHM

FREQUENCY NUMBER	FREQUENCY (RAD/SEC)	FREQUENCY (CYCLES/SEC)	PERIOD (SECONDS)
1	.2297298E+02	.3656263E+01	.2735033E+00
2	.2916193E+02	.4641265E+01	.2154585E+00
3	.3776340E+02	.6010231E+01	.1663830E+00
4	.4767353E+02	.7587478E+01	.1317961E+00
5	.5068753E+02	.8067170E+01	.1239592E+00
6	.8912976E+02	.1418544E+02	.7049481E-01
7	.1035070E+03	.1647366E+02	.6070298E-01
8	.1119087E+03	.1781083E+02	.5614562E-01
9	.1201555E+03	.1912334E+02	.5229213E-01
10	.1445141E+03	.2300013E+02	.4347802E-01

SOLUTION TIME LOG (sec)
INPUT PHASE..... 1
ASSEMBLAGE OF THE STIFFNESS MATRIX ...
... 0
ASSEMBLAGE OF THE MASS MATRIX.....
0
DECOMPOSITION OF THE STIFFNESS MATRIX
..... 0
EIGENVALUE SOLUTION..... 0
OUTPUT PHASE..... 0
TOTAL SOLUTION TIME..... 1

ESFUERZOS EN ELEMENTOS

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1508.5

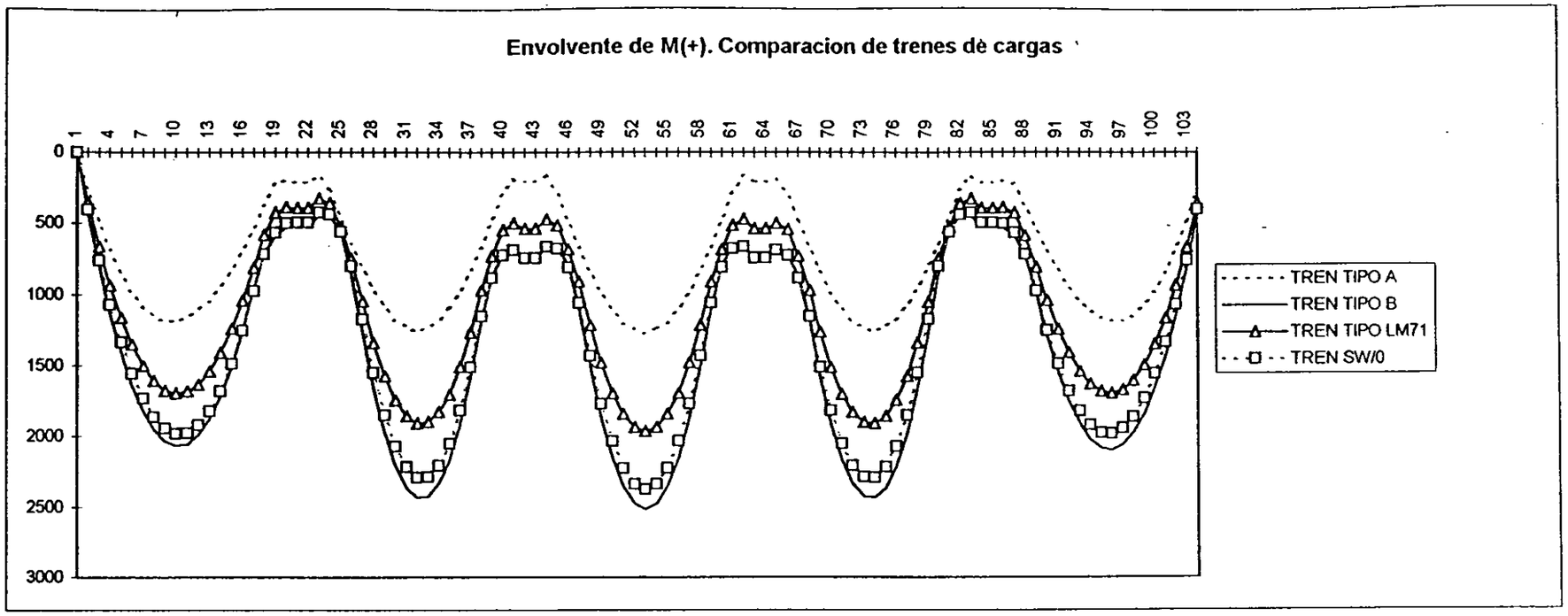
VANO	SECC.	PESO PROPIO		CARGA MUERTA		GRADIENTE TERMICO		TREN TIPO A								TREN TIPO B								TREN TIPO LM71								TREN TIPO SW/0							
								M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc	
		M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q
		(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)	(m.t.)	(t.)
1	1	0	289	0	105	0	48	0	9	0	-2	0	244	0	-32	0	320	0	-70	0	383	0	-82	0	214	0	-47	0	317	0	-60	0	350	0	-76	0	355	0	-77
1	2	319	243	118	91	58	48	261	216	-38	-32	260	217	-38	-32	428	326	-98	-82	405	338	-79	-83	353	259	-72	-60	339	283	-59	-61	402.71	316	-92	-77	382	318	-71	-78
1	3	588	205	218	76	115	48	490	202	-76	-32	487	203	-74	-32	802	286	-196	-82	727	303	-124	-86	665	230	-144	-60	614	256	-96	-63	759.77	278	-184	-77	681	284	-105	-81
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4	15	716	-195	264	-73	1071	9	964	-106	-370	-22	806	54	848	-175	1654	-224	-883	16	322	108	471	-309	1333	-158	-672	5	539	85	542	-253	1546.6	-217	-847	26	380	106	338	-298
4	16	374	-245	137	-91	1085	9	808	-117	-405	-22	605	38	746	-194	1258	-289	-858	16	305	97	202	-353	1047	-221	-663	5	429	71	317	-284	1172.3	-267	-808	26	343	95	38	-336
4	17	-44	-295	-19	-110	1098	9	643	-131	-442	-26	29	31	531	-204	850	-213	-905	-98	295	89	-213	-395	744	-153	-703	-71	201	65	24	-316	800.42	-189	-846	-100	314	86	-352	-376
4	18	-540	-345	-204	-129	1111	9	455	-62	-484	-29	73	30	373	-222	553	-161	-1142	-217	313	83	-748	-443	521	-136	-870	-151	222	61	-373	-346	561.57	-109	-1093	-230	316	79	-839	-418
4	19	-1114	-395	-417	-147	1124	9	265	-149	-532	-32	118	30	114	-231	441	-36	-1552	-311	355	79	-1367	-489	359	-80	-1153	-214	258	58	-806	-380	436.65	-53	-1530	-333	344	75	-1426	-462

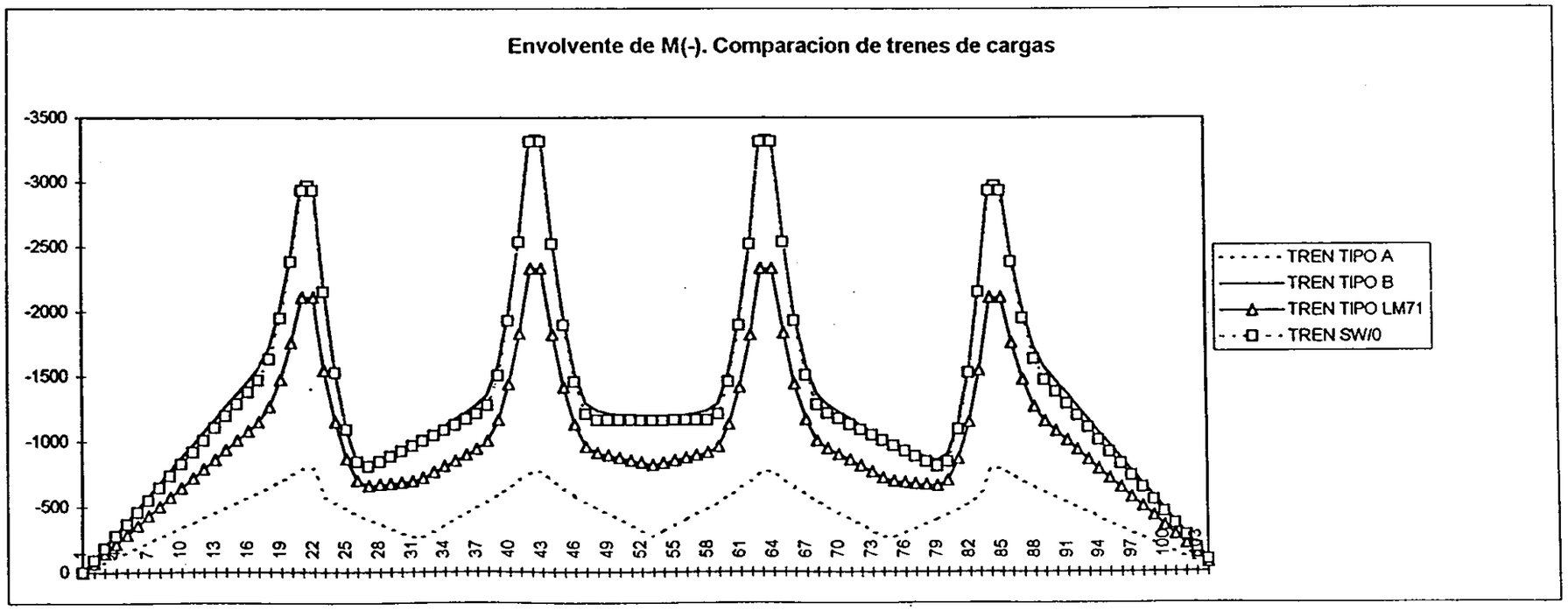
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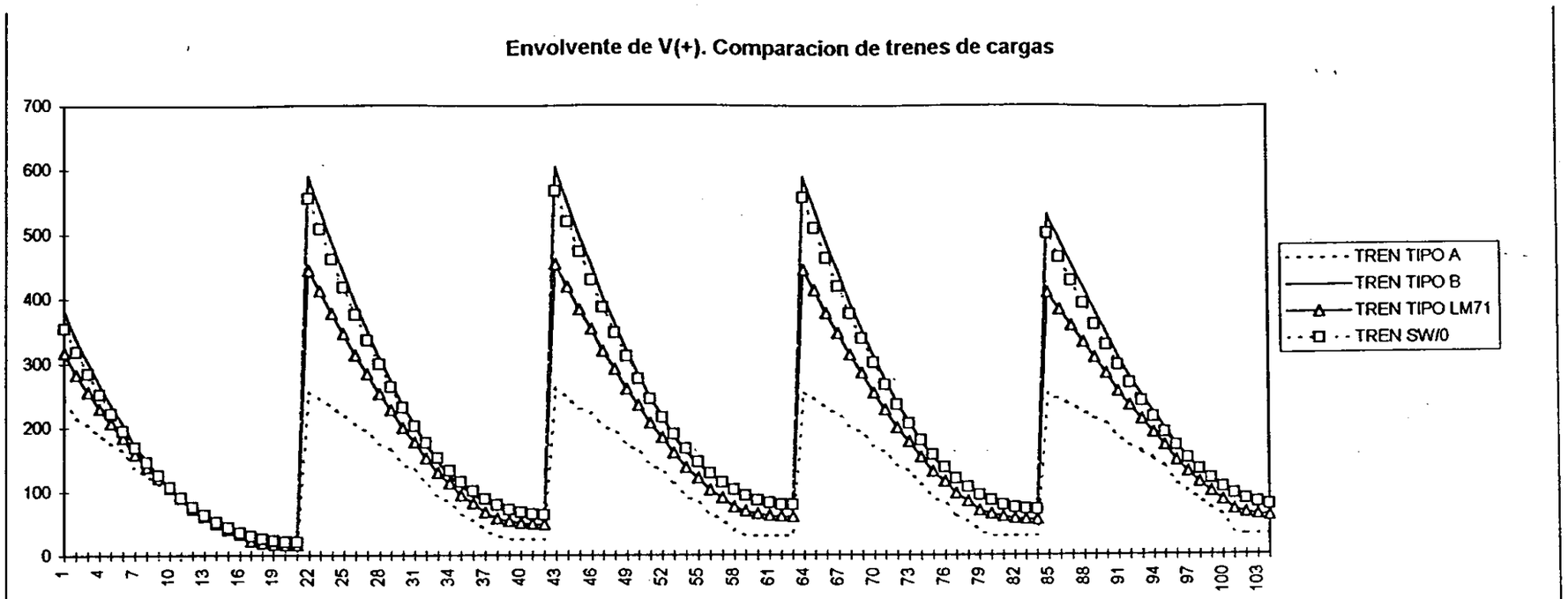
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ESTRUCTURA: E-1508.5

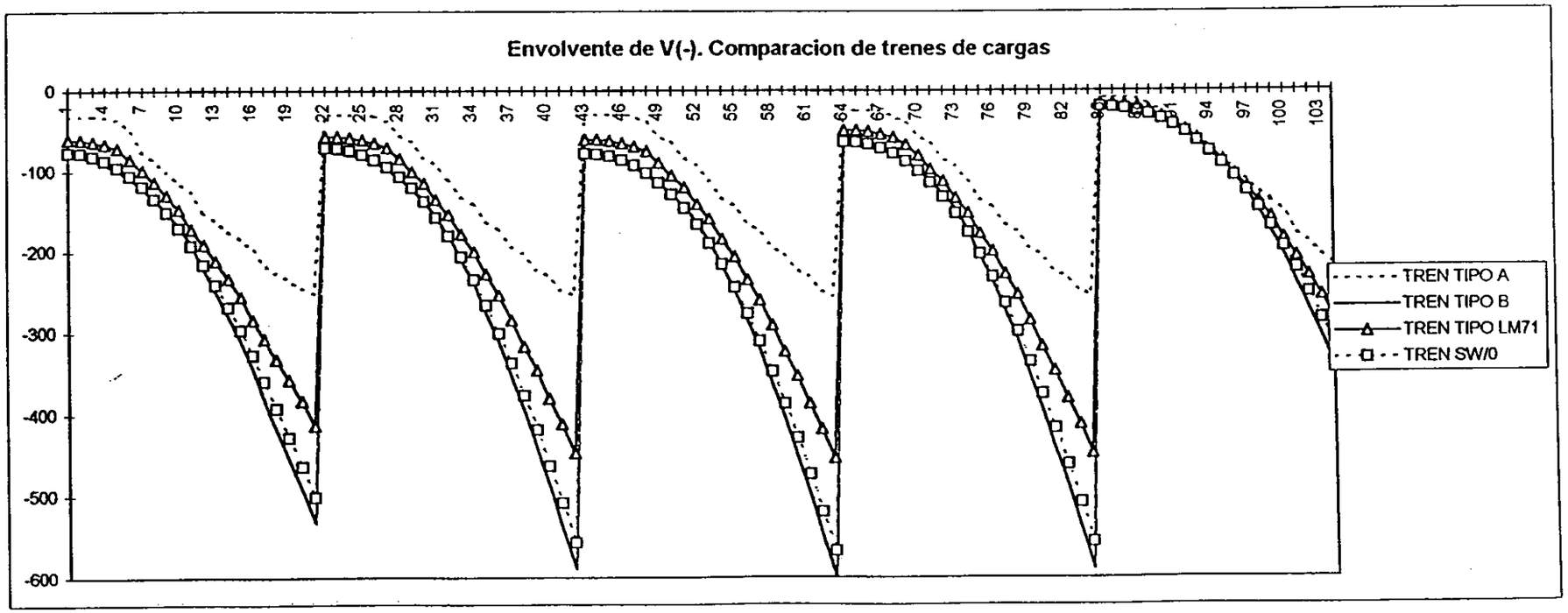
		PESO PROPIO		CARGA MUERTA		GRADIENTE TERMICO		TREN TIPO A								TREN TIPO B								TREN TIPO LM71								TREN TIPO SW/0							
								M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc	
VANO	SECC.	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)	M (m.t.)	Q (t.)
4	20	-1772	-454	-660	-166	1138	9	164	29	-584	-35	163	30	-73	-247	444	35	-2187	-480	426	77	-2116	-541	326	29	-1547	-291	314	57	-1345	-412	421.69	26	-2149	-458	402	72	-2121	-508
4	21	-2528	-522	-931	-184	1151	9	209	30	-793	-173	209	30	-359	-255	528	76	-3009	-577	528	76	-2957	-590	390	56	-2111	-414	390	56	-1915	-447	494.91	71	-2932	-555	495	71	-2923	-556
5	1	-2528	512	-931	183	1151	-48	209	-9	-793	43	-329	252	209	-9	528	-22	-3009	522	-2966	532	528	-22	390	-16	-2111	318	-1929	410	390	-16	494.91	-21	-2932	497	-2924	501	495	-21
5	2	-1945	460	-720	168	1093	-48	200	-8	-742	41	-117	243	199	-9	525	10	-2442	435	-2355	494	512	-22	387	5	-1760	273	-1494	384	378	-17	496.61	15	-2384	425	-2358	464	482	-21
5	3	-1421	414	-527	154	1036	-48	219	152	-695	38	87	235	190	-9	582	67	-2024	308	-1812	456	517	-24	423	44	-1476	212	-1103	358	379	-18	563.01	77	-1946	325	-1860	428	492	-23
5	4	-947	375	-351	140	978	-48	377	67	-651	35	282	225	206	-10	717	158	-1727	185	-1372	419	541	-27	582	151	-1270	130	-757	333	394	-19	714.58	176	-1634	190	-1428	393	523	-26
5	5	-520	337	-192	125	921	-48	537	136	-611	32	465	216	325	-17	983	280	-1566	82	-962	383	586	-31	805	194	-1156	60	-456	309	489	-25	971.93	252	-1474	77	-1061	360	575	-30
5	6	-139	298	-50	111	863	-48	690	127	-573	32	632	206	438	-24	1287	242	-1468	82	-617	349	645	-36	1037	192	-1083	60	-199	285	580	-32	1252.3	215	-1382	77	-754	328	643	-36
5	7	195	259	74	96	806	-48	827	117	-534	32	700	185	680	-40	1545	187	-1371	82	-361	310	715	-43	1240	164	-1011	60	-21	257	674	-40	1487.5	178	-1290	77	-508	297	724	-43
5	8	483	221	181	82	748	-48	949	106	-496	32	827	174	772	-49	1751	148	-1273	82	-133	279	793	-51	1408	137	-939	60	149	234	770	-49	1677.3	140	-1198	77	-314	268	813	-52
5	9	725	182	271	68	691	-48	1044	11	-458	32	933	162	850	-59	1910	117	-1175	82	19	250	874	-61	1539	80	-867	60	280	212	862	-60	1821.7	101	-1106	77	-169	241	906	-63
5	10	920	143	343	53	633	-48	1109	-1	-420	32	1016	150	914	-69	2021	76	-1077	82	119	224	956	-72	1628	52	-795	60	373	192	1005	-76	1920.5	63	-1013	77	-69	216	1000	-76
5	11	1069	105	398	39	575	-48	1160	59	-382	32	1074	138	958	-80	2081	38	-979	82	175	199	1029	-86	1680	24	-722	60	432	172	1075	-90	1973.7	25	-921	77	-7	192	1084	-90
5	12	1171	66	436	24	518	-48	1187	47	-344	32	984	113	1096	-101	2095	-16	-881	82	170	173	1145	-106	1694	1	-650	60	404	148	1127	-104	1981.6	-12	-829	77	19	171	1155	-107
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5	15	1200	-50	446	-19	345	-48	1079	-76	-229	32	881	75	991	-138	1838	-126	-587	82	-101	120	1366	-175	1496	-114	-433	60	316	100	1134	-157	1731.5	-127	-553	77	-23	119	1218	-169
5	16	1117	-89	415	-33	288	-48	987	-78	-191	32	788	61	904	-151	1652	-166	-489	82	-118	108	1296	-203	1350	-142	-361	60	249	86	1102	-184	1557.1	-165	-461	77	-55	106	1167	-195
5	17	987	-127	367	-48	230	-48	852	-174	-153	32	464	35	844	-176	1423	-220	-392	82	-144	99	1175	-238	1164	-171	-289	60	-123	72	988	-206	1337	-202	-369	77	-97	95	1065	-222
5	18	811	-166	301	-62	173	-48	687	-188	-115	32	-110	32	682	-189	1140	-260	-294	82	-143	91	989	-271	937	-200	-217	60	-116	67	826	-230	1071.2	-240	-276	77	-111	87	906	-252
5	19	588	-205	218	-76	115	-48	490	-202	-76	32	-74	32	487	-203	810	-290	-196	82	-124	86	732	-305	668	-229	-144	60	-96	63	611	-255	759.9	-278	-184	77	-105	81	681	-284
5	20	319	-243	118	-91	58	-48	261	-216	-38	32	-38	32	260	-217	432	-329	-98	82	-79	83	409	-341	358	-257	-72	60	-59	61	338	-281	402.9	-316	-92	77	-71	78	381	-318
5	21	0	-289.04	0	-105.2	0	-47.953	0	-10.135	0	-0.4595	0	31.801	0	-231.17	0	-354.79	0	17.448	0	81.577	0	-380.01	0	-231	0	-10	0	60	0	-316	0	-348	0	71	0	77	0	-355

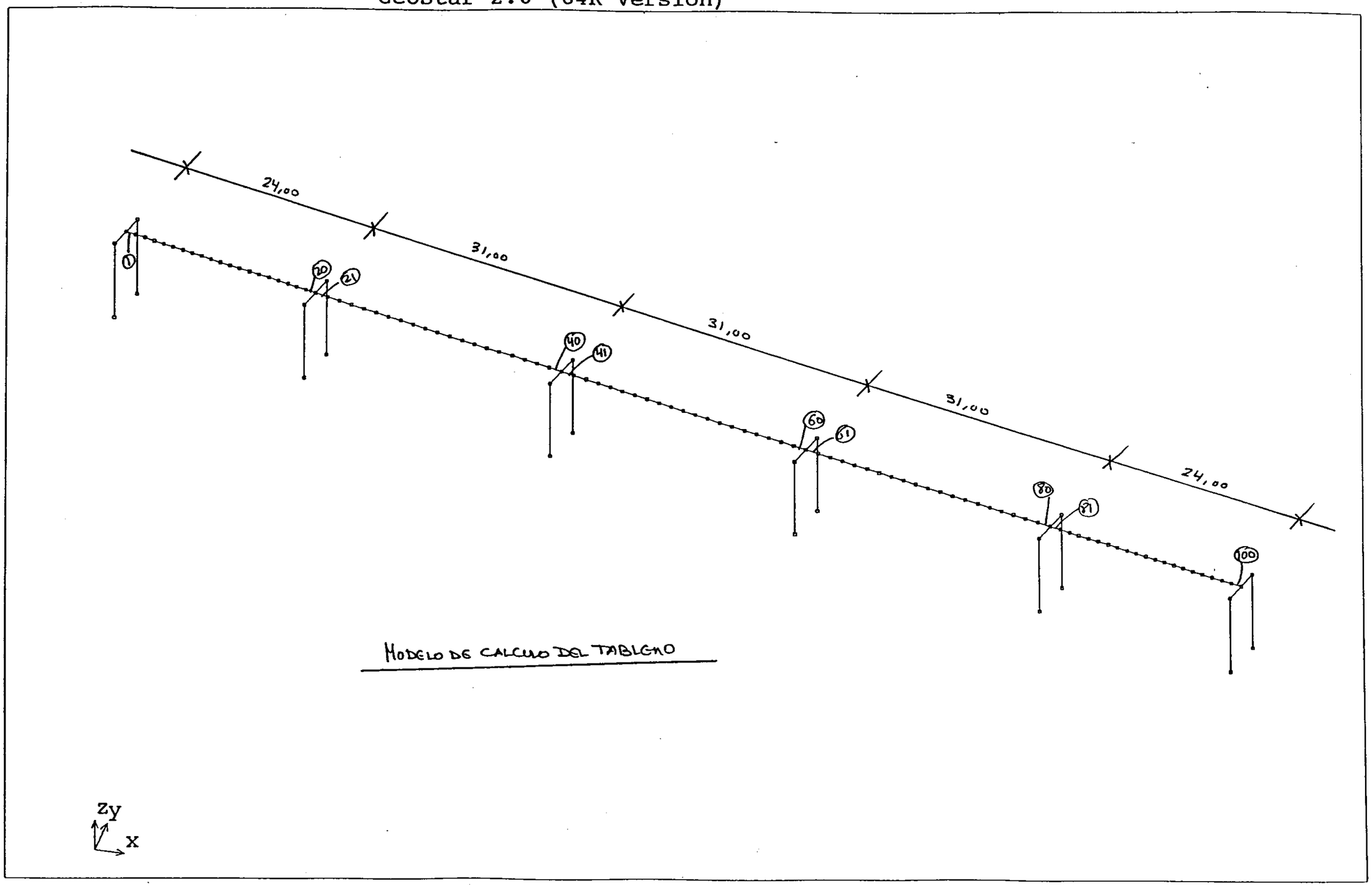
Graficos


Envolvente de M(+). Comparacion de trenes de cargas
0
500
1000
1500
2000
2500
3000
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88 91 94 97 100 103
TREN TIPO A
TREN TIPO B
TREN TIPO LM71
TREN SW/0


Envolvente de M(-). Comparacion de trenes de cargas
-3500
-3000
-2500
-2000
-1500
-1000
-500
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88 91 94 97 100 103
TREN TIPO A
TREN TIPO B
TREN TIPO LM71
TREN SW/0


Envolvente de V(+). Comparacion de trenes de cargas
700
600
500
400
300
200
100
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88 91 94 97 100 103
TREN TIPO A
TREN TIPO B
TREN TIPO LM71
TREN SW/0


Envolvente de V(-). Comparacion de trenes de cargas
0
-100
-200
-300
-400
-500
-600
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88 91 94 97 100 103
TREN TIPO A
TREN TIPO B
TREN TIPO LM71
TREN SW/0



MODELO DE CALCULO DEL TABLERO

Se realizarán las siguientes comprobaciones:

a) Durante las fases constructivas

Combinacion: $PP + \begin{pmatrix} 0,9 \\ 1,1 \end{pmatrix} Pret + SC, constructiva$

Condiciones $\sigma_{max} = f_{ck}/1,60 = 2500\ t/m^2$

$\sigma_{min} = f_{ctk} = -244\ t/m^2$

b) En las fases finales:

Combinacion frecuente:

$$PP + CM + \begin{pmatrix} 0,9 \\ 1,1 \end{pmatrix} Pret + 0,60\ SC + 0,5\ Sob$$

Condicion: $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = 0$

Combinacion rara:

$$PP + CM + \begin{pmatrix} 0,9 \\ 1,1 \end{pmatrix} x\ Pret + SC + 0,6\ \sigma_{sob}.$$

Condicions $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = f_{ctk}$

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:fam-1.LIS

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 2

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=1
Parametros del tramo:
S0= 0.000 S1= 10.250 S2= 0.000 S3= 10.250 S4= 3.500 SR= 0.000
H1= 0.880 H2= 1.500 H3= 1.500 H4= 0.700

Tipo de cableado(1-2-3-4) para tramo nº2 TIPO=2
Parametros del tramo:
S0= 0.000 S1= 1.000 S2= 0.500 S3= 3.900 S4= 3.900 SR= 0.000
H1= 1.500 H2= 1.440 H3= 1.410 H4= 0.700

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...1
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1
Anclaje desde el que se tesa primero..(1=IZDO.)(2=DCHO.)...1

Fuerza de tesado inicial P0(ton)= 7908.0
Fuerza de tesado final P1(ton)= 7416.0
Area del cable (cm2)=520.799988
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 60.00
Las perdidas por acortamiento elástico serán= 1.25%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=7

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	10.250000	-0.005901	0.120976	0.880000
2	10.250000	20.500000	-0.005676	0.116364	0.903636
3	20.500000	24.000000	0.016623	-0.797922	10.275065
4	24.000000	27.900000	0.019494	-0.935700	11.928398
5	27.900000	31.799999	-0.011801	0.810570	-12.432068
6	31.799999	32.299999	0.000000	0.060000	-0.498006
7	32.299999	33.299999	-0.000000	0.060016	-0.498254

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	10.250000	0.000000	0.120391
2	10.250000	20.500000	0.120391	0.236233
3	20.500000	24.000000	0.236233	0.352076
4	24.000000	27.900000	0.352076	0.502971
5	27.900000	31.799999	0.502971	0.593938
6	31.799999	32.299999	0.593938	0.593938
7	32.299999	33.299999	0.593938	0.593939

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	10.250000	0.593939	0.473548
2	10.250000	20.500000	0.473548	0.357706
3	20.500000	24.000000	0.357706	0.241863
4	24.000000	27.900000	0.241863	0.090968
5	27.900000	31.799999	0.090968	0.000000
6	31.799999	32.299999	0.000000	0.000000
7	32.299999	33.299999	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por izda. a_izda= 5.000(mm.)
Penetracion por retesado por izda. retesado _izda= 2.115(mm.)
Penetracion de cuñas ficticia por izda. a_ficticia_izda= 7.115(mm.)

Alcance de penetracion de cuñas+retesado por izda. x= 15.891(m.) perdidas= 5.684%

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 1.834(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 6.834(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 22.842(m.) perdidas= 6.940%

Punto de interseccion de curvas de perdidas x= 21.463(m.) perdidas= 7.989%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	10.250000	12.6	8.9	6910.1	7206.4
2	10.250000	15.890625	8.9	6.9	7206.4	7359.6
3	15.890625	20.500000	6.9	8.5	7359.6	7234.4
4	20.500000	21.462572	8.5	9.2	7234.4	7177.3
5	21.462572	22.841732	9.2	8.2	7177.3	7260.2
6	22.841732	24.000000	8.2	9.1	7260.2	7190.6
7	24.000000	27.900000	9.1	12.6	7190.6	6913.6
8	27.900000	31.799999	12.6	14.9	6913.6	6726.3
9	31.799999	32.299999	14.9	15.0	6726.3	6721.3
10	32.299999	33.299999	15.0	15.1	6721.3	6711.4

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 247.846
Alargamiento por la dcha.(mm.)= 8.440
ALARGAMIENTO TOTAL(mm.)= 256.286

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	10.250000	79.798	85.054
2	10.250000	15.890625	81.811	83.038
3	15.890625	20.500000	83.038	80.489

4	20.500000	21.462572	-235.717	-236.097
5	21.462572	22.841732	-236.097	-240.843
6	22.841732	24.000000	-240.843	-239.063
7	24.000000	27.900000	-280.342	-260.460
8	27.900000	31.799999	157.681	157.907
9	31.799999	32.299999	0.000	0.000
10	32.299999	33.299999	0.003	0.003

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion		Componente Vertical	Componente Longitudinal
x=	0.000	-829.898	6860.046
x=	33.300	401.958	-6699.334

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:fam-2.LIS

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 2

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=1
Parametros del tramo:
S0= 0.000 S1= 1.000 S2= 0.500 S3= 16.700 S4= 3.500 SR= 0.000
H1= 1.500 H2= 1.560 H3= 1.590 H4= 0.700

Tipo de cableado(1-2-3-4) para tramo nº2 TIPO=2
Parametros del tramo:
S0= 0.000 S1= 1.000 S2= 0.500 S3= 3.900 S4= 3.900 SR= 0.000
H1= 1.500 H2= 1.440 H3= 1.410 H4= 0.700

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...2
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1

Fuerza de tesado inicial P0(ton)= 7908.0
Fuerza de tesado final P1(ton)= 7416.0
Area del cable (cm2)=520.799988
Coef.rozamiento cable-vaina NU=0.210000
Coef.rozamientos parasitos (K/NU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 60.00
Las perdidas por acortamiento elástico serán= 1.25%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=8

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	1.000000	0.000000	0.060000	1.500000
2	1.000000	1.500000	0.000000	0.060000	1.500000
3	1.500000	18.200001	-0.005920	0.077760	1.486680
4	18.200001	21.700001	0.019675	-0.853882	9.964622
5	21.700001	25.600000	0.019494	-0.846029	9.879410
6	25.600000	29.500000	-0.011801	0.756284	-10.630187
7	29.500000	30.000000	0.000000	0.060000	-0.360005
8	30.000000	31.000000	-0.000000	0.060014	-0.360220

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	1.000000	0.000000	0.000000
2	1.000000	1.500000	0.000000	0.000000
3	1.500000	18.200001	0.000000	0.196791
4	18.200001	21.700001	0.196791	0.333653
5	21.700001	25.600000	0.333653	0.484548
6	25.600000	29.500000	0.484548	0.575515
7	29.500000	30.000000	0.575515	0.575515
8	30.000000	31.000000	0.575515	0.575516

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	1.000000	0.575516	0.575515
2	1.000000	1.500000	0.575515	0.575515
3	1.500000	18.200001	0.575515	0.378725
4	18.200001	21.700001	0.378725	0.241863
5	21.700001	25.600000	0.241863	0.090968
6	25.600000	29.500000	0.090968	0.000000
7	29.500000	30.000000	0.000000	0.000000
8	30.000000	31.000000	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 1.834(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 6.834(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 20.686(m.) perdidas= 6.947%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	1.000000	16.0	15.9	6640.4	6648.8
2	1.000000	1.500000	15.9	15.9	6648.8	6653.1
3	1.500000	18.200001	15.9	10.4	6653.1	7087.6
4	18.200001	20.686331	10.4	8.2	7087.6	7259.7
5	20.686331	21.700001	8.2	9.1	7259.7	7189.5
6	21.700001	25.600000	9.1	12.6	7189.5	6912.6
7	25.600000	29.500000	12.6	15.0	6912.6	6725.3
8	29.500000	30.000000	15.0	15.0	6725.3	6720.3
9	30.000000	31.000000	15.0	15.1	6720.3	6710.4

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 226.235
ALARGAMIENTO TOTAL(mm.)= 226.235

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	q1	q2
1	0.000000	1.000000	-0.003	-0.003
2	1.000000	1.500000	0.000	0.000
3	1.500000	18.200001	78.347	81.583
4	18.200001	20.686331	-271.143	-284.985
5	20.686331	21.700001	-284.985	-282.904
6	21.700001	25.600000	-280.302	-260.422
7	25.600000	29.500000	157.658	157.882
8	29.500000	30.000000	0.000	0.000
9	30.000000	31.000000	0.003	0.003

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	-397.704	6628.431
x= 31.000	401.897	-6698.310

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:fam-3.LIS

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 2

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=1
Parametros del tramo:
S0= 0.000 S1= 1.000 S2= 0.500 S3= 16.700 S4= 3.500 SR= 0.000
H1= 1.500 H2= 1.560 H3= 1.590 H4= 0.700

Tipo de cableado(1-2-3-4) para tramo nº2 TIPO=2
Parametros del tramo:
S0= 0.000 S1= 1.000 S2= 0.500 S3= 2.850 S4= 2.850 SR= 0.000
H1= 1.300 H2= 1.260 H3= 1.240 H4= 0.700

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...2
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1

Fuerza de tesado inicial P0(ton)= 7908.0
Fuerza de tesado final P1(ton)= 7416.0
Area del cable (cm2)=520.799988
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 60.00
Las perdidas por acortamiento elástico serán= 1.25%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=8

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	1.000000	0.000000	0.060000	1.500000
2	1.000000	1.500000	0.000000	0.060000	1.500000
3	1.500000	18.200001	-0.005920	0.077760	1.486680
4	18.200001	21.700001	0.019675	-0.853882	9.964622
5	21.700001	24.550001	0.029732	-1.290378	14.700606
6	24.550001	27.400002	-0.022715	1.284765	-16.909277
7	27.400002	27.900002	0.000000	0.040000	0.144001
8	27.900002	28.900002	0.000000	0.040000	0.144001

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	1.000000	0.000000	0.000000
2	1.000000	1.500000	0.000000	0.000000
3	1.500000	18.200001	0.000000	0.196791
4	18.200001	21.700001	0.196791	0.333653
5	21.700001	24.550001	0.333653	0.501531
6	24.550001	27.400002	0.501531	0.629431
7	27.400002	27.900002	0.629431	0.629431
8	27.900002	28.900002	0.629431	0.629431

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	1.000000	0.629431	0.629431
2	1.000000	1.500000	0.629431	0.629431
3	1.500000	18.200001	0.629431	0.432641
4	18.200001	21.700001	0.432641	0.295779
5	21.700001	24.550001	0.295779	0.127900
6	24.550001	27.400002	0.127900	0.000000
7	27.400002	27.900002	0.000000	0.000000
8	27.900002	28.900002	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 1.373(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 6.373(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 20.290(m.) perdidas= 8.094%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	1.000000	16.8	16.7	6582.1	6590.6
2	1.000000	1.500000	16.7	16.6	6590.6	6594.8
3	1.500000	18.200001	16.6	11.2	6594.8	7025.5
4	18.200001	20.289988	11.2	9.3	7025.5	7168.9
5	20.289988	21.700001	9.3	10.6	7168.9	7072.2
6	21.700001	24.550001	10.6	14.3	7072.2	6780.5
7	24.550001	27.400002	14.3	17.3	6780.5	6543.8
8	27.400002	27.900002	17.3	17.3	6543.8	6538.8
9	27.900002	28.900002	17.3	17.4	6538.8	6528.8

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 208.366
ALARGAMIENTO TOTAL(mm.)= 208.366

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	q1	q2
1	0.000000	1.000000	-0.003	-0.003
2	1.000000	1.500000	0.000	0.000
3	1.500000	18.200001	77.660	80.869
4	18.200001	20.289988	-268.768	-280.796
5	20.289988	21.700001	-280.796	-278.287
6	21.700001	24.550001	-420.544	-386.430
7	24.550001	27.400002	295.223	296.567
8	27.400002	27.900002	0.000	0.000
9	27.900002	28.900002	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	-394.217	6570.317
x= 28.900	260.944	-6523.612

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:f
REFERENCIA CABLE:fam-4.LIS

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 1

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=6
Parametros del tramo:
S1= 0.000 S2= 15.300 S3= 1.500 SR= 0.000
H1= 0.880 H2= 1.360 H3= 1.300

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...2
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1

Fuerza de tesado inicial P0(ton)= 7908.0
Fuerza de tesado final P1(ton)= 7416.0
Area del cable (cm2)=520.799988
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 60.00
Las perdidas por acortamiento elástico serán= 1.25%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=2

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	1.500000	0.000000	0.040000	1.300000
2	1.500000	16.799999	-0.004665	0.053995	1.289504

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	1.500000	0.000000	0.000000
2	1.500000	16.799999	0.000000	0.142365

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	1.500000	0.142365	0.142365
2	1.500000	16.799999	0.142365	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 2.466(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 7.466(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 0.000(m.) perdidas= 5.402%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	1.500000	7.1	7.3	7348.4	7334.2
2	1.500000	16.799999	7.3	12.1	7334.2	6954.7

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 130.742
ALARGAMIENTO TOTAL(mm.)= 130.742

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	1.500000	0.000	0.000
2	1.500000	16.799999	68.262	63.871

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	-293.700	7342.504
x= 16.800	-710.819	-6918.273

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-5.LIS

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...1
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1
Anclaje desde el que se tesa primero..(1=IZDO.)(2=DCHO.)...1

Fuerza de tesado inicial P0(ton)= 1528.0
Fuerza de tesado final P1(ton)= 1432.0
Area del cable (cm2)=100.800003
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 60.00
Las perdidas por acortamiento elástico serán= 1.25%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=1

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	33.299999	0.000000	0.000000	0.250000

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	33.299999	0.000000	0.000000

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	33.299999	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por izda. a_izda= 5.000(mm.)
Penetracion por retesado por izda. retesado _izda= 6.380(mm.)
Penetracion de cuñas ficticia por izda. a_ficticia_izda= 11.380(mm.)

Alcance de penetracion de cuñas+retesado por izda. x= 33.300(m.) perdidas= 4.196%

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 6.380(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 11.380(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 0.000(m.) perdidas= 4.196%

Punto de interseccion de curvas de perdidas x= 16.650(m.) perdidas= 6.338%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	16.650000	9.6	7.6	1380.6	1412.0
2	16.650000	33.299999	7.6	9.6	1412.0	1380.6

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 260.218
Alargamiento por la dcha.(mm.)= 8.651
ALARGAMIENTO TOTAL(mm.)= 268.870

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	16.650000	0.000	0.000
2	16.650000	33.299999	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	0.000	1380.641
x= 33.300	0.000	-1380.641

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-6.LIS

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...2
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1

Fuerza de tesado inicial P0(ton)= 1528.0
Fuerza de tesado final P1(ton)= 1432.0
Area del cable (cm2)=100.800034
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 60.00
Las perdidas por acortamiento elástico serán= 1.25%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=1

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	31.000000	0.000000	0.000000	0.250000

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	31.000000	0.000000	0.000000

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	31.000000	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 6.371(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 11.371(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 0.000(m.) perdidas= 4.214%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	31.000000	5.8	9.7	1438.6	1380.1

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 242.589
ALARGAMIENTO TOTAL(mm.)= 242.589

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	31.000000	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	0.000	1438.627
x= 31.000	0.000	-1380.094

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-7.LIS

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...2
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1

Fuerza de tesado inicial P0(ton)= 1528.0
Fuerza de tesado final P1(ton)= 1432.0
Area del cable (cm2)=100.800034
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,](kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 60.00
Las perdidas por acortamiento elástico serán= 1.25%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=1

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	28.900000	0.000000	0.000000	0.250000

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	28.900000	0.000000	0.000000

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	28.900000	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 6.363(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 11.363(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 0.000(m.) perdidas= 4.252%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	28.900000	6.2	9.8	1433.6	1378.9

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 226.450
ALARGAMIENTO TOTAL(mm.)= 226.450

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	28.900000	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	0.000	1433.578
x= 28.900	0.000	-1378.938

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	28.900000	6.2	9.8	1433.6	1378.9

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 226.450
ALARGAMIENTO TOTAL(mm.)= 226.450

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	q1	q2
1	0.000000	28.900000	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	0.000	1433.578
x= 28.900	0.000	-1378.938

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GIMPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-8.LIS

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...2
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1

Fuerza de tesado inicial P0(ton)= 1528.0
Fuerza de tesado final P1(ton)= 1432.0
Area del cable (cm2)=100.800003
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 60.00
Las perdidas por acortamiento elástico serán= 1.25%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=1

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	16.799999	0.000000	0.000000	0.250000

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	16.799999	0.000000	0.000000

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	16.799999	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 5.614(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 10.614(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 0.000(m.) perdidas= 5.007%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	16.799999	9.2	11.3	1387.9	1355.9

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 132.631
ALARGAMIENTO TOTAL(mm.)= 132.631

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	16.799999	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	0.000	1387.885
x= 16.800	0.000	-1355.880

PUENTES CONSTRUIDOS POR FASES: Datos previos.

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1508.5

Datos necesarios para la generación del modelo:

Directorio de los archivos "GEO" que se generarán :	g:\MAZAX\VE-1508.5\TABLERO\PRETENSA\PRET-10-BUENO
Directorio de ejecución del COSMOS (donde se encuentran los listados) :	g:\MAZAX\VE-1508.5\TABLERO\PRETENSA\PRET-10-BUENO
Directorio con los datos de replanteo (salidas del REPLOSA) :	G:\MAZAX\VE-1508.5\TABLERO\PRETENSA
Camino + nombre del archivo "GENER.XLS" (con extensión) :	G:\MAZAX\VE-1508.5\TABLERO\PRETENSA\GENERZF1.XLS
Camino + nombre del archivo "SALIDA" para envolvente de SC :	
Directorio donde se ejecutaran los calculos de pilas posteriores :	

Valor del los prefijos a restar a las coordenadas X-Y para obtener número mas manejables:

Xo=	670000
Yo=	4500000

Número de vanos:	5	(el máximo de vanos posible es 20)
Número de punto del replanteo que genera el eje del tablero:	2	
Número de FASES de construccion del tablero:	5	(el máximo es el número de vanos)

(nota: dejar vacias las celdas que no tengan valores)
(*)(número de izquierda a derecha en sentido de avance del p.k.)

DEFINICION DE APOYOS DEL TABLERO

Linea de apoyos N	Número de apoyos de la line	N° del punto de replanteo que corresponde a cada apoyo(*)	
1	2	1	3
2	2	1	3
3	2	1	3
4	2	1	3
5	2	1	3
6	2	1	3
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

DEFINICION DE FASES CONTRUCTIVAS

Extremo de comienzo de la construccion de fases	
Comienzo=1 , se empieza por en E-1	
Comienzo=2 , se empieza por en E-2	
Comienzo =	1

Fase N°	Fin de cada Fase	
	Vano N°	Seccion N°
1	2	7
2	3	7
3	4	7
4	5	7
5	5	21
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Datos de combinacion de hipotesis de pretensado:

	Acciones					
Combinacion	PP	Pret	CM	SC(+)	SC(-)	Grad
1	1.00	0.90	1.00	0.60	0.00	0.50
2	1.00	1.10	1.00	0.60	0.00	0.50
3	1.00	0.90	1.00	0.00	0.60	0.00
4	1.00	1.10	1.00	0.00	0.60	0.00
5	1.00	0.90	1.00	1.00	0.00	0.60
6	1.00	1.10	1.00	1.00	0.00	0.60
7	1.00	0.90	1.00	0.00	1.00	0.00
8	1.00	1.10	1.00	0.00	1.00	0.00

PUENTES CONSTRUIDOS POR FASES: Acciones

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1508.5

Datos de las acciones actuantes sobre los modelos:

Cargas permanentes

Peso especifico del hormigón:	2.50	(t/m3)
Carga muerta (barrera+aceras+pavimento)	12.00	(t/m)

Sobrecarga repartida

Valor de la sobrecarga uniforme durante la construcción	0.10	(t/m2)
Valor de la sobrecarga uniforme de trafico		(t/m2)
Ancho de tablero donde puede actuar la sobrecarg:	14.00	(m.)

Vehiculo pesado

Peso del carro		(t.)
Momento torsor debido al carro		(m.t)

TRENTIPO B

Gradiente Térmico

Gradiente termico a considerar	5.00	(ºC)

Pretensado

Camino de los ficheros de familias:
G:\MAZAXVIE-1508.5\TABLERO\PRETENSA\PRET-10-BUENO

Introduzca para cada fase constructiva el nombre de los ficheros "*.LIS" creados por el programa "CABLE.EXE"
No hay que poner la extension de los ficheros (el programa busca archivos LIS). El máximo número de caracteres es 8.

FAMILIA Nº	Nombre del archivo	Fase de comienzo actuacion de la familia	Situacion del Extremo dorsal del cable	
			Vano	Seccion
1	FAM-1	1	1	1
2	FAM-2	2	2	7
3	FAM-2	3	3	7
4	FAM-3	4	4	7
5	FAM-4	5	5	7
6	FAM-5	1	1	1
7	FAM-6	2	2	7
8	FAM-5	3	3	7
9	FAM-7	4	4	7
10	FAM-8	5	5	7
11				
12				
13				
14				
15				
16				
17				
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40				

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES	Fase nº: 1
PROYECTO : L.A.V. MADRID-ZARAGOZA	
ESTRUCTURA: E-1508.5	

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	1185	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1448	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	1185	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1448	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	-0.3	334.8	0.0	0.0	14.3	8291.0	1111.0	-835.9	0.0	-0.3	334.8	8291.0	1111.0	-835.9	584.5	244.1	714.4	298.4	584.5	244.1	714.4	298.4
1	2	0.0	374.2	289.2	0.0	16.1	12.6	8291.0	166.4	-738.0	0.0	374.2	289.2	8291.0	166.4	-738.0	667.9	467.1	802.2	588.7	670.7	463.7	805.0	585.2
1	3	0.0	698.2	250.5	0.0	30.2	10.9	8291.0	-838.3	-640.2	0.0	698.2	250.5	8291.0	-838.3	-640.2	569.2	590.8	669.4	755.2	574.4	584.4	674.5	748.7
1	4	0.0	975.5	211.9	0.0	42.3	9.2	8291.0	-1547.0	-542.3	0.0	975.5	211.9	8291.0	-1547.0	-542.3	507.9	667.7	583.9	862.2	515.1	658.6	591.1	853.2
1	5	0.0	1207.0	173.2	0.0	52.4	7.6	8291.0	-2140.0	-444.5	0.0	1207.0	173.2	8291.0	-2140.0	-444.5	456.5	732.1	512.3	951.9	465.4	720.9	521.2	940.8
1	6	0.0	1391.0	134.5	0.0	60.5	5.9	8291.0	-2614.0	-346.6	0.0	1391.0	134.5	8291.0	-2614.0	-346.6	415.2	783.8	454.9	1023.9	425.5	770.9	465.2	1011.0
1	7	0.0	1529.0	95.9	0.0	66.5	4.2	8291.0	-2971.0	-248.7	0.0	1529.0	95.9	8291.0	-2971.0	-248.7	384.1	822.9	411.6	1078.1	395.4	808.7	422.9	1064.0
1	8	0.0	1621.0	57.2	0.0	70.5	2.5	8291.0	-3211.0	-150.8	0.0	1621.0	57.2	8291.0	-3211.0	-150.8	363.0	849.3	382.4	1114.8	375.0	834.3	394.4	1099.8
1	9	0.0	1667.0	18.5	0.0	72.5	0.8	8291.0	-3334.0	-53.0	0.0	1667.0	18.5	8291.0	-3334.0	-53.0	352.0	863.1	367.2	1133.8	364.3	847.6	379.5	1118.4
1	10	0.0	1666.0	-20.2	0.0	72.5	-0.8	8291.0	-3339.0	43.7	0.0	1666.0	-20.2	8291.0	-3339.0	43.7	351.0	864.3	366.1	1135.2	363.4	848.8	378.4	1119.8
1	11	0.0	1618.0	-58.9	0.0	70.5	-2.5	8587.0	-3407.0	143.2	0.0	1618.0	-58.9	8587.0	-3407.0	143.2	353.1	908.2	370.4	1186.7	365.1	893.2	382.4	1171.6
1	12	0.0	1525.0	-97.5	0.0	66.5	-4.2	8587.0	-3176.0	241.3	0.0	1525.0	-97.5	8587.0	-3176.0	241.3	372.7	883.7	397.8	1152.3	384.0	869.5	409.1	1138.2
1	13	0.0	1384.0	-136.2	0.0	60.4	-5.9	8587.0	-2827.0	339.5	0.0	1384.0	-136.2	8587.0	-2827.0	339.5	402.1	846.8	439.1	1100.5	412.4	833.9	449.4	1087.7
1	14	0.0	1198.0	-174.8	0.0	52.4	-7.6	8587.0	-2361.0	437.6	0.0	1198.0	-174.8	8587.0	-2361.0	437.6	441.8	797.1	494.7	1030.9	450.7	785.9	503.6	1019.8
1	15	0.0	964.6	-213.5	0.0	42.3	-9.2	8741.0	-1833.0	547.2	0.0	964.6	-213.5	8741.0	-1833.0	547.2	493.7	756.3	566.9	970.0	500.9	747.3	574.1	961.0
1	16	0.0	685.0	-252.2	0.0	30.2	-10.9	8772.0	-1097.0	647.5	0.0	685.0	-252.2	8772.0	-1097.0	647.5	561.0	676.8	659.7	859.7	566.1	670.4	664.9	853.3
1	17	0.0	359.4	-290.9	0.0	16.1	-12.6	8771.0	-260.0	747.7	0.0	359.4	-290.9	8771.0	-260.0	747.7	633.7	585.6	760.9	732.8	636.4	582.2	763.6	729.3
1	18	0.0	-13.0	-329.6	0.0	-0.1	-14.3	8771.0	697.7	848.0	0.0	-13.0	-329.6	8771.0	697.7	848.0	716.9	481.3	876.7	587.6	716.9	481.3	876.7	587.6
1	19	0.0	-431.8	-368.2	0.0	-18.2	-16.0	8646.0	1568.0	577.0	0.0	-431.8	-368.2	8646.0	1568.0	577.0	770.2	394.8	957.7	462.1	767.1	398.7	954.6	466.0
1	20	0.0	-900.9	-413.8	0.0	-38.4	-17.6	8589.0	2262.0	286.5	0.0	-900.9	-413.8	8589.0	2262.0	286.5	621.3	234.8	791.0	250.6	615.2	241.8	784.9	257.5
1	21	0.0	-1429.0	-466.4	0.0	-60.6	-19.3	8672.0	2634.0	-6.4	0.0	-1429.0	-466.4	8672.0	2634.0	-6.4	594.9	274.3	777.4	277.4	585.3	285.3	767.8	288.4
2	1	0.0	-1428.0	326.5	0.0	-60.5	13.0	8602.0	2618.0	-0.4	0.0	-1428.0	326.5	8602.0	2618.0	-0.4	589.2	273.1	770.4	276.0	579.6	284.2	760.8	287.1
2	2	0.0	-974.8	258.7	0.0	-42.0	10.9	8602.0	2281.0	-434.7	0.0	-974.8	258.7	8602.0	2281.0	-434.7	612.9	245.8	783.5	261.0	606.3	253.5	776.8	268.7
2	3	0.0	-619.4	199.8	0.0	-26.9	8.7	8602.0	1086.0	-869.3	0.0	-619.4	199.8	8602.0	1086.0	-869.3	661.4	524.2	831.8	611.4	656.8	530.0	827.2	617.1
2	4	0.0	-348.5	149.9	0.0	-15.1	6.5	8602.0	-656.4	-1061.0	0.0	-348.5	149.9	8602.0	-656.4	-1061.0	440.8	800.7	551.9	962.2	438.2	804.0	549.3	965.4
2	5	0.0	-154.8	99.9	0.0	-6.7	4.3	8325.0	-1841.0	-676.1	0.0	-154.8	99.9	8325.0	-1841.0	-676.1	273.0	967.4	339.5	1175.0	271.9	968.8	338.4	1176.4
2	6	0.0	-38.7	49.9	0.0	-1.7	2.2	8325.0	-2693.0	-423.2	0.0	-38.7	49.9	8325.0	-2693.0	-423.2	162.3	1106.1	199.9	1350.0	162.0	1106.4	199.6	1350.4
2	7	0.0	0.0	0.0	0.0	0.0	0.0	8133.0	-3217.0	-403.9	0.0	0.0	0.0	8133.0	-3217.0	-403.9	75.3	1184.9	92.0	1448.3	75.3	1184.9	92.0	1448.3
2	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Fase-1

ESFUERZOS DE HIPOTESIS SIN ACUMULAR											ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
2	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Fase-1

ESFUERZOS DE HIPOTESIS SIN ACUMULAR											ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
5	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES	Fase nº: 2
PROYECTO : L.A.V. MADRID-ZARAGOZA	
ESTRUCTURA: E-1508.5	

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	1183	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1446	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	1183	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1446	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.1	-52.0	0.0	0.0	11.6	0.0	0.0	65.8	0.0	-0.3	282.8	8291.0	1111.0	-770.1	584.5	244.1	714.4	298.4	584.5	244.1	714.4	298.4
1	2	0.0	-62.4	-52.0	0.0	13.0	10.0	0.0	79.0	65.8	0.0	311.8	237.2	8291.0	245.4	-672.2	669.4	465.3	806.4	583.4	671.6	462.5	808.6	580.7
1	3	0.0	-124.8	-52.0	0.0	23.9	8.3	0.0	158.0	65.8	0.0	573.4	198.5	8291.0	-680.3	-574.4	572.2	587.1	677.7	744.7	576.3	582.0	681.8	739.6
1	4	0.0	-187.2	-52.0	0.0	32.8	6.6	0.0	236.9	65.8	0.0	788.3	159.9	8291.0	-1310.1	-476.5	512.3	662.1	596.4	846.6	517.9	655.1	602.0	839.6
1	5	0.0	-249.6	-52.0	0.0	39.7	4.9	0.0	315.9	65.8	0.0	957.4	121.2	8291.0	-1824.1	-378.7	462.4	724.7	529.0	931.1	469.2	716.2	535.7	922.6
1	6	0.0	-312.0	-52.0	0.0	44.6	3.2	0.0	394.9	65.8	0.0	1079.0	82.5	8291.0	-2219.1	-280.8	422.6	774.5	475.8	997.8	430.2	765.0	483.3	988.3
1	7	0.0	-374.4	-52.0	0.0	47.5	1.6	0.0	473.9	65.8	0.0	1154.6	43.9	8291.0	-2497.1	-182.9	392.9	811.8	436.6	1046.8	401.0	801.6	444.7	1036.7
1	8	0.0	-436.8	-52.0	0.0	48.4	-0.1	0.0	552.9	65.8	0.0	1184.2	5.2	8291.0	-2658.1	-85.0	373.3	836.3	411.5	1078.3	381.5	826.0	419.7	1068.0
1	9	0.0	-499.2	-52.0	0.0	47.2	-1.8	0.0	631.9	65.8	0.0	1167.8	-33.5	8291.0	-2702.1	12.8	363.8	848.3	400.5	1092.1	371.8	838.2	408.5	1082.0
1	10	0.0	-561.6	-52.0	0.0	44.0	-3.5	0.0	710.8	65.8	0.0	1104.4	-72.2	8291.0	-2628.2	109.5	364.3	847.6	403.5	1088.3	371.8	838.2	411.0	1078.9
1	11	0.0	-624.0	-52.0	0.0	38.9	-5.2	0.0	789.8	65.8	0.0	994.0	-110.9	8587.0	-2617.2	209.0	367.9	889.7	412.1	1134.5	374.5	881.4	418.7	1126.2
1	12	0.0	-686.4	-52.0	0.0	31.7	-6.8	0.0	868.8	65.8	0.0	838.6	-149.5	8587.0	-2307.2	307.1	388.9	863.3	443.6	1094.9	394.3	856.6	449.0	1088.2
1	13	0.0	-748.8	-52.0	0.0	22.4	-8.5	0.0	947.8	65.8	0.0	635.2	-188.2	8587.0	-1879.2	405.3	419.8	824.6	489.1	1037.9	423.7	819.8	492.9	1033.1
1	14	0.0	-811.2	-52.0	0.0	11.2	-10.2	0.0	1027.0	65.8	0.0	386.8	-226.8	8587.0	-1334.0	503.4	461.1	772.9	548.9	963.0	463.0	770.6	550.8	960.6
1	15	0.0	-873.6	-52.0	0.0	-2.0	-11.9	0.0	1106.0	65.8	0.0	91.0	-265.5	8741.0	-727.0	613.0	514.4	730.3	625.3	896.9	514.1	730.7	624.9	897.3
1	16	0.0	-936.0	-52.0	0.0	-17.3	-13.6	0.0	1185.0	65.8	0.0	-251.0	-304.2	8772.0	88.0	713.3	583.2	649.0	722.3	781.4	580.2	652.7	719.3	785.0
1	17	0.0	-998.4	-52.0	0.0	-34.6	-15.2	0.0	1264.0	65.8	0.0	-639.0	-342.9	8771.0	1004.0	813.5	657.3	555.9	827.6	649.2	651.5	563.3	821.7	656.6
1	18	0.0	-1061.0	-52.0	0.0	-53.9	-16.9	0.0	1343.0	65.8	0.0	-1074.0	-381.6	8771.0	2040.7	913.8	742.1	449.8	947.6	498.8	732.9	461.3	938.4	510.3
1	19	0.0	-1123.0	-52.0	0.0	-75.2	-18.6	0.0	1422.0	65.8	0.0	-1554.8	-420.2	8646.0	2990.0	642.8	796.9	361.4	1032.7	368.1	784.1	377.4	1019.9	384.1
1	20	0.0	-1186.0	-52.0	0.0	-98.5	-20.3	0.0	1501.0	65.8	0.0	-2086.9	-465.8	8589.0	3763.0	352.3	647.4	204.8	864.7	165.9	631.8	222.7	849.1	183.8
1	21	0.0	-1248.0	-52.0	0.0	-123.9	-22.0	0.0	1580.0	65.8	0.0	-2677.0	-518.4	8672.0	4214.0	59.4	622.5	242.6	855.0	188.2	602.8	265.2	835.4	210.8
2	1	0.0	-1248.0	240.1	0.0	-123.8	23.7	0.0	1580.0	-50.9	0.0	-2676.0	566.6	8602.0	4198.0	-51.4	616.7	241.4	848.0	186.8	597.1	264.0	828.4	209.4
2	2	0.0	-875.9	240.1	0.0	-88.7	21.6	0.0	1501.0	-50.9	0.0	-1850.7	498.8	8602.0	3782.0	-485.6	688.2	159.3	906.3	119.9	674.1	175.5	892.2	136.0
2	3	0.0	-503.8	240.1	0.0	-57.0	19.4	0.0	1422.0	-50.9	0.0	-1123.2	439.9	8602.0	2508.0	-920.2	793.4	358.8	1012.2	385.3	783.7	371.0	1002.5	397.5
2	4	0.0	-131.8	240.1	0.0	-28.6	17.2	0.0	1343.0	-50.9	0.0	-480.3	390.0	8602.0	686.6	-1111.9	623.9	571.2	780.7	675.4	619.1	577.3	775.9	681.5
2	5	0.0	240.3	240.1	0.0	-3.6	15.1	0.0	1264.0	-50.9	0.0	85.5	340.0	8325.0	-577.0	-727.0	507.4	673.7	616.9	827.4	506.8	674.4	616.3	828.2
2	6	0.0	612.5	240.1	0.0	18.1	12.9	0.0	1185.0	-50.9	0.0	573.8	290.0	8325.0	-1508.0	-474.1	447.9	748.2	525.8	941.6	451.0	744.3	528.9	937.8
2	7	0.0	984.5	240.1	0.0	36.4	10.7	0.0	1106.0	-50.9	0.0	984.5	240.1	8133.0	-2111.0	-454.8	412.1	762.9	466.4	979.1	418.3	755.2	472.6	971.3
2	8	0.0	1318.0	190.1	0.0	51.3	8.6	8079.0	-2739.0	-449.2	0.0	1318.0	190.1	8079.0	-2739.0	-449.2	368.9	808.5	401.0	1050.6	377.6	797.6	409.8	1039.7
2	9	0.0	1574.0	140.1	0.0	62.9	6.4	8092.0	-3345.0	-324.1	0.0	1574.0	140.1	8092.0	-3345.0	-324.1	320.6	871.1	332.3	1139.3	331.3	857.7	343.0	1125.9
2	10	0.0	1752.0	90.2	0.0	71.1	4.2	8092.0	-3753.0	-202.0	0.0	1752.0	90.2	8092.0	-3753.0	-202.0	288.4	911.5	286.2	1197.0	300.5	896.3	298.3	1181.8
2	11	0.0	1853.0	40.2	0.0	76.0	2.0	8092.0	-3972.0	-79.9	0.0	1853.0	40.2	8092.0	-3972.0	-79.9	272.0	931.9	262.4	1226.8	285.0	915.7	275.4	1210.6
2	12	0.0	1877.0	-9.7	0.0	77.5	-0.1	8092.0	-4001.0	42.2	0.0	1877.0	-9.7	8092.0	-4001.0	42.2	271.7	932.4	261.1	1228.5	284.9	915.9	274.3	1212.0
2	13	0.0	1823.0	-59.7	0.0	75.6	-2.3	8092.0	-3841.0	164.3	0.0	1823.0	-59.7	8092.0	-3841.0	164.3	287.0	913.2	281.9	1202.5	299.8	897.1	294.7	1186.4

Fase-2

2	14	0.0	1692.0	-109.6	0.0	70.3	-4.5	8092.0	-3492.0	286.4	0.0	1692.0	-109.6	8092.0	-3492.0	286.4	318.1	874.2	324.9	1148.6	330.1	859.2	336.8	1133.6
2	15	0.0	1483.0	-159.6	0.0	61.7	-6.6	8092.0	-2953.0	408.5	0.0	1483.0	-159.6	8092.0	-2953.0	408.5	365.1	815.3	390.2	1066.7	375.6	802.2	400.7	1053.6
2	16	0.0	1197.0	-209.5	0.0	49.7	-8.8	8092.0	-2225.0	530.7	0.0	1197.0	-209.5	8092.0	-2225.0	530.7	427.9	736.6	477.7	957.0	436.4	726.0	486.2	946.4
2	17	0.0	834.0	-259.5	0.0	34.4	-11.0	8092.0	-1309.0	652.7	0.0	834.0	-259.5	8092.0	-1309.0	652.7	506.4	638.3	587.4	819.6	512.2	630.9	593.2	812.3
2	18	0.0	392.9	-309.4	0.0	15.7	-13.2	8092.0	-201.9	774.9	0.0	392.9	-309.4	8092.0	-201.9	774.9	600.8	519.9	719.5	654.1	603.5	516.6	722.2	650.7
2	19	0.0	-125.2	-359.4	0.0	-6.3	-15.3	8092.0	1065.0	842.3	0.0	-125.2	-359.4	8092.0	1065.0	842.3	706.7	387.3	868.4	467.4	705.6	388.7	867.4	468.8
2	20	0.0	-728.2	-418.3	0.0	-31.8	-17.5	8525.0	2173.0	381.1	0.0	-728.2	-418.3	8525.0	2173.0	381.1	632.6	214.7	798.9	232.9	627.6	220.5	793.8	238.7
2	21	0.0	-1429.0	-486.2	0.0	-60.6	-19.7	8697.0	2651.0	-51.3	0.0	-1429.0	-486.2	8697.0	2651.0	-51.3	598.6	272.8	781.9	275.6	589.0	283.8	772.3	286.6
3	1	0.0	-1428.0	326.5	0.0	-60.5	13.0	8627.0	2634.0	0.3	0.0	-1428.0	326.5	8627.0	2634.0	0.3	592.7	271.8	774.7	274.4	583.2	282.8	765.2	285.4
3	2	0.0	-974.8	258.7	0.0	-42.0	10.9	8627.0	2298.0	-434.5	0.0	-974.8	258.7	8627.0	2298.0	-434.5	616.6	244.3	788.0	259.2	610.0	252.0	781.3	266.8
3	3	0.0	-619.4	199.8	0.0	-26.9	8.7	8627.0	1103.0	-869.0	0.0	-619.4	199.8	8627.0	1103.0	-869.0	665.8	522.7	837.1	609.5	661.2	528.4	832.6	615.3
3	4	0.0	-348.3	149.8	0.0	-15.1	6.5	8627.0	-640.4	-1060.0	0.0	-348.3	149.8	8627.0	-640.4	-1060.0	445.0	799.4	557.0	960.5	442.4	802.6	554.5	963.7
3	5	0.0	-154.9	99.9	0.0	-6.7	4.3	8350.0	-1824.0	-676.1	0.0	-154.9	99.9	8350.0	-1824.0	-676.1	277.3	965.9	344.8	1173.2	276.2	967.3	343.7	1174.6
3	6	0.0	-38.7	49.9	0.0	-1.7	2.2	8350.0	-2676.0	-423.1	0.0	-38.7	49.9	8350.0	-2676.0	-423.1	166.7	1104.5	205.2	1348.2	166.4	1104.9	204.9	1348.5
3	7	0.0	0.0	0.0	0.0	0.0	0.0	8158.0	-3200.0	-404.0	0.0	0.0	0.0	8158.0	-3200.0	-404.0	79.6	1183.4	97.3	1446.4	79.6	1183.4	97.3	1446.4
3	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Fase-2

5	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES	Fase nº: 3
PROYECTO : L.A.V. MADRID-ZARAGOZA	
ESTRUCTURA: E-1508.5	

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	1183	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1446	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	1183	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1446	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	14.2	0.0	0.0	12.5	0.0	0.1	-18.1	0.0	-0.3	297.0	8291.0	1111.0	-788.1	584.5	244.1	714.4	298.4	584.5	244.1	714.4	298.4
1	2	0.0	17.0	14.2	0.0	13.9	10.8	0.0	-21.6	-18.1	0.0	328.9	251.4	8291.0	223.8	-690.2	669.0	465.8	805.3	584.9	671.4	462.8	807.6	581.9
1	3	0.0	34.1	14.2	0.0	25.9	9.1	0.0	-43.3	-18.1	0.0	607.5	212.7	8291.0	-723.6	-592.4	571.4	588.1	675.4	747.6	575.8	582.6	679.8	742.1
1	4	0.0	51.2	14.2	0.0	35.8	7.4	0.0	-64.9	-18.1	0.0	839.5	174.1	8291.0	-1375.0	-494.5	511.1	663.7	593.0	850.9	517.2	656.0	599.0	843.3
1	5	0.0	68.2	14.2	0.0	43.7	5.7	0.0	-86.6	-18.1	0.0	1025.6	135.4	8291.0	-1910.7	-396.7	460.8	726.7	524.4	936.8	468.2	717.4	531.8	927.5
1	6	0.0	85.3	14.2	0.0	49.6	4.1	0.0	-108.2	-18.1	0.0	1164.3	96.7	8291.0	-2327.3	-298.8	420.6	777.1	470.0	1005.0	429.0	766.5	478.5	994.4
1	7	0.0	102.4	14.2	0.0	53.4	2.4	0.0	-129.9	-18.1	0.0	1257.0	58.1	8291.0	-2627.0	-200.9	390.5	814.8	429.7	1055.5	399.5	803.5	438.8	1044.1
1	8	0.0	119.4	14.2	0.0	55.3	0.7	0.0	-151.6	-18.1	0.0	1303.6	19.4	8291.0	-2809.7	-103.0	370.4	840.0	403.5	1088.4	379.8	828.2	412.9	1076.6
1	9	0.0	136.5	14.2	0.0	55.1	-1.0	0.0	-173.2	-18.1	0.0	1304.3	-19.3	8291.0	-2875.3	-5.2	360.5	852.4	391.3	1103.6	369.9	840.7	400.7	1091.9
1	10	0.0	153.6	14.2	0.0	52.9	-2.7	0.0	-194.9	-18.1	0.0	1258.0	-58.0	8291.0	-2823.1	91.4	360.6	852.3	393.2	1101.2	369.6	841.0	402.2	1090.0
1	11	0.0	170.7	14.2	0.0	48.7	-4.3	0.0	-216.5	-18.1	0.0	1164.7	-96.6	8587.0	-2833.7	191.0	363.8	894.8	400.6	1148.9	372.1	884.5	408.9	1138.5
1	12	0.0	187.7	14.2	0.0	42.5	-6.0	0.0	-238.2	-18.1	0.0	1026.3	-135.3	8587.0	-2545.4	289.1	384.4	869.0	431.0	1110.8	391.6	860.0	438.2	1101.7
1	13	0.0	204.8	14.2	0.0	34.3	-7.7	0.0	-259.9	-18.1	0.0	840.0	-174.0	8587.0	-2139.1	387.3	414.9	830.8	475.3	1055.2	420.7	823.5	481.2	1047.9
1	14	0.0	221.8	14.2	0.0	24.0	-9.4	0.0	-281.5	-18.1	0.0	608.6	-212.6	8587.0	-1615.5	485.4	455.7	779.7	533.9	981.8	459.8	774.6	538.0	976.6
1	15	0.0	238.9	14.2	0.0	11.7	-11.1	0.0	-303.2	-18.1	0.0	329.9	-251.3	8741.0	-1030.2	595.0	508.6	737.5	609.2	917.1	510.6	735.0	611.2	914.6
1	16	0.0	256.0	14.2	0.0	-2.5	-12.7	0.0	-324.9	-18.1	0.0	5.0	-290.0	8772.0	-236.9	695.3	577.0	656.8	705.0	803.0	576.5	657.3	704.6	803.5
1	17	0.0	273.0	14.2	0.0	-18.8	-14.4	0.0	-346.5	-18.1	0.0	-366.0	-328.7	8771.0	657.5	795.5	650.7	564.2	809.2	672.2	647.5	568.2	806.0	676.3
1	18	0.0	290.1	14.2	0.0	-37.2	-16.1	0.0	-368.2	-18.1	0.0	-783.9	-367.4	8771.0	1672.5	895.8	735.0	458.6	928.0	523.3	728.7	466.5	921.7	531.3
1	19	0.0	307.2	14.2	0.0	-57.5	-17.8	0.0	-389.8	-18.1	0.0	-1247.6	-406.0	8646.0	2600.2	624.8	789.5	370.7	1012.0	394.0	779.7	383.0	1002.3	406.2
1	20	0.0	324.3	14.2	0.0	-79.8	-19.5	0.0	-411.5	-18.1	0.0	-1762.6	-451.6	8589.0	3351.5	334.3	640.1	213.2	844.4	189.2	627.4	227.7	831.7	203.8
1	21	0.0	341.3	14.2	0.0	-104.2	-21.1	0.0	-433.2	-18.1	0.0	-2335.7	-504.2	8672.0	3780.8	41.4	614.8	251.4	833.6	212.8	598.3	270.4	817.1	231.8
2	1	0.0	341.3	-49.6	0.0	-104.1	20.9	0.0	-433.1	62.8	0.0	-2334.7	517.0	8602.0	3764.9	11.4	609.1	250.3	826.6	211.4	592.6	269.2	810.1	230.4
2	2	0.0	264.5	-49.6	0.0	-73.5	18.7	0.0	-335.8	62.8	0.0	-1586.2	449.2	8602.0	3446.2	-422.9	682.2	166.2	889.6	139.0	670.6	179.6	878.0	152.3
2	3	0.0	187.7	-49.6	0.0	-46.2	16.5	0.0	-238.6	62.8	0.0	-935.5	390.3	8602.0	2269.4	-857.5	788.8	364.6	999.5	401.3	781.0	374.4	991.6	411.1
2	4	0.0	110.9	-49.6	0.0	-22.2	14.4	0.0	-141.3	62.8	0.0	-369.4	340.4	8602.0	545.3	-1049.2	621.2	574.7	773.2	684.9	617.4	579.4	769.4	689.6
2	5	0.0	34.0	-49.6	0.0	-1.6	12.2	0.0	-44.0	62.8	0.0	119.5	290.4	8325.0	-621.0	-664.3	506.4	674.8	614.5	830.5	506.2	675.2	614.2	830.8
2	6	0.0	-42.8	-49.6	0.0	15.7	10.0	0.0	53.3	62.8	0.0	531.0	240.5	8325.0	-1454.8	-411.4	448.8	747.1	528.5	938.3	451.5	743.7	531.1	934.9
2	7	0.0	-119.6	-49.6	0.0	29.5	7.9	0.0	150.5	62.8	0.0	864.9	190.5	8133.0	-1960.5	-392.1	414.8	759.5	474.2	969.3	419.8	753.2	479.3	963.0
2	8	0.0	-196.4	-49.6	0.0	40.0	5.7	0.0	247.8	62.8	0.0	1121.6	140.5	8079.0	-2491.2	-386.5	373.4	802.9	414.0	1034.4	380.2	794.3	420.8	1025.9
2	9	0.0	-273.2	-49.6	0.0	47.2	3.5	0.0	345.1	62.8	0.0	1300.8	90.5	8092.0	-2999.9	-261.4	326.9	863.2	350.4	1116.6	335.0	853.1	358.4	1106.5
2	10	0.0	-350.0	-49.6	0.0	50.9	1.4	0.0	442.3	62.8	0.0	1402.0	40.6	8092.0	-3310.7	-139.3	296.6	901.2	309.5	1167.9	305.2	890.3	318.1	1157.0
2	11	0.0	-426.9	-49.6	0.0	51.4	-0.8	0.0	539.6	62.8	0.0	1426.1	-9.3	8092.0	-3432.4	-17.1	282.0	919.4	290.8	1191.3	290.8	908.5	299.5	1180.3
2	12	0.0	-503.7	-49.6	0.0	48.4	-3.0	0.0	636.8	62.8	0.0	1373.3	-59.3	8092.0	-3364.2	104.9	283.5	917.6	294.6	1186.5	291.7	907.3	302.8	1176.2
2	13	0.0	-580.5	-49.6	0.0	42.1	-5.2	0.0	734.1	62.8	0.0	1242.5	-109.2	8092.0	-3106.9	227.0	300.6	896.1	320.5	1154.1	307.8	887.1	327.6	1145.1

Fase-3

Vano	Seccion	Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
		N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
2	14	0.0	-657.3	-49.6	0.0	32.4	-7.3	0.0	831.3	62.8	0.0	1034.7	-159.2	8092.0	-2660.7	349.1	333.6	854.8	368.6	1093.8	339.1	847.9	374.1	1086.9
2	15	0.0	-734.1	-49.6	0.0	19.4	-9.5	0.0	928.6	62.8	0.0	748.9	-209.2	8092.0	-2024.4	471.2	382.4	793.7	439.1	1005.5	385.7	789.5	442.4	1001.4
2	16	0.0	-810.9	-49.6	0.0	3.0	-11.7	0.0	1026.0	62.8	0.0	386.1	-259.1	8092.0	-1199.0	593.4	447.0	712.6	531.8	889.3	447.5	712.0	532.3	888.7
2	17	0.0	-887.7	-49.6	0.0	-16.8	-13.8	0.0	1123.0	62.8	0.0	-53.7	-309.1	8092.0	-186.0	715.4	527.3	612.1	646.5	745.5	524.5	615.6	643.7	749.1
2	18	0.0	-964.6	-49.6	0.0	-39.9	-16.0	0.0	1220.0	62.8	0.0	-571.7	-359.0	8092.0	1018.1	837.6	623.5	491.5	783.7	573.6	616.7	500.0	776.9	582.1
2	19	0.0	-1041.0	-49.6	0.0	-66.4	-18.2	0.0	1318.0	62.8	0.0	-1166.2	-409.0	8092.0	2383.0	905.0	731.4	356.3	938.0	380.3	720.1	370.5	926.7	394.5
2	20	0.0	-1118.0	-49.6	0.0	-96.3	-20.4	0.0	1415.0	62.8	0.0	-1846.2	-467.9	8525.0	3588.0	443.8	657.3	186.4	868.3	153.1	642.0	203.9	853.1	170.6
2	21	0.0	-1195.0	-49.6	0.0	-129.5	-22.5	0.0	1512.0	62.8	0.0	-2624.0	-535.8	8697.0	4163.0	11.5	624.9	242.6	856.1	190.3	604.4	266.2	835.6	213.9
3	1	0.0	-1195.0	238.4	0.0	-129.4	23.9	0.0	1512.0	-48.8	0.0	-2623.0	564.9	8627.0	4146.0	-48.4	619.0	241.6	848.9	189.2	598.5	265.2	828.4	212.7
3	2	0.0	-825.5	238.4	0.0	-94.1	21.8	0.0	1437.0	-48.8	0.0	-1800.3	497.1	8627.0	3735.0	-483.3	690.7	159.2	907.6	121.7	675.8	176.3	892.7	138.8
3	3	0.0	-455.9	238.4	0.0	-62.0	19.6	0.0	1361.0	-48.8	0.0	-1075.3	438.2	8627.0	2464.0	-917.8	796.6	358.8	1014.2	387.6	786.0	372.0	1003.7	400.8
3	4	0.0	-86.3	238.4	0.0	-33.3	17.4	0.0	1285.0	-48.8	0.0	-434.6	388.2	8627.0	644.6	-1108.8	627.0	571.2	782.8	677.6	621.4	578.3	777.1	684.7
3	5	0.0	283.1	238.4	0.0	-8.0	15.2	0.0	1210.0	-48.8	0.0	128.2	338.3	8350.0	-614.0	-724.9	510.7	673.4	619.4	829.1	509.4	675.1	618.0	830.8
3	6	0.0	652.7	238.4	0.0	13.9	13.1	0.0	1134.0	-48.8	0.0	614.0	288.3	8350.0	-1542.0	-471.9	451.3	747.9	528.4	943.1	453.7	744.9	530.8	940.2
3	7	0.0	1022.0	238.4	0.0	32.5	10.9	0.0	1059.0	-48.8	0.0	1022.0	238.4	8158.0	-2141.0	-452.8	415.6	762.4	469.3	980.3	421.1	755.5	474.9	973.3
3	8	0.0	1353.0	188.4	0.0	47.7	8.7	8079.0	-2783.0	-447.0	0.0	1353.0	188.4	8079.0	-2783.0	-447.0	368.1	809.5	398.8	1053.5	376.2	799.3	406.9	1043.3
3	9	0.0	1606.0	138.5	0.0	59.6	6.6	8092.0	-3386.0	-322.0	0.0	1606.0	138.5	8092.0	-3386.0	-322.0	319.7	872.2	330.1	1142.1	329.9	859.5	340.2	1129.4
3	10	0.0	1782.0	88.5	0.0	68.1	4.4	8092.0	-3790.0	-199.8	0.0	1782.0	88.5	8092.0	-3790.0	-199.8	287.8	912.2	284.4	1199.3	299.4	897.6	296.0	1184.8
3	11	0.0	1881.0	38.6	0.0	73.2	2.2	8092.0	-4006.0	-77.7	0.0	1881.0	38.6	8092.0	-4006.0	-77.7	271.6	932.5	260.8	1228.8	284.0	916.9	273.3	1213.2
3	12	0.0	1902.0	-11.4	0.0	75.0	0.1	8092.0	-4032.0	44.4	0.0	1902.0	-11.4	8092.0	-4032.0	44.4	271.2	933.0	259.6	1230.4	283.9	917.0	272.3	1214.5
3	13	0.0	1845.0	-61.4	0.0	73.4	-2.1	8092.0	-3868.0	166.5	0.0	1845.0	-61.3	8092.0	-3868.0	166.5	286.6	913.7	280.5	1204.1	299.1	898.1	293.0	1188.5
3	14	0.0	1712.0	-111.3	0.0	68.4	-4.3	8092.0	-3516.0	288.6	0.0	1712.0	-111.3	8092.0	-3516.0	288.6	317.9	874.5	323.8	1149.9	329.5	859.9	335.4	1135.4
3	15	0.0	1500.0	-161.2	0.0	60.1	-6.5	8092.0	-2974.0	410.7	0.0	1500.0	-161.2	8092.0	-2974.0	410.7	364.8	815.7	389.1	1068.0	375.0	802.9	399.4	1055.2
3	16	0.0	1212.0	-211.2	0.0	48.4	-8.6	8092.0	-2243.0	532.8	0.0	1212.0	-211.2	8092.0	-2243.0	532.8	427.7	736.9	476.9	958.0	435.9	726.6	485.2	947.7
3	17	0.0	845.7	-261.1	0.0	33.3	-10.8	8092.0	-1322.0	654.9	0.0	845.7	-261.1	8092.0	-1322.0	654.9	506.4	638.3	587.0	820.2	512.1	631.2	592.6	813.1
3	18	0.0	402.1	-311.1	0.0	14.9	-13.0	8092.0	-212.5	777.1	0.0	402.1	-311.1	8092.0	-212.5	777.1	600.8	520.0	719.1	654.6	603.3	516.8	721.6	651.4
3	19	0.0	-118.6	-361.0	0.0	-6.9	-15.1	8092.0	1058.0	844.5	0.0	-118.6	-361.0	8092.0	1058.0	844.5	706.7	387.2	868.3	467.7	705.6	388.7	867.1	469.1
3	20	0.0	-724.1	-420.0	0.0	-32.0	-17.3	8525.0	2169.0	383.3	0.0	-724.1	-420.0	8525.0	2169.0	383.3	632.7	214.6	798.8	233.0	627.6	220.4	793.7	238.8
3	21	0.0	-1428.0	-487.8	0.0	-60.5	-19.5	8697.0	2650.0	-49.1	0.0	-1428.0	-487.8	8697.0	2650.0	-49.1	598.6	272.8	781.9	275.6	589.0	283.8	772.3	286.6
4	1	0.0	-1428.0	326.5	0.0	-60.5	13.0	8627.0	2634.0	0.3	0.0	-1428.0	326.5	8627.0	2634.0	0.3	592.7	271.8	774.7	274.4	583.2	282.8	765.2	285.4
4	2	0.0	-974.7	258.7	0.0	-42.0	10.9	8627.0	2297.0	-434.6	0.0	-974.7	258.7	8627.0	2297.0	-434.6	616.5	244.5	787.8	259.4	609.9	252.1	781.2	267.0
4	3	0.0	-619.3	199.8	0.0	-26.9	8.7	8627.0	1102.0	-869.0	0.0	-619.3	199.8	8627.0	1102.0	-869.0	665.6	522.9	837.0	609.7	661.1	528.6	832.4	615.5
4	4	0.0	-348.4	149.9	0.0	-15.1	6.5	8627.0	-640.1	-1060.0	0.0	-348.4	149.9	8627.0	-640.1	-1060.0	445.0	799.3	557.1	960.5	442.4	802.6	554.5	963.7
4	5	0.0	-154.8	99.9	0.0	-6.7	4.3	8350.0	-1824.0	-675.9	0.0	-154.8	99.9	8350.0	-1824.0	-675.9	277.4	965.9	344.8	1173.2	276.2	967.3	343.7	1174.6
4	6	0.0	-38.7	50.0	0.0	-1.7	2.2	8350.0	-2676.0	-423.1	0.0	-38.7	49.9	8350.0	-2676.0	-423.1	166.7	1104.6	205.2	1348.2	166.4	1104.9	204.9	1348.5
4	7	0.0	0.0	0.0	0.0	0.0	0.0	8158.0	-3200.0	-404.0	0.0	0.0	0.0	8158.0	-3200.0	-404.0	79.6	1183.4	97.3	1446.4	79.6	1183.4	97.3	1446.4
4	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Fase-3

Vano	Seccion	Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
		N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1508.5

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	933	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1206	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	924	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1196	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	-4.4	0.0	0.0	12.2	0.0	0.0	4.9	0.0	-0.3	292.6	8291.0	1111.1	-783.3	584.5	244.1	714.4	298.4	584.5	244.1	714.4	298.4
1	2	0.0	-5.3	-4.4	0.0	13.7	10.5	0.0	5.9	4.9	0.0	323.6	247.0	8291.0	229.7	-685.4	669.0	465.8	805.5	584.6	671.3	462.9	807.8	581.7
1	3	0.0	-10.5	-4.4	0.0	25.3	8.9	0.0	11.7	4.9	0.0	597.0	208.3	8291.0	-711.8	-587.6	571.4	588.1	675.8	747.1	575.7	582.7	680.1	741.7
1	4	0.0	-15.8	-4.4	0.0	34.9	7.2	0.0	17.6	4.9	0.0	823.7	169.7	8291.0	-1357.4	-489.7	511.1	663.7	593.6	850.2	517.0	656.2	599.5	842.7
1	5	0.0	-21.1	-4.4	0.0	42.5	5.5	0.0	23.4	4.9	0.0	1004.6	131.0	8291.0	-1887.3	-391.9	460.8	726.7	525.2	935.8	468.0	717.7	532.4	926.8
1	6	0.0	-26.3	-4.4	0.0	48.1	3.8	0.0	29.3	4.9	0.0	1138.0	92.3	8291.0	-2298.1	-294.0	420.6	777.1	471.0	1003.7	428.8	766.9	479.2	993.5
1	7	0.0	-31.6	-4.4	0.0	51.7	2.1	0.0	35.1	4.9	0.0	1225.4	53.7	8291.0	-2591.9	-196.1	390.5	814.8	430.9	1054.0	399.3	803.8	439.7	1042.9
1	8	0.0	-36.8	-4.4	0.0	53.2	0.5	0.0	41.0	4.9	0.0	1266.8	15.0	8291.0	-2768.8	-98.2	370.4	840.0	404.8	1086.6	379.5	828.6	413.9	1075.3
1	9	0.0	-42.1	-4.4	0.0	52.8	-1.2	0.0	46.8	4.9	0.0	1262.2	-23.7	8291.0	-2828.5	-0.4	360.5	852.4	392.9	1101.6	369.5	841.1	401.9	1090.4
1	10	0.0	-47.4	-4.4	0.0	50.3	-2.9	0.0	52.6	4.9	0.0	1210.6	-62.3	8291.0	-2770.5	96.3	360.6	852.3	395.0	1099.0	369.2	841.5	403.5	1088.3
1	11	0.0	-52.6	-4.4	0.0	45.8	-4.6	0.0	58.5	4.9	0.0	1112.1	-101.0	8587.0	-2775.2	195.8	363.8	894.8	402.6	1146.4	371.6	885.1	410.4	1136.6
1	12	0.0	-57.9	-4.4	0.0	39.3	-6.3	0.0	64.3	4.9	0.0	968.4	-139.7	8587.0	-2481.1	293.9	384.4	869.0	433.2	1108.0	391.1	860.6	439.9	1099.6
1	13	0.0	-63.1	-4.4	0.0	30.8	-7.9	0.0	70.2	4.9	0.0	776.9	-178.4	8587.0	-2068.9	392.1	414.9	830.8	477.7	1052.2	420.1	824.2	483.0	1045.7
1	14	0.0	-68.4	-4.4	0.0	20.3	-9.6	0.0	76.0	4.9	0.0	540.2	-217.0	8587.0	-1539.5	490.2	455.7	779.7	536.5	978.5	459.1	775.4	540.0	974.2
1	15	0.0	-73.7	-4.4	0.0	7.7	-11.3	0.0	81.9	4.9	0.0	256.2	-255.7	8741.0	-948.3	599.8	508.6	737.5	612.0	913.6	509.9	735.9	613.3	911.9
1	16	0.0	-78.9	-4.4	0.0	-6.9	-13.0	0.0	87.7	4.9	0.0	-73.9	-294.4	8772.0	-149.2	700.1	577.0	656.8	708.0	799.2	575.8	658.2	706.8	800.7
1	17	0.0	-84.2	-4.4	0.0	-23.5	-14.7	0.0	93.5	4.9	0.0	-450.2	-333.1	8771.0	751.0	800.3	650.7	564.2	812.4	668.3	646.7	569.2	808.4	673.3
1	18	0.0	-89.5	-4.4	0.0	-42.1	-16.3	0.0	99.4	4.9	0.0	-873.4	-371.8	8771.0	1771.9	900.6	735.0	458.6	931.4	519.1	727.9	467.5	924.2	528.1
1	19	0.0	-94.7	-4.4	0.0	-62.7	-18.0	0.0	105.2	4.9	0.0	-1342.3	-410.4	8646.0	2705.4	629.6	789.4	370.7	1015.6	389.5	778.8	384.1	1005.0	402.9
1	20	0.0	-100.0	-4.4	0.0	-85.3	-19.7	0.0	111.1	4.9	0.0	-1862.6	-456.0	8589.0	3462.6	339.1	640.1	213.2	847.9	185.2	626.6	228.7	834.4	200.7
1	21	0.0	-105.2	-4.4	0.0	-110.0	-21.4	0.0	116.9	4.9	0.0	-2440.9	-508.6	8672.0	3897.7	46.2	614.8	251.4	837.3	208.6	597.3	271.5	819.9	228.6
2	1	0.0	-105.2	15.3	0.0	-109.9	21.7	0.0	116.9	-17.0	0.0	-2439.9	532.3	8602.0	3881.8	-5.6	609.1	250.3	830.3	207.2	591.7	270.3	812.9	227.2
2	2	0.0	-81.6	15.3	0.0	-78.0	19.6	0.0	90.7	-17.0	0.0	-1667.8	464.5	8602.0	3536.9	-439.9	682.2	166.2	892.5	135.7	669.9	180.4	880.2	149.9
2	3	0.0	-57.9	15.3	0.0	-49.3	17.4	0.0	64.4	-17.0	0.0	-993.4	405.6	8602.0	2333.8	-874.5	788.8	364.6	1001.7	398.5	780.4	375.1	993.3	409.0
2	4	0.0	-34.2	15.3	0.0	-24.1	15.2	0.0	38.1	-17.0	0.0	-403.6	355.7	8602.0	583.4	-1066.2	621.2	574.7	774.5	683.2	617.1	579.8	770.4	688.4
2	5	0.0	-10.6	15.3	0.0	-2.2	13.0	0.0	11.7	-17.0	0.0	109.0	305.7	8325.0	-609.3	-681.3	506.4	674.8	614.9	830.0	506.1	675.3	614.5	830.4
2	6	0.0	13.1	15.3	0.0	16.4	10.9	0.0	-14.6	-17.0	0.0	544.1	255.8	8325.0	-1469.3	-428.4	448.8	747.1	528.0	938.9	451.6	743.6	530.8	935.4
2	7	0.0	36.8	15.3	0.0	31.5	8.7	0.0	-40.9	-17.0	0.0	901.7	205.8	8133.0	-2001.4	-409.1	414.8	759.5	472.9	971.0	420.1	752.8	478.2	964.3
2	8	0.0	60.5	15.3	0.0	43.3	6.5	0.0	-67.2	-17.0	0.0	1182.1	155.8	8079.0	-2558.4	-403.4	373.4	802.9	411.7	1037.3	380.8	793.6	419.1	1028.0
2	9	0.0	84.1	15.3	0.0	51.8	4.4	0.0	-93.5	-17.0	0.0	1384.9	105.8	8092.0	-3093.4	-278.3	326.9	863.2	347.2	1120.6	335.7	852.1	356.0	1109.5
2	10	0.0	107.8	15.3	0.0	56.9	2.2	0.0	-119.8	-17.0	0.0	1509.8	55.9	8092.0	-3430.5	-156.2	296.6	901.2	305.4	1173.0	306.2	889.1	315.1	1160.9
2	11	0.0	131.5	15.3	0.0	58.6	0.0	0.0	-146.1	-17.0	0.0	1557.6	5.9	8092.0	-3578.5	-34.1	282.0	919.4	285.8	1197.5	292.0	906.9	295.8	1185.0
2	12	0.0	155.1	15.3	0.0	56.9	-2.1	0.0	-172.4	-17.0	0.0	1528.4	-44.0	8092.0	-3536.6	88.0	283.5	917.6	288.7	1193.9	293.2	905.5	298.4	1181.8
2	13	0.0	178.8	15.3	0.0	51.9	-4.3	0.0	-198.7	-17.0	0.0	1421.3	-94.0	8092.0	-3305.6	210.1	300.6	896.1	313.7	1162.6	309.5	885.1	322.5	1151.5
2	14	0.0	202.5	15.3	0.0	43.5	-6.5	0.0	-225.0	-17.0	0.0	1237.2	-143.9	8092.0	-2885.7	332.2	333.6	854.8	361.0	1103.4	341.0	845.5	368.4	1094.1
2	15	0.0	226.2	15.3	0.0	31.8	-8.7	0.0	-251.3	-17.0	0.0	975.1	-193.9	8092.0	-2275.7	454.3	382.4	793.6	430.5	1016.2	387.8	786.9	435.9	1009.4
2	16	0.0	249.8	15.3	0.0	16.7	-10.8	0.0	-277.6	-17.0	0.0	635.9	-243.8	8092.0	-1476.6	576.5	447.0	712.7	522.3	901.1	449.9	709.1	525.2	897.6

Fase-4

Vano	Seccion	Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
		N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
2	17	0.0	273.5	15.3	0.0	-1.8	-13.0	0.0	-303.9	-17.0	0.0	219.8	-293.8	8092.0	-489.9	698.5	527.3	612.1	636.2	758.5	527.0	612.4	635.9	758.9
2	18	0.0	297.2	15.3	0.0	-23.6	-15.2	0.0	-330.2	-17.0	0.0	-274.5	-343.7	8092.0	687.9	820.7	623.5	491.5	772.5	587.7	619.5	496.5	768.5	592.7
2	19	0.0	320.8	15.3	0.0	-48.8	-17.3	0.0	-356.5	-17.0	0.0	-845.4	-393.7	8092.0	2026.5	888.1	731.4	356.4	925.8	395.5	723.1	366.8	917.5	405.9
2	20	0.0	344.5	15.3	0.0	-77.4	-19.5	0.0	-382.8	-17.0	0.0	-1501.7	-452.6	8525.0	3205.2	426.9	657.3	186.4	856.2	167.0	645.0	200.5	843.9	181.1
2	21	0.0	368.2	15.3	0.0	-109.3	-21.7	0.0	-409.1	-17.0	0.0	-2255.8	-520.5	8697.0	3753.9	-5.5	624.9	242.6	843.2	205.2	607.6	262.5	825.8	225.1
3	1	0.0	368.1	-55.3	0.0	-109.3	20.9	0.0	-409.1	61.3	0.0	-2254.9	509.6	8627.0	3736.9	12.9	619.0	241.6	835.9	204.1	601.7	261.5	818.6	224.0
3	2	0.0	282.4	-55.3	0.0	-78.6	18.7	0.0	-314.0	61.3	0.0	-1517.9	441.8	8627.0	3421.0	-421.9	690.7	159.2	897.6	133.1	678.3	173.5	885.2	147.5
3	3	0.0	196.7	-55.3	0.0	-51.2	16.6	0.0	-218.9	61.3	0.0	-878.6	382.9	8627.0	2245.1	-856.4	796.5	358.8	1006.7	397.0	787.8	369.8	998.0	407.9
3	4	0.0	110.9	-55.3	0.0	-27.2	14.4	0.0	-123.9	61.3	0.0	-323.7	332.9	8627.0	520.7	-1047.4	626.9	571.4	778.5	683.0	622.3	577.2	773.8	688.8
3	5	0.0	25.2	-55.3	0.0	-6.6	12.2	0.0	-28.8	61.3	0.0	153.4	283.0	8350.0	-642.8	-663.5	510.6	673.6	618.3	830.5	509.5	675.0	617.2	831.9
3	6	0.0	-60.6	-55.3	0.0	10.6	10.0	0.0	66.3	61.3	0.0	553.5	233.0	8350.0	-1475.7	-410.5	451.2	748.1	530.5	940.5	453.0	745.8	532.3	938.3
3	7	0.0	-146.2	-55.3	0.0	24.5	7.9	0.0	161.3	61.3	0.0	875.8	183.1	8158.0	-1979.7	-391.4	415.4	762.6	474.6	973.6	419.6	757.4	478.8	968.4
3	8	0.0	-232.0	-55.3	0.0	35.0	5.7	0.0	256.4	61.3	0.0	1121.0	133.1	8079.0	-2526.6	-385.7	367.9	809.8	407.3	1042.8	373.9	802.3	413.2	1035.4
3	9	0.0	-317.7	-55.3	0.0	42.2	3.5	0.0	351.4	61.3	0.0	1288.3	83.2	8092.0	-3034.6	-260.7	319.5	872.5	341.8	1127.4	326.7	863.5	349.0	1118.4
3	10	0.0	-403.4	-55.3	0.0	46.0	1.4	0.0	446.5	61.3	0.0	1378.6	33.2	8092.0	-3343.5	-138.5	287.6	912.5	299.3	1180.6	295.4	902.7	307.2	1170.8
3	11	0.0	-489.2	-55.3	0.0	46.4	-0.8	0.0	541.6	61.3	0.0	1391.8	-16.7	8092.0	-3464.4	-16.4	271.3	932.9	279.0	1206.1	279.2	923.0	286.9	1196.2
3	12	0.0	-574.9	-55.3	0.0	43.5	-3.0	0.0	636.6	61.3	0.0	1327.1	-66.7	8092.0	-3395.4	105.7	270.9	933.4	280.9	1203.7	278.2	924.2	288.3	1194.4
3	13	0.0	-660.7	-55.3	0.0	37.2	-5.1	0.0	731.7	61.3	0.0	1184.3	-116.7	8092.0	-3136.3	227.8	286.2	914.2	305.1	1173.4	292.6	906.2	311.4	1165.5
3	14	0.0	-746.4	-55.3	0.0	27.5	-7.3	0.0	826.7	61.3	0.0	965.6	-166.6	8092.0	-2689.3	349.9	317.5	875.0	351.5	1115.2	322.1	869.2	356.2	1109.3
3	15	0.0	-832.1	-55.3	0.0	14.5	-9.5	0.0	921.8	61.3	0.0	667.9	-216.5	8092.0	-2052.2	472.0	364.4	816.3	420.1	1029.3	366.8	813.2	422.5	1026.2
3	16	0.0	-917.8	-55.3	0.0	-1.9	-11.7	0.0	1017.0	61.3	0.0	294.2	-266.5	8092.0	-1226.0	594.1	427.3	737.4	511.1	915.2	427.0	737.8	510.8	915.6
3	17	0.0	-1004.0	-55.3	0.0	-21.7	-13.8	0.0	1112.0	61.3	0.0	-158.3	-316.4	8092.0	-210.0	716.2	505.8	639.0	624.2	773.4	502.2	643.6	620.6	778.1
3	18	0.0	-1089.0	-55.3	0.0	-44.8	-16.0	0.0	1207.0	61.3	0.0	-686.9	-366.4	8092.0	994.5	838.4	600.3	520.6	759.7	603.7	592.7	530.1	752.1	613.2
3	19	0.0	-1175.0	-55.3	0.0	-71.2	-18.2	0.0	1302.0	61.3	0.0	-1293.6	-416.3	8092.0	2360.0	905.8	706.2	387.9	912.0	412.8	694.1	403.1	899.9	428.0
3	20	0.0	-1261.0	-55.3	0.0	-101.1	-20.3	0.0	1397.0	61.3	0.0	-1985.1	-475.3	8525.0	3566.0	444.6	632.1	215.3	842.5	182.8	616.1	233.7	826.5	201.2
3	21	0.0	-1347.0	-55.3	0.0	-134.3	-22.5	0.0	1492.0	61.3	0.0	-2775.0	-543.1	8697.0	4142.0	12.3	598.0	273.5	828.5	222.0	576.7	298.0	807.3	246.5
4	1	0.0	-1347.0	261.7	0.0	-134.3	24.9	0.0	1492.0	-48.2	0.0	-2775.0	588.2	8627.0	4126.0	-47.8	592.1	272.6	821.3	220.8	570.8	297.0	800.1	245.3
4	2	0.0	-941.4	261.7	0.0	-97.5	22.7	0.0	1416.0	-48.2	0.0	-1916.1	520.4	8627.0	3715.0	-482.8	669.5	183.5	885.8	146.8	654.1	201.3	870.3	164.5
4	3	0.0	-535.6	261.7	0.0	-64.0	20.5	0.0	1343.0	-48.2	0.0	-1154.9	461.5	8627.0	2445.0	-917.2	780.1	379.4	997.2	409.0	769.2	393.0	986.3	422.6
4	4	0.0	-130.1	261.7	0.0	-33.9	18.4	0.0	1269.0	-48.2	0.0	-478.5	411.6	8627.0	628.9	-1108.2	617.2	583.6	772.4	690.6	611.4	590.8	766.6	697.9
4	5	0.0	275.6	261.7	0.0	-7.1	16.2	0.0	1194.0	-48.2	0.0	120.8	361.6	8350.0	-630.0	-724.1	507.0	678.0	615.1	834.4	505.8	679.6	613.9	836.0
4	6	0.0	681.2	261.7	0.0	16.3	14.0	0.0	1119.0	-48.2	0.0	642.5	311.6	8350.0	-1557.0	-471.3	453.9	744.7	530.4	940.6	456.6	741.2	533.2	937.1
4	7	0.0	1087.0	261.7	0.0	36.3	11.8	0.0	1045.0	-48.2	0.0	1087.0	261.7	8158.0	-2155.0	-452.2	424.5	751.2	477.8	969.7	430.7	743.5	483.9	961.9
4	8	0.0	1454.0	211.7	0.0	53.0	9.7	8016.0	-2759.0	-442.9	0.0	1454.0	211.7	8016.0	-2759.0	-442.9	384.6	779.0	415.1	1021.0	393.6	767.7	424.1	1009.7
4	9	0.0	1743.0	161.8	0.0	66.3	7.5	8028.0	-3356.0	-319.0	0.0	1743.0	161.8	8028.0	-3356.0	-319.0	343.2	832.7	353.5	1100.4	354.4	818.6	364.8	1086.2
4	10	0.0	1955.0	111.8	0.0	76.3	5.3	8028.0	-3756.0	-197.9	0.0	1955.0	111.8	8028.0	-3756.0	-197.9	318.0	864.3	314.8	1149.0	331.0	848.0	327.7	1132.7
4	11	0.0	2090.0	61.9	0.0	82.9	3.2	8028.0	-3970.0	-76.9	0.0	2090.0	61.9	8028.0	-3970.0	-76.9	308.2	876.6	297.7	1170.4	322.3	858.9	311.8	1152.7
4	12	0.0	2147.0	11.9	0.0	86.1	1.0	8028.0	-3995.0	44.1	0.0	2147.0	11.9	8028.0	-3995.0	44.1	314.1	869.2	302.7	1164.1	328.7	850.9	317.3	1145.7
4	13	0.0	2127.0	-38.0	0.0	85.9	-1.2	8028.0	-3833.0	165.2	0.0	2127.0	-38.0	8028.0	-3833.0	165.2	335.5	842.4	329.6	1130.4	350.1	824.1	344.2	1112.0
4	14	0.0	2030.0	-88.0	0.0	82.4	-3.3	8028.0	-3483.0	286.2	0.0	2030.0	-88.0	8028.0	-3483.0	286.2	372.5	795.9	378.6	1069.0	386.6	778.4	392.6	1051.4
4	15	0.0	1854.0	-137.9	0.0	75.6	-5.5	8029.0	-2946.0	407.3	0.0	1854.0	-137.9	8029.0	-2946.0	407.3	424.9	730.5	449.2	980.7	437.7	714.4	462.1	964.5
4	16	0.0	1602.0	-187.9	0.0	65.3	-7.7	8029.0	-2221.0	528.3	0.0	1602.0	-187.9	8029.0	-2221.0	528.3	493.0	645.1	542.0	864.4	504.1	631.2	553.1	850.5
4	17	0.0	1272.0	-237.8	0.0	51.7	-9.9	8029.0	-1308.0	649.4	0.0	1272.0	-237.8	8029.0	-1308.0	649.4	576.7	540.3	656.7	720.6	585.5	529.3	665.5	709.6
4	18	0.0	864.9	-287.8	0.0	34.8	-12.0	8029.0	-208.6	770.4	0.0	864.9	-287.8	8029.0	-208.6	770.4	675.7	416.2	793.2	549.6	681.6	408.8	799.1	542.2
4	19	0.0	379.9	-337.7	0.0	14.4	-14.2	8029.0	1052.0	837.2	0.0	379.9	-337.7	8029.0	1052.0	837.2	786.2	277.7	946.6	357.4	788.7	274.7	949.0	354.4
4	20	0.0	-189.2	-396.6	0.0	-9.3	-16.4	8458.0	2154.0	380.2	0.0	-189.2	-396.6	8458.0	2154.0	380.2	711.9	116.2	876.7	134.4	710.4	117.9	875.3	136.0
4	21	0.0	-856.4	-464.5	0.0	-36.3	-18.5	8602.0	2625.0	-48.2	0.0	-856.4	-464.5	8602.0	2625.0	-48.2	680.7	167.9	862.2	170.6	675.0	174.5	856.4	177.2
5	1	0.0	-856.2	252.8	0.0	-36.3	10.1	8505.0	2602.0	4.9	0.0	-856.2	252.8	8505.0	2602.0	4.9	672.5	166.6	852.1	169.0	666.7	173.3	846.3	175.6
5	2	0.0	-584.2	200.3	0.0	-25.2	8.4	8505.0	2302.0	-505.5	0.0	-584.2	200.3	8505.0	2302.0	-505.5	672.8	166.3	842.9	179.6	668.8	170.9	838.9	184.2
5	3	0.0	-371.1	154.7	0.0	-16.1	6.7	8505.0	1211.0	-1009.0	0.0	-371.1	154.7	8505.0	1211.0	-1009.0	716.0	440.5	889.2	520.9	713.3	444.0	886.4	524.3
5	4	0.0	-208.8	116.0	0.0	-9.1	5.0	8213.0	-225.6	-978.2	0.0	-208.8	116.0	8213.0	-225.6	-978.2	503.3	661.2	623.1	798.2	501.8	663.1	621.5	800.1

Fase-4

Vano	Seccion	Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
		N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
5	5	0.0	-92.8	77.3	0.0	-4.0	3.4	8213.0	-1105.0	-548.1	0.0	-92.8	77.3	8213.0	-1105.0	-548.1	388.4	805.1	478.2	979.7	387.7	806.0	477.6	980.5
5	6	0.0	-23.2	38.7	0.0	-1.0	1.7	8213.0	-1557.0	-217.3	0.0	-23.2	38.7	8213.0	-1557.0	-217.3	331.1	877.0	405.5	1070.8	330.9	877.2	405.3	1071.0
5	7	0.0	0.0	0.0	0.0	0.0	0.0	7971.0	-1783.0	-261.6	0.0	0.0	0.0	7971.0	-1783.0	-261.6	283.5	898.5	346.5	1098.2	283.5	898.5	346.5	1098.2
5	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES	Fase nº: 5
PROYECTO : L.A.V. MADRID-ZARAGOZA	
ESTRUCTURA: E-1508.5	

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	934	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1211	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	923	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1199	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	0.7	0.0	0.0	12.3	0.0	0.0	-0.8	0.0	-0.3	293.4	8291.0	1111.1	-784.1	584.5	244.1	714.4	298.4	584.5	244.1	714.4	298.4
1	2	0.0	0.9	0.7	0.0	13.7	10.6	0.0	-1.0	-0.8	0.0	324.5	247.8	8291.0	228.7	-686.2	669.0	465.8	805.4	584.7	671.4	462.9	807.8	581.7
1	3	0.0	1.8	0.7	0.0	25.4	8.9	0.0	-2.0	-0.8	0.0	598.7	209.1	8291.0	-713.8	-588.4	571.4	588.1	675.7	747.2	575.7	582.7	680.0	741.8
1	4	0.0	2.6	0.7	0.0	35.1	7.2	0.0	-3.0	-0.8	0.0	826.3	170.5	8291.0	-1360.5	-490.5	511.1	663.7	593.4	850.3	517.1	656.2	599.4	842.8
1	5	0.0	3.5	0.7	0.0	42.8	5.6	0.0	-4.0	-0.8	0.0	1008.1	131.8	8291.0	-1891.3	-392.7	460.7	726.8	525.0	936.0	468.0	717.6	532.3	926.9
1	6	0.0	4.4	0.7	0.0	48.5	3.9	0.0	-5.1	-0.8	0.0	1142.4	93.1	8291.0	-2303.1	-294.8	420.5	777.1	470.8	1004.0	428.8	766.8	479.1	993.6
1	7	0.0	5.3	0.7	0.0	52.1	2.2	0.0	-6.1	-0.8	0.0	1230.7	54.4	8291.0	-2598.0	-196.9	390.4	814.9	430.7	1054.3	399.3	803.8	439.5	1043.2
1	8	0.0	6.2	0.7	0.0	53.8	0.5	0.0	-7.1	-0.8	0.0	1272.9	15.7	8291.0	-2775.9	-99.0	370.4	840.0	404.6	1087.0	379.5	828.5	413.7	1075.5
1	9	0.0	7.1	0.7	0.0	53.4	-1.2	0.0	-8.1	-0.8	0.0	1269.3	-22.9	8291.0	-2836.6	-1.2	360.5	852.4	392.6	1102.0	369.5	841.1	401.7	1090.6
1	10	0.0	7.9	0.7	0.0	51.0	-2.8	0.0	-9.1	-0.8	0.0	1218.6	-61.6	8291.0	-2779.6	95.5	360.6	852.3	394.6	1099.4	369.2	841.4	403.3	1088.6
1	11	0.0	8.8	0.7	0.0	46.6	-4.5	0.0	-10.2	-0.8	0.0	1120.9	-100.3	8587.0	-2785.4	195.0	363.7	894.9	402.2	1146.9	371.7	885.0	410.1	1136.9
1	12	0.0	9.7	0.7	0.0	40.2	-6.2	0.0	-11.2	-0.8	0.0	978.1	-138.9	8587.0	-2492.3	293.1	384.3	869.1	432.7	1108.6	391.1	860.5	439.6	1100.0
1	13	0.0	10.6	0.7	0.0	31.7	-7.9	0.0	-12.2	-0.8	0.0	787.5	-177.6	8587.0	-2081.1	391.3	414.8	830.9	477.2	1052.8	420.2	824.1	482.6	1046.1
1	14	0.0	11.5	0.7	0.0	21.3	-9.6	0.0	-13.2	-0.8	0.0	551.7	-216.2	8587.0	-1552.7	489.4	455.6	779.8	536.0	979.2	459.2	775.2	539.6	974.6
1	15	0.0	12.4	0.7	0.0	8.8	-11.2	0.0	-14.2	-0.8	0.0	268.6	-254.9	8741.0	-962.6	599.0	508.6	737.6	611.4	914.3	510.0	735.8	612.9	912.4
1	16	0.0	13.3	0.7	0.0	-5.7	-12.9	0.0	-15.3	-0.8	0.0	-60.7	-293.6	8772.0	-164.5	699.3	576.9	656.9	707.4	800.0	575.9	658.1	706.4	801.2
1	17	0.0	14.1	0.7	0.0	-22.2	-14.6	0.0	-16.3	-0.8	0.0	-436.1	-332.3	8771.0	734.8	799.5	650.6	564.3	811.7	669.1	646.9	569.1	807.9	673.8
1	18	0.0	15.0	0.7	0.0	-40.8	-16.3	0.0	-17.3	-0.8	0.0	-858.3	-371.0	8771.0	1754.6	899.8	734.9	458.7	930.7	520.0	728.0	467.4	923.8	528.6
1	19	0.0	15.9	0.7	0.0	-61.3	-18.0	0.0	-18.3	-0.8	0.0	-1326.4	-409.6	8646.0	2687.1	628.8	789.3	370.8	1014.9	390.4	778.9	383.9	1004.5	403.5
1	20	0.0	16.8	0.7	0.0	-83.9	-19.6	0.0	-19.3	-0.8	0.0	-1845.8	-455.2	8589.0	3443.3	338.3	640.0	213.3	847.2	186.0	626.7	228.6	833.9	201.3
1	21	0.0	17.7	0.7	0.0	-108.4	-21.3	0.0	-20.4	-0.8	0.0	-2423.2	-507.8	8672.0	3877.3	45.4	614.7	251.6	836.6	209.4	597.5	271.3	819.4	229.2
2	1	0.0	17.7	-2.6	0.0	-108.4	21.5	0.0	-20.3	3.0	0.0	-2422.2	529.7	8602.0	3861.5	-2.6	609.0	250.4	829.6	208.0	591.8	270.1	812.4	227.8
2	2	0.0	13.7	-2.6	0.0	-76.8	19.3	0.0	-15.8	3.0	0.0	-1654.1	461.9	8602.0	3521.1	-436.9	682.1	166.3	891.9	136.3	670.0	180.3	879.8	150.3
2	3	0.0	9.7	-2.6	0.0	-48.5	17.2	0.0	-11.2	3.0	0.0	-983.7	403.0	8602.0	2322.6	-871.5	788.8	364.6	1001.2	399.1	780.5	375.0	993.0	409.4
2	4	0.0	5.7	-2.6	0.0	-23.6	15.0	0.0	-6.6	3.0	0.0	-397.9	353.1	8602.0	576.7	-1063.2	621.1	574.7	774.2	683.6	617.1	579.7	770.2	688.6
2	5	0.0	1.8	-2.6	0.0	-2.0	12.8	0.0	-2.0	3.0	0.0	110.8	303.1	8325.0	-611.3	-678.3	506.4	674.9	614.8	830.1	506.1	675.3	614.4	830.5
2	6	0.0	-2.2	-2.6	0.0	16.2	10.7	0.0	2.5	3.0	0.0	541.9	253.2	8325.0	-1466.8	-425.4	448.8	747.1	528.1	938.7	451.6	743.6	530.8	935.3
2	7	0.0	-6.2	-2.6	0.0	31.0	8.5	0.0	7.1	3.0	0.0	895.5	203.2	8133.0	-1994.3	-406.1	414.8	759.5	473.1	970.7	420.1	752.9	478.4	964.1
2	8	0.0	-10.2	-2.6	0.0	42.5	6.3	0.0	11.7	3.0	0.0	1171.9	153.2	8079.0	-2546.7	-400.5	373.5	802.8	412.2	1036.7	380.7	793.7	419.4	1027.6
2	9	0.0	-14.1	-2.6	0.0	50.6	4.1	0.0	16.3	3.0	0.0	1370.8	103.2	8092.0	-3077.1	-275.4	327.0	863.0	347.9	1119.8	335.6	852.3	356.5	1109.0
2	10	0.0	-18.1	-2.6	0.0	55.3	2.0	0.0	20.8	3.0	0.0	1491.7	53.3	8092.0	-3409.7	-153.3	296.7	901.1	306.2	1172.0	306.1	889.3	315.6	1160.2
2	11	0.0	-22.1	-2.6	0.0	56.6	-0.2	0.0	25.4	3.0	0.0	1535.5	3.4	8092.0	-3553.1	-31.1	282.2	919.2	286.8	1196.3	291.8	907.2	296.5	1184.2
2	12	0.0	-26.0	-2.6	0.0	54.7	-2.4	0.0	30.0	3.0	0.0	1502.4	-46.6	8092.0	-3506.6	90.9	283.6	917.4	289.9	1192.4	292.9	905.8	299.2	1180.8
2	13	0.0	-30.0	-2.6	0.0	49.3	-4.5	0.0	34.6	3.0	0.0	1391.3	-96.5	8092.0	-3271.0	213.0	300.8	895.9	315.1	1160.9	309.2	885.4	323.4	1150.4
2	14	0.0	-34.0	-2.6	0.0	40.6	-6.7	0.0	39.1	3.0	0.0	1203.2	-146.5	8092.0	-2846.6	335.1	333.8	854.5	362.5	1101.4	340.7	845.9	369.4	1092.8

Fase-5

Vano	Seccion	Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
		N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
2	15	0.0	-38.0	-2.6	0.0	28.5	-8.9	0.0	43.7	3.0	0.0	937.1	-196.5	8092.0	-2232.0	457.2	382.6	793.4	432.2	1014.0	387.5	787.3	437.1	1008.0
2	16	0.0	-41.9	-2.6	0.0	13.0	-11.1	0.0	48.3	3.0	0.0	594.0	-246.4	8092.0	-1428.3	579.4	447.3	712.3	524.2	898.8	449.5	709.6	526.5	896.0
2	17	0.0	-45.9	-2.6	0.0	-5.8	-13.2	0.0	52.9	3.0	0.0	173.9	-296.4	8092.0	-437.0	701.4	527.6	611.7	638.3	755.9	526.6	612.9	637.3	757.1
2	18	0.0	-49.9	-2.6	0.0	-28.0	-15.4	0.0	57.4	3.0	0.0	-324.4	-346.3	8092.0	745.3	823.6	623.8	491.1	774.7	584.8	619.1	497.0	770.0	590.8
2	19	0.0	-53.9	-2.6	0.0	-53.5	-17.6	0.0	62.0	3.0	0.0	-899.2	-396.3	8092.0	2088.5	891.0	731.7	355.9	928.3	392.4	722.6	367.3	919.2	403.9
2	20	0.0	-57.8	-2.6	0.0	-82.4	-19.7	0.0	66.6	3.0	0.0	-1559.5	-455.2	8525.0	3271.8	429.8	657.6	186.0	858.6	164.2	644.5	201.0	845.6	179.2
2	21	0.0	-61.8	-2.6	0.0	-114.7	-21.9	0.0	71.1	3.0	0.0	-2317.6	-523.1	8697.0	3825.0	-2.6	625.2	242.2	845.8	202.2	607.1	263.1	827.6	223.1
3	1	0.0	-61.8	9.3	0.0	-114.6	21.7	0.0	71.2	-10.7	0.0	-2316.7	518.9	8627.0	3808.1	2.2	619.4	241.2	838.5	201.1	601.2	262.1	820.4	221.9
3	2	0.0	-47.4	9.3	0.0	-82.7	19.5	0.0	54.6	-10.7	0.0	-1565.3	451.1	8627.0	3475.6	-432.6	691.0	158.9	899.6	130.8	677.9	173.9	886.5	145.9
3	3	0.0	-33.0	9.3	0.0	-54.1	17.4	0.0	38.0	-10.7	0.0	-911.6	392.2	8627.0	2283.1	-867.1	796.7	358.6	1008.2	395.1	787.5	370.1	999.0	406.6
3	4	0.0	-18.7	9.3	0.0	-28.9	15.2	0.0	21.5	-10.7	0.0	-342.3	342.2	8627.0	542.2	-1058.1	627.0	571.2	779.3	682.0	622.1	577.4	774.4	688.1
3	5	0.0	-4.3	9.3	0.0	-7.0	13.0	0.0	4.9	-10.7	0.0	149.2	292.3	8350.0	-637.9	-674.2	510.6	673.5	618.5	830.3	509.5	675.0	617.3	831.7
3	6	0.0	10.1	9.3	0.0	11.5	10.9	0.0	-11.6	-10.7	0.0	563.6	242.3	8350.0	-1487.4	-421.2	451.1	748.1	530.0	941.1	453.1	745.7	532.0	938.6
3	7	0.0	24.5	9.3	0.0	26.6	8.7	0.0	-28.2	-10.7	0.0	900.3	192.4	8158.0	-2007.9	-402.1	415.3	762.8	473.5	975.0	419.8	757.1	478.1	969.3
3	8	0.0	38.9	9.3	0.0	38.4	6.5	0.0	-44.8	-10.7	0.0	1159.9	142.4	8079.0	-2571.4	-396.4	367.7	810.1	405.5	1045.0	374.2	801.9	412.0	1036.8
3	9	0.0	53.3	9.3	0.0	46.8	4.3	0.0	-61.3	-10.7	0.0	1341.6	92.5	8092.0	-3095.9	-271.4	319.2	872.9	339.4	1130.4	327.1	862.9	347.3	1120.4
3	10	0.0	67.6	9.3	0.0	51.9	2.2	0.0	-77.9	-10.7	0.0	1446.2	42.5	8092.0	-3421.4	-149.2	287.1	913.0	296.3	1184.4	296.0	902.0	305.1	1173.4
3	11	0.0	82.0	9.3	0.0	53.5	0.0	0.0	-94.5	-10.7	0.0	1473.8	-7.5	8092.0	-3558.8	-27.1	270.8	933.5	275.3	1210.8	279.9	922.1	284.4	1199.3
3	12	0.0	96.4	9.3	0.0	51.9	-2.2	0.0	-111.0	-10.7	0.0	1423.5	-57.4	8092.0	-3506.4	95.0	270.3	934.2	276.5	1209.2	279.1	923.1	285.3	1198.1
3	13	0.0	110.8	9.3	0.0	46.8	-4.3	0.0	-127.6	-10.7	0.0	1295.1	-107.4	8092.0	-3263.9	217.1	285.5	915.0	300.0	1179.7	293.5	905.0	308.0	1169.7
3	14	0.0	125.2	9.3	0.0	38.4	-6.5	0.0	-144.1	-10.7	0.0	1090.8	-157.3	8092.0	-2833.4	339.2	316.7	876.0	345.8	1122.3	323.2	867.8	352.4	1114.1
3	15	0.0	139.6	9.3	0.0	26.6	-8.7	0.0	-160.7	-10.7	0.0	807.5	-207.2	8092.0	-2212.9	461.3	363.5	817.3	413.8	1037.2	368.0	811.6	418.3	1031.5
3	16	0.0	153.9	9.3	0.0	11.5	-10.9	0.0	-177.2	-10.7	0.0	448.1	-257.2	8092.0	-1403.2	583.4	426.3	738.6	504.1	924.0	428.3	736.1	506.1	921.5
3	17	0.0	168.3	9.3	0.0	-7.0	-13.0	0.0	-193.8	-10.7	0.0	10.0	-307.1	8092.0	-403.8	705.5	504.8	640.3	616.6	783.0	503.6	641.7	615.4	784.5
3	18	0.0	182.7	9.3	0.0	-28.9	-15.2	0.0	-210.4	-10.7	0.0	-504.2	-357.1	8092.0	784.1	827.7	599.2	522.0	751.4	614.1	594.3	528.1	746.5	620.2
3	19	0.0	197.1	9.3	0.0	-54.1	-17.4	0.0	-226.9	-10.7	0.0	-1096.5	-407.0	8092.0	2133.1	895.1	705.0	389.4	903.1	424.0	695.8	401.0	893.9	435.6
3	20	0.0	211.5	9.3	0.0	-82.7	-19.5	0.0	-243.5	-10.7	0.0	-1773.6	-466.0	8525.0	3322.5	433.9	630.9	216.6	833.6	193.0	617.8	231.7	820.5	208.1
3	21	0.0	225.9	9.3	0.0	-114.6	-21.7	0.0	-260.1	-10.7	0.0	-2549.1	-533.8	8697.0	3881.9	1.6	596.7	275.0	819.0	233.0	578.5	295.9	800.8	253.9
4	1	0.0	225.9	-34.1	0.0	-114.7	21.9	0.0	-260.1	39.1	0.0	-2549.1	554.1	8627.0	3865.9	-8.7	590.8	274.0	811.8	231.8	572.6	294.9	793.6	252.7
4	2	0.0	173.1	-34.1	0.0	-82.4	19.7	0.0	-199.5	39.1	0.0	-1743.0	486.3	8627.0	3515.5	-443.7	668.5	184.7	878.4	155.2	655.5	199.7	865.4	170.2
4	3	0.0	120.3	-34.1	0.0	-53.5	17.6	0.0	-138.9	39.1	0.0	-1034.6	427.4	8627.0	2306.1	-878.1	779.3	380.4	991.6	415.9	770.2	391.8	982.5	427.3
4	4	0.0	67.5	-34.1	0.0	-28.0	15.4	0.0	-78.3	39.1	0.0	-411.0	377.5	8627.0	550.6	-1069.1	616.7	584.2	769.2	694.6	611.9	590.2	764.5	700.6
4	5	0.0	14.7	-34.1	0.0	-5.8	13.2	0.0	-17.7	39.1	0.0	135.5	327.5	8350.0	-647.7	-685.0	506.8	678.3	614.3	835.5	505.8	679.5	613.4	836.7
4	6	0.0	-38.1	-34.1	0.0	13.0	11.1	0.0	42.9	39.1	0.0	604.4	277.6	8350.0	-1514.1	-432.2	454.0	744.6	532.0	938.6	456.2	741.8	534.2	935.9
4	7	0.0	-90.9	-34.1	0.0	28.5	8.9	0.0	103.5	39.1	0.0	996.1	227.6	8158.0	-2051.5	-413.1	424.9	750.8	481.7	964.8	429.7	744.7	486.5	958.7
4	8	0.0	-143.7	-34.1	0.0	40.6	6.7	0.0	164.1	39.1	0.0	1310.3	177.6	8016.0	-2594.9	-403.8	385.2	778.1	421.3	1013.1	392.1	769.5	428.2	1004.5
4	9	0.0	-196.4	-34.1	0.0	49.3	4.5	0.0	224.7	39.1	0.0	1546.6	127.7	8028.0	-3131.3	-279.9	344.2	831.5	362.2	1089.5	352.5	821.0	370.6	1079.0
4	10	0.0	-249.2	-34.1	0.0	54.6	2.4	0.0	285.3	39.1	0.0	1705.8	77.7	8028.0	-3470.7	-158.8	319.3	862.7	325.7	1135.2	328.6	851.0	335.0	1123.5
4	11	0.0	-302.0	-34.1	0.0	56.6	0.2	0.0	345.9	39.1	0.0	1788.0	27.9	8028.0	-3624.1	-37.8	309.8	874.6	311.0	1153.6	319.4	862.5	320.7	1141.6
4	12	0.0	-354.8	-34.1	0.0	55.3	-2.0	0.0	406.5	39.1	0.0	1792.2	-22.1	8028.0	-3588.5	83.2	315.9	866.9	318.4	1144.4	325.3	855.1	327.8	1132.6
4	13	0.0	-407.6	-34.1	0.0	50.5	-4.1	0.0	467.2	39.1	0.0	1719.4	-72.1	8028.0	-3365.8	204.3	337.6	839.7	347.7	1107.7	346.2	828.9	356.3	1096.9
4	14	0.0	-460.4	-34.1	0.0	42.4	-6.3	0.0	527.7	39.1	0.0	1569.6	-122.0	8028.0	-2955.3	325.3	375.0	792.8	399.0	1043.4	382.2	783.8	406.2	1034.3
4	15	0.0	-513.2	-34.1	0.0	31.0	-8.5	0.0	588.4	39.1	0.0	1340.8	-172.0	8029.0	-2357.6	446.4	427.7	727.0	472.0	952.1	432.9	720.4	477.3	945.5
4	16	0.0	-566.0	-34.1	0.0	16.2	-10.7	0.0	648.9	39.1	0.0	1036.0	-222.0	8029.0	-1572.1	567.4	496.1	641.3	567.2	832.9	498.8	637.8	569.9	829.4
4	17	0.0	-618.8	-34.1	0.0	-2.0	-12.8	0.0	709.6	39.1	0.0	653.2	-271.9	8029.0	-598.4	688.5	580.0	536.1	684.2	686.2	579.7	536.5	683.9	686.6
4	18	0.0	-671.6	-34.1	0.0	-23.6	-15.0	0.0	770.1	39.1	0.0	193.3	-321.9	8029.0	561.5	809.5	679.4	411.6	823.0	512.2	675.4	416.6	819.0	517.3
4	19	0.0	-724.4	-34.1	0.0	-48.5	-17.2	0.0	830.8	39.1	0.0	-344.5	-371.8	8029.0	1882.8	876.3	790.2	272.8	978.8	317.1	781.9	283.1	970.5	327.4
4	20	0.0	-777.2	-34.1	0.0	-76.8	-19.3	0.0	891.4	39.1	0.0	-966.4	-430.7	8458.0	3045.4	419.3	715.8	111.6	908.9	97.3	703.7	125.6	896.8	111.3
4	21	0.0	-830.0	-34.1	0.0	-108.4	-21.5	0.0	952.0	39.1	0.0	-1686.4	-498.6	8602.0	3577.0	-9.1	685.0	163.0	896.6	131.0	667.8	182.8	879.4	150.7
5	1	0.0	-830.1	224.3	0.0	-108.4	21.3	0.0	952.1	-39.7	0.0	-1686.3	477.1	8505.0	3554.1	-34.8	676.7	161.8	886.5	129.5	659.6	181.5	869.3	149.2
5	2	0.0	-560.9	224.3	0.0	-83.8	19.6	0.0	904.5	-39.7	0.0	-1145.1	424.6	8505.0	3206.5	-545.2	712.9	120.2	911.7	100.6	699.6	135.5	898.4	115.8

Fase-5

Vano	Seccion	Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
		N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
5	3	0.0	-291.6	224.3	0.0	-61.3	18.0	0.0	856.9	-39.7	0.0	-662.7	379.0	8505.0	2067.9	-1048.7	797.6	338.3	999.9	382.1	787.2	351.4	989.5	395.2
5	4	0.0	-22.7	224.3	0.0	-40.7	16.3	0.0	809.3	-39.7	0.0	-231.5	340.3	8213.0	583.7	-1017.9	623.4	510.7	770.6	613.3	616.4	519.4	763.7	621.9
5	5	0.0	246.5	224.3	0.0	-22.2	14.6	0.0	761.7	-39.7	0.0	153.7	301.6	8213.0	-343.3	-587.8	547.0	606.5	662.7	748.5	543.2	611.2	658.9	753.2
5	6	0.0	515.4	224.3	0.0	-5.7	12.9	0.0	714.1	-39.7	0.0	492.2	263.0	8213.0	-842.9	-257.0	528.0	630.2	626.8	793.5	527.1	631.4	625.8	794.7
5	7	0.0	784.6	224.3	0.0	8.8	11.2	0.0	666.5	-39.7	0.0	784.6	224.3	7971.0	-1116.5	-301.3	519.0	603.4	604.7	774.7	520.5	601.5	606.2	772.8
5	8	0.0	1031.0	185.6	0.0	21.3	9.6	8736.0	-1879.0	-333.6	0.0	1031.0	185.6	8736.0	-1879.0	-333.6	497.6	750.6	569.2	966.2	501.2	746.1	572.8	961.7
5	9	0.0	1230.0	146.9	0.0	31.7	7.9	8722.0	-2244.0	-274.0	0.0	1230.0	146.9	8722.0	-2244.0	-274.0	474.6	777.2	533.6	1008.2	480.0	770.5	539.0	1001.4
5	10	0.0	1383.0	108.2	0.0	40.2	6.2	8722.0	-2521.0	-189.3	0.0	1383.0	108.2	8722.0	-2521.0	-189.3	458.2	797.7	507.8	1040.5	465.0	789.2	514.6	1032.0
5	11	0.0	1490.0	69.5	0.0	46.6	4.5	8722.0	-2699.0	-107.2	0.0	1490.0	69.5	8722.0	-2699.0	-107.2	449.2	809.1	492.7	1059.5	457.1	799.1	500.6	1049.5
5	12	0.0	1550.0	30.9	0.0	51.0	2.8	8722.0	-2778.0	-25.1	0.0	1550.0	30.9	8722.0	-2778.0	-25.1	447.3	811.4	488.1	1065.2	455.9	800.6	496.8	1054.3
5	13	0.0	1564.0	-7.8	0.0	53.4	1.2	8722.0	-2759.0	57.0	0.0	1564.0	-7.8	8722.0	-2759.0	57.0	452.6	804.8	494.0	1057.8	461.6	793.4	503.1	1046.4
5	14	0.0	1531.0	-46.5	0.0	53.8	-0.5	8722.0	-2641.0	139.1	0.0	1531.0	-46.4	8722.0	-2641.0	139.1	465.0	789.2	510.5	1037.1	474.2	777.8	519.6	1025.7
5	15	0.0	1452.0	-85.1	0.0	52.2	-2.2	8721.0	-2425.0	221.2	0.0	1452.0	-85.1	8721.0	-2425.0	221.2	484.6	764.5	537.4	1003.2	493.4	753.4	546.2	992.1
5	16	0.0	1327.0	-123.8	0.0	48.5	-3.9	8721.0	-2110.0	303.3	0.0	1327.0	-123.8	8721.0	-2110.0	303.3	511.5	730.8	575.0	956.0	519.8	720.4	583.3	945.7
5	17	0.0	1155.0	-162.5	0.0	42.8	-5.6	8721.0	-1697.0	385.4	0.0	1155.0	-162.5	8721.0	-1697.0	385.4	545.5	688.2	623.1	895.8	552.8	679.1	630.4	886.7
5	18	0.0	937.1	-201.2	0.0	35.2	-7.2	8721.0	-1185.0	467.5	0.0	937.1	-201.2	8721.0	-1185.0	467.5	586.8	636.4	681.8	822.2	592.8	628.9	687.8	814.7
5	19	0.0	672.5	-239.8	0.0	25.5	-8.9	8721.0	-574.8	549.6	0.0	672.5	-239.8	8721.0	-574.8	549.6	635.2	575.8	751.0	735.6	639.6	570.3	755.3	730.1
5	20	0.0	361.6	-278.5	0.0	13.7	-10.6	8721.0	133.9	631.7	0.0	361.6	-278.5	8721.0	133.9	631.7	690.8	506.1	830.7	635.7	693.2	503.1	833.0	632.7
5	21	0.0	-0.1	-324.1	0.0	0.0	-12.3	8721.0	1128.0	713.9	0.0	-0.1	-324.1	8721.0	1128.0	713.9	609.1	263.4	744.4	322.0	609.1	263.4	744.4	322.0

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INICIAL

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1508.5

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	PP,inicial + CM + 0.9 x Pret,inicial + 0.6 x SC(+) + 0.5 x GRAD	823	131
2	PP,inicial + CM + 1.1 x Pret,inicial + 0.6 x SC(+) + 0.5 x GRAD	1034	117
3	PP,inicial + CM + 0.9 x Pret,inicial + 0.6 x SC(-) + 0.5 x GRAD	989	115
4	PP,inicial + CM + 1.1 x Pret,inicial + 0.6 x SC(-) + 0.5 x GRAD	1264	233
5	PP,inicial + CM + 0.9 x Pret,inicial + 1.0* SC(+) + 0.6 x GRAD	904	89
6	PP,inicial + CM + 1.1 x Pret,inicial + 1.0* SC(+) + 0.6 x GRAD	1086	74
7	PP,inicial + CM + 0.9 x Pret,inicial + 1.0* SC(-) + 0.6 x GRAD	1089	-99
8	PP,inicial + CM + 1.1 x Pret,inicial + 1.0* SC(-) + 0.6 x GRAD	1364	123

PP,inicial= Peso propio en tiempo inicial
Pret,inicial = Pretensado en tiempo inicial
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INICIAL																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	-0.3	293.4	8291.0	1111.1	-784.1	0.0	-0.1	105.3	0.0	0.0	320.0	0.0	0.0	-69.6	0.0	0.0	23.91	585	244	714	298	585	244	714	298	585	244	714	298	585	244	714	298
1	2	0.0	324.5	247.8	8291.0	228.7	-686.2	0.0	117.6	90.9	0.0	428.4	326.2	0.0	-97.9	-81.6	0.0	28.7	23.91	735	383	872	502	679	453	815	572	765	346	901	465	672	462	809	580
1	3	0.0	598.7	209.1	8291.0	-713.8	-588.4	0.0	218.1	76.5	0.0	801.7	286.1	0.0	-195.8	-81.6	0.0	57.4	23.91	695	433	800	592	588	567	693	726	751	363	855	522	575	583	680	742
1	4	0.0	826.3	170.5	8291.0	-1360.5	-490.5	0.0	301.2	62.1	0.0	1129.9	257.2	0.0	-293.7	-81.6	0.0	86.1	23.91	685	446	767	632	532	637	615	824	763	348	846	534	512	662	595	849
1	5	0.0	1008.1	131.8	8291.0	-1891.3	-392.7	0.0	367.1	47.7	0.0	1406.2	217.0	0.0	-391.6	-81.6	0.0	114.8	23.91	676	456	741	666	483	699	548	908	774	334	838	543	457	732	521	941
1	6	0.0	1142.4	93.1	8291.0	-2303.1	-294.8	0.0	415.6	33.3	0.0	1638.9	178.8	0.0	-489.5	-81.6	0.0	143.5	23.91	671	464	721	690	441	751	492	978	785	321	835	548	408	793	458	1020
1	7	0.0	1230.7	54.4	8291.0	-2598.0	-196.9	0.0	446.9	18.9	0.0	1817.7	123.4	0.0	-587.4	-81.6	0.0	172.2	23.91	667	469	707	708	407	795	447	1034	793	310	833	550	367	845	407	1084
1	8	0.0	1272.9	15.7	8291.0	-2775.9	-99.0	0.0	461.0	4.5	0.0	1948.0	94.7	0.0	-685.3	-81.6	0.0	200.9	23.91	665	471	699	718	379	829	413	1076	801	301	835	548	332	888	366	1135
1	9	0.0	1269.3	-22.9	8291.0	-2836.6	-1.2	0.0	457.7	-9.9	0.0	2031.0	45.1	0.0	-783.1	-81.6	0.0	229.5	23.91	665	471	697	720	358	855	390	1105	807	293	839	542	305	922	337	1171
1	10	0.0	1218.6	-61.6	8291.0	-2779.6	95.5	0.0	437.1	-24.3	0.0	2063.1	9.3	0.0	-881.0	-81.6	0.0	258.2	23.91	667	468	701	715	345	872	379	1119	812	286	846	533	285	947	319	1194
1	11	0.0	1120.9	-100.3	8587.0	-2785.4	195.0	0.0	399.3	-38.7	0.0	2053.6	-25.0	0.0	-978.9	-81.6	0.0	286.9	23.91	666	517	704	769	332	935	370	1187	810	335	849	587	265	1018	304	1270
1	12	0.0	978.1	-138.9	8587.0	-2492.3	293.1	0.0	344.2	-53.1	0.0	1984.6	-74.6	0.0	-1076.8	-81.6	0.0	315.6	23.91	672	508	721	748	333	933	381	1173	813	332	861	572	260	1025	308	1265
1	13	0.0	787.5	-177.6	8587.0	-2081.1	391.3	0.0	271.8	-67.5	0.0	1873.6	-110.4	0.0	-1174.7	-81.6	0.0	344.3	23.91	682	497	744	719	341	923	404	1145	815	330	877	551	261	1023	324	1245
1	14	0.0	551.7	-216.2	8587.0	-1552.7	489.4	0.0	182.2	-81.9	0.0	1712.1	-159.9	0.0	-1272.6	-81.6	0.0	373.0	23.91	693	482	773	682	357	904	437	1103	816	328	896	528	270	1012	351	1212
1	15	0.0	268.6	-254.9	8741.0	-962.6	599.0	0.0	75.2	-96.3	0.0	1500.1	-193.3	0.0	-1370.5	-81.6	0.0	401.7	23.91	709	487	811	664	381	897	484	1074	818	350	920	527	288	1014	391	1190
1	16	0.0	-60.7	-293.6	8772.0	-164.5	699.3	0.0	-49.0	-110.7	0.0	1246.7	-227.8	0.0	-1468.4	-81.6	0.0	430.4	23.91	732	462	863	605	419	855	549	998	825	347	955	490	319	980	449	1123
1	17	0.0	-436.1	-332.3	8771.0	734.8	799.5	0.0	-190.4	-125.1	0.0	948.8	-227.0	0.0	-1566.3	-81.6	0.0	459.0	23.91	754	435	915	539	458	805	619	910	826	344	988	449	352	939	513	1044
1	18	0.0	-858.3	-371.0	8771.0	1754.6	899.8	0.0	-349.3	-139.5	0.0	717.0	-158.9	0.0	-1726.5	-185.4	0.0	487.7	23.91	790	389	986	451	499	754	695	815	847	318	1043	379	382	901	578	962
1	19	0.0	-1326.4	-409.6	8646.0	2687.1	628.8	0.0	-525.4	-153.9	0.0	582.2	-67.3	0.0	-2024.5	-307.9	0.0	516.4	23.91	803	353	1029	373	493	742	719	761	852	293	1077	312	356	914	581	934
1	20	0.0	-1845.8	-455.2	8589.0	3443.3	338.3	0.0	-718.7	-168.3	0.0	525.3	-10.3	0.0	-2442.4	-435.1	0.0	545.1	23.91	619	237	826	210	294	611	501	584	661	189	868	162	139	789	346	762
1	21	0.0	-2423.2	-507.8	8672.0	3877.3	45.4	0.0	-929.4	-182.7	0.0	527.5	22.0	0.0	-3009.1	-521.6	0.0	573.8	23.91	563	311	785	269	181	750	403	707	606	262	827	220	-9	969	213	927
2	1	0.0	-2422.2	529.7	8602.0	3861.5	-2.6	0.0	-928.9	184.3	0.0	527.5	-76.1	0.0	-3009.1	577.0	0.0	573.7	-4.235	557	310	778	267	176	748	396	706	600	261	821	218	-15	967	206	925
2	2	0.0	-1654.1	461.9	8602.0	3521.1	-436.9	0.0	-657.9	165.7	0.0	443.8	-34.8	0.0	-2187.2	479.9	0.0	567.2	-4.235	665	186	875	156	370	525	580	495	702	143	912	113	231	684	441	654
2	3	0.0	-983.7	403.0	8602.0	2322.6	-871.5	0.0	-415.5	147.1	0.0	440.7	36.2	0.0	-1533.8	353.1	0.0	560.6	-4.235	811	337	1023	372	562	649	774	684	850	288	1063	322	457	780	670	815
2	4	0.0	-397.9	353.1	8602.0	576.7	-1063.2	0.0	-202.0	128.5	0.0	553.1	159.3	0.0	-1093.0	228.5	0.0	554.1	-4.235	690	488	843	597	475	758	628	866	737	429	890	538	401	851	554	960
2	5	0.0	110.8	303.1	8325.0	-611.3	-676.3	0.0	-17.3	109.9	0.0	849.9	214.3	0.0	-841.1	94.9	0.0	547.5	-4.235	637	511	745	667	418	786	526	941	704	427	812	583	360	858	469	1013
2	6	0.0	541.9	253.2	8325.0	-1466.8	-425.4	0.0	138.7	91.3	0.0	1258.0	288.1	0.0	-799.8	-19.5	0.0	540.9	-4.235	647	499	726	691	391	820	470	1011	742	380	821	572	336	888	416	1080
2	7	0.0	895.5	203.2	8133.0	-1994.3	-406.1	0.0	265.6	72.7	0.0	1654.0	225.1	0.0	-830.1	-19.5	0.0	534.4	-4.235	674	434	733	646	375	809	434	1020	796	282	854	493	319	880	377	1091
2	8	0.0	1171.9	153.2	8079.0	-2546.7	-400.5	0.0	363.9	54.1	0.0	1971.6	183.9	0.0	-860.4	-19.5	0.0	527.8	-4.235	682	417	720	651	348	835	386	1069	825	237	863	471	289	909	328	1143
2	9	0.0	1370.8	103.2	8092.0	-3077.1	-275.4	0.0	433.3	35.5	0.0	2205.2	120.8	0.0	-905.9	-34.2	0.0	521.2	-4.235	670	433	691	690	308	887	329	1143	829	234	850	491	247	964	267	1220
2	10	0.0	1491.7	53.3	8092.0	-3409.7	-153.3	0.0	473.8	16.9	0.0	2360.2	79.7	0.0	-958.8	-34.2	0.0	514.7	-4.235	662	443	671	714	279	923	289	1194	831	231	841	502	214	1004	224	1275
2	11	0.0	1535.5	3.4	8092.0	-3553.1	-31.1	0.0	485.5	-1.7	0.0	2431.1	15.5	0.0	-1012.5	-35.2	0.0	508.1	-4.235	656	451	661	728	261	945	266	1222	830	233	835	510	193	1032	197	1309
2	12	0.0	1502.4	-46.6	8092.0	-3506.6	90.9	0.0	468.4	-20.3	0.0	2423.6	-38.8	0.0	-1067.1	-35.2	0.0	501.5	-4.235	653	454	660	729	254	954	261	1229	827	237	833	512	182	1045	188	1320
2	13	0.0	1391.3	-96.5	8092.0	-3271.0	213.0	0.0	422.5	-38.9	0.0	2331.8	-78.9	0.0	-1121.6	-35.2	0.0	495.0	-4.235	653	455	667	720	258	949	272	1214	820	245	834	510	182	1045	196	1310
2	14	0.0	1203.2	-146.5	8092.0	-2846.6	335.1	0.0	347.7	-57.5	0.0	2161.7	-143.1	0.0	-1176.1	-35.2	0.0	488.4	-4.235	655	452	684	699	273	931	302	1178	811	257	839	504	193	1031	222	1278
2	15	0.0	937.1	-196.5	8092.0	-2232.0	457.2	0.0	244.1	-76.1	0.0	1907.3	-183.1	0.0	-1230.7	-35.2	0.0	481.8	-4.235	660	446	709	667	299	899	348	1119	798	273	847	494	215	1004	264	1224
2	16	0.0	594.0	-246.4	8092.0	-1428.3	579.4	0.0	111.6	-94.7	0.0	1574.6	-248.6	0.0	-1285.2	-35.2	0.0	475.3	-4.235	667	436	744	623	335	853	412	1039	783	292	860	479	248	962	325	1149
2	17	0.0	173.9	-296.4	8092.0	-437.0	701.4	0.0	-49.6	-113.3	0.0	1182.4	-224.6	0.0	-1364.2	-97.3	0.0	468.7	-4.235	680	421	790	565	380	797	491	941	768	310	879	454	287	913	398	1057
2	18	0.0	-324.4	-346.3	8092.0	745.3	823.6	0.0	-239.7	-131.9	0.0	864.2	-127.6	0.0	-1590.1	-197.8	0.0	462.1	-4.235	711	382	861	476	421	746	572	839	777	299	928	393	313	881	463	975
2	19	0.0	-899.2	-396.3	8092.0	2088.5	891.0	0.0	-458.5	-150.5	0.0	725.4	-52.2	0.0	-1989.1	-316.5	0.0	455.6	-4.235	766	312	963	349	451	708	647	745	824	241	1020	277	315	878	512	914
2	20	0.0	-1559.5	-455.2	8525.0	3271.8	429.8	0.0	-706.4	-169.1	0.0	692.9	19.6	0.0	-2562.4	-475.2	0.0	449.0	-4.235	647	198	848	176	302	595	503	573	698	139	899	118	140	781	341	759
2	21	0.0	-2317.6	-523.1	8697.0	3825.0	-2.6	0.0	-983.0	-187.7	0.0	749.6	60.7	0.0	-3368.3	-570.1	0.0	442.4	-4.235	576	299	796	259	149	789	370	749	630	236	851	196	-64	1034	156	995
3	1	0.0	-2316.7	518.9	8627.0	3808.1	2.2	0.0	-982.6	186.0	0.0	749.6	-82.3	0.0	-3368.3	591.3	0.0	442.5	-5E-05	570	298	789	258	144	788	363	748	625	235	844	195	-70	1033	149	993
3	2	0.0	-1565.3	451.1	8627.0	3475.6	-432.6	0.0	-708.8	167.4	0.0	659.1	-40.7	0.0	-2545.6	484.8	0.0	442.5	-5E-05	676	176	885	148	337	566	545	538	725	120	934	92	175	751	384	723
3	3	0.0	-911.6	392.2	8627.0	2283.1	-867.1	0.0	-463.7	148.8	0.0	657.5	31.3	0.0	-1953.5	325.5	0.0	442.5	-5E-05	823	326	1034	363	518	707	730	744	875	261	1086	297	386	874	597	910
3	4	0.0	-342.3	342.2	8627.0	542.2	-1058.1	0.0	-247.4	130.2	0.0	789.3	176.9	0.0	-1537.8	206.1	0.0	442.5	-5E-05	703	476	855	587	428	821	580	931	764	399	917	510	323	952	476	1062
3	5	0.0	149.2	292.3	8350.0	-637.9	-674.2	0.0	-60.1	111.6	0.0	1092.5	215.2	0.0	-1296.9	104.2	0.0	442.5	-5E-05	650	499	757	656	368	852	476	1009	731	397	839	554	280	963	388	1119
3	6	0.0	563.6	242.3	8350.0	-1487.4	-421.2	0.0	98.6	93.0	0.0	1499.6	267.7	0.0	-1238.5	11.1	0.0	442.5	-5E-05	659	488	737	681	341	886	420	1078	768	351	847	544	257	991	336	1184

Vano	Seccion	TIEMPO INICIAL																		TENSIONES EN FIBRAS SUPERIOR E INFERIOR															
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
		N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	7	0.0	900.3	192.4	8158.0	-2007.9	-402.1	0.0	228.2	74.4	0.0	1864.0	204.6	0.0	-1221.3	11.1	0.0	442.5	-5E-05	682	429	740	641	329	870	388	1083	816	260	875	472	246	975	305	1187
3	8	0.0	1159.9	142.4	8079.0	-2571.4	-396.4	0.0	329.2	55.8	0.0	2150.0	163.5	0.0	-1204.1	11.1	0.0	442.5	-5E-05	681	418	719	653	301	894	339	1129	835	225	872	460	219	997	257	1232
3	9	0.0	1341.6	92.5	8092.0	-3095.9	-271.4	0.0	401.2	37.2	0.0	2351.8	100.4	0.0	-1186.9	11.1	0.0	442.5	-5E-05	665	439	685	697	266	939	286	1197	833	229	853	487	186	1040	206	1298
3	10	0.0	1446.2	42.5	8092.0	-3421.4	-149.2	0.0	444.5	18.6	0.0	2475.2	59.3	0.0	-1169.6	11.1	0.0	442.5	-5E-05	653	455	662	726	243	968	253	1239	829	234	838	505	164	1068	173	1339
3	11	0.0	1473.8	-7.5	8092.0	-3558.8	-27.1	0.0	458.9	0.0	0.0	2514.4	-4.9	0.0	-1152.4	-10.0	0.0	442.5	-5E-05	643	467	648	744	231	983	236	1260	822	243	826	520	153	1081	157	1359
3	12	0.0	1423.5	-57.4	8092.0	-3506.4	95.0	0.0	444.5	-18.6	0.0	2475.2	-59.3	0.0	-1169.6	-11.1	0.0	442.5	-5E-05	636	476	642	751	226	989	233	1264	812	255	818	530	147	1089	153	1364
3	13	0.0	1295.1	-107.4	8092.0	-3263.9	217.1	0.0	401.3	-37.2	0.0	2351.8	-99.3	0.0	-1186.8	-11.1	0.0	442.5	-5E-05	631	482	646	746	233	981	247	1246	799	272	814	536	152	1082	166	1347
3	14	0.0	1090.8	-157.3	8092.0	-2833.4	339.2	0.0	329.2	-55.8	0.0	2150.1	-163.5	0.0	-1204.1	-11.1	0.0	442.5	-5E-05	630	484	659	730	250	960	279	1206	784	291	813	537	168	1062	197	1309
3	15	0.0	807.5	-207.2	8092.0	-2212.9	461.3	0.0	228.3	-74.4	0.0	1863.9	-203.5	0.0	-1221.3	-11.1	0.0	442.5	-5E-05	630	483	680	703	278	925	328	1145	765	315	815	535	195	1029	245	1249
3	16	0.0	448.1	-257.2	8092.0	-1403.2	583.4	0.0	98.7	-93.0	0.0	1499.6	-269.0	0.0	-1238.5	-11.1	0.0	442.5	-5E-05	634	479	712	664	317	876	394	1061	743	341	821	527	232	982	310	1167
3	17	0.0	10.0	-307.1	8092.0	-403.8	705.5	0.0	-60.0	-111.6	0.0	1092.5	-214.0	0.0	-1296.8	-104.2	0.0	442.5	-5E-05	644	466	756	609	362	819	474	962	726	364	837	506	274	929	386	1072
3	18	0.0	-504.2	-357.1	8092.0	784.1	827.7	0.0	-247.4	-130.2	0.0	789.3	-178.2	0.0	-1537.8	-206.1	0.0	442.5	-5E-05	675	427	828	519	400	771	552	863	737	350	889	442	296	903	448	995
3	19	0.0	-1096.5	-407.0	8092.0	2133.1	895.1	0.0	-463.5	-148.8	0.0	661.8	-39.9	0.0	-1953.5	-325.5	0.0	442.5	-5E-05	731	356	929	391	427	738	625	773	784	291	982	325	294	905	492	939
3	20	0.0	-1773.6	-466.0	8525.0	3322.5	433.9	0.0	-708.6	-167.4	0.0	659.1	40.7	0.0	-2545.6	-484.8	0.0	442.5	-5E-05	616	233	819	210	277	624	479	600	665	177	868	154	115	809	318	786
3	21	0.0	-2549.1	-533.8	8697.0	3881.9	1.6	0.0	-982.6	-186.0	0.0	749.7	82.3	0.0	-3368.3	-591.3	0.0	442.5	-5E-05	547	332	770	290	121	822	343	780	602	269	824	227	-93	1067	130	1025
4	1	0.0	-2549.1	554.1	8627.0	3865.9	-8.7	0.0	-982.8	187.7	0.0	749.7	-60.7	0.0	-3368.3	570.1	0.0	442.4	4.236	541	331	762	289	115	821	336	779	596	268	817	226	-99	1066	123	1024
4	2	0.0	-1743.0	486.3	8627.0	3515.5	-443.7	0.0	-706.4	169.1	0.0	692.9	-19.6	0.0	-2562.5	475.2	0.0	449.0	4.236	658	197	868	167	313	593	523	564	709	138	919	109	151	780	361	750
4	3	0.0	-1034.6	427.4	8627.0	2306.1	-878.1	0.0	-458.5	150.5	0.0	725.3	52.2	0.0	-1989.1	316.5	0.0	455.6	4.236	814	337	1026	372	498	733	711	768	871	265	1084	301	363	902	575	938
4	4	0.0	-411.0	377.5	8627.0	550.6	-1069.1	0.0	-239.7	131.9	0.0	864.2	126.4	0.0	-1590.1	197.8	0.0	462.1	4.236	703	476	856	586	414	839	566	949	770	392	923	502	305	974	458	1085
4	5	0.0	135.5	327.5	8350.0	-647.7	-685.0	0.0	-49.6	113.3	0.0	1182.4	225.7	0.0	-1364.2	97.3	0.0	468.7	4.236	659	488	766	645	359	863	467	1021	747	377	855	534	266	980	374	1137
4	6	0.0	604.4	277.6	8350.0	-1514.1	-432.2	0.0	111.6	94.7	0.0	1574.6	247.3	0.0	-1285.2	35.2	0.0	475.3	4.236	674	469	752	663	342	885	420	1079	789	324	867	518	254	995	332	1189
4	7	0.0	996.1	227.6	8158.0	-2051.5	-413.1	0.0	244.0	76.1	0.0	1907.3	184.2	0.0	-1230.7	35.2	0.0	481.8	4.236	702	403	759	617	341	856	398	1070	840	231	897	445	257	961	314	1175
4	8	0.0	1310.3	177.6	8016.0	-2594.9	-403.8	0.0	347.7	57.5	0.0	2161.7	143.1	0.0	-1176.2	35.2	0.0	488.4	4.236	707	375	743	610	324	854	360	1089	862	181	898	416	244	955	280	1190
4	9	0.0	1546.6	127.7	8028.0	-3131.3	-279.9	0.0	422.4	38.9	0.0	2331.8	80.0	0.0	-1121.6	35.2	0.0	495.0	4.236	696	390	714	649	302	885	320	1143	863	181	881	439	225	981	243	1239
4	10	0.0	1705.8	77.7	8028.0	-3470.7	-158.8	0.0	468.3	20.3	0.0	2423.6	38.9	0.0	-1067.1	35.2	0.0	501.5	4.236	689	399	695	672	290	899	296	1172	862	182	869	455	217	990	224	1263
4	11	0.0	1788.0	27.9	8028.0	-3624.1	-37.8	0.0	485.4	1.7	0.0	2431.1	-15.5	0.0	-1012.6	35.2	0.0	508.1	4.236	684	406	685	685	289	901	290	1180	858	188	859	467	220	987	221	1266
4	12	0.0	1792.2	-22.1	8028.0	-3588.5	83.2	0.0	473.7	-16.9	0.0	2360.2	-79.7	0.0	-958.8	34.2	0.0	514.7	4.236	681	409	684	687	299	889	301	1166	851	197	853	474	233	970	236	1248
4	13	0.0	1719.4	-72.1	8028.0	-3365.8	204.3	0.0	433.1	-35.5	0.0	2205.2	-119.7	0.0	-933.0	16.1	0.0	521.2	4.236	681	410	691	678	316	867	326	1135	840	211	850	479	253	946	263	1214
4	14	0.0	1569.6	-122.0	8028.0	-2955.3	325.3	0.0	363.8	-54.1	0.0	1971.7	-183.9	0.0	-908.1	16.1	0.0	527.8	4.236	683	407	707	657	344	831	368	1082	826	227	850	478	282	909	306	1159
4	15	0.0	1340.8	-172.0	8029.0	-2357.6	446.4	0.0	265.5	-72.7	0.0	1654.0	-223.9	0.0	-883.2	16.1	0.0	534.4	4.236	687	402	731	627	383	783	427	1008	809	250	853	475	323	859	367	1084
4	16	0.0	1036.0	-222.0	8029.0	-1572.1	567.4	0.0	138.5	-91.3	0.0	1258.0	-289.4	0.0	-858.3	16.1	0.0	540.9	4.236	694	393	765	585	432	722	503	913	789	274	860	466	374	795	445	986
4	17	0.0	653.2	-271.9	8029.0	-598.4	688.5	0.0	-17.4	-109.9	0.0	849.9	-213.1	0.0	-905.0	-98.3	0.0	547.5	4.236	710	373	815	523	485	656	589	806	778	289	882	439	423	733	527	883
4	18	0.0	193.3	-321.9	8029.0	561.5	809.5	0.0	-202.0	-128.5	0.0	553.0	-160.6	0.0	-1141.9	-216.9	0.0	554.1	4.236	749	325	892	426	528	601	672	701	796	266	939	367	451	698	594	799
4	19	0.0	-344.5	-371.8	8029.0	1882.8	876.3	0.0	-415.7	-147.1	0.0	440.7	-38.2	0.0	-1551.8	-311.0	0.0	560.6	4.236	812	245	1001	290	561	560	750	604	852	196	1040	240	455	692	644	736
4	20	0.0	-966.4	-430.7	8458.0	3045.4	419.3	0.0	-658.0	-165.7	0.0	443.8	34.8	0.0	-2187.2	-479.9	0.0	567.2	4.236	699	131	892	117	404	470	597	456	736	89	929	74	265	830	458	615
4	21	0.0	-1686.4	-498.6	8602.0	3577.0	-9.1	0.0	-929.2	-184.3	0.0	527.5	76.1	0.0	-3009.1	-576.9	0.0	573.8	4.236	633	222	845	190	252	661	463	629	676	173	887	141	61	880	273	848
5	1	0.0	-1686.3	477.1	8505.0	3554.1	-34.8	0.0	-929.2	182.7	0.0	527.5	-22.0	0.0	-3009.1	521.6	0.0	573.8	-23.9	625	221	835	189	244	660	453	627	668	172	877	140	53	879	263	847
5	2	0.0	-1145.1	424.6	8505.0	3206.5	-545.2	0.0	-718.5	168.3	0.0	525.3	10.3	0.0	-2442.4	435.1	0.0	545.1	-23.9	692	144	891	124	367	518	566	498	734	96	933	76	212	696	411	676
5	3	0.0	-662.7	379.0	8505.0	2067.9	-1048.7	0.0	-525.0	153.9	0.0	582.2	67.3	0.0	-2024.5	307.9	0.0	516.4	-23.9	812	321	1014	365	502	709	704	753	860	260	1062	304	364	882	566	926
5	4	0.0	-231.5	340.3	8213.0	583.7	-1017.9	0.0	-349.1	139.5	0.0	717.1	157.6	0.0	-1726.5	185.4	0.0	487.7	-23.9	679	441	826	544	388	806	535	908	736	370	883	472	270	953	418	1056
5	5	0.0	153.7	301.6	8213.0	-343.3	-587.8	0.0	-190.3	125.1	0.0	983.2	280.3	0.0	-1566.3	81.6	0.0	459.0	-23.9	654	472	770	614	355	847	470	989	729	379	844	521	248	981	364	1123
5	6	0.0	492.2	263.0	8213.0	-842.9	-257.0	0.0	-48.9	110.7	0.0	1287.1	241.8	0.0	-1468.4	81.6	0.0	430.3	-23.9	688	430	786	593	370	828	469	992	783	311	881	475	270	954	369	1117
5	7	0.0	784.6	224.3	7971.0	-1116.5	-301.3	0.0	75.4	96.3	0.0	1544.5	187.3	0.0	-1370.5	81.6	0.0	401.6	-23.9	724	347	809	518	392	763	478	934	836	207	921	378	299	879	384	1051
5	8	0.0	1031.0	185.6	8736.0	-1879.0	-333.6	0.0	182.3	81.9	0.0	1751.2	147.8	0.0	-1272.6	81.6	0.0	373.0	-23.9	739	448	811	664	399	874	470	1090	865	291	936	506	312	983	384	1189
5	9	0.0	1230.0	146.9	8722.0	-2244.0	-274.0	0.0	272.0	67.5	0.0	1910.1	117.1	0.0	-1174.7	81.6	0.0	344.3	-23.9	745	438	804	669	401	869	460	1100	881	268	940	499	321	970	380	1201
5	10	0.0	1383.0	108.2	8722.0	-2521.0	-189.3	0.0	344.4	53.1	0.0	2021.4	77.6	0.0	-1076.9	81.6	0.0	315.6	-23.9	750	432	799	675	407	862	456	1105	893	253	942	496	334	954	383	1197
5	11	0.0	1490.0	69.5	8722.0	-2699.0	-107.2	0.0	399.5	38.7	0.0	2080.6	37.9	0.0	-978.9	81.6	0.0	286.9	-23.9	754	427	797	678	417	849	461	1100	900	244	944	494	351	933	394	1183
5	12	0.0	1550.0	30.9	8722.0	-2778.0	-25.1	0.0	437.3	24.3	0.0	2094.9	-16.4	0.0	-881.1	81.6	0.0	258.2	-23.9	757	423	798	677	432	831	473	1085	904	239	945	492	372	906	413	1160
5	13	0.0	1564.0	-7.8	8722.0	-2759.0	57.0	0.0	457.8	9.9	0.0	2057.1	-57.2	0.0	-783.2	81.6	0.0	229.5	-23.9	760	420	801	673	451	807	492	1060	904	239	945	492	397	874	439	1127
5	14	0.0	1531.0	-46.4	8722.0	-2641.0	139.1	0.0	461.1	-4.5	0.0	1971.6	-86.7	0.0	-685.3	81.6	0.0	200.9	-23.9	762	417	807	665	474	779	519	1026	899	245	945	493	427	837	472	1085
5	15	0.0	1452.0	-85.1	8721.0	-2425.0	221.2	0.0	447.0	-18.9	0.0	1838.4	-126.2	0.0	-587.4	81.6	0.0	172.2	-23.9	763	416	816	654	501	744	553	983	891	255	944	494	461	794	513	1033
5	16	0.0	1327.0	-123.8	8721.0	-2110.0	303.3	0.0	415.7	-33.3	0.0	1652.3	-165.9	0.0	-489.5	81.6	0.0	143.5	-23.9	763	416	827	641	532	705	596	930	878	272	941	497	499	746	562	972
5	17	0.0	1155.0	-162.5	8721.0	-1697.0	385.4	0.0	367.1	-47.7	0.0	1422.8	-220.5	0.0	-391.6	81.6	0.0	114.8	-23.9	763	416	840	623	568	660	646	868	862	292	939	500	541	693	619	901
5	18	0.0	937.1	-201.2	8721.0	-1185.0	467.5	0.0	301.3	-62.1	0.0	1140.4	-260.0	0.0	-293.7	81.6	0.0	86.1	-23.9	762	417	857	603	608	610	703	796	841	318	936	504	588	635	683	821
5	19	0.0	672.5	-239.8	8721.0	-574.8	549.6	0.0	218.1	-76.5	0.0	810.1	-289.5	0.0	-195.8	81.6	0.0	57.4	-23.9	760	420	876	579	652	554	768	714	816	349	932	509	639	571	755	731
5	20	0.0	361.6	-278.5	8721.0	133.9	631.7	0.0	117.7	-90.9	0.0	432.1	-329.1	0.0	-97.9	81.6	0.0	28.7	-23.9	757	423	897	552	701	494	841	623	787	385	927	515	694	502	834	631
5	21	0.0	-0.1	-324.1	8721.0	1128.0	713.9	0.0	0.0	-105.3	0.0	0.0	-354.8	0.0	0.0	17.4	0.0	0.0	-23.9	609	263	744	322	609	263	744	322	609	263	744	322	609	263	744	322

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INFINITO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1508.5

Resumen de combinaciones:

		Tension máxima (t/m2)	Tension mínima (t/m2)
1	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	725	143
2	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	924	93
3	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	774	24
4	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	923	229
5	PP,final + CM + 0.9 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	888	-52
6	PP,final + CM + 1.1 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	982	37
7	PP,final + CM + 0.9 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	1019	-190
8	PP,final + CM + 1.1 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	1016	15

PP,final= Peso propio en tiempo final
Pret,final = Pretensado en tiempo final
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR															
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	-0.3	289.3	6964.0	933.4	-640.1	0.0	-0.1	105.3	0.0	0.0	320.0	0.0	0.0	-69.6	0.0	0.0	23.91	491	205	600	251	491	205	600	251	491	205	600	251	491	205	600	251
1	2	0.0	319.6	243.6	6964.0	214.4	-557.9	0.0	117.6	90.9	0.0	428.4	326.2	0.0	-97.9	-81.6	0.0	28.7	23.91	640	294	755	393	583	364	699	463	669	257	785	356	577	373	692	472
1	3	0.0	588.8	205.0	6964.0	-555.0	-475.6	0.0	218.1	76.5	0.0	801.7	286.1	0.0	-195.8	-81.6	0.0	57.4	23.91	625	312	714	444	518	446	608	577	681	242	770	374	505	462	594	594
1	4	0.0	811.4	166.3	6964.0	-1076.0	-393.5	0.0	301.2	62.1	0.0	1129.9	257.2	0.0	-293.7	-81.6	0.0	86.1	23.91	633	302	705	456	481	493	552	647	712	204	783	357	461	518	532	672
1	5	0.0	987.8	127.6	6964.0	-1499.0	-311.3	0.0	367.1	47.7	0.0	1406.2	217.0	0.0	-391.6	-81.6	0.0	114.8	23.91	640	293	697	465	447	535	504	707	738	171	795	342	421	568	478	740
1	6	0.0	1118.0	89.0	6964.0	-1823.0	-229.1	0.0	415.6	33.3	0.0	1638.9	178.8	0.0	-489.5	-81.6	0.0	143.5	23.91	647	284	693	470	418	572	464	757	761	141	807	327	385	613	431	799
1	7	0.0	1201.0	50.3	6965.0	-2049.0	-146.9	0.0	446.9	18.9	0.0	1817.7	123.4	0.0	-587.4	-81.6	0.0	172.2	23.91	653	277	691	473	393	603	431	799	780	119	818	314	353	653	391	849
1	8	0.0	1238.0	11.6	6965.0	-2176.0	-64.6	0.0	461.0	4.5	0.0	1948.0	94.7	0.0	-685.3	-81.6	0.0	200.9	23.91	658	271	692	472	372	629	406	830	794	101	828	301	326	688	360	888
1	9	0.0	1229.0	-27.1	6965.0	-2204.0	17.6	0.0	457.7	-9.9	0.0	2031.0	45.1	0.0	-783.1	-81.6	0.0	229.5	23.91	663	265	696	467	356	650	389	852	805	87	838	289	303	716	336	918
1	10	0.0	1173.0	-65.8	6965.0	-2134.0	98.8	0.0	437.1	-24.3	0.0	2063.1	9.3	0.0	-881.0	-81.6	0.0	258.2	23.91	666	261	701	460	344	665	379	864	811	80	846	279	284	740	319	939
1	11	0.0	1071.0	-104.4	7213.0	-2116.0	182.4	0.0	399.3	-38.7	0.0	2053.6	-25.0	0.0	-978.9	-81.6	0.0	286.9	23.91	664	303	704	505	330	721	370	923	808	122	848	324	263	805	303	1007
1	12	0.0	922.8	-143.1	7213.0	-1848.0	264.8	0.0	344.2	-53.1	0.0	1984.6	-74.6	0.0	-1076.8	-81.6	0.0	315.6	23.91	666	301	715	491	326	726	375	916	806	125	855	315	253	818	302	1008
1	13	0.0	727.9	-181.8	7213.0	-1481.0	347.3	0.0	271.8	-67.5	0.0	1873.6	-110.4	0.0	-1174.7	-81.6	0.0	344.3	23.91	667	298	729	473	327	725	389	900	801	131	862	306	247	825	309	1000
1	14	0.0	486.6	-220.4	7213.0	-1015.0	429.7	0.0	182.2	-81.9	0.0	1712.1	-159.9	0.0	-1272.6	-81.6	0.0	373.0	23.91	668	297	746	452	332	718	409	874	791	143	869	298	245	827	323	982
1	15	0.0	198.8	-259.1	7342.0	-496.9	521.8	0.0	75.2	-96.3	0.0	1500.1	-193.3	0.0	-1370.5	-81.6	0.0	401.7	23.91	670	315	767	450	343	725	440	860	779	178	876	313	250	842	347	977
1	16	0.0	-135.5	-297.8	7368.0	196.6	606.0	0.0	-49.0	-110.7	0.0	1246.7	-227.8	0.0	-1468.4	-81.6	0.0	430.4	23.91	677	311	798	417	363	704	484	810	769	195	890	301	263	829	384	935
1	17	0.0	-515.8	-336.5	7368.0	973.8	690.2	0.0	-190.4	-125.1	0.0	948.8	-227.0	0.0	-1566.3	-81.6	0.0	459.0	23.91	679	308	827	381	383	678	531	751	752	217	899	290	277	812	424	885
1	18	0.0	-942.9	-375.1	7368.0	1853.0	774.4	0.0	-349.3	-139.5	0.0	717.0	-158.9	0.0	-1726.5	-185.4	0.0	487.7	23.91	693	291	870	326	402	655	579	690	750	219	927	254	285	802	462	838
1	19	0.0	-1416.0	-413.8	7263.0	2658.0	546.8	0.0	-525.4	-153.9	0.0	582.2	-67.3	0.0	-2024.5	-307.9	0.0	516.4	23.91	687	281	890	281	377	670	580	669	735	221	939	220	239	842	442	842
1	20	0.0	-1940.0	-459.4	7215.0	3316.0	302.8	0.0	-718.7	-168.3	0.0	525.3	-10.3	0.0	-2442.4	-435.1	0.0	545.1	23.91	516	205	703	166	190	578	378	540	557	156	745	118	36	756	223	718
1	21	0.0	-2523.0	-512.0	7284.0	3703.0	56.7	0.0	-929.4	-182.7	0.0	527.5	22.0	0.0	-3009.1	-521.6	0.0	573.8	23.91	451	286	652	235	69	725	270	673	494	237	694	186	-121	944	79	892
2	1	0.0	-2522.0	521.5	7226.0	3690.0	6.4	0.0	-928.9	184.3	0.0	527.5	-76.1	0.0	-3009.1	577.0	0.0	573.7	-4.235	446	285	646	233	65	724	264	672	489	236	688	184	-126	943	74	891
2	2	0.0	-1767.0	453.6	7226.0	3417.0	-358.5	0.0	-657.9	165.7	0.0	443.8	-34.8	0.0	-2187.2	479.9	0.0	567.2	-4.235	562	153	752	111	267	492	457	450	599	110	789	68	128	651	319	609
2	3	0.0	-1109.0	394.7	7226.0	2424.0	-723.5	0.0	-415.5	147.1	0.0	440.7	38.2	0.0	-1533.8	353.1	0.0	560.6	-4.235	709	248	903	257	460	561	654	569	748	199	943	208	355	691	550	700
2	4	0.0	-536.1	344.8	7226.0	970.5	-884.2	0.0	-202.0	128.5	0.0	553.1	159.3	0.0	-1093.0	228.5	0.0	554.1	-4.235	631	346	776	417	416	615	561	686	678	287	823	358	342	709	487	779
2	5	0.0	-40.3	294.8	6993.0	-14.1	-561.2	0.0	-17.3	109.9	0.0	849.9	214.3	0.0	-841.1	94.9	0.0	547.5	-4.235	610	336	718	445	390	611	498	720	677	252	785	361	333	682	441	792
2	6	0.0	378.1	244.9	6993.0	-719.5	-348.7	0.0	138.7	91.3	0.0	1258.0	288.1	0.0	-799.8	-19.5	0.0	540.9	-4.235	640	298	724	437	384	618	468	758	735	179	819	318	330	687	414	826
2	7	0.0	718.9	194.9	6832.0	-1149.0	-332.6	0.0	265.6	72.7	0.0	1654.0	225.1	0.0	-830.1	-19.5	0.0	534.4	-4.235	683	219	750	374	384	594	451	749	804	67	871	222	327	664	394	819
2	8	0.0	982.3	145.0	6786.0	-1600.0	-327.8	0.0	363.9	54.1	0.0	1971.6	183.9	0.0	-860.4	-19.5	0.0	527.8	-4.235	704	185	755	359	370	604	421	777	847	6	898	179	311	677	362	851
2	9	0.0	1168.0	95.0	6797.0	-2033.0	-222.7	0.0	433.3	35.5	0.0	2205.2	120.8	0.0	-905.9	-34.2	0.0	521.2	-4.235	705	186	741	378	343	639	379	831	864	-14	900	179	282	716	318	908
2	10	0.0	1277.0	45.1	6797.0	-2298.0	-120.2	0.0	473.8	16.9	0.0	2360.2	79.7	0.0	-958.8	-34.2	0.0	514.7	-4.235	705	185	732	389	323	665	350	868	875	-27	902	177	257	747	285	950
2	11	0.0	1308.0	-4.9	6797.0	-2405.0	-17.6	0.0	485.5	-1.7	0.0	2431.1	15.5	0.0	-1012.5	-35.2	0.0	508.1	-4.235	703	189	726	397	308	683	332	891	877	-30	900	178	239	769	263	977
2	12	0.0	1262.0	-54.8	6797.0	-2353.0	85.0	0.0	468.4	-20.3	0.0	2423.6	-38.8	0.0	-1067.1	-35.2	0.0	501.5	-4.235	699	194	724	399	300	694	325	899	872	-24	897	182	227	785	253	990
2	13	0.0	1138.0	-104.8	6797.0	-2142.0	187.6	0.0	422.5	-38.9	0.0	2331.8	-78.9	0.0	-1121.6	-35.2	0.0	495.0	-4.235	692	202	725	399	298	696	330	893	859	-8	892	189	221	792	254	989
2	14	0.0	936.9	-154.7	6797.0	-1772.0	290.1	0.0	347.7	-57.5	0.0	2161.7	-143.1	0.0	-1176.1	-35.2	0.0	488.4	-4.235	684	212	729	393	302	691	347	872	839	17	884	198	222	791	267	972
2	15	0.0	658.3	-204.7	6797.0	-1243.0	392.7	0.0	244.1	-76.1	0.0	1907.3	-183.1	0.0	-1230.7	-35.2	0.0	481.8	-4.235	673	225	737	384	312	678	375	836	811	52	874	211	228	783	292	941
2	16	0.0	302.2	-254.7	6797.0	-554.5	495.3	0.0	111.6	-94.7	0.0	1574.6	-248.6	0.0	-1285.2	-35.2	0.0	475.3	-4.235	661	241	748	370	329	657	415	786	776	96	863	225	241	767	328	896
2	17	0.0	-131.0	-304.6	6797.0	292.2	597.8	0.0	-49.6	-113.3	0.0	1182.4	-224.6	0.0	-1364.2	-97.3	0.0	468.7	-4.235	649	256	764	349	349	631	465	724	738	145	853	238	256	748	372	841
2	18	0.0	-642.1	-354.6	6797.0	1299.0	700.5	0.0	-239.7	-131.9	0.0	864.2	-127.6	0.0	-1590.1	-197.8	0.0	462.1	-4.235	651	254	801	304	361	617	511	667	718	170	867	220	253	752	403	802
2	19	0.0	-1230.0	-404.5	6797.0	2440.0	757.1	0.0	-458.5	-150.5	0.0	725.4	-52.2	0.0	-1989.1	-316.5	0.0	455.6	-4.235	674	225	862	226	358	621	546	622	731	153	919	155	222	790	411	792
2	20	0.0	-1903.0	-463.4	7161.0	3447.0	369.6	0.0	-706.4	-169.1	0.0	692.9	19.6	0.0	-2562.4	-475.2	0.0	449.0	-4.235	548	162	739	118	203	558	394	515	599	103	790	59	40	745	231	701
2	21	0.0	-2674.0	-531.3	7306.0	3925.0	6.4	0.0	-983.0	-187.7	0.0	749.6	60.7	0.0	-3368.3	-570.1	0.0	442.4	-4.235	462	276	670	217	36	766	243	707	517	213	724	154	-178	1012	30	952
3	1	0.0	-2673.0	526.4	7247.0	3912.0	-1.3	0.0	-982.6	186.0	0.0	749.6	-82.3	0.0	-3368.3	591.3	0.0	442.5	-5E-05	457	275	664	215	31	765	238	705	512	212	719	153	-182	1010	24	951
3	2	0.0	-1910.0	458.6	7247.0	3627.0	-366.6	0.0	-708.8	167.4	0.0	659.1	-40.7	0.0	-2545.6	484.8	0.0	442.5	-5E-05	572	143	770	93	233	533	430	484	621	87	819	37	71	718	269	669
3	3	0.0	-1245.0	399.6	7247.0	2620.0	-731.6	0.0	-463.7	148.8	0.0	657.5	31.3	0.0	-1953.5	325.5	0.0	442.5	-5E-05	721	236	923	237	417	617	619	618	773	171	975	172	284	784	486	785
3	4	0.0	-663.7	349.7	7247.0	1153.0	-892.3	0.0	-247.4	130.2	0.0	789.3	176.9	0.0	-1537.8	206.1	0.0	442.5	-5E-05	646	331	797	394	371	676	522	739	707	254	859	317	266	807	418	870
3	5	0.0	-160.6	299.7	7014.0	156.8	-569.5	0.0	-60.1	111.6	0.0	1092.5	215.2	0.0	-1296.9	104.2	0.0	442.5	-5E-05	625	320	739	422	344	672	458	775	707	217	821	319	256	783	370	885
3	6	0.0	265.4	249.8	7014.0	-561.6	-357.0	0.0	98.6	93.0	0.0	1499.6	267.7	0.0	-1238.5	11.1	0.0	442.5	-5E-05	656	281	746	414	339	678	429	811	766	144	856	276	255	784	345	917

		TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	7	0.0	613.7	199.8	6852.0	-1004.0	-340.9	0.0	228.2	74.4	0.0	1864.0	204.6	0.0	-1221.3	11.1	0.0	442.5	-5E-05	696	206	768	355	343	648	415	797	830	38	902	187	260	752	332	901
3	8	0.0	884.8	149.9	6786.0	-1483.0	-336.1	0.0	329.2	55.8	0.0	2150.0	163.5	0.0	-1204.1	11.1	0.0	442.5	-5E-05	710	177	765	346	330	653	385	822	864	-15	919	153	248	756	303	925
3	9	0.0	1078.0	99.9	6797.0	-1928.0	-231.1	0.0	401.2	37.2	0.0	2351.8	100.4	0.0	-1186.9	11.1	0.0	442.5	-5E-05	709	181	748	369	310	681	350	869	876	-29	916	159	229	782	269	970
3	10	0.0	1195.0	50.0	6797.0	-2207.0	-126.5	0.0	444.5	18.6	0.0	2475.2	59.3	0.0	-1169.6	11.1	0.0	442.5	-5E-05	706	185	736	384	296	698	327	898	882	-36	912	164	217	798	247	997
3	11	0.0	1233.0	0.0	6797.0	-2326.0	-25.9	0.0	458.9	0.0	0.0	2514.4	-4.9	0.0	-1152.4	-10.0	0.0	442.5	-5E-05	700	191	727	396	289	707	315	912	879	-32	905	172	210	806	237	1010
3	12	0.0	1195.0	-49.9	6797.0	-2287.0	76.6	0.0	444.5	-18.6	0.0	2475.2	-59.3	0.0	-1169.6	-11.1	0.0	442.5	-5E-05	694	200	721	403	284	713	312	916	869	-20	897	183	204	813	232	1016
3	13	0.0	1078.0	-99.9	6797.0	-2089.0	179.2	0.0	401.3	-37.2	0.0	2351.8	-99.3	0.0	-1186.8	-11.1	0.0	442.5	-5E-05	684	212	718	407	285	712	320	906	852	2	886	197	204	813	239	1007
3	14	0.0	884.9	-149.8	6797.0	-1732.0	281.8	0.0	329.2	-55.8	0.0	2150.1	-163.5	0.0	-1204.1	-11.1	0.0	442.5	-5E-05	673	226	719	405	293	702	340	881	827	33	873	212	211	805	258	984
3	15	0.0	613.9	-199.8	6797.0	-1216.0	384.3	0.0	228.3	-74.4	0.0	1863.9	-203.5	0.0	-1221.3	-11.1	0.0	442.5	-5E-05	659	243	724	400	307	684	371	842	794	74	858	232	224	789	288	946
3	16	0.0	265.7	-249.7	6797.0	-541.0	486.9	0.0	98.7	-93.0	0.0	1499.6	-269.0	0.0	-1238.5	-11.1	0.0	442.5	-5E-05	644	262	731	390	327	659	414	788	754	124	841	253	243	765	330	893
3	17	0.0	-160.3	-299.7	6797.0	293.5	589.5	0.0	-60.0	-111.6	0.0	1092.5	-214.0	0.0	-1296.8	-104.2	0.0	442.5	-5E-05	631	278	747	371	350	631	465	724	713	176	828	269	261	742	377	835
3	18	0.0	-663.6	-349.7	6797.0	1287.0	692.1	0.0	-247.4	-130.2	0.0	789.3	-178.2	0.0	-1537.8	-206.1	0.0	442.5	-5E-05	635	274	784	324	360	618	509	669	696	197	845	248	255	750	404	800
3	19	0.0	-1244.0	-399.6	6797.0	2415.0	748.7	0.0	-463.5	-148.8	0.0	661.8	-39.9	0.0	-1953.5	-325.5	0.0	442.5	-5E-05	659	243	847	246	354	625	542	628	712	178	899	180	221	792	409	794
3	20	0.0	-1909.0	-458.5	7161.0	3409.0	361.3	0.0	-708.6	-167.4	0.0	659.1	40.7	0.0	-2545.6	-484.8	0.0	442.5	-5E-05	537	174	727	131	197	564	387	522	586	118	776	75	36	750	226	707
3	21	0.0	-2673.0	-526.4	7306.0	3875.0	-1.9	0.0	-982.6	-186.0	0.0	749.7	82.3	0.0	-3368.3	-591.3	0.0	442.5	-5E-05	455	284	661	226	29	774	235	716	510	221	716	164	-185	1019	22	962
4	1	0.0	-2674.0	531.2	7247.0	3861.0	-1.6	0.0	-982.8	187.7	0.0	749.7	-60.7	0.0	-3368.3	570.1	0.0	442.4	4.236	450	283	655	226	24	774	229	716	504	221	710	163	-190	1019	15	961
4	2	0.0	-1903.0	463.4	7247.0	3575.0	-367.0	0.0	-706.4	169.1	0.0	692.9	-19.6	0.0	-2562.5	475.2	0.0	449.0	4.236	570	145	766	98	225	542	421	494	621	87	817	39	63	728	259	681
4	3	0.0	-1230.0	404.5	7247.0	2568.0	-731.9	0.0	-458.5	150.5	0.0	725.3	52.2	0.0	-1989.1	316.5	0.0	455.6	4.236	725	232	924	235	409	628	609	631	782	160	982	163	273	797	473	800
4	4	0.0	-642.1	354.5	7247.0	1102.0	-892.6	0.0	-239.7	131.9	0.0	864.2	126.4	0.0	-1590.1	197.8	0.0	462.1	4.236	652	323	802	388	362	686	512	751	719	239	869	305	254	821	404	887
4	5	0.0	-131.2	304.6	7014.0	104.4	-569.7	0.0	-49.6	113.3	0.0	1182.4	225.7	0.0	-1364.2	97.3	0.0	468.7	4.236	635	307	748	411	336	683	448	787	724	196	836	301	243	799	355	903
4	6	0.0	302.1	254.6	7014.0	-613.9	-357.3	0.0	111.6	94.7	0.0	1574.6	247.3	0.0	-1285.2	35.2	0.0	475.3	4.236	667	267	755	402	335	684	423	819	782	123	870	258	247	793	335	928
4	7	0.0	658.1	204.7	6852.0	-1057.0	-341.2	0.0	244.0	76.1	0.0	1907.3	184.2	0.0	-1230.7	35.2	0.0	481.8	4.236	706	194	776	345	344	646	415	798	844	21	914	172	261	751	331	903
4	8	0.0	936.8	154.7	6733.0	-1504.0	-333.5	0.0	347.7	57.5	0.0	2161.7	143.1	0.0	-1176.2	35.2	0.0	488.4	4.236	720	156	774	325	338	635	392	804	876	-38	929	130	258	735	312	904
4	9	0.0	1138.0	104.8	6744.0	-1946.0	-229.4	0.0	422.4	38.9	0.0	2331.8	80.0	0.0	-1121.6	35.2	0.0	495.0	4.236	718	161	757	348	324	655	362	843	886	-49	924	139	248	751	286	938
4	10	0.0	1262.0	54.8	6744.0	-2223.0	-127.7	0.0	468.3	20.3	0.0	2423.6	38.9	0.0	-1067.1	35.2	0.0	501.5	4.236	715	165	744	364	316	665	345	864	888	-52	917	147	243	756	272	955
4	11	0.0	1308.0	4.9	6744.0	-2342.0	-26.1	0.0	485.4	1.7	0.0	2431.1	-15.5	0.0	-1012.6	35.2	0.0	508.1	4.236	709	173	734	377	314	667	339	872	883	-45	908	159	245	754	270	958
4	12	0.0	1277.0	-45.1	6744.0	-2304.0	75.6	0.0	473.7	-16.9	0.0	2360.2	-79.7	0.0	-958.8	34.2	0.0	514.7	4.236	701	183	727	386	318	662	344	865	870	-29	896	174	253	744	279	947
4	13	0.0	1168.0	-95.0	6744.0	-2108.0	177.3	0.0	433.1	-35.5	0.0	2205.2	-119.7	0.0	-933.0	16.1	0.0	521.2	4.236	690	196	723	391	325	653	358	848	849	-3	882	192	262	733	295	927
4	14	0.0	982.0	-145.0	6744.0	-1755.0	278.9	0.0	363.8	-54.1	0.0	1971.7	-183.9	0.0	-908.1	16.1	0.0	527.8	4.236	677	212	722	392	338	637	383	816	820	33	865	212	277	714	322	894
4	15	0.0	718.5	-195.0	6744.0	-1243.0	380.7	0.0	265.5	-72.7	0.0	1654.0	-223.9	0.0	-883.2	16.1	0.0	534.4	4.236	662	231	725	389	358	612	420	770	784	79	846	236	298	688	360	845
4	16	0.0	377.8	-244.9	6744.0	-575.0	482.3	0.0	138.5	-91.3	0.0	1258.0	-289.4	0.0	-858.3	16.1	0.0	540.9	4.236	645	253	730	382	383	581	468	710	740	134	825	263	325	654	410	783
4	17	0.0	-40.7	-294.9	6744.0	251.7	584.0	0.0	-17.4	-109.9	0.0	849.9	-213.1	0.0	-905.0	-98.3	0.0	547.5	4.236	633	268	746	362	407	551	520	645	700	184	813	278	346	628	459	722
4	18	0.0	-536.2	-344.8	6744.0	1235.0	685.6	0.0	-202.0	-128.5	0.0	553.0	-160.6	0.0	-1141.9	-216.9	0.0	554.1	4.236	638	261	785	313	418	537	564	589	685	202	832	254	340	635	487	687
4	19	0.0	-1110.0	-394.8	6744.0	2354.0	741.8	0.0	-415.7	-147.1	0.0	440.7	-38.2	0.0	-1551.8	-311.0	0.0	560.6	4.236	664	228	849	233	413	543	598	547	704	179	889	183	308	675	492	679
4	20	0.0	-1767.0	-453.7	7105.0	3339.0	357.9	0.0	-658.0	-165.7	0.0	443.8	34.8	0.0	-2187.2	-479.9	0.0	567.2	4.236	544	159	731	119	249	499	436	458	581	117	768	76	111	658	298	617
4	21	0.0	-2523.0	-521.5	7225.0	3794.0	-1.9	0.0	-929.2	-184.3	0.0	527.5	76.1	0.0	-3009.1	-576.9	0.0	573.8	4.236	461	268	664	213	79	707	282	651	504	219	706	164	-111	926	91	870
5	1	0.0	-2523.0	511.9	7144.0	3776.0	-62.1	0.0	-929.2	182.7	0.0	527.5	-22.0	0.0	-3009.1	521.6	0.0	573.8	-23.9	454	267	656	211	73	706	274	650	497	218	698	162	-118	925	83	869
5	2	0.0	-1940.0	459.4	7144.0	3444.0	-490.9	0.0	-718.5	168.3	0.0	525.3	10.3	0.0	-2442.4	435.1	0.0	545.1	-23.9	530	180	721	136	205	554	396	510	572	132	763	88	50	732	241	688
5	3	0.0	-1415.0	413.8	7144.0	2448.0	-913.8	0.0	-525.0	153.9	0.0	582.2	67.3	0.0	-2024.5	307.9	0.0	516.4	-23.9	647	313	841	320	337	702	531	708	695	253	889	259	199	874	393	881
5	4	0.0	-942.4	375.1	6899.0	1162.0	-887.9	0.0	-349.1	139.5	0.0	717.1	157.6	0.0	-1726.5	185.4	0.0	487.7	-23.9	555	390	701	448	264	755	410	812	612	319	758	376	146	902	293	960
5	5	0.0	-515.4	336.4	6899.0	343.2	-526.6	0.0	-190.3	125.1	0.0	983.2	280.3	0.0	-1566.3	81.6	0.0	459.0	-23.9	554	392	672	484	254	767	373	859	628	298	747	390	148	900	266	992
5	6	0.0	-135.1	297.8	6899.0	-115.3	-248.8	0.0	-48.9	110.7	0.0	1287.1	241.8	0.0	-1468.4	81.6	0.0	430.3	-23.9	601	333	704	444	283	731	386	843	696	214	799	326	183	856	286	968
5	7	0.0	199.2	259.1	6696.0	-384.6	-285.9	0.0	75.4	96.3	0.0	1544.5	187.3	0.0	-1370.5	81.6	0.0	401.6	-23.9	647	242	738	363	315	658	406	778	759	102	850	222	222	775	313	895
5	8	0.0	487.0	220.4	7338.0	-1065.0	-313.1	0.0	182.3	81.9	0.0	1751.2	147.8	0.0	-1272.6	81.6	0.0	373.0	-23.9	674	310	751	469	333	737	411	896	799	153	877	312	247	845	324	1004
5	9	0.0	728.2	181.8	7326.0	-1411.0	-263.1	0.0	272.0	67.5	0.0	1910.1	117.1	0.0	-1174.7	81.6	0.0	344.3	-23.9	690	288	755	462	346	719	411	893	826	118	891	292	266	819	331	993
5	10	0.0	923.2	143.1	7326.0	-1683.0	-191.9	0.0	344.4	53.1	0.0	2021.4	77.6	0.0	-1076.9	81.6	0.0	315.6	-23.9	703	272	759	457	360	702	416	887	845	93	902	278	286	794	343	979
5	11	0.0	1072.0	104.4	7326.0	-1872.0	-122.9	0.0	399.5	38.7	0.0	2080.6	37.9	0.0	-978.9	81.6	0.0	286.9	-23.9	712	260	762	454	375	682	425	876	858	77	908	270	309	766	359	959
5	12	0.0	1174.0	65.7	7326.0	-1976.0	-54.0	0.0	437.3	24.3	0.0	2094.9	-16.4	0.0	-881.1	81.6	0.0	258.2	-23.9	718	252	765	450	393	660	439	858	865	68	912	266	333	735	379	933
5	13	0.0	1229.0	27.1	7326.0	-2001.0	15.0	0.0	457.8	9.9	0.0	2057.1	-57.2	0.0	-783.2	81.6	0.0	229.5	-23.9	722	248	767	447	412	636	458	835	865	68	911	267	359	703	404	902
5	14	0.0	1239.0	-11.6	7326.0	-1942.0	83.9	0.0	461.1	-4.5	0.0	1971.6	-86.7	0.0	-685.3	81.6	0.0	200.9	-23.9	722	248	769	444	433	609	481	806	859	76	907	272	387	668	434	864
5	15	0.0	1202.0	-50.3	7326.0	-1800.0	152.9	0.0	447.0	-18.9	0.0	1838.4	-126.2	0.0	-587.4	81.6	0.0	172.2	-23.9	719	252	771	442	456	580	509	771	847	91	899	282	416	630	469	821
5	16	0.0	1118.0	-89.0	7326.0	-1575.0	221.9	0.0	415.7	-33.3	0.0	1652.3	-165.9	0.0	-489.5	81.6	0.0	143.5	-23.9	712	260	772	441	481	549	541	730	827	116	887	297	448	591	508	772
5	17	0.0	988.1	-127.6	7326.0	-1267.0	290.8	0.0	367.1	-47.7	0.0	1422.8	-220.5	0.0	-391.6	81.6	0.0	114.8	-23.9	703	271	774	439	508	516	579	683	802	148	872	315	481	549	552	717
5	18	0.0	811.7	-166.3	7326.0	-876.9	359.8	0.0	301.3	-62.1	0.0	1140.4	-260.0	0.0	-293.7	81.6	0.0	86.1	-23.9	690	287	774	438	537	480	620	631	769	188	853	339	517	505	600	656
5	19	0.0	588.9	-205.0	7326.0	-403.6	428.8	0.0	218.1	-76.5	0.0	810.1	-289.5	0.0	-195.8	81.6	0.0	57.4	-23.9	674	307	774	438	567	442	667	573	731	237	831	368	554	459	654	589
5	20	0.0	319.7	-243.7	7326.0	152.1	497.7	0.0	117.7	-90.9	0.0	432.1	-329.1	0.0	-97.9	81.6	0.0	28.7	-23.9	656	331	775	438	599	402	718	509	686	293	804	400	592	410	711	517
5	21	0.0	-0.1	-289.3	7326.0	947.8	566.7	0.0	0.0	-105.3	0.0	0.0	-354.8	0.0	0.0	17.4	0.0	0.0	-23.9	512	221	625	270	512	221	625	270	512	221	625	270	512	221	625	270

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO: L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1508.5

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As mín.Inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As mín.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As mín. (cm2/m.)	Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t/ m2.)	Tens.inf. σ i (t/ m2.)
1	1	-0.3	-0.6	17.510	2.000	14.000	7.560	621.600	0.778	1.222	0.00	0.00	30.705	8.55	0.00	0.000	5	491	205
1	2	1341.5	246.6	12.892	2.000	14.000	7.560	621.600	0.892	1.108	0.00	0.00	30.705	6.30	0.00	0.000	5	669	257
1	3	2499.0	432.5	12.892	2.000	14.000	7.560	621.600	0.993	1.007	0.00	0.00	30.705	6.30	0.00	0.000	5	681	242
1	4	3492.8	560.8	12.892	2.000	14.000	7.560	621.600	1.079	0.921	0.00	0.00	30.705	6.30	0.00	0.000	5	712	204
1	5	4313.8	632.0	12.892	2.000	14.000	7.560	621.600	1.150	0.850	0.00	0.00	30.705	6.30	0.00	0.000	5	738	171
1	6	4973.9	646.0	12.892	2.000	14.000	7.560	621.600	1.208	0.792	0.00	0.00	30.705	6.30	0.00	0.000	5	761	141
1	7	5456.7	602.1	12.892	2.000	14.000	7.560	621.600	1.251	0.749	0.00	0.00	30.705	6.30	0.00	0.000	5	780	119
1	8	5771.9	501.2	12.892	2.000	14.000	7.560	621.600	1.280	0.720	0.00	0.00	30.705	6.30	0.00	0.000	5	794	101
1	9	5920.8	343.3	12.892	2.000	14.000	7.560	621.600	1.295	0.705	0.00	0.00	30.705	6.30	0.00	0.000	5	805	87
1	10	5897.0	127.5	12.892	2.000	14.000	7.560	621.600	1.296	0.704	0.00	0.00	30.705	6.30	0.00	0.000	5	811	80
1	11	5716.3	-145.1	12.892	2.000	14.000	7.560	621.600	1.283	0.717	0.00	1.23	30.705	6.30	0.00	0.000	5	808	122
1	12	5350.7	-475.0	12.892	2.000	14.000	7.560	621.600	1.256	0.744	0.00	0.44	30.705	6.30	0.00	0.000	5	806	125
1	13	4826.5	-862.4	12.892	2.000	14.000	7.560	621.600	1.215	0.785	0.00	0.00	30.705	6.30	0.00	0.000	5	801	131
1	14	4130.9	-1307.0	12.892	2.000	14.000	7.560	621.600	1.161	0.839	0.00	0.00	30.705	6.30	0.00	0.000	5	791	143
1	15	3263.7	-1809.1	12.892	2.000	14.000	7.560	621.600	1.093	0.907	0.00	0.00	30.705	6.30	0.00	0.000	5	779	178
1	16	2349.5	-2479.4	12.892	2.000	14.000	7.560	621.600	1.012	0.988	0.00	0.00	30.705	6.30	0.00	0.000	5	769	195
1	17	1476.1	-3408.7	12.892	2.000	14.000	7.560	621.600	0.916	1.084	0.00	0.00	30.705	6.30	0.00	0.000	5	752	217
1	18	644.0	-4528.1	12.892	2.000	14.000	7.560	621.600	0.807	1.193	0.00	0.00	30.705	6.30	0.00	0.000	5	750	219
1	19	-99.4	-5948.8	12.892	2.000	14.000	7.560	621.600	0.707	1.293	0.00	0.00	30.705	6.30	0.00	0.000	5	735	221
1	20	-787.3	-7651.6	17.510	2.000	14.000	7.560	621.600	0.647	1.353	0.00	0.00	30.705	8.55	0.00	0.000	5	557	156
1	21	-1455.2	-9692.3	17.510	2.000	14.000	7.560	621.600	0.627	1.373	0.00	0.00	30.705	8.55	0.00	0.000	5	494	237

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As mín.Inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As mín.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As mín. (cm2/m.)	Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t/ m2.)	Tens.inf. σ i (t/ m2.)
2	1	-1454.0	-9690.0	17.510	2.000	14.000	7.560	621.600	0.627	1.373	0.00	0.00	30.705	8.55	0.00	0.000	5	489	236
2	2	-666.0	-6918.1	17.510	2.000	14.000	7.560	621.600	0.666	1.334	0.00	0.00	30.705	8.55	0.00	0.000	5	599	110
2	3	129.8	-4587.5	12.892	2.000	14.000	7.560	621.600	0.784	1.216	0.00	0.00	30.705	6.30	0.00	0.000	5	748	199
2	4	996.5	-2746.7	12.892	2.000	14.000	7.560	621.600	0.966	1.034	0.00	0.00	30.705	6.30	0.00	0.000	5	678	287
2	5	2044.3	-1347.9	12.892	2.000	14.000	7.560	621.600	1.116	0.884	0.00	0.00	30.705	6.30	0.00	0.000	5	677	252
2	6	3473.5	-734.6	12.892	2.000	14.000	7.560	621.600	1.220	0.780	0.00	0.00	30.705	6.30	0.00	0.000	5	735	179
2	7	4759.4	-359.1	12.892	2.000	14.000	7.560	621.600	1.297	0.703	0.00	1.65	30.705	6.30	0.00	0.000	5	804	67
2	8	5768.5	-79.0	12.892	2.000	14.000	7.560	621.600	1.375	0.625	0.00	3.92	30.705	6.30	0.00	0.000	5	847	6
2	9	6491.5	82.4	12.892	2.000	14.000	7.560	621.600	1.440	0.560	0.00	0.00	30.705	6.30	0.00	0.000	5	864	-14
2	10	6938.5	137.5	12.892	2.000	14.000	7.560	621.600	1.482	0.518	0.00	0.00	30.705	6.30	0.00	0.000	5	875	-27
2	11	7099.0	95.3	12.892	2.000	14.000	7.560	621.600	1.499	0.501	0.00	0.00	30.705	6.30	0.00	0.000	5	877	-30
2	12	6983.2	-43.3	12.892	2.000	14.000	7.560	621.600	1.493	0.507	0.00	7.36	30.705	6.30	0.00	0.000	5	872	-24
2	13	6581.0	-278.0	12.892	2.000	14.000	7.560	621.600	1.463	0.537	0.00	6.48	30.705	6.30	0.00	0.000	5	859	-8
2	14	5902.1	-608.1	12.892	2.000	14.000	7.560	621.600	1.409	0.591	0.00	4.91	30.705	6.30	0.00	0.000	5	839	17
2	15	4937.2	-1033.9	12.892	2.000	14.000	7.560	621.600	1.331	0.669	0.00	2.64	30.705	6.30	0.00	0.000	5	811	52
2	16	3695.6	-1555.4	12.892	2.000	14.000	7.560	621.600	1.230	0.770	0.00	0.00	30.705	6.30	0.00	0.000	5	776	96
2	17	2314.2	-2317.1	12.892	2.000	14.000	7.560	621.600	1.104	0.896	0.00	0.00	30.705	6.30	0.00	0.000	5	738	145
2	18	1195.8	-3707.9	12.892	2.000	14.000	7.560	621.600	0.955	1.045	0.00	0.00	30.705	6.30	0.00	0.000	5	718	170
2	19	251.8	-5516.4	12.892	2.000	14.000	7.560	621.600	0.786	1.214	0.00	0.00	30.705	6.30	0.00	0.000	5	731	153
2	20	-635.6	-7757.8	17.510	2.000	14.000	7.560	621.600	0.667	1.333	0.00	0.00	30.705	8.55	0.00	0.000	5	599	103
2	21	-1503.2	-10537.9	17.510	2.000	14.000	7.560	621.600	0.627	1.373	0.00	0.00	30.705	8.55	0.00	0.000	5	517	213

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As mín.Inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As mín.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As mín. (cm2/m.)	Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t/ m2.)	Tens.inf. σ i (t/ m2.)
3	1	-1501.8	-10535.8	17.510	2.000	14.000	7.560	621.600	0.627	1.373	0.00	0.00	30.705	8.55	0.00	0.000	5	512	212
3	2	-704.6	-7746.7	17.510	2.000	14.000	7.560	621.600	0.666	1.334	0.00	0.00	30.705	8.55	0.00	0.000	5	621	87
3	3	112.2	-5493.3	12.892	2.000	14.000	7.560	621.600	0.784	1.216	0.00	0.00	30.705	6.30	0.00	0.000	5	773	171
3	4	1027.8	-3673.4	12.892	2.000	14.000	7.560	621.600	0.966	1.034	0.00	0.00	30.705	6.30	0.00	0.000	5	707	254
3	5	2103.9	-2276.3	12.892	2.000	14.000	7.560	621.600	1.116	0.884	0.00	0.00	30.705	6.30	0.00	0.000	5	707	217
3	6	3459.1	-1530.2	12.892	2.000	14.000	7.560	621.600	1.220	0.780	0.00	0.00	30.705	6.30	0.00	0.000	5	766	144

3	7	4722.6	-1074.3	12.892	2.000	14.000	7.560	621.600	1.297	0.703	0.00	1.65	30.705	6.30	0.00	0.000	5	830	38
3	8	5709.7	-713.5	12.892	2.000	14.000	7.560	621.600	1.375	0.625	0.00	3.92	30.705	6.30	0.00	0.000	5	864	-15
3	9	6410.3	-449.0	12.892	2.000	14.000	7.560	621.600	1.440	0.560	0.00	5.82	30.705	6.30	0.00	0.000	5	876	-29
3	10	6835.7	-278.9	12.892	2.000	14.000	7.560	621.600	1.482	0.518	0.00	7.03	30.705	6.30	0.00	0.000	5	882	-36
3	11	6973.2	-205.9	12.892	2.000	14.000	7.560	621.600	1.499	0.501	0.00	7.54	30.705	6.30	0.00	0.000	5	879	-32
3	12	6835.8	-278.9	12.892	2.000	14.000	7.560	621.600	1.493	0.507	0.00	7.36	30.705	6.30	0.00	0.000	5	869	-20
3	13	6410.5	-448.9	12.892	2.000	14.000	7.560	621.600	1.463	0.537	0.00	6.48	30.705	6.30	0.00	0.000	5	852	2
3	14	5710.0	-713.4	12.892	2.000	14.000	7.560	621.600	1.409	0.591	0.00	4.91	30.705	6.30	0.00	0.000	5	827	33
3	15	4723.0	-1074.0	12.892	2.000	14.000	7.560	621.600	1.331	0.669	0.00	2.64	30.705	6.30	0.00	0.000	5	794	74
3	16	3459.7	-1529.9	12.892	2.000	14.000	7.560	621.600	1.230	0.770	0.00	0.00	30.705	6.30	0.00	0.000	5	754	124
3	17	2104.2	-2275.7	12.892	2.000	14.000	7.560	621.600	1.104	0.896	0.00	0.00	30.705	6.30	0.00	0.000	5	713	176
3	18	1027.8	-3673.2	12.892	2.000	14.000	7.560	621.600	0.955	1.045	0.00	0.00	30.705	6.30	0.00	0.000	5	696	197
3	19	119.7	-5491.5	12.892	2.000	14.000	7.560	621.600	0.786	1.214	0.00	0.00	30.705	6.30	0.00	0.000	5	712	178
3	20	-703.5	-7744.8	17.510	2.000	14.000	7.560	621.600	0.667	1.333	0.00	0.00	30.705	8.55	0.00	0.000	5	586	118
3	21	-1501.8	-10535.9	17.510	2.000	14.000	7.560	621.600	0.627	1.373	0.00	0.00	30.705	8.55	0.00	0.000	5	510	221

VANO	SECCIÓN	Md(+)	Md(-)	Area	Canto	Ancho	Ancho Inf.				SEGÚN ARTICULO 47.8		Perimetro	ART.51.3	Pretensado	Dist. pret.	Número	Tens.sup.	Tens.inf.
				A	h	b	bi	Ap	dp,inf	dp,sup	As mín.inf.	As mín.sup.	u	As mín.	preteso inf.	preteso.Di	hipótesis	σ s	σ i
		(mt)	(mt)	(m2)	(m.)	(m.)	(m.)	(cm2.)	(m.)	(m.)	(cm2/m.)	(cm2/m.)	(m.)	(cm2/m.)	(cm2.)	(m.)	combinacion	(t./ m2.)	(t./ m2.)
4	1	-1503.0	-10537.7	17.510	2.000	14.000	7.560	621.600	0.627	1.373	0.00	0.00	30.705	8.55	0.00	0.000	5	504	221
4	2	-635.5	-7757.8	17.510	2.000	14.000	7.560	621.600	0.666	1.334	0.00	0.00	30.705	8.55	0.00	0.000	5	621	87
4	3	251.7	-5516.5	12.892	2.000	14.000	7.560	621.600	0.784	1.216	0.00	0.00	30.705	6.30	0.00	0.000	5	782	160
4	4	1195.9	-3707.9	12.892	2.000	14.000	7.560	621.600	0.966	1.034	0.00	0.00	30.705	6.30	0.00	0.000	5	719	239
4	5	2314.0	-2317.6	12.892	2.000	14.000	7.560	621.600	1.116	0.884	0.00	0.00	30.705	6.30	0.00	0.000	5	724	196
4	6	3695.4	-1555.5	12.892	2.000	14.000	7.560	621.600	1.220	0.780	0.00	0.00	30.705	6.30	0.00	0.000	5	782	123
4	7	4936.8	-1034.2	12.892	2.000	14.000	7.560	621.600	1.297	0.703	0.00	1.65	30.705	6.30	0.00	0.000	5	844	21
4	8	5901.9	-608.2	12.892	2.000	14.000	7.560	621.600	1.375	0.625	0.00	3.92	30.705	6.30	0.00	0.000	5	876	-38
4	9	6580.8	-278.1	12.892	2.000	14.000	7.560	621.600	1.440	0.560	0.00	5.82	30.705	6.30	0.00	0.000	5	886	-49
4	10	6983.0	-43.4	12.892	2.000	14.000	7.560	621.600	1.482	0.518	0.00	7.03	30.705	6.30	0.00	0.000	5	888	-52
4	11	7098.9	95.2	12.892	2.000	14.000	7.560	621.600	1.499	0.501	0.00	0.00	30.705	6.30	0.00	0.000	5	883	-45
4	12	6938.4	137.4	12.892	2.000	14.000	7.560	621.600	1.493	0.507	0.00	0.00	30.705	6.30	0.00	0.000	5	870	-29
4	13	6491.2	41.5	12.892	2.000	14.000	7.560	621.600	1.463	0.537	0.00	0.00	30.705	6.30	0.00	0.000	5	849	-3
4	14	5768.0	-150.9	12.892	2.000	14.000	7.560	621.600	1.409	0.591	0.00	4.91	30.705	6.30	0.00	0.000	5	820	33
4	15	4758.6	-439.2	12.892	2.000	14.000	7.560	621.600	1.331	0.669	0.00	2.64	30.705	6.30	0.00	0.000	5	784	79
4	16	3472.8	-822.7	12.892	2.000	14.000	7.560	621.600	1.230	0.770	0.00	0.00	30.705	6.30	0.00	0.000	5	740	134
4	17	2043.8	-1444.7	12.892	2.000	14.000	7.560	621.600	1.104	0.896	0.00	0.00	30.705	6.30	0.00	0.000	5	700	184
4	18	996.3	-2820.1	12.892	2.000	14.000	7.560	621.600	0.955	1.045	0.00	0.00	30.705	6.30	0.00	0.000	5	685	202
4	19	128.8	-4616.2	12.892	2.000	14.000	7.560	621.600	0.786	1.214	0.00	0.00	30.705	6.30	0.00	0.000	5	704	179
4	20	-666.1	-6918.3	17.510	2.000	14.000	7.560	621.600	0.667	1.333	0.00	0.00	30.705	8.55	0.00	0.000	5	581	117
4	21	-1455.0	-9692.0	17.510	2.000	14.000	7.560	621.600	0.627	1.373	0.00	0.00	30.705	8.55	0.00	0.000	5	504	219

VANO	SECCIÓN	Md(+)	Md(-)	Area	Canto	Ancho	Ancho Inf.				SEGÚN ARTICULO 47.8		Perimetro	ART.51.3	Pretensado	Dist. pret.	Número	Tens.sup.	Tens.inf.
				A	h	b	bi	Ap	dp,inf	dp,sup	As mín.inf.	As mín.sup.	u	As mín.	preteso inf.	preteso.Di	hipótesis	σ s	σ i
		(mt)	(mt)	(m2)	(m.)	(m.)	(m.)	(cm2.)	(m.)	(m.)	(cm2/m.)	(cm2/m.)	(m.)	(cm2/m.)	(cm2.)	(m.)	combinacion	(t./ m2.)	(t./ m2.)
5	1	-1455.0	-9692.0	17.510	2.000	14.000	7.560	621.600	0.627	1.373	0.00	0.00	30.705	8.55	0.00	0.000	5	497	218
5	2	-787.1	-7651.4	17.510	2.000	14.000	7.560	621.600	0.663	1.337	0.00	0.00	30.705	8.55	0.00	0.000	5	572	132
5	3	-98.2	-5946.7	12.892	2.000	14.000	7.560	621.600	0.770	1.230	0.00	0.00	30.705	6.30	0.00	0.000	5	695	253
5	4	644.8	-4527.1	12.892	2.000	14.000	7.560	621.600	0.925	1.075	0.00	0.00	30.705	6.30	0.00	0.000	5	612	319
5	5	1528.1	-3408.0	12.892	2.000	14.000	7.560	621.600	1.034	0.966	0.00	0.00	30.705	6.30	0.00	0.000	5	628	298
5	6	2410.4	-2478.6	12.892	2.000	14.000	7.560	621.600	1.090	0.910	0.00	0.00	30.705	6.30	0.00	0.000	5	696	214
5	7	3331.1	-1808.7	12.892	2.000	14.000	7.560	621.600	1.130	0.870	0.00	0.00	30.705	6.30	0.00	0.000	5	759	102
5	8	4190.2	-1306.6	12.892	2.000	14.000	7.560	621.600	1.170	0.830	0.00	0.00	30.705	6.30	0.00	0.000	5	799	153
5	9	4881.9	-861.9	12.892	2.000	14.000	7.560	621.600	1.207	0.793	0.00	0.00	30.705	6.30	0.00	0.000	5	826	118
5	10	5406.9	-474.4	12.892	2.000	14.000	7.560	621.600	1.233	0.767	0.00	0.00	30.705	6.30	0.00	0.000	5	845	93
5	11	5758.5	-144.1	12.892	2.000	14.000	7.560	621.600	1.248	0.752	0.00	0.21	30.705	6.30	0.00	0.000	5	858	77
5	12	5946.6	128.6	12.892	2.000	14.000	7.560	621.600	1.252	0.748	0.00	0.00	30.705	6.30	0.00	0.000	5	865	68
5	13	5960.1	343.4	12.892	2.000	14.000	7.560	621.600	1.244	0.756	0.00	0.00	30.705	6.30	0.00	0.000	5	865	68
5	14	5808.9	502.2	12.892	2.000	14.000	7.560	621.600	1.225	0.775	0.00	0.00	30.705	6.30	0.00	0.000	5	859	76
5	15	5489.4	603.0	12.892	2.000	14.000	7.560	621.600	1.195	0.805	0.00	0.00	30.705	6.30	0.00	0.000	5	847	91
5	16	4994.3	646.1	12.892	2.000	14.000	7.560	621.600	1.154	0.846	0.00	0.00	30.705	6.30	0.00	0.000	5	827	116
5	17	4339.2	632.3	12.892	2.000	14.000	7.560	621.600	1.101	0.899	0.00	0.00	30.705	6.30	0.00	0.000	5	802	148
5	18	3509.2	561.2	12.892	2.000	14.000	7.560	621.600	1.037	0.963	0.00	0.00	30.705	6.30	0.00	0.000	5	769	188
5	19	2511.8	432.6	12.892	2.000	14.000	7.560	621.600	0.962	1.038	0.00	0.00	30.705	6.30	0.00	0.000	5	731	237
5	20	1347.4	246.8	12.892	2.000	14.000	7.560	621.600	0.875	1.125	0.00	0.00	30.705	6.30	0.00	0.000	5	686	293
5	21	-0.1	-0.2	17.510	2.000	14.000	7.560	621.600	0.778	1.222	0.00	0.00	30.705	8.55	0.00	0.000	5	512	221

Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.000	0.00	0.00	0.00	0.00	0.000	7	491	205	0.000	0.00	0.000	0.00	8.55	8.55	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	577	373	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	505	462	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	461	518	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	421	568	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	385	613	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	353	653	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	326	688	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	303	716	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	284	740	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	263	805	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	253	818	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	247	825	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	245	827	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	250	842	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	263	829	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	277	812	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	285	802	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	239	842	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	36	756	0.000	0.00	0.000	0.00	8.55	8.55	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	-121	944	0.228	0.00	3.187	11.38	11.38	11.38	8.55	8.55	8.55

Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.000	0.00	0.00	0.00	0.00	0.000	7	-126	943	0.235	0.00	3.297	11.77	11.77	11.77	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	128	651	0.000	0.00	0.000	0.00	8.55	8.55	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	355	691	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	342	709	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	333	682	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	330	687	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	327	664	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	311	677	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
1.969	0.00	0.23	1.54	0.00	0.000	7	282	716	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
1.941	0.00	0.45	2.97	0.00	0.000	7	257	747	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
1.935	0.00	0.49	3.26	0.00	0.000	7	239	769	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
1.947	0.00	0.40	2.64	0.00	0.000	7	227	785	0.000	0.00	0.000	0.00	7.36	7.36	6.30	6.30	6.30
1.983	0.00	0.13	0.87	0.00	0.000	7	221	792	0.000	0.00	0.000	0.00	6.48	6.48	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	222	791	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	228	783	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	241	767	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	256	748	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	253	752	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	222	790	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	40	745	0.000	0.00	0.000	0.00	8.55	8.55	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	-178	1012	0.299	0.00	4.186	14.95	14.95	14.95	8.55	8.55	8.55

Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.000	0.00	0.00	0.00	0.00	0.000	7	-182	1010	0.306	0.00	4.283	15.30	15.30	15.30	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	71	718	0.000	0.00	0.000	0.00	8.55	8.55	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	284	784	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	266	807	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	256	783	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	255	784	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30

0.000	0.00	0.00	0.00	0.00	0.000	7	260	752	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
1.965	0.00	0.26	1.75	0.00	0.000	7	248	756	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
1.936	0.00	0.48	3.18	0.00	0.000	7	229	782	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
1.922	0.00	0.59	3.90	0.00	0.000	7	217	798	0.000	0.00	0.000	0.00	7.03	7.03	6.30	6.30	6.30
1.929	0.00	0.54	3.56	0.00	0.000	7	210	806	0.000	0.00	0.000	0.00	7.54	7.54	6.30	6.30	6.30
1.954	0.00	0.35	2.29	0.00	0.000	7	204	813	0.000	0.00	0.000	0.00	7.36	7.36	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	204	813	0.000	0.00	0.000	0.00	6.48	6.48	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	211	805	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	224	789	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	243	765	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	261	742	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	255	750	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	221	792	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	36	750	0.000	0.00	0.000	0.00	8.55	8.55	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	-185	1019	0.307	0.00	4.295	15.34	15.34	15.34	8.55	8.55	8.55

Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.000	0.00	0.00	0.00	0.00	0.000	7	-190	1019	0.314	0.00	4.399	15.71	15.71	15.71	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	63	728	0.000	0.00	0.000	0.00	8.55	8.55	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	273	797	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	254	821	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	243	799	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	247	793	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	261	751	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
1.916	0.00	0.64	4.21	0.00	0.000	7	258	735	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
1.895	0.00	0.79	5.23	0.00	0.000	7	248	751	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
1.889	0.00	0.84	5.56	0.00	0.000	7	243	756	0.000	0.00	0.000	0.00	7.03	7.03	6.30	6.30	6.30
1.902	0.00	0.74	4.89	0.00	0.000	7	245	754	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
1.935	0.00	0.49	3.26	0.00	0.000	7	253	744	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
1.993	0.00	0.05	0.33	0.00	0.000	7	262	733	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	277	714	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	298	688	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	325	654	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	346	628	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	340	635	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	308	675	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	111	658	0.000	0.00	0.000	0.00	8.55	8.55	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	-111	926	0.215	0.00	3.004	10.73	10.73	10.73	8.55	8.55	8.55

Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.000	0.00	0.00	0.00	0.00	0.000	7	-118	925	0.226	0.00	3.168	11.32	11.32	11.32	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	50	732	0.000	0.00	0.000	0.00	8.55	8.55	8.55	8.55	8.55
0.000	0.00	0.00	0.00	0.00	0.000	7	199	874	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	146	902	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	148	900	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	183	856	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	222	775	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	247	845	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	266	819	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	286	794	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	309	766	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	333	735	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	359	703	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	387	668	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	416	630	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	448	591	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	481	549	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	517	505	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	554	459	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	592	410	0.000	0.00	0.000	0.00	6.30	6.30	6.30	6.30	6.30
0.000	0.00	0.00	0.00	0.00	0.000	7	512	221	0.000	0.00	0.000	0.00	8.55	8.55	8.55	8.55	8.55

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 24.00 tg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
1	1	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
1	2	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	3	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	4	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	5	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	6	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	7	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	8	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	9	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	10	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	11	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	12	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	13	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	14	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	15	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	16	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	17	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	18	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	19	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
1	20	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
1	21	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
1	1	-0.3	289.3	-0.1	105.3	383	0	-82	0	0.0	23.91	0.00	0.00	933.4	-640.1	6964
1	2	319.6	243.6	117.6	90.9	338	405	-83	-79	28.7	23.91	0.00	0.00	214.4	-557.9	6964
1	3	588.8	205.0	218.1	76.5	303	727	-86	-124	57.4	23.91	0.00	0.00	-555	-475.6	6964
1	4	811.4	166.3	301.2	62.1	268	979	-91	-143	86.1	23.91	0.00	0.00	-1076	-393.5	6964
1	5	987.8	127.6	367.1	47.7	235	1158	-99	-144	114.8	23.91	0.00	0.00	-1499	-311.3	6964
1	6	1118.0	89.0	415.6	33.3	206	1283	-108	-118	143.5	23.91	0.00	0.00	-1823	-229.1	6964
1	7	1201.0	50.3	446.9	18.9	174	1250	-120	-102	172.2	23.91	0.00	0.00	-2049	-146.9	6965
1	8	1238.0	11.6	461.0	4.5	149	1250	-134	-90	200.9	23.91	0.00	0.00	-2176	-64.62	6965
1	9	1229.0	-27.1	457.7	-9.9	126	1213	-150	-88	229.5	23.91	0.00	0.00	-2204	17.57	6965
1	10	1173.0	-65.8	437.1	-24.3	106	1146	-167	-105	258.2	23.91	0.00	0.00	-2134	98.76	6965
1	11	1071.0	-104.4	399.3	-38.7	88	1056	-189	194	286.9	23.91	0.00	0.00	-2116	182.4	7213
1	12	922.8	-143.1	344.2	-53.1	72	954	-221	138	315.6	23.91	0.00	0.00	-1848	264.8	7213
1	13	727.9	-181.8	271.8	-67.5	61	874	-249	8	344.3	23.91	0.00	0.00	-1481	347.3	7213
1	14	486.6	-220.4	182.2	-81.9	51	793	-279	-133	373.0	23.91	0.00	0.00	-1015	429.7	7213
1	15	198.8	-259.1	75.2	-96.3	43	715	-310	-361	401.7	23.91	0.00	0.00	-496.9	521.8	7342
1	16	-135.5	-297.8	-49.0	-110.7	36	645	-343	-645	430.4	23.91	0.00	0.00	196.6	606	7368
1	17	-515.8	-336.5	-190.4	-125.1	30	584	-383	-963	459.0	23.91	0.00	0.00	973.8	690.2	7368
1	18	-942.9	-375.1	-349.3	-139.5	27	541	-418	-1372	487.7	23.91	0.00	0.00	1853	774.4	7368
1	19	-1416.0	-413.8	-525.4	-153.9	24	517	-455	-1813	516.4	23.91	0.00	0.00	2658	546.8	7263
1	20	-1940.0	-459.4	-718.7	-168.3	22	512	-494	-2355	545.1	23.91	0.00	0.00	3316	302.8	7215
1	21	-2523.0	-512.0	-929.4	-182.7	22	528	-532	-2964	573.8	23.91	0.00	0.00	3703	56.71	7284

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 24.00 tg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
2	1	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
2	2	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
2	3	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	4	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	5	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	6	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	7	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	8	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	9	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	10	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	11	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	12	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	13	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	14	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	15	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	16	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	17	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	18	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	19	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
2	20	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
2	21	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
2	1	-2522.0	521.5	-928.9	184.3	590	-2958	-76	528	573.7	-4.235	0.00	0.00	3690	6.383	7226
2	2	-1767.0	453.6	-657.9	165.7	541	-2117	-77	426	567.2	-4.235	0.00	0.00	3417	-358.5	7226
2	3	-1109.0	394.7	-415.5	147.1	489	-1369	-79	355	560.6	-4.235	0.00	0.00	2424	-723.5	7226
2	4	-536.1	344.8	-202.0	128.5	443	-748	-83	313	554.1	-4.235	0.00	0.00	970.5	-884.2	7226
2	5	-40.3	294.8	-17.3	109.9	394	-214	-89	295	547.5	-4.235	0.00	0.00	-14.06	-561.2	6993
2	6	378.1	244.9	138.7	91.3	353	202	-97	295	540.9	-4.235	0.00	0.00	-719.5	-348.7	6993
2	7	718.9	194.9	265.6	72.7	309	471	-108	322	534.4	-4.235	0.00	0.00	-1149	-332.6	6832
2	8	982.3	145.0	363.9	54.1	273	701	-121	343	527.8	-4.235	0.00	0.00	-1600	-327.8	6786
2	9	1168.0	95.0	433.3	35.5	236	823	-137	356	521.2	-4.235	0.00	0.00	-2033	-222.7	6797
2	10	1277.0	45.1	473.8	16.9	206	909	-155	357	514.7	-4.235	0.00	0.00	-2298	-120.2	6797
2	11	1308.0	-4.9	485.5	-1.7	175	904	-179	569	508.1	-4.235	0.00	0.00	-2405	-17.58	6797
2	12	1262.0	-54.8	468.4	-20.3	147	854	-209	566	501.5	-4.235	0.00	0.00	-2353	84.95	6797
2	13	1138.0	-104.8	422.5	-38.9	126	806	-239	476	495.0	-4.235	0.00	0.00	-2142	187.6	6797
2	14	936.9	-154.7	347.7	-57.5	109	685	-275	352	488.4	-4.235	0.00	0.00	-1772	290.1	6797
2	15	658.3	-204.7	244.1	-76.1	95	645	-311	123	481.8	-4.235	0.00	0.00	-1243	392.7	6797
2	16	302.2	-254.7	111.6	-94.7	84	604	-354	-145	475.3	-4.235	0.00	0.00	-554.5	495.3	6797
2	17	-131.0	-304.6	-49.6	-113.3	76	577	-395	-576	468.7	-4.235	0.00	0.00	292.2	597.8	6797
2	18	-642.1	-354.6	-239.7	-131.9	69	562	-443	-1088	462.1	-4.235	0.00	0.00	1299	700.5	6797
2	19	-1230.0	-404.5	-458.5	-150.5	65	579	-489	-1724	455.6	-4.235	0.00	0.00	2440	757.1	6797
2	20	-1903.0	-463.4	-706.4	-169.1	63	626	-541	-2452	449.0	-4.235	0.00	0.00	3447	369.6	7161
2	21	-2674.0	-531.3	-983.0	-187.7	62	704	-590	-3310	442.4	-4.235	0.00	0.00	3925	6.436	7306

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 24.00 tg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
3	1	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
3	2	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
3	3	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	4	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	5	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	6	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	7	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	8	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	9	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	10	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	11	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	12	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	13	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	14	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
3	1	-2673.0	526.4	-982.6	186.0	605	-3295	-82	750	442.5	-4.9E-05	0.00	0.00	3912	-1.337	7247
3	2	-1910.0	458.6	-708.8	167.4	551	-2440	-83	639	442.5	-4.9E-05	0.00	0.00	3627	-366.6	7247
3	3	-1245.0	399.6	-463.7	148.8	499	-1697	-85	561	442.5	-4.9E-05	0.00	0.00	2620	-731.6	7247
3	4	-663.7	349.7	-247.4	130.2	453	-1044	-90	511	442.5	-4.9E-05	0.00	0.00	1153	-892.3	7247
3	5	-160.6	299.7	-60.1	111.6	405	-517	-96	486	442.5	-4.9E-05	0.00	0.00	156.8	-569.5	7014
3	6	265.4	249.8	98.6	93.0	364	-69	-104	490	442.5	-4.9E-05	0.00	0.00	-561.6	-357	7014
3	7	613.7	199.8	228.2	74.4	320	212	-115	499	442.5	-4.9E-05	0.00	0.00	-1004	-340.9	6852
3	8	884.8	149.9	329.2	55.8	285	456	-129	512	442.5	-4.9E-05	0.00	0.00	-1483	-336.1	6786
3	9	1078.0	99.9	401.2	37.2	247	592	-144	517	442.5	-4.9E-05	0.00	0.00	-1928	-231.1	6797
3	10	1195.0	50.0	444.5	18.6	217	693	-163	509	442.5	-4.9E-05	0.00	0.00	-2207	-128.5	6797
3	11	1233.0	0.0	458.9	0.0	187	704	-187	703	442.5	-4.9E-05	0.00	0.00	-2326	-25.92	6797
3	12	1195.0	-49.9	444.5	-18.6	163	507	-217	692	442.5	-4.9E-05	0.00	0.00	-2287	76.61	6797
3	13	1078.0	-99.9	401.3	-37.2	144	517	-247	591	442.5	-4.9E-05	0.00	0.00	-2089	179.2	6797
3	14	884.9	-149.8	329.2	-55.8	129	510	-284	456	442.5	-4.9E-05	0.00	0.00	-1732	281.8	6797

3	15	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	16	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	17	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	18	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	19	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
3	20	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
3	21	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90

VANO	SECCIÓN	PESO PROPIO		CARGA MUERTA		Vmax(+) y Mconc		Vmin(-) y Mconc		GRAD. TERMIC		ASIENTOS DIF.		PRETENSADO FINAL		
		Mpp (m.t)	Vpp (t.)	Mse (m.t)	Vse (t.)	Vsc (m.t)	Msc (t.)	Vsc (m.t)	Msc (t.)	Mgrad (m.t)	Vgrad (t.)	Masi (m.t)	Vasi (t.)	Mpf (m.t)	Vpf (t.)	Npf (t.)
3	15	613.9	-199.8	228.3	-74.4	115	500	-320	212	442.5	-4.9E-05	0.00	0.00	-1216	384.3	6797
3	16	265.7	-249.7	98.7	-93.0	104	490	-364	-69	442.5	-4.9E-05	0.00	0.00	-541	486.9	6797
3	17	-160.3	-299.7	-60.0	-111.6	96	486	-405	-516	442.5	-4.9E-05	0.00	0.00	293.5	589.5	6797
3	18	-663.6	-349.7	-247.4	-130.2	90	511	-453	-1045	442.5	-4.9E-05	0.00	0.00	1287	692.1	6797
3	19	-1244.0	-399.6	-463.5	-148.8	85	561	-499	-1696	442.5	-4.9E-05	0.00	0.00	2415	748.7	6797
3	20	-1909.0	-458.5	-708.6	-167.4	83	639	-551	-2440	442.5	-4.9E-05	0.00	0.00	3409	361.3	7161
3	21	-2673.0	-526.4	-982.6	-186.0	82	750	-600	-3314	442.5	-4.9E-05	0.00	0.00	3875	-1.86	7306

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 24.00 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
4	1	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
4	2	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
4	3	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	4	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	5	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	6	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	7	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	8	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	9	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	10	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	11	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	12	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	13	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	14	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	15	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	16	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	17	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	18	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	19	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
4	20	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
4	21	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90

VANO	SECCIÓN	PESO PROPIO		CARGA MUERTA		Vmax(+) y Mconc		Vmin(-) y Mconc		GRAD. TERMIC		ASIENTOS DIF.		PRETENSADO FINAL		
		Mpp (m.t)	Vpp (t.)	Mse (m.t)	Vse (t.)	Vsc (m.t)	Msc (t.)	Vsc (m.t)	Msc (t.)	Mgrad (m.t)	Vgrad (t.)	Masi (m.t)	Vasi (t.)	Mpf (m.t)	Vpf (t.)	Npf (t.)
4	1	-2674.0	531.2	-982.8	187.7	590	-3312	-65	727	442.4	4.236	0.00	0.00	3861	-1.632	7247
4	2	-1903.0	463.4	-706.4	169.1	541	-2452	-66	643	449.0	4.236	0.00	0.00	3575	-367	7247
4	3	-1230.0	404.5	-458.5	150.5	489	-1725	-68	591	455.6	4.236	0.00	0.00	2568	-731.9	7247
4	4	-642.1	354.5	-239.7	131.9	443	-1088	-73	568	462.1	4.236	0.00	0.00	1102	-892.6	7247
4	5	-131.2	304.6	-49.6	113.3	395	-577	-79	569	468.7	4.236	0.00	0.00	104.4	-569.7	7014
4	6	302.1	254.6	111.6	94.7	354	-144	-88	599	475.3	4.236	0.00	0.00	-613.9	-357.3	7014
4	7	658.1	204.7	244.0	76.1	311	123	-99	634	481.8	4.236	0.00	0.00	-1057	-341.2	6852
4	8	936.8	154.7	347.7	57.5	275	353	-112	672	488.4	4.236	0.00	0.00	-1504	-333.5	6733
4	9	1138.0	104.8	422.4	38.9	239	477	-128	701	495.0	4.236	0.00	0.00	-1946	-229.4	6744
4	10	1262.0	54.8	468.3	20.3	209	567	-147	856	501.5	4.236	0.00	0.00	-2223	-127.7	6744
4	11	1308.0	4.9	485.4	1.7	179	569	-175	903	508.1	4.236	0.00	0.00	-2342	-26.08	6744
4	12	1277.0	-45.1	473.7	-16.9	155	355	-206	909	514.7	4.236	0.00	0.00	-2304	75.62	6744
4	13	1168.0	-95.0	433.1	-35.5	137	356	-236	823	521.2	4.236	0.00	0.00	-2108	177.3	6744
4	14	982.0	-145.0	363.8	-54.1	121	341	-273	701	527.8	4.236	0.00	0.00	-1755	278.9	6744
4	15	718.5	-195.0	265.5	-72.7	108	322	-309	471	534.4	4.236	0.00	0.00	-1243	380.7	6744
4	16	377.8	-244.9	138.5	-91.3	97	305	-353	202	540.9	4.236	0.00	0.00	-575	482.3	6744
4	17	-40.7	-294.9	-17.4	-109.9	89	295	-395	-213	547.5	4.236	0.00	0.00	251.7	584	6744
4	18	-536.2	-344.8	-202.0	-128.5	83	313	-443	-748	554.1	4.236	0.00	0.00	1235	685.6	6744
4	19	-1110.0	-394.8	-415.7	-147.1	79	355	-489	-1367	560.6	4.236	0.00	0.00	2354	741.8	6744
4	20	-1767.0	-453.7	-658.0	-165.7	77	426	-541	-2118	567.2	4.236	0.00	0.00	3339	357.9	7105
4	21	-2523.0	-521.5	-929.2	-184.3	76	528	-590	-2957	573.8	4.236	0.00	0.00	3794	-1.92	7225

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 24.00 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
5	1	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
5	2	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90
5	3	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	4	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	5	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	6	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	7	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	8	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	9	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	10	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	11	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	12	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	13	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	14	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	15	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	16	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	17	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	18	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	19	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	20	12.892	5.218	0.888	-1.112	0.000	175.5	3.360	7.560	2.000	195.0	90
5	21	17.510	5.874	0.930	-1.070	0.000	175.5	7.560	7.560	2.000	195.0	90

VANO	SECCIÓN	PESO PROPIO		CARGA MUERTA		Vmax(+) y Mconc		Vmin(-) y Mconc		GRAD. TERMIC		ASIENTOS DIF.		PRETENSADO FINAL		
		Mpp (m.t)	Vpp (t.)	Mse (m.t)	Vse (t.)	Vsc (m.t)	Msc (t.)	Vsc (m.t)	Msc (t.)	Mgrad (m.t)	Vgrad (t.)	Masi (m.t)	Vasi (t.)	Mpf (m.t)	Vpf (t.)	Npf (t.)
5	1	-2523.0	511.9	-929.2	182.7	532	-2966	-22	528	573.8	-23.9	0.00	0.00	3776	-62.12	7144
5	2	-1940.0	459.4	-716.5	168.3	494	-2355	-22	512	545.1	-23.9	0.00	0.00	3444	-490.9	7144
5	3	-1415.0	413.8	-525.0	153.9	456	-1812	-24	517	516.4	-23.9	0.00	0.00	2448	-913.8	7144
5	4	-942.4	375.1	-349.1	139.5	419	-1372	-27	541	487.7	-23.9	0.00	0.00	1162	-887.9	6899
5	5	-515.4	336.4	-190.3	125.1	383	-962	-31	586	459.0	-23.9	0.00	0.00	343.2	-526.6	6899
5	6	-135.1	297.8	-48.9	110.7	349	-617	-36	645	430.3	-23.9	0.00	0.00	-115.3	-248.8	6899
5	7	199.2	259.1	75.4	96.3	310	-361	-43	715	401.6	-23.9	0.00	0.00	-384.6	-285.9	6696
5	8	487.0	220.4	182.3	81.9	279	-133	-51	793	373.0	-23.9	0.00	0.00	-1065	-313.1	7338
5	9	728.2	181.8	272.0	67.5	250	19	-61	874	344.3	-23.9	0.00	0.00	-1411	-263.1	7326
5	10	923.2	143.1	344.4	53.1	224	119	-72	956	315.6	-23.9	0.00	0.00	-1683	-191.9	7326
5	11	1072.0	104.4	399.5	38.7	199	175	-86	1029	286.9	-23.9	0.00	0.00	-1872	-122.9	7326
5	12	1174.0	65.7	437.3	24.3	173	170	-106	1145	258.2	-23.9	0.00	0.00	-1978	-54.01	7326
5	13	1229.0	27.1	457.8	9.9	152	161	-126	1213	229.5	-23.9	0.00	0.00	-2001	14.98	7326
5	14	1239.0	-11.6	461.1	-4.5	134	136	-149	1390	200.9	-23.9	0.00	0.00	-1942	83.92	7326
5	15	1202.0	-50.3	447.0	-18.9	120	-101	-175	1366	172.2	-23.9	0.00	0.00	-1800	152.9	7326
5	16	1118.0	-89.0	415.7	-33.3	108	-118	-203	1296	143.5	-23.9	0.00	0.00	-1575	221.9	7326
5	17	988.1	-127.6	367.1	-47.7	99	-144	-238	1175	114.8	-23.9	0.00	0.00	-1267	290.8	7326
5	18	811.7	-166.3	301.3	-62.1	91	-143	-271	989	86.1	-23.9	0.00	0.00	-876.9	359.8	7326
5	19	588.9	-205.0	218.1	-76.5	86	-124	-305	732	57.4	-23.9	0.00	0.00	-403.6	428.8	7326
5	20	319.7	-243.7	117.7	-90.9	83	-79	-341	409	28.7	-23.9	0.00	0.00	152.1	497.7	7326
5	21	-0.1	-289.3	0.0	-105.3	82	0	-380	0	0.0	-23.9	0.00	0.00	947.8	566.7	7326

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO: L.A.V. MADRID - ZARAGOZA
ESTRUCTURA: E-1508.5

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd.(+) (t.)	CORT. Vrd.(-) (t.)	MOMEN. Md.(+) (t x m.)	MOMEN. Md.(-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
1	1	0.0	0.0	562.1	-407.3	932.9	933.1	562.1	932.9	545.5	227.9	-244.3	A-B
1	2	0.0	0.0	486.4	-380.8	1521.4	490.0	486.4	1521.4	799.0	215.9	-244.3	A-B
1	3	0.0	0.0	436.7	-351.0	1831.6	-14.4	436.7	1831.6	851.8	149.8	-244.3	A-B
1	4	0.0	0.0	386.6	-324.7	2190.6	-289.2	386.6	2190.6	912.8	73.2	-244.3	A-B
1	5	0.0	0.0	340.0	-301.4	2443.2	-495.6	340.0	2443.2	955.8	19.4	-244.3	A-B
1	6	0.0	0.0	299.6	-281.6	2617.6	-620.5	299.6	2617.6	985.5	-17.8	-244.3	A-B
1	7	0.0	0.0	253.1	-264.9	2556.0	-719.0	264.9	-719.0	418.0	693.5	-244.3	A-B
1	8	0.0	0.0	218.6	-251.1	2549.4	-781.6	251.1	-781.6	407.3	706.9	-244.3	A-B
1	9	0.0	0.0	209.7	-262.5	1478.4	193.4	262.5	193.4	573.2	499.1	-244.3	A-B
1	10	0.0	0.0	212.7	-287.5	1421.2	124.2	287.5	124.2	561.4	513.8	-244.3	A-B
1	11	0.0	0.0	221.4	-316.4	1221.0	381.2	316.4	381.2	624.3	478.3	-244.3	A-B
1	12	0.0	0.0	232.5	-361.0	1197.0	259.1	361.0	259.1	603.6	504.3	-244.3	A-B
1	13	0.0	0.0	249.9	-400.2	1246.8	30.4	400.2	30.4	564.7	553.0	-244.3	A-B
1	14	0.0	0.0	269.8	-442.2	1336.3	-211.8	442.2	-211.8	523.5	604.7	-244.3	A-B
1	15	0.0	0.0	301.7	-477.0	1425.5	-627.5	477.0	-627.5	462.8	703.3	-244.3	A-B
1	16	0.0	0.0	328.0	-521.9	1644.1	-1047.8	521.9	-1047.8	393.3	794.9	-244.3	A-B
1	17	0.0	0.0	356.3	-576.7	1902.7	-1529.4	576.7	-1529.4	311.4	897.5	-244.3	A-B
1	18	0.0	0.0	386.9	-625.2	2233.7	-2143.3	625.2	-2143.3	207.0	1028.4	-244.3	A-B
1	19	0.0	0.0	107.7	-988.0	2461.0	-2973.3	988.0	-2973.3	57.6	1197.2	-244.3	A-B
1	20	0.0	0.0	-192.6	-1379.1	2508.8	-4204.4	1379.1	-4204.4	-254.0	1177.6	-244.3	C
1	21	0.0	0.0	-499.7	-1784.1	2247.8	-5922.1	1784.1	-5922.1	-522.2	1494.3	-244.3	C

VANO	SECCIÓN	Pdr. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
1	1	6964.0	397.7	1.62	31.67	90	VERIFICA	756.0	195.0	0.267	10539.5	562.1	VERIFICA
1	2	6964.0	540.2	1.79	29.16	90	VERIFICA	336.0	195.0	0.267	4460.9	486.4	VERIFICA
1	3	6964.0	540.2	1.79	29.16	90	VERIFICA	336.0	195.0	0.267	4460.9	436.7	VERIFICA
1	4	6964.0	540.2	1.79	29.16	90	VERIFICA	336.0	195.0	0.267	4460.9	386.6	VERIFICA
1	5	6964.0	540.2	1.79	29.16	90	VERIFICA	336.0	195.0	0.267	4460.9	340.0	VERIFICA
1	6	6964.0	540.2	1.79	29.16	90	VERIFICA	336.0	195.0	0.267	4460.9	299.6	VERIFICA
1	7	6965.0	540.3	1.79	29.16	90	VERIFICA	336.0	195.0	0.267	4460.8	264.9	VERIFICA
1	8	6965.0	540.3	1.79	29.16	90	VERIFICA	336.0	195.0	0.267	4460.8	251.1	VERIFICA
1	9	6965.0	540.3	1.79	29.16	90	VERIFICA	336.0	195.0	0.267	4460.8	262.5	VERIFICA
1	10	6965.0	540.3	1.79	29.16	90	VERIFICA	336.0	195.0	0.267	4460.8	287.5	VERIFICA
1	11	7213.0	559.5	1.81	28.87	90	VERIFICA	336.0	195.0	0.267	4432.3	316.4	VERIFICA
1	12	7213.0	559.5	1.81	28.87	90	VERIFICA	336.0	195.0	0.267	4432.3	361.0	VERIFICA
1	13	7213.0	559.5	1.81	28.87	90	VERIFICA	336.0	195.0	0.267	4432.3	400.2	VERIFICA
1	14	7213.0	559.5	1.81	28.87	90	VERIFICA	336.0	195.0	0.267	4432.3	442.2	VERIFICA
1	15	7342.0	569.5	1.83	28.72	90	VERIFICA	336.0	195.0	0.267	4417.6	477.0	VERIFICA
1	16	7368.0	571.5	1.83	28.69	90	VERIFICA	336.0	195.0	0.267	4414.6	521.9	VERIFICA
1	17	7368.0	571.5	1.83	28.69	90	VERIFICA	336.0	195.0	0.267	4414.6	576.7	VERIFICA
1	18	7368.0	571.5	1.83	28.69	90	VERIFICA	336.0	195.0	0.267	4414.6	625.2	VERIFICA
1	19	7263.0	563.4	1.82	28.81	90	VERIFICA	336.0	195.0	0.267	4426.6	988.0	VERIFICA
1	20	7215.0	412.1	1.64	31.39	90	VERIFICA	756.0	195.0	0.267	10486.9	1379.1	VERIFICA
1	21	7284.0	416.0	1.64	31.31	90	VERIFICA	756.0	195.0	0.267	10472.5	1784.1	VERIFICA

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd.(+) (t.)	CORT. Vrd.(-) (t.)	MOMEN. Md.(+) (t x m.)	MOMEN. Md.(-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
2	1	0.0	0.0	1949.6	521.1	-5923.6	2236.0	1949.6	-5923.6	-525.7	1491.3	-244.3	C
2	2	0.0	0.0	1382.0	77.3	-3396.1	2724.5	1382.0	-3396.1	-125.3	1031.1	-244.3	A-B
2	3	0.0	0.0	822.1	-360.9	-1915.7	2426.0	822.1	-1915.7	234.6	968.9	-244.3	A-B
2	4	0.0	0.0	490.6	-589.3	-1258.7	1606.9	589.3	1606.9	833.9	218.0	-244.3	A-B
2	5	0.0	0.0	637.6	-337.1	-421.8	1197.4	637.6	-421.8	470.7	632.4	-244.3	A-B
2	6	0.0	0.0	685.4	-198.5	358.4	999.5	685.4	358.4	603.4	466.0	-244.3	A-B
2	7	0.0	0.0	532.5	-260.2	1034.7	1021.4	532.5	1034.7	706.0	309.4	-244.3	A-B
2	8	0.0	0.0	380.7	-336.9	1471.3	917.2	380.7	1471.3	776.7	212.8	-244.3	A-B
2	9	0.0	0.0	326.7	-316.9	1603.7	723.7	326.7	1603.7	800.0	185.4	-244.3	A-B
2	10	0.0	0.0	281.1	-303.5	1691.6	585.6	303.5	585.6	626.9	402.4	-244.3	A-B
2	11	0.0	0.0	238.3	-302.4	564.5	1900.5	302.4	1900.5	850.5	122.1	-244.3	A-B
2	12	0.0	0.0	237.9	-347.9	485.0	1844.1	347.9	1844.1	840.9	134.2	-244.3	A-B
2	13	0.0	0.0	246.9	-392.5	471.4	1655.7	392.5	1655.7	808.9	174.3	-244.3	A-B
2	14	0.0	0.0	262.3	-447.7	412.0	1416.1	447.7	1416.1	768.1	225.4	-244.3	A-B
2	15	0.0	0.0	282.9	-501.1	536.0	1017.1	501.1	1017.1	700.3	310.4	-244.3	A-B
2	16	0.0	0.0	307.1	-566.1	723.7	562.4	566.1	562.4	622.9	407.4	-244.3	A-B
2	17	0.0	0.0	335.0	-628.1	994.5	-139.3	628.1	-139.3	503.5	556.9	-244.3	A-B
2	18	0.0	0.0	366.5	-700.7	1347.9	-963.1	700.7	-963.1	363.4	732.5	-244.3	A-B
2	19	0.0	0.0	355.1	-814.8	1789.3	-1995.6	814.8	-1995.6	187.8	952.6	-244.3	A-B
2	20	0.0	0.0	-105.8	-1396.8	2037.1	-3471.9	1396.8	-3471.9	-141.0	1041.1	-244.3	A-B
2	21	0.0	0.0	-547.9	-1962.9	1690.0	-5862.3	1962.9	-5862.3	-511.4	1484.7	-244.3	C

VANO	SECCIÓN	Pdr. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
2	1	7226.0	412.7	1.64	31.37	90	VERIFICA	756.0	195.0	0.267	10484.6	1949.6	VERIFICA
2	2	7226.0	412.7	1.64	31.37	90	VERIFICA	756.0	195.0	0.267	10484.6	1382.0	VERIFICA
2	3	7226.0	560.5	1.82	28.85	90	VERIFICA	336.0	195.0	0.267	4430.8	822.1	VERIFICA
2	4	7226.0	560.5	1.82	28.85	90	VERIFICA	336.0	195.0	0.267	4430.8	589.3	VERIFICA
2	5	6993.0	542.4	1.79	29.13	90	VERIFICA	336.0	195.0	0.267	4457.5	637.6	VERIFICA
2	6	6993.0	542.4	1.79	29.13	90	VERIFICA	336.0	195.0	0.267	4457.5	685.4	VERIFICA
2	7	6832.0	530.0	1.78	29.32	90	VERIFICA	336.0	195.0	0.267	4476.2	532.5	VERIFICA
2	8	6786.0	526.4	1.78	29.38	90	VERIFICA	336.0	195.0	0.267	4481.6	380.7	VERIFICA
2	9	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	326.7	VERIFICA
2	10	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	303.5	VERIFICA
2	11	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	302.4	VERIFICA
2	12	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	347.9	VERIFICA
2	13	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	392.5	VERIFICA
2	14	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	447.7	VERIFICA
2	15	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	501.1	VERIFICA
2	16	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	566.1	VERIFICA
2	17	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	628.1	VERIFICA
2	18	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	700.7	VERIFICA
2	19	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	814.8	VERIFICA
2	20	7161.0	409.0	1.64	31.45	90	VERIFICA	756.0	195.0	0.267	10498.2	1396.8	VERIFICA
2	21	7306.0	417.3	1.65	31.29	90	VERIFICA	756.0	195.0	0.267	10468.0	1962.9	VERIFICA

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd.(+) (t.)	CORT. Vrd.(-) (t.)	MOMEN. Md.(+) (t x m.)	MOMEN. Md.(-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
3	1	0.0	0.0	1974.6	516.4	-6513.5	2410.2	1974.6	-6513.5	-618.0	1599.9	-244.3	C
3	2	0.0	0.0	1399.0	72.2	-3961.2	2892.8	1399.0	-3961.2	-213.6	1135.2	-244.3	A-B
3	3	0.0	0.0	839.1	-366.2	-2489.1	2587.3	839.1	-2489.1	138.7	1092.7	-244.3	A-B
3	4	0.0	0.0	507.8	-594.8	-1780.0	1763.8	594.8	1763.8	862.2	186.2	-244.3	A-B
3	5	0.0	0.0	654.8	-343.0	-950.1	1351.1	654.8	-950.1	382.5	746.6	-244.3	A-B
3	6	0.0	0.0	703.0	-204.8	-118.9	1164.3	703.0	-118.9	523.8	569.4	-244.3	A-B
3	7	0.0	0.0	550.6	-266.9	577.6	1166.5	550.6	577.6	629.8	408.4	-244.3	A-B
3	8	0.0	0.0	399.2	-343.9	1022.0	1041.7	399.2	1022.0	700.2	308.5	-244.3	A-B
3	9	0.0	0.0	345.7	-324.3	1178.5	842.2	345.7	1178.5	727.7	276.0	-244.3	A-B
3	10	0.0	0.0	300.5	-311.3	1291.5	695.2	311.3	695.2	645.5	379.1	-244.3	A-B
3	11	0.0	0.0	254.2	-306.0	991.8	1190.4	306.0	1190.4	729.7	273.5	-244.3	A-B

VANO	SECCIÓN	Pdr. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
3	1	7247.0	413.9	1.64	31.35	90	VERIFICA	756.0	195.0	0.267	10480.3	1974.6	VERIFICA
3	2	7247.0	413.9	1.64	31.35	90	VERIFICA	756.0	195.0	0.267	10480.3	1399.0	VERIFICA
3	3	7247.0	562.1	1.82	28.83	90	VERIFICA	336.0	195.0	0.267	4428.4	839.1	VERIFICA
3	4	7247.0	562.1	1.82	28.83	90	VERIFICA	336.0	195.0	0.267	4428.4	594.8	VERIFICA
3	5	7014.0	544.1	1.80	29.10	90	VERIFICA	336.0	195.0	0.267	4455.1	654.8	VERIFICA
3	6	7014.0	544.1	1.80	29.10	90	VERIFICA	336.0	195.0	0.267	4455.1	703.0	VERIFICA
3	7	6852.0	531.5	1.78	29.30	90	VERIFICA	336.0	195.0	0.267	4473.9	550.6	VERIFICA
3	8	6786.0	526.4	1.78	29.38	90	VERIFICA	336.0	195.0	0.267	4481.6	399.2	VERIFICA
3	9	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	345.7	VERIFICA
3	10	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	311.3	VERIFICA
3	11	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	306.0	VERIFICA

3	12	0.0	0.0	259.2	-352.3	-51.4	1874.6	352.3	1874.6	846.1	127.6	-244.3	A-B
3	13	0.0	0.0	272.5	-397.5	18.3	1680.8	397.5	1680.8	813.1	169.0	-244.3	A-B
3	14	0.0	0.0	289.5	-453.3	126.0	1436.4	453.3	1436.4	771.6	221.1	-244.3	A-B
3	15	0.0	0.0	310.4	-507.1	291.8	1029.3	507.1	1029.3	702.3	307.8	-244.3	A-B
3	16	0.0	0.0	334.8	-572.9	522.2	565.5	572.9	565.5	623.4	406.7	-244.3	A-B
3	17	0.0	0.0	363.0	-635.1	824.5	-147.2	635.1	-147.2	502.2	558.6	-244.3	A-B
3	18	0.0	0.0	394.6	-707.9	1234.1	-982.6	707.9	-982.6	360.1	736.7	-244.3	A-B
3	19	0.0	0.0	383.3	-822.2	1719.6	-2026.7	822.2	-2026.7	182.5	959.2	-244.3	A-B
3	20	0.0	0.0	-77.4	-1404.1	2012.1	-3514.1	1404.1	-3514.1	-147.7	1048.8	-244.3	A-B
3	21	0.0	0.0	-519.6	-1970.1	1709.4	-5915.7	1970.1	-5915.7	-519.9	1494.4	-244.3	C

3	12	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	352.3	VERIFICA
3	13	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	397.5	VERIFICA
3	14	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	453.3	VERIFICA
3	15	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	507.1	VERIFICA
3	16	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	572.9	VERIFICA
3	17	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	635.1	VERIFICA
3	18	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	707.9	VERIFICA
3	19	6797.0	527.2	1.78	29.37	90	VERIFICA	336.0	195.0	0.267	4480.3	822.2	VERIFICA
3	20	7161.0	409.0	1.64	31.45	90	VERIFICA	756.0	195.0	0.267	10498.2	1404.1	VERIFICA
3	21	7306.0	417.3	1.65	31.29	90	VERIFICA	756.0	195.0	0.267	10468.0	1970.1	VERIFICA

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f c1,k (t/m2.)	ZONA
4	1	0.0	0.0	1967.4	547.4	-5928.2	1659.9	1967.4	-5928.2	-525.2	1493.3	-244.3	C
4	2	0.0	0.0	1399.4	103.1	-3343.4	2190.7	1399.4	-3343.4	-115.8	1022.7	-244.3	A-B
4	3	0.0	0.0	839.9	-335.1	-1869.4	1934.8	839.9	-1869.4	244.1	960.6	-244.3	A-B
4	4	0.0	0.0	508.5	-564.0	-1159.7	1160.4	564.0	1160.4	759.5	314.8	-244.3	A-B
4	5	0.0	0.0	656.0	-312.1	-329.4	795.5	656.0	-329.4	488.0	614.3	-244.3	A-B
4	6	0.0	0.0	704.0	-174.4	503.3	656.8	704.0	503.3	629.7	436.8	-244.3	A-B
4	7	0.0	0.0	552.6	-236.6	1203.2	706.1	552.6	1203.2	736.2	275.0	-244.3	A-B
4	8	0.0	0.0	404.4	-311.1	1684.5	660.0	404.4	1684.5	808.8	163.2	-244.3	A-B
4	9	0.0	0.0	350.8	-292.6	1852.1	509.8	350.8	1852.1	838.2	128.3	-244.3	A-B
4	10	0.0	0.0	305.2	-280.9	1974.6	617.8	305.2	1974.6	859.0	102.2	-244.3	A-B
4	11	0.0	0.0	258.8	-281.9	1964.0	626.8	281.9	626.8	629.7	389.5	-244.3	A-B
4	12	0.0	0.0	258.7	-325.6	576.7	1684.8	325.6	1684.8	809.7	164.0	-244.3	A-B
4	13	0.0	0.0	271.5	-372.1	649.3	1527.8	372.1	1527.8	783.0	197.5	-244.3	A-B
4	14	0.0	0.0	287.8	-429.6	758.8	1315.1	429.6	1315.1	746.8	242.8	-244.3	A-B
4	15	0.0	0.0	308.3	-484.5	927.8	939.4	484.5	939.4	682.9	322.9	-244.3	A-B
4	16	0.0	0.0	332.1	-551.8	1159.0	501.7	551.8	501.7	608.5	416.2	-244.3	A-B
4	17	0.0	0.0	359.8	-615.1	1462.6	-155.1	615.1	-155.1	496.7	556.2	-244.3	A-B
4	18	0.0	0.0	390.7	-689.2	1871.3	-994.8	689.2	-994.8	353.9	735.2	-244.3	A-B
4	19	0.0	0.0	379.1	-804.1	2355.0	-1985.6	804.1	-1985.6	185.4	946.4	-244.3	A-B
4	20	0.0	0.0	-78.0	-1382.7	2646.4	-3474.8	1382.7	-3474.8	-144.7	1038.5	-244.3	A-B
4	21	0.0	0.0	-516.6	-1945.3	2339.0	-5819.3	1945.3	-5819.3	-509.2	1472.2	-244.3	C

VANO	SECCIÓN	Pσr. (Ton.)	σ xd (T/m2.)	cot θ -	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
4	1	7247.0	413.9	1.64	31.35	90	VERIFICA	756.0	195.0	0.267	10480.3	1967.4	VERIFICA
4	2	7247.0	413.9	1.64	31.35	90	VERIFICA	756.0	195.0	0.267	10480.3	1399.4	VERIFICA
4	3	7247.0	562.1	1.82	28.83	90	VERIFICA	336.0	195.0	0.267	4428.4	839.9	VERIFICA
4	4	7247.0	562.1	1.82	28.83	90	VERIFICA	336.0	195.0	0.267	4428.4	564.0	VERIFICA
4	5	7014.0	544.1	1.80	29.10	90	VERIFICA	336.0	195.0	0.267	4455.1	656.0	VERIFICA
4	6	7014.0	544.1	1.80	29.10	90	VERIFICA	336.0	195.0	0.267	4455.1	704.0	VERIFICA
4	7	6852.0	531.5	1.78	29.30	90	VERIFICA	336.0	195.0	0.267	4473.9	552.6	VERIFICA
4	8	6733.0	522.3	1.77	29.45	90	VERIFICA	336.0	195.0	0.267	4487.8	404.4	VERIFICA
4	9	6744.0	523.1	1.77	29.43	90	VERIFICA	336.0	195.0	0.267	4486.5	350.8	VERIFICA
4	10	6744.0	523.1	1.77	29.43	90	VERIFICA	336.0	195.0	0.267	4486.5	305.2	VERIFICA
4	11	6744.0	523.1	1.77	29.43	90	VERIFICA	336.0	195.0	0.267	4486.5	281.9	VERIFICA
4	12	6744.0	523.1	1.77	29.43	90	VERIFICA	336.0	195.0	0.267	4486.5	325.6	VERIFICA
4	13	6744.0	523.1	1.77	29.43	90	VERIFICA	336.0	195.0	0.267	4486.5	372.1	VERIFICA
4	14	6744.0	523.1	1.77	29.43	90	VERIFICA	336.0	195.0	0.267	4486.5	429.6	VERIFICA
4	15	6744.0	523.1	1.77	29.43	90	VERIFICA	336.0	195.0	0.267	4486.5	484.5	VERIFICA
4	16	6744.0	523.1	1.77	29.43	90	VERIFICA	336.0	195.0	0.267	4486.5	551.8	VERIFICA
4	17	6744.0	523.1	1.77	29.43	90	VERIFICA	336.0	195.0	0.267	4486.5	615.1	VERIFICA
4	18	6744.0	523.1	1.77	29.43	90	VERIFICA	336.0	195.0	0.267	4486.5	689.2	VERIFICA
4	19	6744.0	523.1	1.77	29.43	90	VERIFICA	336.0	195.0	0.267	4486.5	804.1	VERIFICA
4	20	7105.0	405.8	1.63	31.51	90	VERIFICA	756.0	195.0	0.267	10509.9	1382.7	VERIFICA
4	21	7225.0	412.6	1.64	31.38	90	VERIFICA	756.0	195.0	0.267	10484.8	1945.3	VERIFICA

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f c1,k (t/m2.)	ZONA
5	1	0.0	0.0	1778.3	494.2	-5850.7	2321.0	1778.3	-5850.7	-518.8	1473.3	-244.3	C
5	2	0.0	0.0	1191.0	4.5	-4075.7	2637.0	1191.0	-4075.7	-237.7	1150.1	-244.3	A-B
5	3	0.0	0.0	621.0	-474.6	-3180.7	2252.3	621.0	-3180.7	13.1	1232.2	-244.3	A-B
5	4	0.0	0.0	511.8	-500.4	-2832.8	1543.4	511.8	-2832.8	53.3	1139.0	-244.3	A-B
5	5	0.0	0.0	740.2	-192.9	-2158.8	1275.6	740.2	-2158.8	167.9	995.3	-244.3	A-B
5	6	0.0	0.0	886.9	29.3	-1316.5	1331.7	886.9	-1316.5	311.2	815.8	-244.3	A-B
5	7	0.0	0.0	713.0	-65.7	-513.9	1537.3	713.0	-513.9	432.0	629.0	-244.3	A-B
5	8	0.0	0.0	558.9	-153.1	-260.6	1286.0	558.9	-260.6	524.9	624.8	-244.3	A-B
5	9	0.0	0.0	486.5	-165.6	117.3	1316.5	486.5	117.3	588.2	543.3	-244.3	A-B
5	10	0.0	0.0	438.0	-159.8	396.2	1365.6	438.0	396.2	635.7	483.8	-244.3	A-B
5	11	0.0	0.0	389.7	-158.6	597.9	1426.6	389.7	597.9	670.0	440.8	-244.3	A-B
5	12	0.0	0.0	340.4	-167.9	693.4	1577.6	340.4	693.4	686.2	420.5	-244.3	A-B
5	13	0.0	0.0	298.7	-177.1	770.5	1680.8	298.7	770.5	699.3	404.0	-244.3	A-B
5	14	0.0	0.0	270.7	-199.9	-207.7	2994.1	270.7	-207.7	532.9	612.5	-244.3	A-B
5	15	0.0	0.0	270.9	-249.3	-468.0	2981.5	270.9	-468.0	488.7	668.0	-244.3	A-B
5	16	0.0	0.0	274.4	-302.4	-371.3	2884.3	302.4	2884.3	1058.9	-46.5	-244.3	A-B
5	17	0.0	0.0	280.9	-365.7	-263.3	2700.2	365.7	2700.2	1027.6	-7.3	-244.3	A-B
5	18	0.0	0.0	291.0	-424.6	-89.7	2405.7	424.6	2405.7	977.5	55.5	-244.3	A-B
5	19	0.0	0.0	304.2	-486.8	137.1	1991.0	486.8	1991.0	907.0	143.9	-244.3	A-B
5	20	0.0	0.0	320.5	-551.9	427.8	1465.5	551.9	1465.5	817.6	255.9	-244.3	A-B
5	21	0.0	0.0	333.9	-631.1	947.7	947.6	631.1	947.6	568.5	245.8	-244.3	A-B

VANO	SECCIÓN	Pσr. (Ton.)	σ xd (T/m2.)	cot θ -	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
5	1	7144.0	408.0	1.63	31.47	90	VERIFICA	756.0	195.0	0.267	10501.8	1778.3	VERIFICA
5	2	7144.0	408.0	1.63	31.47	90	VERIFICA	756.0	195.0	0.267	10501.8	1191.0	VERIFICA
5	3	7144.0	554.2	1.81	28.95	90	VERIFICA	336.0	195.0	0.267	4440.1	621.0	VERIFICA
5	4	6899.0	535.2	1.79	29.24	90	VERIFICA	336.0	195.0	0.267	4468.4	511.8	VERIFICA
5	5	6899.0	535.2	1.79	29.24	90	VERIFICA	336.0	195.0	0.267	4468.4	740.2	VERIFICA
5	6	6899.0	535.2	1.79	29.24	90	VERIFICA	336.0	195.0	0.267	4468.4	886.9	VERIFICA
5	7	6696.0	519.4	1.77	29.49	90	VERIFICA	336.0	195.0	0.267	4492.2	713.0	VERIFICA
5	8	7338.0	569.2	1.82	28.72	90	VERIFICA	336.0	195.0	0.267	4418.0	558.9	VERIFICA
5	9	7326.0	568.3	1.82	28.74	90	VERIFICA	336.0	195.0	0.267	4419.4	486.5	VERIFICA
5	10	7326.0	568.3	1.82	28.74	90	VERIFICA	336.0	195.0	0.267	4419.4	438.0	VERIFICA
5	11	7326.0	568.3	1.82	28.74	90	VERIFICA	336.0	195.0	0.267	4419.4	389.7	VERIFICA
5	12	7326.0	568.3	1.82	28.74	90	VERIFICA	336.0	195.0	0.267	4419.4	340.4	VERIFICA
5	13	7326.0	568.3	1.82	28.74	90	VERIFICA	336.0	195.0	0.267	4419.4	298.7	VERIFICA
5	14	7326.0	568.3	1.82	28.74	90	VERIFICA	336.0	195.0	0.267	4419.4	270.7	VERIFICA
5	15	7326.0	568.3	1.82	28.74	90	VERIFICA	336.0	195.0	0.267	4419.4	270.9	VERIFICA
5	16	7326.0	568.3	1.82	28.74	90	VERIFICA	336.0	195.0	0.267	4419.4	302.4	VERIFICA
5	17	7326.0	568.3	1.82	28.74	90	VERIFICA	336.0	195.0	0.267	4419.4	365.7	VERIFICA
5	18	7326.0	568.3	1.82	28.74	90	VERIFICA	336.0	195.0	0.267	4419.4	424.6	VERIFICA
5	19	7326.0	568.3	1.82	28.74	90	VERIFICA	336.0	195.0	0.267	4419.4	486.8	VERIFICA
5	20	7326.0	568.3	1.82	28.74	90	VERIFICA	336.0	195.0	0.267	4419.4	551.9	VERIFICA
5	21	7326.0	418.4	1.65	31.26	90	VERIFICA	756.0	195.0	0.267	10463.8	631.1	VERIFICA

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO: L.A.V. MADRID - ZARAGOZA
ESTRUCTURA: E-1508.5.

VANO	SECCIÓN	$f_{yw,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdz(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
1	1	4.2	1203.68	-3444.0	-	-	1203.68	0.0	96.0	96.0
1	2	4.2	534.97	-3390.1	-	-	534.97	0.0	96.0	96.0
1	3	4.2	534.97	3089.3	-	-	534.97	0.0	96.0	96.0
1	4	4.2	534.97	3610.3	-	-	534.97	0.0	96.0	96.0
1	5	4.2	534.97	4033.3	-	-	534.97	0.0	96.0	96.0
1	6	4.2	534.97	4357.3	-	-	534.97	0.0	96.0	96.0
1	7	4.2	534.97	4583.6	-	-	534.97	0.0	96.0	96.0
1	8	4.2	534.97	4710.6	-	-	534.97	0.0	96.0	96.0
1	9	4.2	534.97	4738.6	-	-	534.97	0.0	96.0	96.0
1	10	4.2	534.97	4668.6	-	-	534.97	0.0	96.0	96.0
1	11	4.2	534.97	4740.9	-	-	534.97	0.0	96.0	96.0
1	12	4.2	534.97	4472.9	-	-	534.97	0.0	96.0	96.0
1	13	4.2	534.97	4105.9	-	-	534.97	0.0	96.0	96.0
1	14	4.2	534.97	3639.9	-	-	534.97	0.0	96.0	96.0
1	15	4.2	534.97	3168.7	-	-	534.97	0.0	96.0	96.0
1	16	4.2	534.97	-3556.5	-	-	534.97	0.0	96.0	96.0
1	17	4.2	534.97	-4333.7	-	-	534.97	3.1	96.0	96.0
1	18	4.2	534.97	-5212.9	-	-	534.97	6.7	96.0	96.0
1	19	4.2	534.97	-5970.0	-	-	534.97	33.8	96.0	96.0
1	20	4.2	1203.68	-5917.1	1.508	0.756	1372.02	0.6	96.0	96.0
1	21	4.2	1203.68	-6329.0	1.380	0.682	1132.90	53.7	96.0	96.0

VANO	SECCIÓN	$f_{yw,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdz(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
2	1	4.2	1203.68	-6295.1	1.383	0.655	1089.33	71.2	96.0	96.0
2	2	4.2	1203.68	-6022.1	-	-	1203.68	14.8	96.0	96.0
2	3	4.2	534.97	-5719.1	-	-	534.97	21.5	96.0	96.0
2	4	4.2	534.97	-4265.6	-	-	534.97	4.1	96.0	96.0
2	5	4.2	534.97	2558.9	-	-	534.97	7.8	96.0	96.0
2	6	4.2	534.97	3264.3	-	-	534.97	11.4	96.0	96.0
2	7	4.2	534.97	3635.2	-	-	534.97	0.0	96.0	96.0
2	8	4.2	534.97	4069.5	-	-	534.97	0.0	96.0	96.0
2	9	4.2	534.97	4506.5	-	-	534.97	0.0	96.0	96.0
2	10	4.2	534.97	4771.5	-	-	534.97	0.0	96.0	96.0
2	11	4.2	534.97	4878.5	-	-	534.97	0.0	96.0	96.0
2	12	4.2	534.97	4826.5	-	-	534.97	0.0	96.0	96.0
2	13	4.2	534.97	4615.5	-	-	534.97	0.0	96.0	96.0
2	14	4.2	534.97	4245.5	-	-	534.97	0.0	96.0	96.0
2	15	4.2	534.97	3716.5	-	-	534.97	0.0	96.0	96.0
2	16	4.2	534.97	3028.0	-	-	534.97	2.4	96.0	96.0
2	17	4.2	534.97	-3391.7	-	-	534.97	7.1	96.0	96.0
2	18	4.2	534.97	-4398.5	-	-	534.97	12.6	96.0	96.0
2	19	4.2	534.97	-5539.5	-	-	534.97	21.4	96.0	96.0
2	20	4.2	1203.68	-6028.6	-	-	1203.68	16.0	96.0	96.0
2	21	4.2	1203.68	-6558.9	1.397	0.649	1091.07	71.9	96.0	96.0

VANO	SECCIÓN	$f_{yw,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdz(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
3	1	4.2	1203.68	-6524.6	1.359	0.649	1062.25	75.4	96.0	96.0
3	2	4.2	1203.68	-6239.6	-	-	1203.68	16.1	96.0	96.0
3	3	4.2	534.97	-5924.7	-	-	534.97	22.7	96.0	96.0
3	4	4.2	534.97	-4457.7	-	-	534.97	4.5	96.0	96.0
3	5	4.2	534.97	-3355.3	-	-	534.97	9.1	96.0	96.0
3	6	4.2	534.97	3114.0	-	-	534.97	12.7	96.0	96.0
3	7	4.2	534.97	3497.5	-	-	534.97	1.2	96.0	96.0
3	8	4.2	534.97	3952.5	-	-	534.97	0.0	96.0	96.0
3	9	4.2	534.97	4401.5	-	-	534.97	0.0	96.0	96.0
3	10	4.2	534.97	4680.5	-	-	534.97	0.0	96.0	96.0
3	11	4.2	534.97	4799.5	-	-	534.97	0.0	96.0	96.0

3	12	4.2	534.97	4760.5	-	-	534.97	0.0	96.0	96.0
3	13	4.2	534.97	4562.5	-	-	534.97	0.0	96.0	96.0
3	14	4.2	534.97	4205.5	-	-	534.97	0.0	96.0	96.0
3	15	4.2	534.97	3689.5	-	-	534.97	0.0	96.0	96.0
3	16	4.2	534.97	3014.5	-	-	534.97	2.9	96.0	96.0
3	17	4.2	534.97	-3393.0	-	-	534.97	7.6	96.0	96.0
3	18	4.2	534.97	-4386.5	-	-	534.97	13.2	96.0	96.0
3	19	4.2	534.97	-5514.5	-	-	534.97	21.9	96.0	96.0
3	20	4.2	1203.68	-5990.6	-	-	1203.68	16.6	96.0	96.0
3	21	4.2	1203.68	-6508.9	1.390	0.648	1083.76	73.1	96.0	96.0

VANO	SECCIÓN	fya,d (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
4	1	4.2	1203.68	-6473.6	1.392	0.651	1089.71	72.5	96.0	96.0
4	2	4.2	1203.68	-6187.6	-	-	1203.68	16.2	96.0	96.0
4	3	4.2	534.97	-5872.7	-	-	534.97	22.8	96.0	96.0
4	4	4.2	534.97	-4406.7	-	-	534.97	2.2	96.0	96.0
4	5	4.2	534.97	-3302.9	-	-	534.97	9.1	96.0	96.0
4	6	4.2	534.97	3166.3	-	-	534.97	12.8	96.0	96.0
4	7	4.2	534.97	3550.5	-	-	534.97	1.3	96.0	96.0
4	8	4.2	534.97	3954.2	-	-	534.97	0.0	96.0	96.0
4	9	4.2	534.97	4400.2	-	-	534.97	0.0	96.0	96.0
4	10	4.2	534.97	4677.2	-	-	534.97	0.0	96.0	96.0
4	11	4.2	534.97	4796.2	-	-	534.97	0.0	96.0	96.0
4	12	4.2	534.97	4758.2	-	-	534.97	0.0	96.0	96.0
4	13	4.2	534.97	4562.2	-	-	534.97	0.0	96.0	96.0
4	14	4.2	534.97	4209.2	-	-	534.97	0.0	96.0	96.0
4	15	4.2	534.97	3697.2	-	-	534.97	0.0	96.0	96.0
4	16	4.2	534.97	3029.2	-	-	534.97	1.3	96.0	96.0
4	17	4.2	534.97	-3327.0	-	-	534.97	6.1	96.0	96.0
4	18	4.2	534.97	-4310.3	-	-	534.97	11.8	96.0	96.0
4	19	4.2	534.97	-5429.3	-	-	534.97	20.6	96.0	96.0
4	20	4.2	1203.68	-5900.4	-	-	1203.68	14.9	96.0	96.0
4	21	4.2	1203.68	-6398.7	1.396	0.655	1101.19	69.8	96.0	96.0

VANO	SECCIÓN	fya,d (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
5	1	4.2	1203.68	-6351.5	1.397	0.688	1156.71	51.6	96.0	96.0
5	2	4.2	1203.68	-6019.5	-	-	1203.68	0.0	96.0	96.0
5	3	4.2	534.97	-5705.7	-	-	534.97	6.5	96.0	96.0
5	4	4.2	534.97	-4308.0	-	-	534.97	0.0	96.0	96.0
5	5	4.2	534.97	-3489.2	-	-	534.97	15.6	96.0	96.0
5	6	4.2	534.97	2625.9	-	-	534.97	26.7	96.0	96.0
5	7	4.2	534.97	2821.3	-	-	534.97	13.7	96.0	96.0
5	8	4.2	534.97	3735.4	-	-	534.97	1.8	96.0	96.0
5	9	4.2	534.97	4077.0	-	-	534.97	0.0	96.0	96.0
5	10	4.2	534.97	4349.0	-	-	534.97	0.0	96.0	96.0
5	11	4.2	534.97	4538.0	-	-	534.97	0.0	96.0	96.0
5	12	4.2	534.97	4644.0	-	-	534.97	0.0	96.0	96.0
5	13	4.2	534.97	4667.0	-	-	534.97	0.0	96.0	96.0
5	14	4.2	534.97	4608.0	-	-	534.97	0.0	96.0	96.0
5	15	4.2	534.97	4466.0	-	-	534.97	0.0	96.0	96.0
5	16	4.2	534.97	4241.0	-	-	534.97	0.0	96.0	96.0
5	17	4.2	534.97	3933.0	-	-	534.97	0.0	96.0	96.0
5	18	4.2	534.97	3542.9	-	-	534.97	0.0	96.0	96.0
5	19	4.2	534.97	3069.6	-	-	534.97	0.0	96.0	96.0
5	20	4.2	534.97	-3492.8	-	-	534.97	1.3	96.0	96.0
5	21	4.2	1203.68	-3588.9	-	-	1203.68	0.0	96.0	96.0

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO: L.A.V. MADRID - ZARAGOZA
ESTRUCTURA: E-1508.5

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
1	1	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	562.1	-407.3	932.9	933.1
1	2	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	486.4	-380.8	1521.4	490.0
1	3	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	436.7	-351.0	1831.6	-14.4
1	4	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	386.6	-324.7	2190.6	-289.2
1	5	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	340.0	-301.4	2443.2	-495.6
1	6	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	299.6	-281.6	2617.6	-620.5
1	7	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	253.1	-264.9	2556.0	-719.0
1	8	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	218.6	-251.1	2549.4	-781.6
1	9	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	209.7	-262.5	1478.4	193.4
1	10	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	212.7	-287.5	1421.2	124.2
1	11	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	221.4	-316.4	1221.0	381.2
1	12	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	232.5	-361.0	1197.0	259.1
1	13	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	249.9	-400.2	1246.8	30.4
1	14	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	269.8	-442.2	1336.3	-211.8
1	15	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	301.7	-477.0	1425.5	-627.5
1	16	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	328.0	-521.9	1644.1	-1047.8
1	17	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	356.3	-576.7	1902.7	-1529.4
1	18	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	386.9	-625.2	2233.7	-2143.3
1	19	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	107.7	-988.0	2461.0	-2973.3
1	20	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	-192.6	-1379.1	2508.8	-4204.4
1	21	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	-499.7	-1784.1	2247.8	-5922.1

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
2	1	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	1949.6	521.1	-5923.6	2236.0
2	2	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	1382.0	77.3	-3396.1	2724.5
2	3	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	822.1	-360.9	-1915.7	2426.0
2	4	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	490.6	-589.3	-1258.7	1606.9
2	5	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	637.6	-337.1	-421.8	1197.4
2	6	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	685.4	-198.5	358.4	999.5
2	7	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	532.5	-260.2	1034.7	1021.4
2	8	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	380.7	-336.9	1471.3	917.2
2	9	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	326.7	-316.9	1603.7	723.7
2	10	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	281.1	-303.5	1691.6	585.6
2	11	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	238.3	-302.4	564.5	1900.5
2	12	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	237.9	-347.9	485.0	1844.1
2	13	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	246.9	-392.5	471.4	1655.7
2	14	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	262.3	-447.7	412.0	1416.1
2	15	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	282.9	-501.1	536.0	1017.1
2	16	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	307.1	-566.1	723.7	562.4
2	17	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	335.0	-628.1	994.5	-139.3
2	18	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	366.5	-700.7	1347.9	-963.1
2	19	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	355.1	-814.8	1789.3	-1995.6
2	20	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	-105.8	-1396.8	2037.1	-3471.9
2	21	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	-547.9	-1962.9	1690.0	-5862.3

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
3	1	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	1974.6	516.4	-6513.5	2410.2
3	2	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	1399.0	72.2	-3961.2	2892.8
3	3	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	839.1	-366.2	-2489.1	2587.3
3	4	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	507.8	-594.8	-1780.0	1763.8
3	5	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	654.8	-343.0	-950.1	1351.1
3	6	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	703.0	-204.8	-118.9	1164.3
3	7	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	550.6	-266.9	577.6	1166.5
3	8	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	399.2	-343.9	1022.0	1041.7

3	9	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	345.7	-324.3	1178.5	842.2
3	10	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	300.5	-311.3	1291.5	695.2
3	11	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	254.2	-306.0	991.8	1190.4
3	12	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	259.2	-352.3	-51.4	1874.6
3	13	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	272.5	-397.5	18.3	1680.8
3	14	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	289.5	-453.3	126.0	1436.4
3	15	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	310.4	-507.1	291.8	1029.3
3	16	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	334.8	-572.9	522.2	565.5
3	17	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	363.0	-635.1	824.5	-147.2
3	18	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	394.6	-707.9	1234.1	-982.6
3	19	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	383.3	-822.2	1719.6	-2026.7
3	20	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	-77.4	-1404.1	2012.1	-3514.1
3	21	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	-519.6	-1970.1	1709.4	-5915.7

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
4	1	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	1967.4	547.4	-5928.2	1659.9
4	2	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	1399.4	103.1	-3343.4	2190.7
4	3	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	839.9	-335.1	-1869.4	1934.8
4	4	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	508.5	-564.0	-1159.7	1160.4
4	5	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	656.0	-312.1	-329.4	795.5
4	6	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	704.0	-174.4	503.3	656.8
4	7	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	552.6	-236.6	1203.2	706.1
4	8	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	404.4	-311.1	1684.5	660.0
4	9	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	350.8	-292.6	1852.1	509.8
4	10	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	305.2	-280.9	1974.6	617.8
4	11	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	258.8	-281.9	1964.0	626.8
4	12	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	258.7	-325.6	576.7	1684.8
4	13	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	271.5	-372.1	649.3	1527.8
4	14	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	287.8	-429.6	758.8	1315.1
4	15	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	308.3	-484.5	927.8	939.4
4	16	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	332.1	-551.8	1159.0	501.7
4	17	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	359.8	-615.1	1462.6	-155.1
4	18	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	390.7	-689.2	1871.3	-994.8
4	19	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	379.1	-804.1	2355.0	-1985.6
4	20	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	-78.0	-1382.7	2646.4	-3474.8
4	21	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	-516.6	-1945.3	2339.0	-5819.3

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
5	1	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	1778.3	494.2	-5850.7	2321.0
5	2	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	1191.0	4.5	-4075.7	2637.0
5	3	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	621.0	-474.6	-3180.7	2252.3
5	4	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	511.8	-500.4	-2832.8	1543.4
5	5	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	740.2	-192.9	-2158.8	1275.6
5	6	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	886.9	29.3	-1316.5	1331.7
5	7	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	713.0	-65.7	-513.9	1537.3
5	8	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	558.9	-153.1	-260.6	1286.0
5	9	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	486.5	-165.6	117.3	1316.5
5	10	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	438.0	-159.8	396.2	1365.6
5	11	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	389.7	-158.6	597.9	1426.6
5	12	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	340.4	-167.9	693.4	1577.6
5	13	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	298.7	-177.1	770.5	1680.8
5	14	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	270.7	-199.9	-207.7	2994.1
5	15	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	270.9	-249.3	-468.0	2981.5
5	16	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	274.4	-302.4	-371.3	2884.3
5	17	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	280.9	-365.7	-263.3	2700.2
5	18	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	291.0	-424.6	-89.7	2405.7
5	19	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	304.2	-486.8	137.1	1991.0
5	20	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	320.5	-551.9	427.8	1465.5
5	21	14.000	8.400	2.000	0.406	90	5.65	13.4	15.8	112.6	1.008	4435	4200	15455	333.9	-631.1	947.7	947.6

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5

VANO	SECCIÓN	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
1	1	-	17.3	-	30.0	9.66	ALA COMPRIMIDA	-	12.5	-	30.0	7.00	ALA COMPRIMIDA	9.66
1	2	-	15.0	-	30.0	8.36	ALA COMPRIMIDA	-	11.7	-	30.0	6.54	ALA COMPRIMIDA	8.36
1	3	-	13.4	-	30.0	7.50	ALA COMPRIMIDA	147.71	-	5.8	45.0	5.59	ALA TRACCIONADA	7.50
1	4	-	11.9	-	30.0	6.64	ALA COMPRIMIDA	147.71	-	5.4	45.0	5.17	ALA TRACCIONADA	6.64
1	5	-	10.5	-	30.0	5.84	ALA COMPRIMIDA	147.71	-	5.0	45.0	4.80	ALA TRACCIONADA	5.84
1	6	-	9.2	-	30.0	5.15	ALA COMPRIMIDA	147.71	-	4.6	45.0	4.49	ALA TRACCIONADA	5.15
1	7	-	7.8	-	30.0	4.35	ALA COMPRIMIDA	147.71	-	4.4	45.0	4.22	ALA TRACCIONADA	4.35
1	8	-	6.7	-	30.0	3.76	ALA COMPRIMIDA	147.71	-	4.1	45.0	4.00	ALA TRACCIONADA	4.00
1	9	-	6.5	-	30.0	3.60	ALA COMPRIMIDA	-	8.1	-	30.0	4.51	ALA COMPRIMIDA	4.51
1	10	-	6.5	-	30.0	3.65	ALA COMPRIMIDA	-	8.9	-	30.0	4.94	ALA COMPRIMIDA	4.94
1	11	-	6.8	-	30.0	3.80	ALA COMPRIMIDA	-	9.7	-	30.0	5.44	ALA COMPRIMIDA	5.44
1	12	-	7.2	-	30.0	4.00	ALA COMPRIMIDA	-	11.1	-	30.0	6.20	ALA COMPRIMIDA	6.20
1	13	-	7.7	-	30.0	4.29	ALA COMPRIMIDA	-	12.3	-	30.0	6.88	ALA COMPRIMIDA	6.88
1	14	-	8.3	-	30.0	4.64	ALA COMPRIMIDA	147.71	-	7.3	45.0	7.05	ALA TRACCIONADA	7.05
1	15	-	9.3	-	30.0	5.18	ALA COMPRIMIDA	147.71	-	7.9	45.0	7.60	ALA TRACCIONADA	7.60
1	16	-	10.1	-	30.0	5.64	ALA COMPRIMIDA	147.71	-	8.6	45.0	8.32	ALA TRACCIONADA	8.32
1	17	-	11.0	-	30.0	6.12	ALA COMPRIMIDA	147.71	-	9.5	45.0	9.19	ALA TRACCIONADA	9.19
1	18	-	11.9	-	30.0	6.65	ALA COMPRIMIDA	147.71	-	10.3	45.0	9.96	ALA TRACCIONADA	9.96
1	19	-	3.3	-	30.0	1.85	ALA COMPRIMIDA	147.71	-	16.3	45.0	15.75	ALA TRACCIONADA	15.75
1	20	-	5.9	-	30.0	3.31	ALA COMPRIMIDA	147.71	-	22.7	45.0	21.98	ALA TRACCIONADA	21.98
1	21	-	15.4	-	30.0	8.59	ALA COMPRIMIDA	147.71	-	29.4	45.0	28.43	ALA TRACCIONADA	28.43

VANO	SECCIÓN	b (°)	τ d (Kp/cm2.)	τ max (Kp/cm2.)	e (cm.)	armadura superior Aα,sup (cm2/m.)	armadura inferior Aα,inf (cm2/m.)
1	1	30	17.3	69.28	0.15	1.21	8.45
1	2	30	15.0	69.28	0.16	0.90	7.45
1	3	30	13.4	69.28	0.16	0.73	6.78
1	4	30	11.9	69.28	0.17	0.57	6.07
1	5	30	10.5	69.28	0.17	0.44	5.40
1	6	30	9.2	69.28	0.18	0.34	4.81
1	7	30	7.8	69.28	0.18	0.24	4.10
1	8	45	4.1	80.00	0.19	0.10	3.90
1	9	30	8.1	69.28	0.18	0.26	4.25
1	10	30	8.9	69.28	0.18	0.32	4.62
1	11	30	9.7	69.28	0.17	0.38	5.05
1	12	30	11.1	69.28	0.17	0.50	5.71
1	13	30	12.3	69.28	0.17	0.61	6.27
1	14	45	7.3	80.00	0.18	0.32	6.73
1	15	45	7.9	80.00	0.18	0.37	7.23
1	16	45	8.6	80.00	0.18	0.45	7.87
1	17	45	9.5	80.00	0.18	0.55	8.64
1	18	45	10.3	80.00	0.18	0.64	9.32
1	19	45	16.3	80.00	0.16	1.60	14.14
1	20	45	22.7	80.00	0.15	3.12	18.86
1	21	45	29.4	80.00	0.13	5.23	23.21

VANO	SECCIÓN	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
2	1	147.71	-	32.1	45.0	31.07	ALA TRACCIONADA	-	16.0	-	30.0	8.95	ALA COMPRIMIDA	31.07
2	2	147.71	-	22.8	45.0	22.03	ALA TRACCIONADA	-	2.4	-	30.0	1.33	ALA COMPRIMIDA	22.03
2	3	147.71	-	13.6	45.0	13.10	ALA TRACCIONADA	-	11.1	-	30.0	6.20	ALA COMPRIMIDA	13.10
2	4	147.71	-	8.1	45.0	7.82	ALA TRACCIONADA	-	18.1	-	30.0	10.13	ALA COMPRIMIDA	10.13
2	5	147.71	-	10.5	45.0	10.16	ALA TRACCIONADA	-	10.4	-	30.0	5.79	ALA COMPRIMIDA	10.16
2	6	-	21.1	-	30.0	11.78	ALA COMPRIMIDA	-	6.1	-	30.0	3.41	ALA COMPRIMIDA	11.78
2	7	-	16.4	-	30.0	9.15	ALA COMPRIMIDA	-	8.0	-	30.0	4.47	ALA COMPRIMIDA	9.15
2	8	-	11.7	-	30.0	6.54	ALA COMPRIMIDA	-	10.4	-	30.0	5.79	ALA COMPRIMIDA	6.54
2	9	-	10.1	-	30.0	5.61	ALA COMPRIMIDA	-	9.8	-	30.0	5.44	ALA COMPRIMIDA	5.61
2	10	-	8.7	-	30.0	4.83	ALA COMPRIMIDA	-	9.3	-	30.0	5.22	ALA COMPRIMIDA	5.22
2	11	-	7.3	-	30.0	4.09	ALA COMPRIMIDA	-	9.3	-	30.0	5.20	ALA COMPRIMIDA	5.20
2	12	-	7.3	-	30.0	4.09	ALA COMPRIMIDA	-	10.7	-	30.0	5.98	ALA COMPRIMIDA	5.98
2	13	-	7.6	-	30.0	4.24	ALA COMPRIMIDA	-	12.1	-	30.0	6.74	ALA COMPRIMIDA	6.74
2	14	-	8.1	-	30.0	4.51	ALA COMPRIMIDA	-	13.8	-	30.0	7.69	ALA COMPRIMIDA	7.69
2	15	-	8.7	-	30.0	4.86	ALA COMPRIMIDA	-	15.4	-	30.0	8.61	ALA COMPRIMIDA	8.61
2	16	-	9.5	-	30.0	5.28	ALA COMPRIMIDA	-	17.4	-	30.0	9.73	ALA COMPRIMIDA	9.73
2	17	-	10.3	-	30.0	5.76	ALA COMPRIMIDA	147.71	-	10.4	45.0	10.01	ALA TRACCIONADA	10.01
2	18	-	11.3	-	30.0	6.30	ALA COMPRIMIDA	147.71	-	11.6	45.0	11.17	ALA TRACCIONADA	11.17
2	19	-	10.9	-	30.0	6.10	ALA COMPRIMIDA	147.71	-	13.4	45.0	12.99	ALA TRACCIONADA	12.99
2	20	-	3.3	-	30.0	1.82	ALA COMPRIMIDA	147.71	-	23.0	45.0	22.26	ALA TRACCIONADA	22.26
2	21	-	16.9	-	30.0	9.42	ALA COMPRIMIDA	147.71	-	32.4	45.0	31.28	ALA TRACCIONADA	31.28

VANO	SECCIÓN	b (°)	τ d (Kp/cm2.)	τ max (Kp/cm2.)	e (cm.)	armadura superior Aα,sup (cm2/m.)	armadura inferior Aα,inf (cm2/m.)
2	1	45	32.1	80.00	0.12	6.24	24.83
2	2	45	22.8	80.00	0.15	3.14	18.89
2	3	45	13.6	80.00	0.17	1.11	11.99
2	4	30	18.1	69.28	0.15	1.33	8.80
2	5	45	10.5	80.00	0.18	0.67	9.49
2	6	30	21.1	69.28	0.14	1.79	9.98
2	7	30	16.4	69.28	0.15	1.08	8.07
2	8	30	11.7	69.28	0.17	0.55	5.99
2	9	30	10.1	69.28	0.17	0.41	5.21
2	10	30	9.3	69.28	0.18	0.35	4.86
2	11	30	9.3	69.28	0.18	0.35	4.85
2	12	30	10.7	69.28	0.17	0.46	5.52
2	13	30	12.1	69.28	0.17	0.59	6.16
2	14	30	13.8	69.28	0.16	0.77	6.93
2	15	30	15.4	69.28	0.16	0.96	7.65
2	16	30	17.4	69.28	0.15	1.22	8.50
2	17	45	10.4	80.00	0.18	0.65	9.36
2	18	45	11.6	80.00	0.17	0.81	10.36
2	19	45	13.4	80.00	0.17	1.09	11.90
2	20	45	23.0	80.00	0.14	3.20	19.06
2	21	45	32.4	80.00	0.12	6.33	24.96

VANO	SECCIÓN	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
3	1	147.71	-	32.6	45.0	31.47	ALA TRACCIONADA	-	15.9	-	30.0	8.87	ALA COMPRIMIDA	31.47
3	2	147.71	-	23.1	45.0	22.30	ALA TRACCIONADA	-	2.2	-	30.0	1.24	ALA COMPRIMIDA	22.30
3	3	147.71	-	13.8	45.0	13.37	ALA TRACCIONADA	-	11.3	-	30.0	6.29	ALA COMPRIMIDA	13.37
3	4	147.71	-	8.4	45.0	8.09	ALA TRACCIONADA	-	18.3	-	30.0	10.22	ALA COMPRIMIDA	10.22
3	5	147.71	-	10.8	45.0	10.44	ALA TRACCIONADA	-	10.6	-	30.0	5.89	ALA COMPRIMIDA	10.44
3	6	147.71	-	11.6	45.0	11.20	ALA TRACCIONADA	-	6.3	-	30.0	3.52	ALA COMPRIMIDA	11.20
3	7	-	17.0	-	30.0	9.46	ALA COMPRIMIDA	-	8.2	-	30.0	4.59	ALA COMPRIMIDA	9.46
3	8	-	12.3	-	30.0	6.86	ALA COMPRIMIDA	-	10.6	-	30.0	5.91	ALA COMPRIMIDA	6.86
3	9	-	10.6	-	30.0	5.94	ALA COMPRIMIDA	-	10.0	-	30.0	5.57	ALA COMPRIMIDA	5.94
3	10	-	9.3	-	30.0	5.16	ALA COMPRIMIDA	-	9.6	-	30.0	5.35	ALA COMPRIMIDA	5.35

VANO	SECCIÓN	b (°)	τ d (Kp/cm2.)	τ max (Kp/cm2.)	e (cm.)	armadura superior Aα,sup (cm2/m.)	armadura inferior Aα,inf (cm2/m.)
3	1	45	32.6	80.00	0.12	6.40	25.07
3	2	45	23.1	80.00	0.14	3.21	19.08
3	3	45	13.8	80.00	0.17	1.16	12.22
3	4	30	18.3	69.28	0.15	1.35	8.87
3	5	45	10.8	80.00	0.18	0.70	9.73
3	6	45	11.6	80.00	0.17	0.81	10.39
3	7	30	17.0	69.28	0.15	1.16	8.30
3	8	30	12.3	69.28	0.17	0.61	6.25
3	9	30	10.6	69.28	0.17	0.46	5.48
3	10	30	9.6	69.28	0.17	0.37	4.98

3	11	-	7.8	-	30.0	4.37	ALA COMPRIMIDA	-	9.4	-	30.0	5.26	ALA COMPRIMIDA	5.26	3	11	30	9.4	69.28	0.18	0.36	4.90
3	12	147.71	-	4.3	45.0	4.13	ALA TRACCIONADA	-	10.8	-	30.0	6.05	ALA COMPRIMIDA	6.05	3	12	30	10.8	69.28	0.17	0.47	5.58
3	13	-	8.4	-	30.0	4.68	ALA COMPRIMIDA	-	12.2	-	30.0	6.83	ALA COMPRIMIDA	6.83	3	13	30	12.2	69.28	0.17	0.60	6.23
3	14	-	8.9	-	30.0	4.97	ALA COMPRIMIDA	-	14.0	-	30.0	7.79	ALA COMPRIMIDA	7.79	3	14	30	14.0	69.28	0.16	0.78	7.00
3	15	-	9.6	-	30.0	5.33	ALA COMPRIMIDA	-	15.6	-	30.0	8.71	ALA COMPRIMIDA	8.71	3	15	30	15.6	69.28	0.16	0.98	7.73
3	16	-	10.3	-	30.0	5.75	ALA COMPRIMIDA	-	17.6	-	30.0	9.84	ALA COMPRIMIDA	9.84	3	16	30	17.6	69.28	0.15	1.25	8.59
3	17	-	11.2	-	30.0	6.24	ALA COMPRIMIDA	147.71	-	10.5	45.0	10.12	ALA TRACCIONADA	10.12	3	17	45	10.5	80.00	0.18	0.66	9.46
3	18	-	12.1	-	30.0	6.78	ALA COMPRIMIDA	147.71	-	11.7	45.0	11.28	ALA TRACCIONADA	11.28	3	18	45	11.7	80.00	0.17	0.82	10.46
3	19	-	11.8	-	30.0	6.59	ALA COMPRIMIDA	147.71	-	13.6	45.0	13.10	ALA TRACCIONADA	13.10	3	19	45	13.6	80.00	0.17	1.11	11.99
3	20	-	2.4	-	30.0	1.33	ALA COMPRIMIDA	147.71	-	23.1	45.0	22.38	ALA TRACCIONADA	22.38	3	20	45	23.1	80.00	0.14	3.24	19.14
3	21	-	16.0	-	30.0	8.93	ALA COMPRIMIDA	147.71	-	32.5	45.0	31.40	ALA TRACCIONADA	31.40	3	21	45	32.5	80.00	0.12	6.37	25.02

VANO	SECCIÓN	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
4	1	147.71	-	32.4	45.0	31.35	ALA TRACCIONADA	-	16.9	-	30.0	9.41	ALA COMPRIMIDA	31.35
4	2	147.71	-	23.1	45.0	22.30	ALA TRACCIONADA	-	3.2	-	30.0	1.77	ALA COMPRIMIDA	22.30
4	3	147.71	-	13.8	45.0	13.39	ALA TRACCIONADA	-	10.3	-	30.0	5.76	ALA COMPRIMIDA	13.39
4	4	147.71	-	8.4	45.0	8.10	ALA TRACCIONADA	-	17.4	-	30.0	9.69	ALA COMPRIMIDA	9.69
4	5	147.71	-	10.8	45.0	10.45	ALA TRACCIONADA	-	9.6	-	30.0	5.36	ALA COMPRIMIDA	10.45
4	6	-	21.7	-	30.0	12.10	ALA COMPRIMIDA	-	5.4	-	30.0	3.00	ALA COMPRIMIDA	12.10
4	7	-	17.0	-	30.0	9.50	ALA COMPRIMIDA	-	7.3	-	30.0	4.07	ALA COMPRIMIDA	9.50
4	8	-	12.5	-	30.0	6.95	ALA COMPRIMIDA	-	9.6	-	30.0	5.35	ALA COMPRIMIDA	6.95
4	9	-	10.8	-	30.0	6.03	ALA COMPRIMIDA	-	9.0	-	30.0	5.03	ALA COMPRIMIDA	6.03
4	10	-	9.4	-	30.0	5.24	ALA COMPRIMIDA	-	8.6	-	30.0	4.83	ALA COMPRIMIDA	5.24
4	11	-	8.0	-	30.0	4.45	ALA COMPRIMIDA	-	8.7	-	30.0	4.84	ALA COMPRIMIDA	4.84
4	12	-	8.0	-	30.0	4.44	ALA COMPRIMIDA	-	10.0	-	30.0	5.60	ALA COMPRIMIDA	5.60
4	13	-	8.4	-	30.0	4.66	ALA COMPRIMIDA	-	11.5	-	30.0	6.39	ALA COMPRIMIDA	6.39
4	14	-	8.9	-	30.0	4.94	ALA COMPRIMIDA	-	13.2	-	30.0	7.38	ALA COMPRIMIDA	7.38
4	15	-	9.5	-	30.0	5.30	ALA COMPRIMIDA	-	14.9	-	30.0	8.33	ALA COMPRIMIDA	8.33
4	16	-	10.2	-	30.0	5.71	ALA COMPRIMIDA	-	17.0	-	30.0	9.48	ALA COMPRIMIDA	9.48
4	17	-	11.1	-	30.0	6.18	ALA COMPRIMIDA	147.71	-	10.1	45.0	9.80	ALA TRACCIONADA	9.80
4	18	-	12.0	-	30.0	6.71	ALA COMPRIMIDA	147.71	-	11.4	45.0	10.98	ALA TRACCIONADA	10.98
4	19	-	11.7	-	30.0	6.51	ALA COMPRIMIDA	147.71	-	13.3	45.0	12.82	ALA TRACCIONADA	12.82
4	20	-	2.4	-	30.0	1.34	ALA COMPRIMIDA	147.71	-	22.8	45.0	22.04	ALA TRACCIONADA	22.04
4	21	-	15.9	-	30.0	8.88	ALA COMPRIMIDA	147.71	-	32.1	45.0	31.00	ALA TRACCIONADA	31.00

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm.)	armadura superior Aα,sup (cm2/m.)	armadura inferior Aα,inf (cm2/m.)
4	1	45	32.4	80.00	0.12	6.36	25.00
4	2	45	23.1	80.00	0.14	3.22	19.09
4	3	45	13.8	80.00	0.17	1.16	12.23
4	4	30	17.4	69.28	0.15	1.21	8.48
4	5	45	10.8	80.00	0.18	0.71	9.75
4	6	30	21.7	69.28	0.14	1.89	10.21
4	7	30	17.0	69.28	0.15	1.17	8.33
4	8	30	12.5	69.28	0.17	0.62	6.32
4	9	30	10.8	69.28	0.17	0.47	5.56
4	10	30	9.4	69.28	0.18	0.36	4.89
4	11	30	8.7	69.28	0.18	0.30	4.54
4	12	30	10.0	69.28	0.17	0.40	5.19
4	13	30	11.5	69.28	0.17	0.53	5.87
4	14	30	13.2	69.28	0.16	0.70	6.68
4	15	30	14.9	69.28	0.16	0.90	7.43
4	16	30	17.0	69.28	0.15	1.16	8.32
4	17	45	10.1	80.00	0.18	0.62	9.18
4	18	45	11.4	80.00	0.17	0.78	10.20
4	19	45	13.3	80.00	0.17	1.06	11.75
4	20	45	22.8	80.00	0.15	3.14	18.90
4	21	45	32.1	80.00	0.12	6.21	24.79

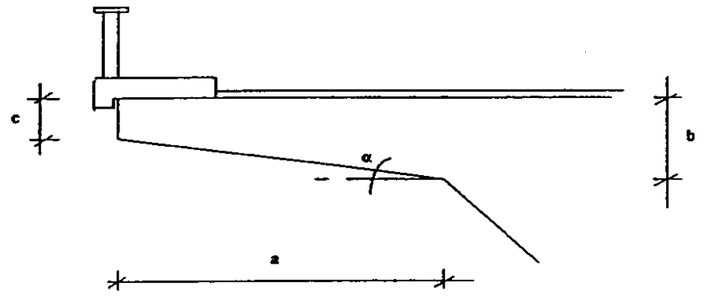
VANO	SECCIÓN	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
5	1	147.71	-	29.3	45.0	28.34	ALA TRACCIONADA	-	15.2	-	30.0	8.49	ALA COMPRIMIDA	28.34
5	2	147.71	-	19.6	45.0	18.98	ALA TRACCIONADA	-	0.1	-	30.0	0.08	ALA COMPRIMIDA	18.98
5	3	147.71	-	10.2	45.0	9.90	ALA TRACCIONADA	-	14.6	-	30.0	8.16	ALA COMPRIMIDA	9.90
5	4	147.71	-	8.4	45.0	8.16	ALA TRACCIONADA	-	15.4	-	30.0	8.60	ALA COMPRIMIDA	8.60
5	5	147.71	-	12.2	45.0	11.80	ALA TRACCIONADA	-	5.9	-	30.0	3.31	ALA COMPRIMIDA	11.80
5	6	147.71	-	14.6	45.0	14.13	ALA TRACCIONADA	-	0.9	-	30.0	0.50	ALA COMPRIMIDA	14.13
5	7	147.71	-	11.8	45.0	11.36	ALA TRACCIONADA	-	2.0	-	30.0	1.13	ALA COMPRIMIDA	11.36
5	8	147.71	-	9.2	45.0	8.91	ALA TRACCIONADA	-	4.7	-	30.0	2.63	ALA COMPRIMIDA	8.91
5	9	-	15.0	-	30.0	8.36	ALA COMPRIMIDA	-	5.1	-	30.0	2.85	ALA COMPRIMIDA	8.36
5	10	-	13.5	-	30.0	7.53	ALA COMPRIMIDA	-	4.9	-	30.0	2.75	ALA COMPRIMIDA	7.53
5	11	-	12.0	-	30.0	6.70	ALA COMPRIMIDA	-	4.9	-	30.0	2.73	ALA COMPRIMIDA	6.70
5	12	-	10.5	-	30.0	5.85	ALA COMPRIMIDA	-	5.2	-	30.0	2.88	ALA COMPRIMIDA	5.85
5	13	-	9.2	-	30.0	5.13	ALA COMPRIMIDA	-	5.5	-	30.0	3.04	ALA COMPRIMIDA	5.13
5	14	147.71	-	4.5	45.0	4.31	ALA TRACCIONADA	-	6.2	-	30.0	3.44	ALA COMPRIMIDA	4.31
5	15	147.71	-	4.5	45.0	4.32	ALA TRACCIONADA	-	7.7	-	30.0	4.28	ALA COMPRIMIDA	4.32
5	16	147.71	-	4.5	45.0	4.37	ALA TRACCIONADA	-	9.3	-	30.0	5.20	ALA COMPRIMIDA	5.20
5	17	147.71	-	4.6	45.0	4.48	ALA TRACCIONADA	-	11.3	-	30.0	6.28	ALA COMPRIMIDA	6.28
5	18	147.71	-	4.8	45.0	4.64	ALA TRACCIONADA	-	13.1	-	30.0	7.30	ALA COMPRIMIDA	7.30
5	19	-	9.4	-	30.0	5.23	ALA COMPRIMIDA	-	15.0	-	30.0	8.36	ALA COMPRIMIDA	8.36
5	20	-	9.9	-	30.0	5.51	ALA COMPRIMIDA	-	17.0	-	30.0	9.48	ALA COMPRIMIDA	9.48
5	21	-	10.3	-	30.0	5.74	ALA COMPRIMIDA	-	19.4	-	30.0	10.84	ALA COMPRIMIDA	10.84

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm.)	armadura superior Aα,sup (cm2/m.)	armadura inferior Aα,inf (cm2/m.)
5	1	45	29.3	80.00	0.13	5.19	23.15
5	2	45	19.6	80.00	0.15	2.33	16.65
5	3	45	10.2	80.00	0.18	0.63	9.26
5	4	30	15.4	69.28	0.16	0.96	7.64
5	5	45	12.2	80.00	0.17	0.90	10.90
5	6	45	14.6	80.00	0.17	1.29	12.84
5	7	45	11.8	80.00	0.17	0.83	10.53
5	8	45	9.2	80.00	0.18	0.51	8.39
5	9	30	15.0	69.28	0.16	0.90	7.46
5	10	30	13.5	69.28	0.16	0.73	6.79
5	11	30	12.0	69.28	0.17	0.58	6.12
5	12	30	10.5	69.28	0.17	0.44	5.41
5	13	30	9.2	69.28	0.18	0.34	4.79
5	14	45	4.5	80.00	0.19	0.12	4.19
5	15	45	4.5	80.00	0.19	0.12	4.20
5	16	30	9.3	69.28	0.18	0.35	4.85
5	17	30	11.3	69.28	0.17	0.51	5.77
5	18	30	13.1	69.28	0.16	0.69	6.61
5	19	30	15.0	69.28	0.16	0.90	7.46
5	20	30	17.0	69.28	0.15	1.16	8.32
5	21	30	19.4	69.28	0.15	1.52	9.32

CALCULO DE ARMADURA DE VOLADIZO

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5

DATOS GEOMETRIA

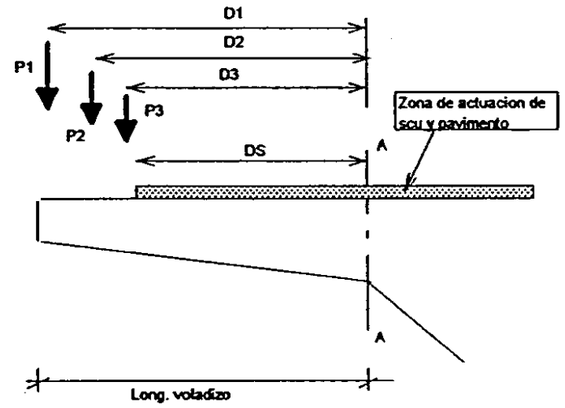


a (longitud voladizo) (m.) =	2.8
b (canto en base del voladizo) (m.) =	0.406
c (canto en extremo del voladizo) (m.) =	0.200
α (angulo cara inferior voladizo) (rad) =	0.073
Recubrimiento (c.d.g. armadura) (m.) =	0.050

DATOS MATERIALES

HORMIGONES		
	Fck(kp/cm2)	γc
Tablero	400	1.5
ACEROS		
	Fk(kp/cm2)	γs
Acero pasivo	5100	1.15

DATOS CARGAS (P1, P2, P3 son cargas permanentes).



Cargas actuantes (valores caracteristicos)

Peso propio hormigón (t/m3) =	2.50

P1(t/m)=	0.75	D1(m.)=	2.80
P2(t/m)=	0.00	D2(m.)=	0.00
P3(t/m)=	0.00	D3(m)=	0.00

Peso pavimento (t/m2)=	0.10
Valor s.c.u. (t/m2)=	0.40

Distancia actuacion s.c. DS(m.)=	2.80

Esfuerzos debidos al carro en Seccion A-A

Momento Mk(m.t/m)=	0.00
Cortante Vk(m.t/m)=	0.00

Coeficientes de ponderacion de acciones

ESTADOS LIMITES ULTIMOS	
	γf
Acciones permanentes desfav.	1.5
Acciones variables desfavorables	1.5

CALCULO

ESFUERZOS (DE SERVICIO) DEBIDOS A LAS CARGAS:

Carga	Momento(mT/	ortante (T/m)
Peso propio	-2.63	2.12
P1	-2.10	0.75
P2	0.00	0.00
P3	0.00	0.00
Pavimento	-0.39	0.28
Sobrecarga repartida (s.c.u.)	-1.57	1.12
Carro	0.00	0.00
TOTAL	-6.69	4.27

ESFUERZOS DE DISEÑO PARA EL DIMENSIONAMIENTO

Carga	Momento(mT/	ortante (T/m	reducido (T/m
Peso propio	-3.95	3.18	2.37
P1	-3.15	1.13	0.47
P2	0.00	0.00	0.00
P3	0.00	0.00	0.00
Pavimento	-0.59	0.42	0.30
Sobrecarga repartida (s.c.u.)	-2.35	1.68	1.19
Carro	0.00	0.00	0.00
TOTAL	-10.04	6.41	4.33

ARMADO FLEXION (por metro)

As sup.(cm²)	omprobació	Def.sup.(o/oo	Def.inf.(o/oo)	ef. acero(o/oo)
6.56	Vale	-11.541	0.972	-10.000

ARMADO CORTANTE (como viga, por metro)

As 90ª(cm²/m)	omprobació	Vu1 (T)	Vcu (T)	Vsu (T)
0.00	Vale	284.80	29.07	0.00

DISTRIBUCIÓN CONJUNTA DE ARMADURA DE RASANTE Y FLEXIÓN EN VOLADIZOS

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5

ARMADURA SUPERIOR DISPUESTA=	24.50	CM2/M
ARMADURA INFERIOR DISPUESTA=	10.05	CM2/M

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
1	1	9.66	1.21	8.45	6.56	0.00	7.77	8.45	0.00	16.73	0.00	0.00
1	2	8.36	0.90	7.45	6.56	0.00	7.47	7.45	0.00	17.03	0.00	0.00
1	3	7.50	0.73	6.78	6.56	0.00	7.29	6.78	0.00	17.21	0.00	0.00
1	4	6.64	0.57	6.07	6.56	0.00	7.13	6.07	0.00	17.37	0.00	0.00
1	5	5.84	0.44	5.40	6.56	0.00	7.00	5.40	0.00	17.50	0.00	0.00
1	6	5.15	0.34	4.81	6.56	0.00	6.90	4.81	0.00	17.60	0.00	0.00
1	7	4.35	0.24	4.10	6.56	0.00	6.81	4.10	0.00	17.69	0.00	0.00
1	8	4.00	0.10	3.90	6.56	0.00	6.67	3.90	0.00	17.83	0.00	0.00
1	9	4.51	0.26	4.25	6.56	0.00	6.83	4.25	0.00	17.67	0.00	0.00
1	10	4.94	0.32	4.62	6.56	0.00	6.88	4.62	0.00	17.62	0.00	0.00
1	11	5.44	0.38	5.05	6.56	0.00	6.94	5.05	0.00	17.56	0.00	0.00
1	12	6.20	0.50	5.71	6.56	0.00	7.06	5.71	0.00	17.44	0.00	0.00
1	13	6.88	0.61	6.27	6.56	0.00	7.17	6.27	0.00	17.33	0.00	0.00
1	14	7.05	0.32	6.73	6.56	0.00	6.88	6.73	0.00	17.62	0.00	0.00
1	15	7.60	0.37	7.23	6.56	0.00	6.94	7.23	0.00	17.56	0.00	0.00
1	16	8.32	0.45	7.87	6.56	0.00	7.01	7.87	0.00	17.49	0.00	0.00
1	17	9.19	0.55	8.64	6.56	0.00	7.11	8.64	0.00	17.39	0.00	0.00
1	18	9.96	0.64	9.32	6.56	0.00	7.20	9.32	0.00	17.30	0.00	0.00
1	19	15.75	1.60	14.14	6.56	0.00	8.17	14.14	0.00	16.33	0.00	0.00
1	20	21.98	3.12	18.86	6.56	0.00	9.69	18.86	0.00	14.81	4.04	0.00
1	21	28.43	5.23	23.21	6.56	0.00	11.79	23.21	0.00	12.71	10.50	0.45

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
2	1	31.07	6.24	24.83	6.56	0.00	12.80	24.83	0.00	11.70	13.13	3.08
2	2	22.03	3.14	18.89	6.56	0.00	9.70	18.89	0.00	14.80	4.09	0.00
2	3	13.10	1.11	11.99	6.56	0.00	7.67	11.99	0.00	16.83	0.00	0.00
2	4	10.13	1.33	8.80	6.56	0.00	7.89	8.80	0.00	16.61	0.00	0.00
2	5	10.16	0.67	9.49	6.56	0.00	7.23	9.49	0.00	17.27	0.00	0.00
2	6	11.78	1.79	9.98	6.56	0.00	8.36	9.98	0.00	16.14	0.00	0.00
2	7	9.15	1.08	8.07	6.56	0.00	7.64	8.07	0.00	16.86	0.00	0.00
2	8	6.54	0.55	5.99	6.56	0.00	7.12	5.99	0.00	17.38	0.00	0.00
2	9	5.61	0.41	5.21	6.56	0.00	6.97	5.21	0.00	17.53	0.00	0.00
2	10	5.22	0.35	4.86	6.56	0.00	6.91	4.86	0.00	17.59	0.00	0.00
2	11	5.20	0.35	4.85	6.56	0.00	6.91	4.85	0.00	17.59	0.00	0.00
2	12	5.98	0.46	5.52	6.56	0.00	7.02	5.52	0.00	17.48	0.00	0.00
2	13	6.74	0.59	6.16	6.56	0.00	7.15	6.16	0.00	17.35	0.00	0.00
2	14	7.69	0.77	6.93	6.56	0.00	7.33	6.93	0.00	17.17	0.00	0.00
2	15	8.61	0.96	7.65	6.56	0.00	7.52	7.65	0.00	16.98	0.00	0.00
2	16	9.73	1.22	8.50	6.56	0.00	7.79	8.50	0.00	16.71	0.00	0.00
2	17	10.01	0.65	9.36	6.56	0.00	7.21	9.36	0.00	17.29	0.00	0.00
2	18	11.17	0.81	10.36	6.56	0.00	7.37	10.36	0.00	17.13	0.00	0.00
2	19	12.99	1.09	11.90	6.56	0.00	7.65	11.90	0.00	16.85	0.00	0.00
2	20	22.26	3.20	19.06	6.56	0.00	9.77	19.06	0.00	14.73	4.32	0.00
2	21	31.28	6.33	24.96	6.56	0.00	12.89	24.96	0.00	11.61	13.35	3.30

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
3	1	31.47	6.40	25.07	6.56	0.00	12.97	25.07	0.00	11.53	13.53	3.48
3	2	22.30	3.21	19.08	6.56	0.00	9.78	19.08	0.00	14.72	4.36	0.00
3	3	13.37	1.16	12.22	6.56	0.00	7.72	12.22	0.00	16.78	0.00	0.00
3	4	10.22	1.35	8.87	6.56	0.00	7.91	8.87	0.00	16.59	0.00	0.00
3	5	10.44	0.70	9.73	6.56	0.00	7.27	9.73	0.00	17.23	0.00	0.00

3	6	11.20	0.81	10.39	6.56	0.00	7.37	10.39	0.00	17.13	0.00	0.00
3	7	9.46	1.16	8.30	6.56	0.00	7.72	8.30	0.00	16.78	0.00	0.00
3	8	6.86	0.61	6.25	6.56	0.00	7.17	6.25	0.00	17.33	0.00	0.00
3	9	5.94	0.46	5.48	6.56	0.00	7.02	5.48	0.00	17.48	0.00	0.00
3	10	5.35	0.37	4.98	6.56	0.00	6.93	4.98	0.00	17.57	0.00	0.00
3	11	5.26	0.36	4.90	6.56	0.00	6.92	4.90	0.00	17.58	0.00	0.00
3	12	6.05	0.47	5.58	6.56	0.00	7.04	5.58	0.00	17.46	0.00	0.00
3	13	6.83	0.60	6.23	6.56	0.00	7.17	6.23	0.00	17.33	0.00	0.00
3	14	7.79	0.78	7.00	6.56	0.00	7.35	7.00	0.00	17.15	0.00	0.00
3	15	8.71	0.98	7.73	6.56	0.00	7.54	7.73	0.00	16.96	0.00	0.00
3	16	9.84	1.25	8.59	6.56	0.00	7.82	8.59	0.00	16.68	0.00	0.00
3	17	10.12	0.66	9.46	6.56	0.00	7.22	9.46	0.00	17.28	0.00	0.00
3	18	11.28	0.82	10.46	6.56	0.00	7.39	10.46	0.00	17.11	0.00	0.00
3	19	13.10	1.11	11.99	6.56	0.00	7.67	11.99	0.00	16.83	0.00	0.00
3	20	22.38	3.24	19.14	6.56	0.00	9.80	19.14	0.00	14.70	4.44	0.00
3	21	31.40	6.37	25.02	6.56	0.00	12.94	25.02	0.00	11.56	13.46	3.41

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
4	1	31.35	6.36	25.00	6.56	0.00	12.92	25.00	0.00	11.58	13.42	3.37
4	2	22.30	3.22	19.09	6.56	0.00	9.78	19.09	0.00	14.72	4.37	0.00
4	3	13.39	1.16	12.23	6.56	0.00	7.72	12.23	0.00	16.78	0.00	0.00
4	4	9.69	1.21	8.48	6.56	0.00	7.78	8.48	0.00	16.72	0.00	0.00
4	5	10.45	0.71	9.75	6.56	0.00	7.27	9.75	0.00	17.23	0.00	0.00
4	6	12.10	1.89	10.21	6.56	0.00	8.45	10.21	0.00	16.05	0.00	0.00
4	7	9.50	1.17	8.33	6.56	0.00	7.73	8.33	0.00	16.77	0.00	0.00
4	8	6.95	0.62	6.32	6.56	0.00	7.19	6.32	0.00	17.31	0.00	0.00
4	9	6.03	0.47	5.56	6.56	0.00	7.03	5.56	0.00	17.47	0.00	0.00
4	10	5.24	0.36	4.89	6.56	0.00	6.92	4.89	0.00	17.58	0.00	0.00
4	11	4.84	0.30	4.54	6.56	0.00	6.87	4.54	0.00	17.63	0.00	0.00
4	12	5.60	0.40	5.19	6.56	0.00	6.97	5.19	0.00	17.53	0.00	0.00
4	13	6.39	0.53	5.87	6.56	0.00	7.09	5.87	0.00	17.41	0.00	0.00
4	14	7.38	0.70	6.68	6.56	0.00	7.27	6.68	0.00	17.23	0.00	0.00
4	15	8.33	0.90	7.43	6.56	0.00	7.46	7.43	0.00	17.04	0.00	0.00
4	16	9.48	1.16	8.32	6.56	0.00	7.72	8.32	0.00	16.78	0.00	0.00
4	17	9.80	0.62	9.18	6.56	0.00	7.18	9.18	0.00	17.32	0.00	0.00
4	18	10.98	0.78	10.20	6.56	0.00	7.34	10.20	0.00	17.16	0.00	0.00
4	19	12.82	1.06	11.75	6.56	0.00	7.62	11.75	0.00	16.88	0.00	0.00
4	20	22.04	3.14	18.90	6.56	0.00	9.70	18.90	0.00	14.80	4.10	0.00
4	21	31.00	6.21	24.79	6.56	0.00	12.78	24.79	0.00	11.72	13.06	3.01

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
5	1	28.34	5.19	23.15	6.56	0.00	11.76	23.15	0.00	12.74	10.40	0.35
5	2	18.98	2.33	16.65	6.56	0.00	8.89	16.65	0.00	15.61	1.04	0.00
5	3	9.90	0.63	9.26	6.56	0.00	7.20	9.26	0.00	17.30	0.00	0.00
5	4	8.60	0.96	7.64	6.56	0.00	7.52	7.64	0.00	16.98	0.00	0.00
5	5	11.80	0.90	10.90	6.56	0.00	7.46	10.90	0.00	17.04	0.00	0.00
5	6	14.13	1.29	12.84	6.56	0.00	7.85	12.84	0.00	16.65	0.00	0.00
5	7	11.36	0.83	10.53	6.56	0.00	7.40	10.53	0.00	17.10	0.00	0.00
5	8	8.91	0.51	8.39	6.56	0.00	7.07	8.39	0.00	17.43	0.00	0.00
5	9	8.36	0.90	7.46	6.56	0.00	7.47	7.46	0.00	17.03	0.00	0.00
5	10	7.53	0.73	6.79	6.56	0.00	7.29	6.79	0.00	17.21	0.00	0.00
5	11	6.70	0.58	6.12	6.56	0.00	7.14	6.12	0.00	17.36	0.00	0.00
5	12	5.85	0.44	5.41	6.56	0.00	7.00	5.41	0.00	17.50	0.00	0.00
5	13	5.13	0.34	4.79	6.56	0.00	6.90	4.79	0.00	17.60	0.00	0.00
5	14	4.31	0.12	4.19	6.56	0.00	6.68	4.19	0.00	17.82	0.00	0.00
5	15	4.32	0.12	4.20	6.56	0.00	6.68	4.20	0.00	17.82	0.00	0.00
5	16	5.20	0.35	4.85	6.56	0.00	6.91	4.85	0.00	17.59	0.00	0.00
5	17	6.28	0.51	5.77	6.56	0.00	7.07	5.77	0.00	17.43	0.00	0.00
5	18	7.30	0.69	6.61	6.56	0.00	7.25	6.61	0.00	17.25	0.00	0.00
5	19	8.36	0.90	7.46	6.56	0.00	7.47	7.46	0.00	17.03	0.00	0.00
5	20	9.48	1.16	8.32	6.56	0.00	7.72	8.32	0.00	16.78	0.00	0.00
5	21	10.84	1.52	9.32	6.56	0.00	8.08	9.32	0.00	16.42	0.00	0.00

CÁLCULO DE ARMADURA DE TORSION . ART. 48.2 EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
1	1	0.00	716.04	12.613	0.333	3783.65	vale	6.40	6.76
1	2	1.20	648.02	13.033	0.250	2932.48	vale	5.61	5.92
1	3	2.40	587.15	13.033	0.250	2932.48	vale	5.08	5.36
1	4	3.60	533.45	13.033	0.250	2932.48	vale	4.61	4.87
1	5	4.80	486.91	13.033	0.250	2932.48	vale	4.21	4.45
1	6	6.00	447.53	13.033	0.250	2932.48	vale	3.87	4.09
1	7	7.20	415.30	13.033	0.250	2932.48	vale	3.59	3.79
1	8	8.40	390.24	13.033	0.250	2932.48	vale	3.38	3.56
1	9	9.60	372.34	13.033	0.250	2932.48	vale	3.22	3.40
1	10	10.80	361.60	13.033	0.250	2932.48	vale	3.13	3.30
1	11	12.00	358.02	13.033	0.250	2932.48	vale	3.10	3.27
1	12	10.80	361.60	13.033	0.250	2932.48	vale	3.13	3.30
1	13	9.60	372.34	13.033	0.250	2932.48	vale	3.22	3.40
1	14	8.40	390.24	13.033	0.250	2932.48	vale	3.38	3.56
1	15	7.20	415.30	13.033	0.250	2932.48	vale	3.59	3.79
1	16	6.00	447.53	13.033	0.250	2932.48	vale	3.87	4.09
1	17	4.80	486.91	13.033	0.250	2932.48	vale	4.21	4.45
1	18	3.60	533.45	13.033	0.250	2932.48	vale	4.61	4.87
1	19	2.40	587.15	13.033	0.250	2932.48	vale	5.08	5.36
1	20	1.20	648.02	12.613	0.333	3783.65	vale	5.79	6.12
1	21	0.00	716.04	12.613	0.333	3783.65	vale	6.40	6.76

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
2	1	0.00	924.89	12.613	0.333	3783.65	vale	8.27	8.73
2	2	1.55	837.02	12.613	0.333	3783.65	vale	7.48	7.90
2	3	3.10	758.41	13.033	0.250	2932.48	vale	6.56	6.93
2	4	4.65	689.04	13.033	0.250	2932.48	vale	5.96	6.29
2	5	6.20	628.92	13.033	0.250	2932.48	vale	5.44	5.74
2	6	7.75	578.05	13.033	0.250	2932.48	vale	5.00	5.28
2	7	9.30	536.43	13.033	0.250	2932.48	vale	4.64	4.90
2	8	10.85	504.06	13.033	0.250	2932.48	vale	4.36	4.60
2	9	12.40	480.94	13.033	0.250	2932.48	vale	4.16	4.39
2	10	13.95	467.07	13.033	0.250	2932.48	vale	4.04	4.27
2	11	15.50	462.44	13.033	0.250	2932.48	vale	4.00	4.22
2	12	13.95	467.07	13.033	0.250	2932.48	vale	4.04	4.27
2	13	12.40	480.94	13.033	0.250	2932.48	vale	4.16	4.39
2	14	10.85	504.06	13.033	0.250	2932.48	vale	4.36	4.60
2	15	9.30	536.43	13.033	0.250	2932.48	vale	4.64	4.90
2	16	7.75	578.05	13.033	0.250	2932.48	vale	5.00	5.28
2	17	6.20	628.92	13.033	0.250	2932.48	vale	5.44	5.74
2	18	4.65	689.04	13.033	0.250	2932.48	vale	5.96	6.29
2	19	3.10	758.41	13.033	0.250	2932.48	vale	6.56	6.93
2	20	1.55	837.02	12.613	0.333	3783.65	vale	7.48	7.90
2	21	0.00	924.89	12.613	0.333	3783.65	vale	8.27	8.73

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
3	1	0.00	924.89	12.613	0.333	3783.65	vale	8.27	8.73
3	2	1.55	837.02	12.613	0.333	3783.65	vale	7.48	7.90
3	3	3.10	758.41	13.033	0.250	2932.48	vale	6.56	6.93
3	4	4.65	689.04	13.033	0.250	2932.48	vale	5.96	6.29
3	5	6.20	628.92	13.033	0.250	2932.48	vale	5.44	5.74
3	6	7.75	578.05	13.033	0.250	2932.48	vale	5.00	5.28

3	7	9.30	536.43	13.033	0.250	2932.48	vale	4.64	4.90
3	8	10.85	504.06	13.033	0.250	2932.48	vale	4.36	4.60
3	9	12.40	480.94	13.033	0.250	2932.48	vale	4.16	4.39
3	10	13.95	467.07	13.033	0.250	2932.48	vale	4.04	4.27
3	11	15.50	462.44	13.033	0.250	2932.48	vale	4.00	4.22
3	12	13.95	467.07	13.033	0.250	2932.48	vale	4.04	4.27
3	13	12.40	480.94	13.033	0.250	2932.48	vale	4.16	4.39
3	14	10.85	504.06	13.033	0.250	2932.48	vale	4.36	4.60
3	15	9.30	536.43	13.033	0.250	2932.48	vale	4.64	4.90
3	16	7.75	578.05	13.033	0.250	2932.48	vale	5.00	5.28
3	17	6.20	628.92	13.033	0.250	2932.48	vale	5.44	5.74
3	18	4.65	689.04	13.033	0.250	2932.48	vale	5.96	6.29
3	19	3.10	758.41	13.033	0.250	2932.48	vale	6.56	6.93
3	20	1.55	837.02	12.613	0.333	3783.65	vale	7.48	7.90
3	21	0.00	924.89	12.613	0.333	3783.65	vale	8.27	8.73

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
4	1	0.00	924.89	12.613	0.333	3783.65	vale	8.27	8.73
4	2	1.55	837.02	12.613	0.333	3783.65	vale	7.48	7.90
4	3	3.10	758.41	13.033	0.250	2932.48	vale	6.56	6.93
4	4	4.65	689.04	13.033	0.250	2932.48	vale	5.96	6.29
4	5	6.20	628.92	13.033	0.250	2932.48	vale	5.44	5.74
4	6	7.75	578.05	13.033	0.250	2932.48	vale	5.00	5.28
4	7	9.30	536.43	13.033	0.250	2932.48	vale	4.64	4.90
4	8	10.85	504.06	13.033	0.250	2932.48	vale	4.36	4.60
4	9	12.40	480.94	13.033	0.250	2932.48	vale	4.16	4.39
4	10	13.95	467.07	13.033	0.250	2932.48	vale	4.04	4.27
4	11	15.50	462.44	13.033	0.250	2932.48	vale	4.00	4.22
4	12	13.95	467.07	13.033	0.250	2932.48	vale	4.04	4.27
4	13	12.40	480.94	13.033	0.250	2932.48	vale	4.16	4.39
4	14	10.85	504.06	13.033	0.250	2932.48	vale	4.36	4.60
4	15	9.30	536.43	13.033	0.250	2932.48	vale	4.64	4.90
4	16	7.75	578.05	13.033	0.250	2932.48	vale	5.00	5.28
4	17	6.20	628.92	13.033	0.250	2932.48	vale	5.44	5.74
4	18	4.65	689.04	13.033	0.250	2932.48	vale	5.96	6.29
4	19	3.10	758.41	13.033	0.250	2932.48	vale	6.56	6.93
4	20	1.55	837.02	12.613	0.333	3783.65	vale	7.48	7.90
4	21	0.00	924.89	12.613	0.333	3783.65	vale	8.27	8.73

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
5	1	0.00	716.04	12.613	0.333	3783.65	vale	6.40	6.76
5	2	1.20	648.02	12.613	0.333	3783.65	vale	5.79	6.12
5	3	2.40	587.15	13.033	0.250	2932.48	vale	5.08	5.36
5	4	3.60	533.45	13.033	0.250	2932.48	vale	4.61	4.87
5	5	4.80	486.91	13.033	0.250	2932.48	vale	4.21	4.45
5	6	6.00	447.53	13.033	0.250	2932.48	vale	3.87	4.09
5	7	7.20	415.30	13.033	0.250	2932.48	vale	3.59	3.79
5	8	8.40	390.24	13.033	0.250	2932.48	vale	3.38	3.56
5	9	9.60	372.34	13.033	0.250	2932.48	vale	3.22	3.40
5	10	10.80	361.60	13.033	0.250	2932.48	vale	3.13	3.30
5	11	12.00	358.02	13.033	0.250	2932.48	vale	3.10	3.27
5	12	10.80	361.60	13.033	0.250	2932.48	vale	3.13	3.30
5	13	9.60	372.34	13.033	0.250	2932.48	vale	3.22	3.40
5	14	8.40	390.24	13.033	0.250	2932.48	vale	3.38	3.56
5	15	7.20	415.30	13.033	0.250	2932.48	vale	3.59	3.79
5	16	6.00	447.53	13.033	0.250	2932.48	vale	3.87	4.09
5	17	4.80	486.91	13.033	0.250	2932.48	vale	4.21	4.45
5	18	3.60	533.45	13.033	0.250	2932.48	vale	4.61	4.87
5	19	2.40	587.15	13.033	0.250	2932.48	vale	5.08	5.36
5	20	1.20	648.02	13.033	0.250	2932.48	vale	5.61	5.92
5	21	0.00	716.04	12.613	0.333	3783.65	vale	6.40	6.76

GINPROSA

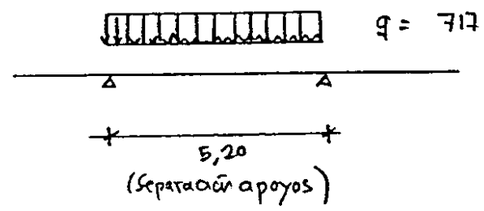
ASUNTO

RIOSTRAS DE PILAS

PAG. 1

CALCULO DE ARMADURA INFERIOR

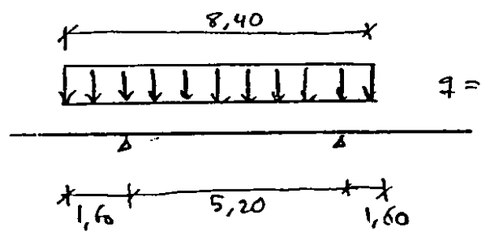
Reacción máxima = 1,50 (1088 + 374 + 1023) = 3730 ton.
pp cm tren



$M_d = \frac{717 \times 5{,}20^2}{8} = 2423$ mt $\longrightarrow$ $M_d = \frac{2423}{6{,}00} = 404$ mt/m. $\longrightarrow 48{,}5$ cm²/m.

$V_d = \frac{717 \times 5{,}20}{2 \times 6{,}00} = 311$ t/m. $\longrightarrow V_{cu} = 155$ t $\quad A_\alpha = 21{,}70$ cm²/m.
2c ø12/0,20

CALCULO DE ARMADURA SUPERIOR



$M_d = -\frac{377{,}40 \times 1{,}60^2}{2} = 484$ mt $\longrightarrow$ $m_d = 81$ mt/m $\longrightarrow 10$ cm²/m.

$V_d = \frac{377{,}40 \times 1{,}60}{6} = 101$ t/m

GINPROSA

ASUNTO	FECHA
TENDONES PARA REALIZAR EL PUNTO FIJO E 1508.5. TABLERO DERECHO.	PAG. 1

Peso de tablero + carga muerta = 6452 tm.

Fuerza de coacción sobre punto fijo = 0,03 x 6452 = 194 tm.

Carga de frenado = $\frac{(10 \times 141 + 30 \times 2) \times (1+0,90)}{8}$ = 349 tm.

Fuerza total en punto fijo = 543 tm. Se toman con 2 anclajes

Las fuerzas de diseño por anclaje son:

En servicio $H_s = \frac{543}{2} = 272$ tm.

En rotura $H_d = \frac{543}{2} \times 1,50 = 410$ tm.

Se toman tendones de 27 0,6" con carga de rotura

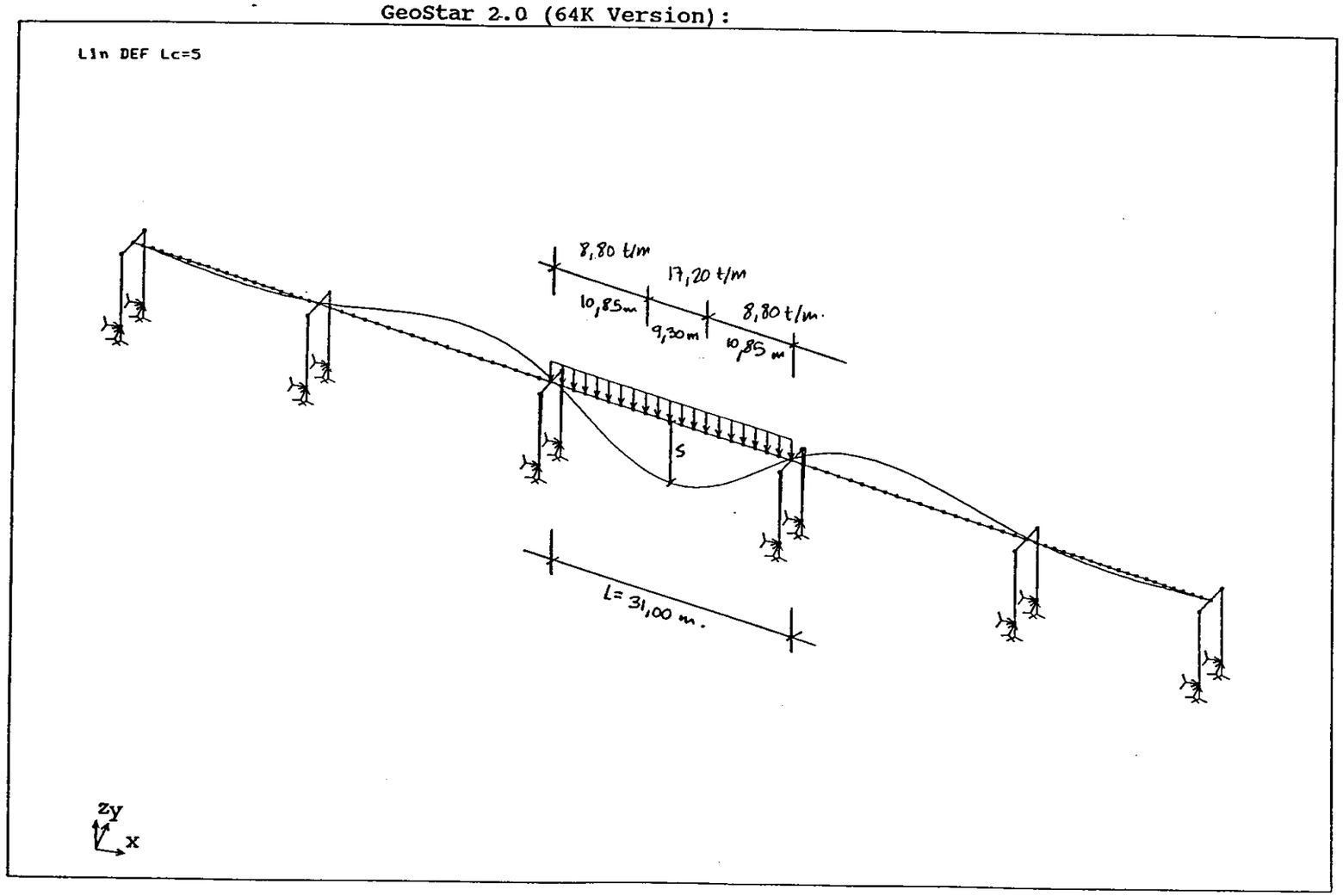
$P_u = 718$ tm > H_d.

Se tesan al 40% de la carga de rotura $P_o = 287$ tm.

Se disponen 4 neoprenos de 400 x 500 x 81 (33)

E-1508.5 ESTADO LIMITE DE DEFORMACIONES

GeoStar 2.0 (64K Version):

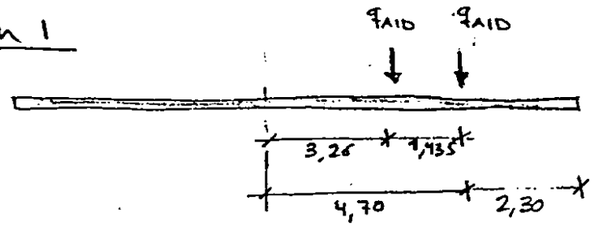


$$\frac{S}{L} = \frac{4{,}6 \text{ mm}}{31000 \text{ mm}} = \frac{1}{6739} < \frac{1}{1909} \quad \therefore \text{Verifica}$$

Load case 5

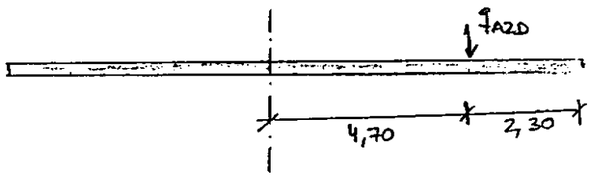
Node	UX	UY	UZ	RX	RY	RZ
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
4	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
5	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
6	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
7	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
8	0.0000	0.0000	-0.0003	0.0000	0.0000	0.0000
9	0.0000	0.0000	-0.0003	0.0000	0.0000	0.0000
10	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
11	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
12	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
13	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
14	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
15	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
16	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
17	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
18	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
19	0.0000	0.0001	-0.0002	0.0000	-0.0001	0.0000
20	0.0000	0.0001	-0.0002	0.0000	-0.0001	0.0000
21	0.0000	0.0001	-0.0001	0.0000	-0.0001	0.0000
22	0.0000	0.0001	0.0000	0.0000	-0.0001	0.0000
23	0.0000	0.0001	0.0002	0.0000	-0.0001	0.0000
24	0.0000	0.0002	0.0003	0.0000	-0.0001	0.0000
25	0.0000	0.0002	0.0005	0.0000	-0.0001	0.0000
26	0.0000	0.0002	0.0007	0.0000	-0.0001	0.0000
27	0.0001	0.0002	0.0009	0.0000	-0.0001	0.0000
28	0.0001	0.0002	0.0011	0.0000	-0.0001	0.0000
29	0.0001	0.0002	0.0012	0.0000	-0.0001	0.0000
30	0.0001	0.0002	0.0014	0.0000	-0.0001	0.0000
31	0.0001	0.0002	0.0015	0.0000	-0.0001	0.0000
32	0.0001	0.0002	0.0016	0.0000	-0.0001	0.0000
33	0.0001	0.0002	0.0017	0.0000	0.0000	0.0000
34	0.0001	0.0002	0.0018	0.0000	0.0000	0.0000
35	0.0001	0.0002	0.0018	0.0000	0.0000	0.0000
36	0.0001	0.0002	0.0017	0.0000	0.0001	0.0000
37	0.0001	0.0002	0.0016	0.0000	0.0001	0.0000
38	0.0001	0.0002	0.0014	0.0000	0.0001	0.0000
39	0.0001	0.0003	0.0012	0.0000	0.0002	0.0000
40	0.0001	0.0003	0.0008	0.0001	0.0002	0.0000
41	0.0001	0.0003	0.0004	0.0001	0.0003	0.0000
42	0.0001	0.0003	0.0000	0.0001	0.0003	0.0000
43	0.0001	0.0003	-0.0006	0.0001	0.0004	0.0000
44	0.0001	0.0003	-0.0012	0.0001	0.0004	0.0000
45	0.0001	0.0003	-0.0018	0.0001	0.0004	0.0000
46	0.0001	0.0003	-0.0024	0.0001	0.0004	0.0000
47	0.0001	0.0003	-0.0030	0.0001	0.0003	0.0000
48	0.0001	0.0003	-0.0035	0.0001	0.0003	0.0000
49	0.0001	0.0003	-0.0040	0.0001	0.0002	0.0000
50	0.0001	0.0003	-0.0043	0.0000	0.0002	0.0000
51	0.0001	0.0003	-0.0045	0.0000	0.0001	0.0000
52	0.0001	0.0003	-0.0046	0.0000	0.0000	0.0000
53	0.0001	0.0003	-0.0045	0.0000	-0.0001	0.0000
54	0.0001	0.0003	-0.0043	0.0000	-0.0002	0.0000
55	0.0001	0.0003	-0.0040	-0.0001	-0.0002	0.0000
56	0.0001	0.0003	-0.0035	-0.0001	-0.0003	0.0000
57	0.0001	0.0003	-0.0030	-0.0001	-0.0003	0.0000
58	0.0001	0.0003	-0.0024	-0.0001	-0.0004	0.0000
59	0.0001	0.0003	-0.0018	-0.0001	-0.0004	0.0000
60	0.0001	0.0003	-0.0012	-0.0001	-0.0004	0.0000
61	0.0001	0.0003	-0.0006	-0.0001	-0.0004	0.0000
62	0.0001	0.0003	0.0000	-0.0001	-0.0003	0.0000
63	0.0001	0.0003	0.0004	-0.0001	-0.0003	0.0000
64	0.0001	0.0003	0.0008	-0.0001	-0.0002	0.0000
65	0.0001	0.0003	0.0012	0.0000	-0.0002	0.0000
66	0.0001	0.0003	0.0014	0.0000	-0.0001	0.0000
67	0.0001	0.0002	0.0016	0.0000	-0.0001	0.0000
68	0.0001	0.0002	0.0017	0.0000	-0.0001	0.0000
69	0.0001	0.0002	0.0018	0.0000	0.0000	0.0000
70	0.0000	0.0002	0.0018	0.0000	0.0000	0.0000
71	0.0000	0.0002	0.0017	0.0000	0.0000	0.0000
72	0.0000	0.0002	0.0016	0.0000	0.0001	0.0000
73	0.0000	0.0002	0.0015	0.0000	0.0001	0.0000
74	0.0000	0.0002	0.0014	0.0000	0.0001	0.0000
75	0.0000	0.0002	0.0012	0.0000	0.0001	0.0000
76	0.0000	0.0002	0.0011	0.0000	0.0001	0.0000
77	0.0000	0.0002	0.0009	0.0000	0.0001	0.0000
78	0.0000	0.0002	0.0007	0.0000	0.0001	0.0000
79	0.0000	0.0002	0.0005	0.0000	0.0001	0.0000
80	0.0000	0.0002	0.0003	0.0000	0.0001	0.0000
81	0.0000	0.0001	0.0002	0.0000	0.0001	0.0000
82	0.0000	0.0001	0.0000	0.0000	0.0001	0.0000
83	0.0000	0.0001	-0.0001	0.0000	0.0001	0.0000
84	0.0000	0.0001	-0.0002	0.0000	0.0001	0.0000
85	0.0000	0.0001	-0.0002	0.0000	0.0001	0.0000
86	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
87	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
88	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
89	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
90	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
91	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
92	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
93	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
94	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
95	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
96	0.0000	0.0000	-0.0003	0.0000	0.0000	0.0000
97	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
98	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
99	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
100	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
101	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
102	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

SITUACION 1



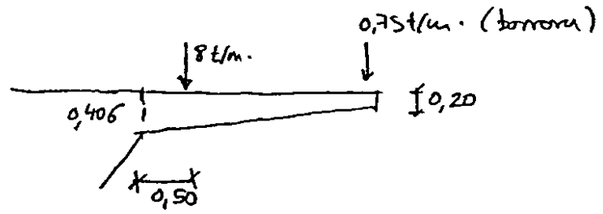
q_{AID} = 50 KN/m y 6,40 m de longitud.

SITUACIÓN DE DISEÑO 2:



q_{A2D} = 80 KN/m. y 20 m de longitud.

COMPROBACION DEL VOLADIZO



V_d: $\left(0,20+\frac{0,206}{2}\right)2,8 \cdot 2,5 + 0,75 + 8,0 = 10,9$ t/m

$M_d = \left(0,20 \cdot \frac{2,8}{2} + \frac{0,206}{2} \cdot \frac{2,8}{3}\right) \times 2,8 \times 2,5 + 0,75 \times 2,8 + 8 \times 0,50 = 8,73$

$V_{cu} = 25,0$ ton > V_d OK

M_d < M_u

ESTABILIDAD

Tensor en pilas $T_d = 10 t/m \cdot 31,0 \left(4,70 - \frac{1,435}{2}\right) = 1235$ m.t

en estribos. $T_d = 10 t/m \cdot \frac{24}{2} \cdot \left(4,70 - \frac{1,435}{2}\right) = 477,9$ mt

Reacc en pilas = ± 237,5 tm.

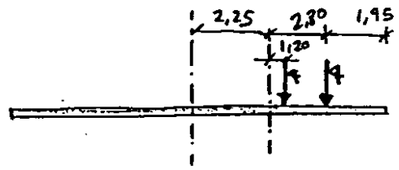
Reacc en estrib = ± 92 tm.

Reacciones de peso propio y carga muerta.

Estribos = $\frac{289+105}{2} = 197 >> 92$ No existe vuelco

Pilas = $\frac{976+367}{2} = 671,5 >> 237,5$ No hay vuelco

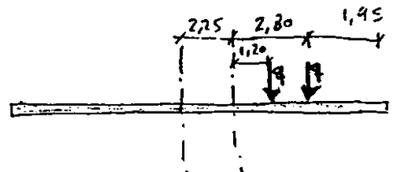
CASO A



q = 1,50 t/m.

P = 10 t

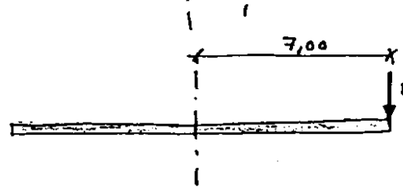
CASO B



q = 5,0 t/m.

P = 22 t

CASO C



12 t/m en longitud L = 30 m.

COMPROBACIONES

ESTABILIDAD DEL CONJUNTO CASO C

Se aplica la carga de 12 t/m y el torsor de $t = 12 \times 7 = 84$ mt/m a una longitud de 30 m en estructura porticada con los siguientes resultados:

Reacciones negativas en apoyos	Estribos	−130 tm.
	Pilas extremas	−194 tm.
	Pilas centrales	−210 tm.

Torsor máximo T_d = 1300 mt

Las reacciones de peso propio y carga muerta son las siguientes:

Estribo	197 tm	> 130	NO HAY VUELCO
Pila extrema	671,5 tm	> 194	"
Pila central	708 tm	> −210	

COMPROBACIONES DE VALIDEZ CASO B

Carga uniforme

M_d = 6,69 (carga permanente) + $q \times (2,80 - 1,95)$ → 10,94 mt < M_u sección

Carga puntual 22 t

M_d = 6,69 + 0,375.22 = 14,94 mt < M_u sección.

(0,375 calculado según Tablas de Homberg.)

PUENTE E-1508.5

2.2.- Tablero izquierdo

GINPROSA

ASUNTO	FECHA
E-1508.5. TABLERO IZQUIERDO CARGAS CONSIDERADAS.	PAG. 1

1º) Peso Propio $\gamma = 2,5\ t/m^3$

2º) Carga muerta.

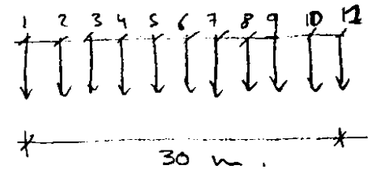
Traviesas + carriles	——	0,64 t/m.
Balasto	——	7,20 t/m.
Cables + Conductos	——	0,30 t/m.
Barreras	——	1,50 t/m.
Sc Pareos	——	1,57 t/m
TOTAL CM	——	11,20 t/m.
Tensor asociado	——	2,90 m.t/m.

3º) TREN TIPO B

Se supone una carga de 10 t/m aplicada como sobrecarga de uso y los 2,0 t/m de exceso de peso por barrera aplicada como un tren de cargas puntuales

$q = 10\ t/m.$

Exceso barrera



11 cargas puntuales de $P = 5,5\ t$

Vano	Seccion	Area A (m2)	Inercia I (m4)	Fibra sup. v (m.)	Fibra inf. v' (m.)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ancho Sup. bs (m.)	Ancho cort. bw (m.)	Perimetro u (m.)	Canto volad. hf (m.)	Nº Aliger. na -	Dist. cdg.Alig va (m.)	Separ.Alig sa (m.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Inercia tors. J (m4.)	Inercia eje vert. (m4.)	Coord.sec. X (m.)
1	1	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	0.000
1	2	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	1.189
1	3	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	2.377
1	4	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	3.566
1	5	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	4.754
1	6	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	5.943
1	7	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	7.131
1	8	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	8.320
1	9	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	9.508
1	10	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	10.697
1	11	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	11.885
1	12	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	13.074
1	13	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	14.262
1	14	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	15.451
1	15	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	16.639
1	16	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	17.828
1	17	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	19.016
1	18	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	20.205
1	19	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	21.393
1	20	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	22.582
1	21	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	23.770

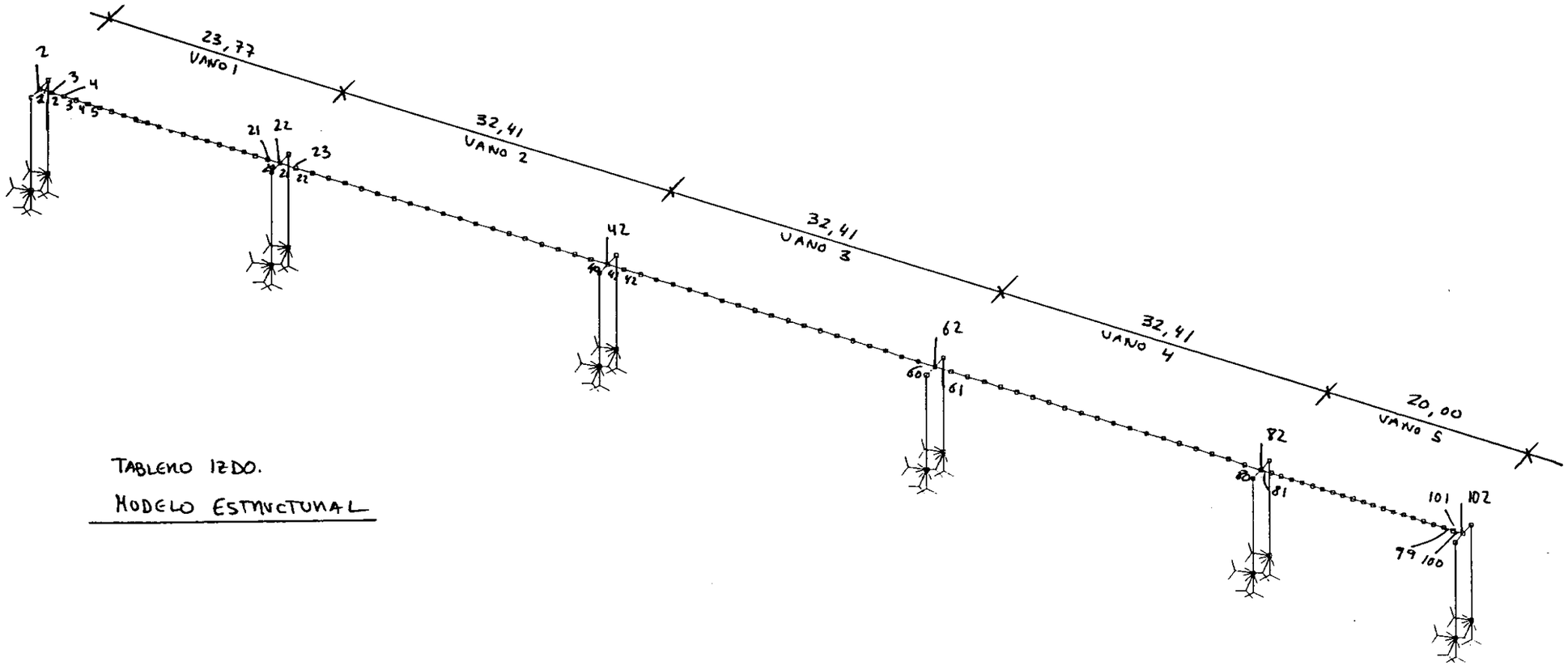
Vano	Seccion	Area A (m2)	Inercia I (m4)	Fibra sup. v (m.)	Fibra inf. v' (m.)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ancho Sup. bs (m.)	Ancho cort. bw (m.)	Perimetro u (m.)	Canto volad. hf (m.)	Nº Aliger. na -	Dist. cdg.Alig va (m.)	Separ.Alig sa (m.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Inercia tors. J (m4.)	Inercia eje vert. (m4.)	Coord.sec. X (m.)
2	1	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	0.000
2	2	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	1.621
2	3	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	3.241
2	4	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	4.862
2	5	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	6.482
2	6	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	8.103
2	7	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	9.723
2	8	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	11.344
2	9	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	12.964
2	10	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	14.585
2	11	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	16.205
2	12	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	17.826
2	13	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	19.446
2	14	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	21.067
2	15	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	22.687
2	16	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	24.308
2	17	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	25.928
2	18	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	27.549
2	19	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	29.169
2	20	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	30.790
2	21	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	32.410

Vano	Seccion	Area A (m2)	Inercia I (m4)	Fibra sup. v (m.)	Fibra inf. v' (m.)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ancho Sup. bs (m.)	Ancho cort. bw (m.)	Perimetro u (m.)	Canto volad. hf (m.)	Nº Aliger. na -	Dist. cdg.Alig va (m.)	Separ.Alig sa (m.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Inercia tors. J (m4.)	Inercia eje vert. (m4.)	Coord.sec. X (m.)
3	1	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	0.000
3	2	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	1.621
3	3	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	3.241
3	4	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	4.862
3	5	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	6.482
3	6	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	8.103
3	7	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	9.723
3	8	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	11.344
3	9	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	12.964
3	10	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	14.585
3	11	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	16.205
3	12	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	17.826
3	13	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	19.446
3	14	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	21.067
3	15	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	22.687
3	16	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	24.308
3	17	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	25.928
3	18	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	27.549
3	19	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	29.169
3	20	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	30.790

3	21	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	32.410

Vano	Seccion	Area A (m2)	Inercia I (m4)	Fibra sup. v (m.)	Fibra inf. v' (m.)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ancho Sup. bs (m.)	Ancho cort. bw (m.)	Perimetro u (m.)	Canto volad. hf (m.)	Nº Aliger. na -	Dist. cdg.Alig va (m.)	Separ.Alig sa (m.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Inercia tors. J (m4.)	Inercia eje vert. (m4.)	Coord.sec. X (m.)
4	1	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	0.000
4	2	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	1.621
4	3	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	3.241
4	4	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	4.862
4	5	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	6.482
4	6	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	8.103
4	7	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	9.723
4	8	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	11.344
4	9	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	12.964
4	10	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	14.585
4	11	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	16.205
4	12	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	17.826
4	13	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	19.446
4	14	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	21.067
4	15	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	22.687
4	16	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	24.308
4	17	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	25.928
4	18	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	27.549
4	19	8.796	4.089	0.972	-1.128	2.100	8.300	5.100	5.500	2.300	19.976	0.378	2	1.050	2.000	8.666	0.330	6.939	32.049	29.169
4	20	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	30.790
4	21	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	32.049	32.410

Vano	Seccion	Area A (m2)	Inercia I (m4)	Fibra sup. v (m.)	Fibra inf. v' (m.)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ancho Sup. bs (m.)	Ancho cort. bw (m.)	Perimetro u (m.)	Canto volad. hf (m.)	Nº Aliger. na -	Dist. cdg.Alig va (m.)	Separ.Alig sa (m.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Inercia tors. J (m4.)	Inercia eje vert. (m4.)	Coord.sec. X (m.)
5	1	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	0.000
5	2	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	1.000
5	3	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	2.000
5	4	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	3.000
5	5	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	4.000
5	6	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	5.000
5	7	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	6.000
5	8	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	7.000
5	9	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	8.000
5	10	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	9.000
5	11	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	10.000
5	12	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	11.000
5	13	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	12.000
5	14	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	13.000
5	15	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	14.000
5	16	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	15.000
5	17	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	16.000
5	18	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	17.000
5	19	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	18.000
5	20	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	19.000
5	21	11.875	4.480	0.992	-1.108	2.100	8.300	5.100	5.500	5.100	19.976	0.378	0	0.000	0.000	8.614	0.350	7.014	35.505	20.000


23,77
VANO 1
32,41
VANO 2
32,41
VANO 3
32,41
VANO 4
20,00
VANO 5
2
3
4
5
21
22
23
42
62
82
101
102
79
100
TABLERO IZDO.
MODELO ESTRUCTURAL

GINPROSA	ASUNTO	FECHA
	E-1508.5 TABLERO 17DO CALCULO DEL COEFICIENTE DE IMPACTO	PAG. 1

Masa vibrante

Peso propio $\gamma = 2,5$ t/m³

Carga muerta $q = 11,20$ t/m.

Adoptamos un peso especifico ficticio $\gamma' = 2,5 + \frac{11,20}{8,796} = 3,77$

De acuerdo con el calculo de los modos de vibración efectivos: el mayor periodo y su frecuencia correspondiente son:

$T = 0,283$ seg. $n_0 = 3,52$ Hz

La frecuencia anterior esta comprendida en los limites del EC.

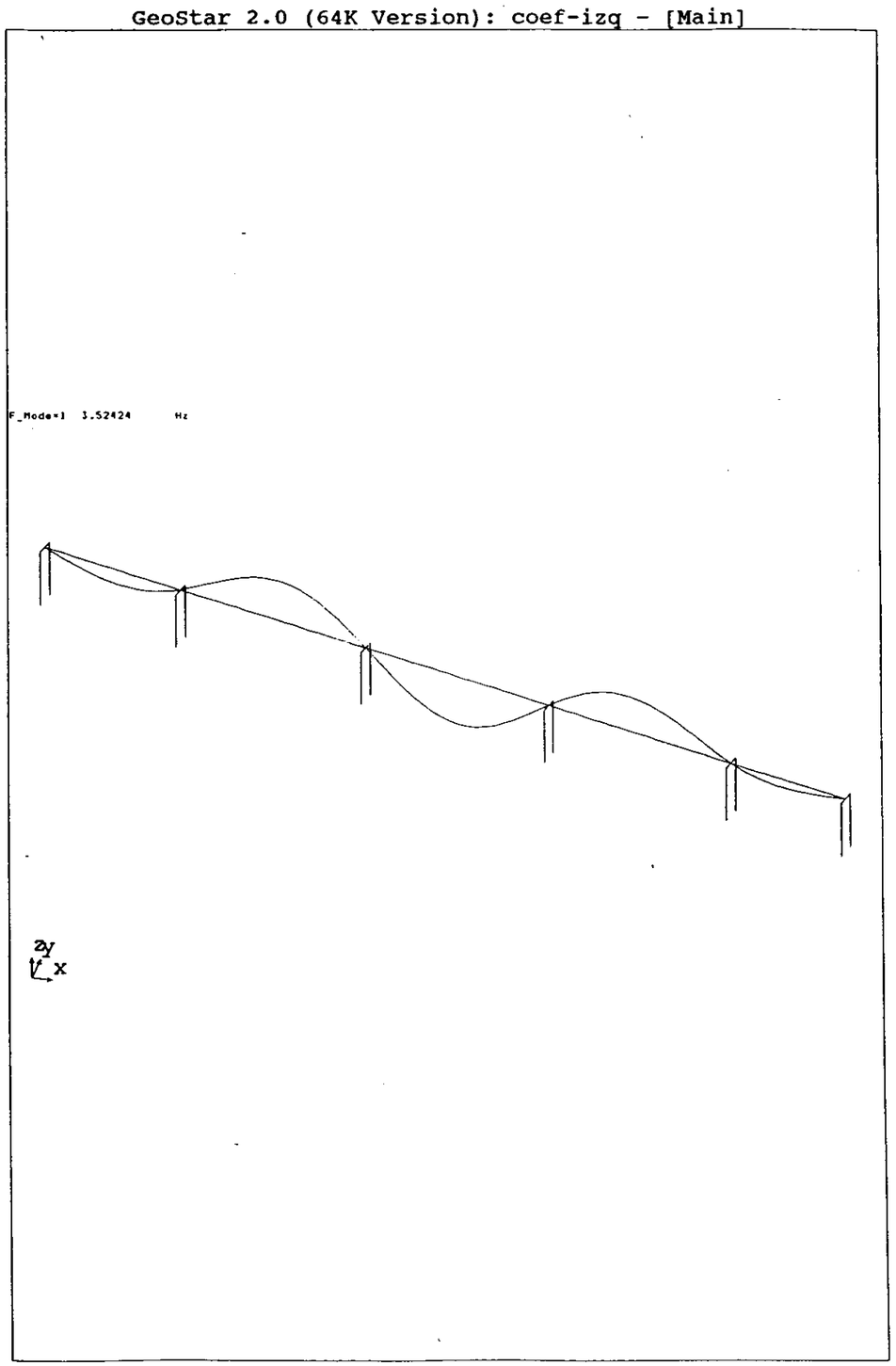
$n_{min} = 23,58 \times L^{-0,592} = 3,00$ Hz

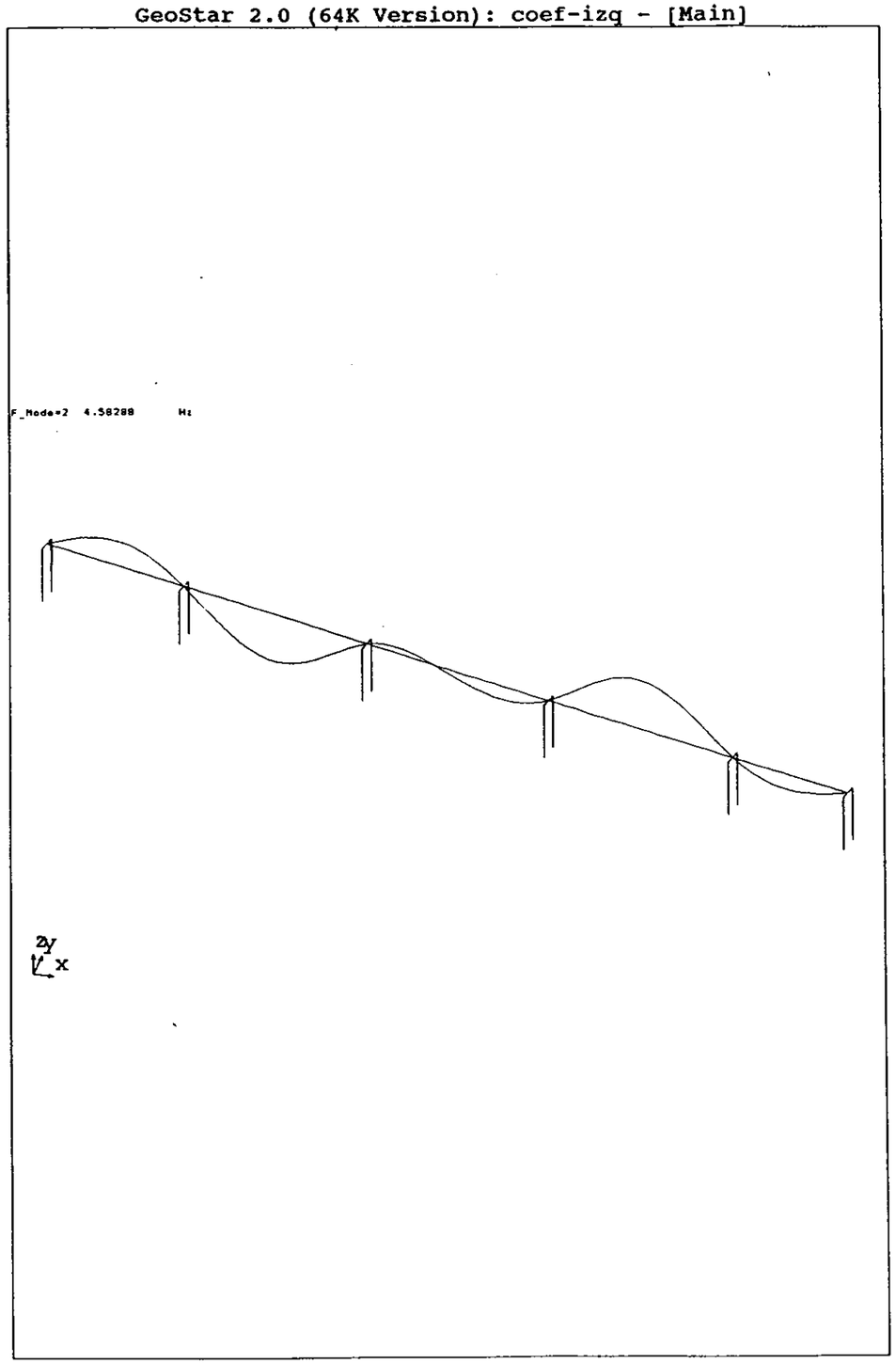
$n_{max} = 94,76 \times L^{-0,748} = 7,02$ Hz

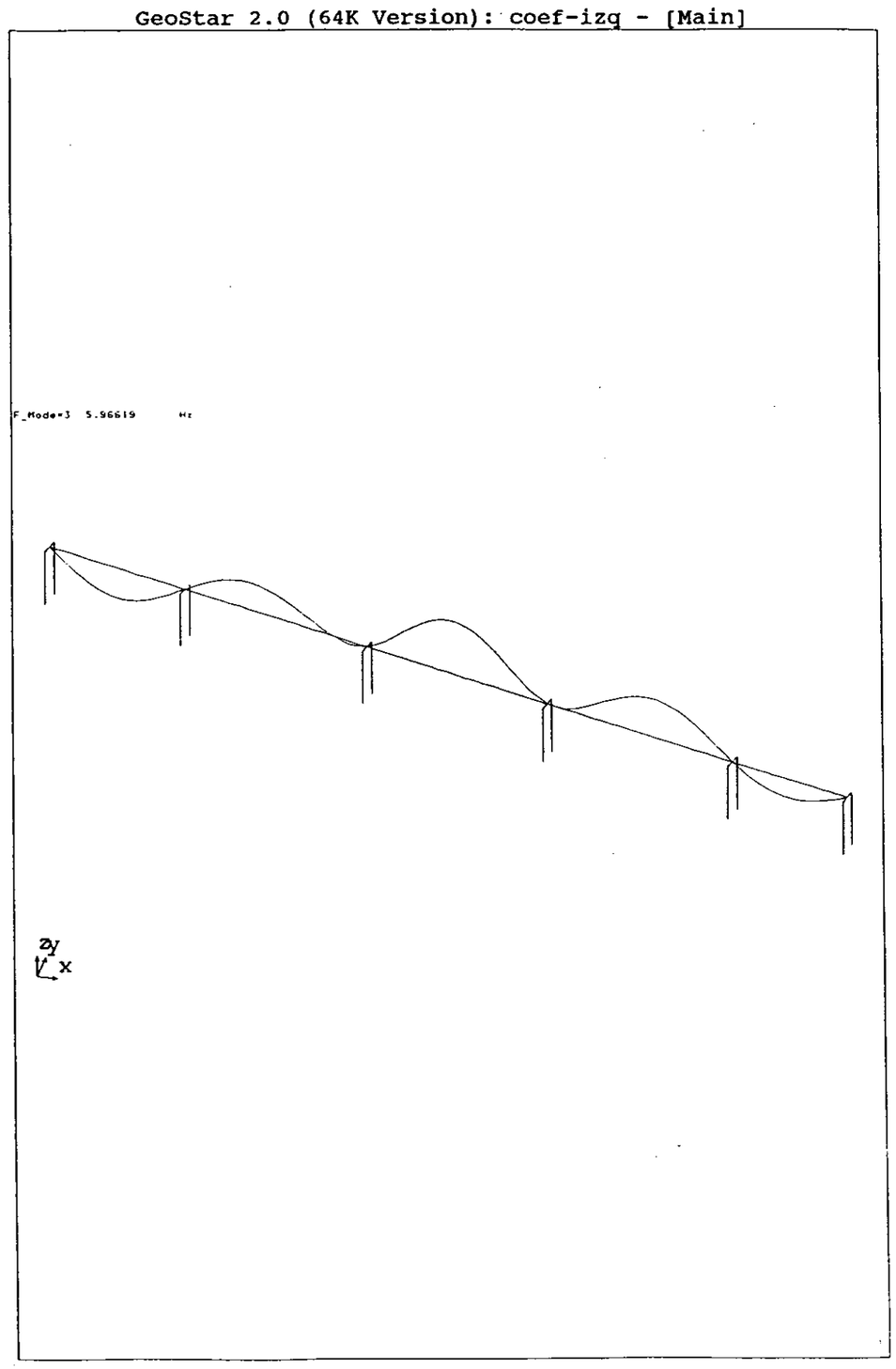
El coeficiente de impacto según la IPF-75

$$\mu = \frac{\sqrt{T}}{2L} = \frac{55,5 \times 0,283}{2 \times L}$$

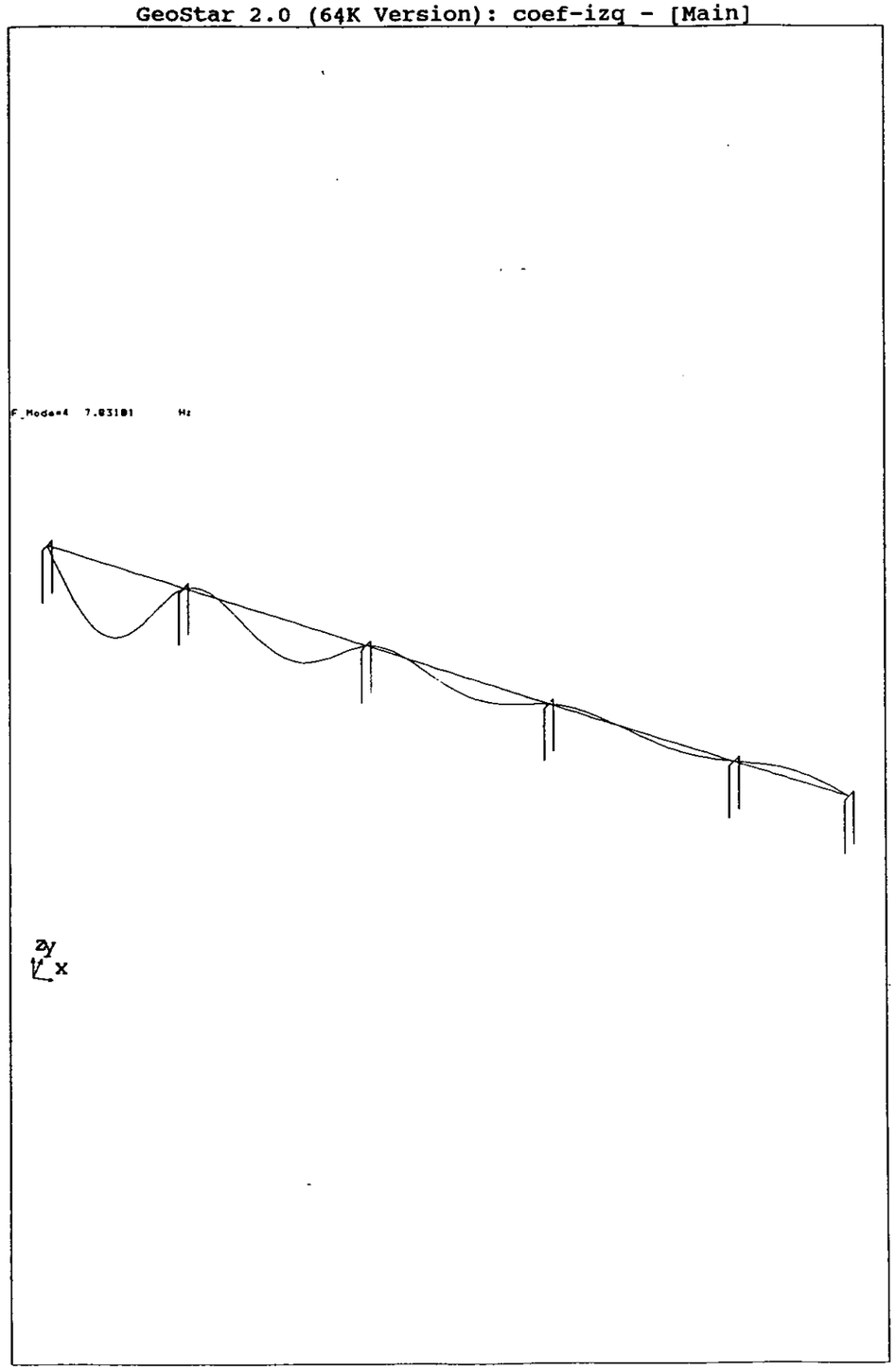
$L = 32,41$ m $\rightarrow \mu = 0,238 \rightarrow I = 1,19$



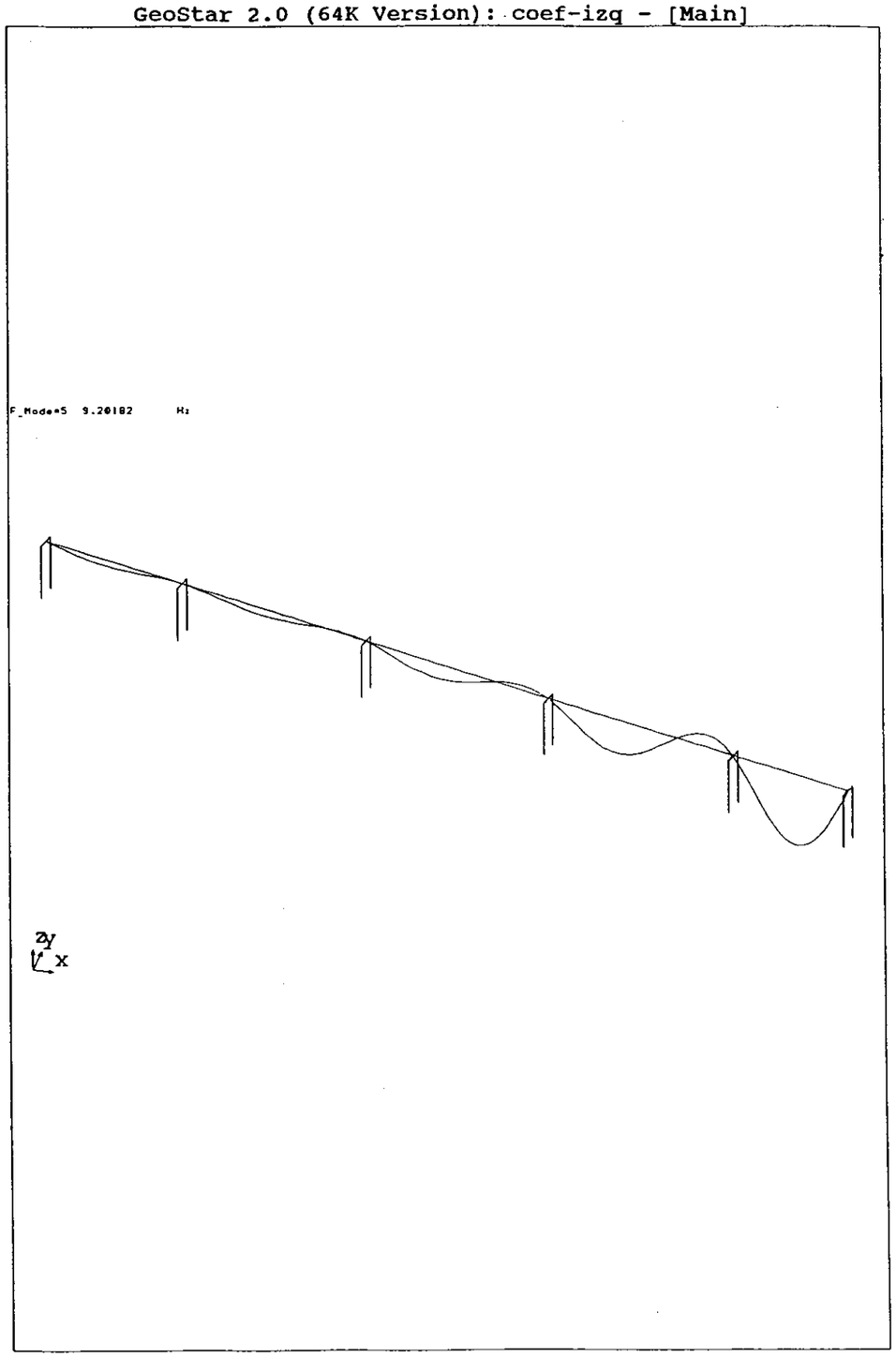

GeoStar 2.0 (64K Version): coef-izq - [Main]
F_Mode=2 4.58288 Hz
zy
x


GeoStar 2.0 (64K Version): coef-izq - [Main]
F_Mode=3 5.96619 Hz
zy
x

GeoStar 2.0 (64K Version): coef-izq - [Main]



GeoStar 2.0 (64K Version): coef-izq - [Main]



```
**************************************************************
**************************************************************
**                                  **
**                                  **
** CCCC  OOOO  SSSS  M   M  OOOO  SSSS   / M   M **
** C   O O S    MM  MM  O O S    / MM  MM **
** C   O O  SSSS  M M M M  O O  SSSS  /  M M M M **
** C   O O     S  M M M M  O O     S /   M M M **
** CCCC  OOOO  SSSS  M   M  OOOO  SSSS /   M   M **
**                                  **
**                                  **
**              VERSION: 2.00               **
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**                                  **
**************************************************************
**************************************************************
```

Problem name: coef-izq
Date : 12/03/1998 Time: 16:09:51
Title :
Subtitle :

Element group data

Element group number= 1
Element name:
BEAM3D Three dimensional Elastic Beam elements
Type of beam element = ... 0
EQ. 0 ; Symmetric beam element
EQ. 1 ; Unsymmetric beam element
EQ. 2 ; Symmetric tapered beam element

Real constant data

Real constant set 1
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.335
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.2843
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9762
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 2
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 3
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 4
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 5
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000

Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 6
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 7
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 8
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 9
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 10
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 11
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 12
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 13
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 14
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 15
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 16
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 17
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 18
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 19
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.335
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.2843
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9762

Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 20
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 21
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 22
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.335
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.2843
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9762
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 23
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 24
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 25
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 26
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 27
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 28
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 29
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 30
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 31
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 32
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 33
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0

End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 34
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 35
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 36
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 37
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 38
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 39
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.335
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.2843
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9762
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 40
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 41
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 42
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.335
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.2843
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9762
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 43
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 44
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 45
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 46
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 47
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000

Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 48
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 49
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 50
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 51
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 52
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 53
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 54
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 55
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 56
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 57
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 58
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 59
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.335
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.2843
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9762
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 60
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 61
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 32.049

Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 62
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.335
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.2843
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9762
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 63
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 64
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 65
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 66
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 67
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 68
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 69
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 70
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 71
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 72
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 73
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 74
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 75
Associated with :
BEAM3D Three dimensional Elastic Beam elements

Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 76
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 77
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 78
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7958
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.0889
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9389
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 79
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.335
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.2843
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 6.9762
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 80
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 32.049
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 81
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 82
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 83
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 84
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 85
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 86
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 87
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 88
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 89

Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 90
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 91
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 92
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 93
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 94
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 95
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 96
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 97
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 98
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 99
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 100
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 11.875
Moment of Inertia about element Y-axis = 35.505
Moment of Inertia about element Z-axis = 4.4798
Depth of beam (y-axis) = 2.1000
Width of beam (z-axis) = 8.3000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 7.0135
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 101
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 1000.0
Moment of Inertia about element Y-axis = 1000.0
Moment of Inertia about element Z-axis = 1000.0
Depth of beam (y-axis) = 10.000
Width of beam (z-axis) = 10.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1000.0
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 102
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.000
Moment of Inertia about element Y-axis = .10000E-03
Moment of Inertia about element Z-axis = .10000E-03
Depth of beam (y-axis) = 1.0000
Width of beam (z-axis) = 1.0000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = .10000E-03
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000

Torsion const for max shear stress = .00000

Material propery data

Material property set 1

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0
ALPX : X thermal expansion	.10000E-04	0
DENS : Mass Density	.37700	0

Material property set 2

	Value	Temp curve no.
EX : X Elastic Modulus	1.0000	0
NUXY : Poisson Ratio	.20000	0

Material property set 3

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0

Nodal input data

NODE	BOUNDARY CONDITION CODES (0 = FREE ; 1 = FIXED)						NODAL POINT COORDINATES		
	X	Y	Z	XX	YY	ZZ	X	Y	Z
1	1	1	1	1	1	1	.00000	.00000	.10000E+07
2	0	0	0	0	0	0	2199.5	8872.7	.00000
3	0	0	0	0	0	0	2200.7	8872.4	.00000
4	0	0	0	0	0	0	2201.8	8872.1	.00000
5	0	0	0	0	0	0	2203.0	8871.9	.00000
6	0	0	0	0	0	0	2204.1	8871.6	.00000
7	0	0	0	0	0	0	2205.3	8871.3	.00000
8	0	0	0	0	0	0	2206.4	8871.0	.00000
9	0	0	0	0	0	0	2207.6	8870.7	.00000
10	0	0	0	0	0	0	2208.7	8870.5	.00000
11	0	0	0	0	0	0	2209.9	8870.2	.00000
12	0	0	0	0	0	0	2211.0	8869.9	.00000
13	0	0	0	0	0	0	2212.2	8869.6	.00000
14	0	0	0	0	0	0	2213.4	8869.3	.00000
15	0	0	0	0	0	0	2214.5	8869.0	.00000
16	0	0	0	0	0	0	2215.7	8868.8	.00000
17	0	0	0	0	0	0	2216.8	8868.5	.00000
18	0	0	0	0	0	0	2218.0	8868.2	.00000
19	0	0	0	0	0	0	2219.1	8867.9	.00000
20	0	0	0	0	0	0	2220.3	8867.6	.00000
21	0	0	0	0	0	0	2221.4	8867.3	.00000
22	0	0	0	0	0	0	2222.6	8867.1	.00000
23	0	0	0	0	0	0	2224.2	8866.7	.00000
24	0	0	0	0	0	0	2225.7	8866.3	.00000
25	0	0	0	0	0	0	2227.3	8865.9	.00000
26	0	0	0	0	0	0	2228.9	8865.5	.00000
27	0	0	0	0	0	0	2230.5	8865.1	.00000
28	0	0	0	0	0	0	2232.0	8864.8	.00000
29	0	0	0	0	0	0	2233.6	8864.4	.00000
30	0	0	0	0	0	0	2235.2	8864.0	.00000
31	0	0	0	0	0	0	2236.8	8863.6	.00000
32	0	0	0	0	0	0	2238.3	8863.2	.00000
33	0	0	0	0	0	0	2239.9	8862.8	.00000
34	0	0	0	0	0	0	2241.5	8862.4	.00000
35	0	0	0	0	0	0	2243.1	8862.1	.00000
36	0	0	0	0	0	0	2244.6	8861.7	.00000
37	0	0	0	0	0	0	2246.2	8861.3	.00000
38	0	0	0	0	0	0	2247.8	8860.9	.00000
39	0	0	0	0	0	0	2249.3	8860.5	.00000
40	0	0	0	0	0	0	2250.9	8860.1	.00000
41	0	0	0	0	0	0	2252.5	8859.7	.00000
42	0	0	0	0	0	0	2254.1	8859.4	.00000
43	0	0	0	0	0	0	2255.6	8859.0	.00000
44	0	0	0	0	0	0	2257.2	8858.6	.00000
45	0	0	0	0	0	0	2258.8	8858.2	.00000
46	0	0	0	0	0	0	2260.4	8857.8	.00000
47	0	0	0	0	0	0	2261.9	8857.4	.00000
48	0	0	0	0	0	0	2263.5	8857.1	.00000
49	0	0	0	0	0	0	2265.1	8856.7	.00000
50	0	0	0	0	0	0	2266.7	8856.3	.00000
51	0	0	0	0	0	0	2268.2	8855.9	.00000
52	0	0	0	0	0	0	2269.8	8855.5	.00000
53	0	0	0	0	0	0	2271.4	8855.1	.00000
54	0	0	0	0	0	0	2273.0	8854.7	.00000
55	0	0	0	0	0	0	2274.5	8854.4	.00000
56	0	0	0	0	0	0	2276.1	8854.0	.00000
57	0	0	0	0	0	0	2277.7	8853.6	.00000
58	0	0	0	0	0	0	2279.3	8853.2	.00000
59	0	0	0	0	0	0	2280.8	8852.8	.00000
60	0	0	0	0	0	0	2282.4	8852.4	.00000
61	0	0	0	0	0	0	2284.0	8852.0	.00000
62	0	0	0	0	0	0	2285.6	8851.7	.00000
63	0	0	0	0	0	0	2287.1	8851.3	.00000
64	0	0	0	0	0	0	2288.7	8850.9	.00000
65	0	0	0	0	0	0	2290.3	8850.5	.00000
66	0	0	0	0	0	0	2291.8	8850.1	.00000
67	0	0	0	0	0	0	2293.4	8849.7	.00000
68	0	0	0	0	0	0	2295.0	8849.3	.00000
69	0	0	0	0	0	0	2296.6	8849.0	.00000
70	0	0	0	0	0	0	2298.1	8848.6	.00000
71	0	0	0	0	0	0	2299.7	8848.2	.00000
72	0	0	0	0	0	0	2301.3	8847.8	.00000
73	0	0	0	0	0	0	2302.9	8847.4	.00000
74	0	0	0	0	0	0	2304.4	8847.0	.00000
75	0	0	0	0	0	0	2306.0	8846.7	.00000
76	0	0	0	0	0	0	2307.6	8846.3	.00000
77	0	0	0	0	0	0	2309.2	8845.9	.00000
78	0	0	0	0	0	0	2310.7	8845.5	.00000
79	0	0	0	0	0	0	2312.3	8845.1	.00000
80	0	0	0	0	0	0	2313.9	8844.7	.00000
81	0	0	0	0	0	0	2315.5	8844.3	.00000
82	0	0	0	0	0	0	2317.0	8844.0	.00000
83	0	0	0	0	0	0	2318.0	8843.7	.00000
84	0	0	0	0	0	0	2319.0	8843.5	.00000
85	0	0	0	0	0	0	2319.9	8843.2	.00000
86	0	0	0	0	0	0	2320.9	8843.0	.00000
87	0	0	0	0	0	0	2321.9	8842.8	.00000
88	0	0	0	0	0	0	2322.9	8842.5	.00000
89	0	0	0	0	0	0	2323.8	8842.3	.00000
90	0	0	0	0	0	0	2324.8	8842.1	.00000
91	0	0	0	0	0	0	2325.8	8841.8	.00000
92	0	0	0	0	0	0	2326.7	8841.6	.00000
93	0	0	0	0	0	0	2327.7	8841.3	.00000
94	0	0	0	0	0	0	2328.7	8841.1	.00000
95	0	0	0	0	0	0	2329.7	8840.9	.00000
96	0	0	0	0	0	0	2330.6	8840.6	.00000
97	0	0	0	0	0	0	2331.6	8840.4	.00000
98	0	0	0	0	0	0	2332.6	8840.2	.00000
99	0	0	0	0	0	0	2333.5	8839.9	.00000
100	0	0	0	0	0	0	2334.5	8839.7	.00000
101	0	0	0	0	0	0	2335.5	8839.4	.00000
102	0	0	0	0	0	0	2336.5	8839.2	.00000
103	0	0	0	0	0	0	2199.9	8874.2	.00000
104	1	1	0	0	0	0	2199.1	8871.3	.00000
105	0	0	0	0	0	0	2222.9	8868.5	.00000
106	1	1	0	0	0	0	2222.2	8865.6	.00000
107	0	0	0	0	0	0	2254.4	8860.8	.00000
108	1	1	0	0	0	0	2253.7	8857.9	.00000
109	0	0	0	0	0	0	2285.9	8853.1	.00000
110	1	1	0	0	0	0	2285.2	8850.2	.00000
111	0	0	0	0	0	0	2317.4	8845.4	.00000
112	1	1	0	0	0	0	2316.7	8842.5	.00000
113	0	0	0	0	0	0	2336.8	8840.7	.00000
114	1	1	0	0	0	0	2336.1	8837.7	.00000
115	1	1	1	0	0	0	2199.9	8874.2	-10.000
116	1	1	1	0	0	0	2199.1	8871.3	-10.000
117	1	1	1	0	0	0	2222.9	8868.5	-10.000
118	1	1	1	0	0	0	2222.2	8865.6	-10.000
119	1	1	1	0	0	0	2254.4	8860.8	-10.000
120	1	1	1	0	0	0	2253.7	8857.9	-10.000
121	1	1	1	0	0	0	2285.9	8853.1	-10.000
122	1	1	1	0	0	0	2285.2	8850.2	-10.000
123	1	1	1	0	0	0	2317.4	8845.4	-10.000
124	1	1	1	0	0	0	2316.7	8842.5	-10.000
125	1	1	1	0	0	0	2336.8	8840.7	-10.000
126	1	1	1	0	0	0	2336.1	8837.7	-10.000

Element input data

ELEM	EGRP	MP	REAL	ECS	NODE 1	NODE 2	NODE 3	NODE 4	NODE 5	NODE 6
					NODE 7	NODE 8	NODE 9	NODE10	NODE11	NODE12
					NODE13	NODE14	NODE15	NODE16	NODE17	NODE18
					NODE19	NODE20				
1	1	1	1	-1	2	3	1			
2	1	1	2	-1	3	4	1			
3	1	1	3	-1	4	5	1			
4	1	1	4	-1	5	6	1			
5	1	1	5	-1	6	7	1			
6	1	1	6	-1	7	8	1			
7	1	1	7	-1	8	9	1			
8	1	1	8	-1	9	10	1			
9	1	1	9	-1	10	11	1			
10	1	1	10	-1	11	12	1			
11	1	1	11	-1	12	13	1			
12	1	1	12	-1	13	14	1			
13	1	1	13	-1	14	15	1			
14	1	1	14	-1	15	16	1			
15	1	1	15	-1	16	17	1			
16	1	1	16	-1	17	18	1			
17	1	1	17	-1	18	19	1			
18	1	1	18	-1	19	20	1			
19	1	1	19	-1	20	21	1			
20	1	1	20	-1	21	22	1			
21	1	1	21	-1	22	23	1			
22	1	1	22	-1	23	24	1			

23	1	1	23	-1	24	25	1
24	1	1	24	-1	25	26	1
25	1	1	25	-1	26	27	1
26	1	1	26	-1	27	28	1
27	1	1	27	-1	28	29	1
28	1	1	28	-1	29	30	1
29	1	1	29	-1	30	31	1
30	1	1	30	-1	31	32	1
31	1	1	31	-1	32	33	1
32	1	1	32	-1	33	34	1
33	1	1	33	-1	34	35	1
34	1	1	34	-1	35	36	1
35	1	1	35	-1	36	37	1
36	1	1	36	-1	37	38	1
37	1	1	37	-1	38	39	1
38	1	1	38	-1	39	40	1
39	1	1	39	-1	40	41	1
40	1	1	40	-1	41	42	1
41	1	1	41	-1	42	43	1
42	1	1	42	-1	43	44	1
43	1	1	43	-1	44	45	1
44	1	1	44	-1	45	46	1
45	1	1	45	-1	46	47	1
46	1	1	46	-1	47	48	1
47	1	1	47	-1	48	49	1
48	1	1	48	-1	49	50	1
49	1	1	49	-1	50	51	1
50	1	1	50	-1	51	52	1
51	1	1	51	-1	52	53	1
52	1	1	52	-1	53	54	1
53	1	1	53	-1	54	55	1
54	1	1	54	-1	55	56	1
55	1	1	55	-1	56	57	1
56	1	1	56	-1	57	58	1
57	1	1	57	-1	58	59	1
58	1	1	58	-1	59	60	1
59	1	1	59	-1	60	61	1
60	1	1	60	-1	61	62	1
61	1	1	61	-1	62	63	1
62	1	1	62	-1	63	64	1
63	1	1	63	-1	64	65	1
64	1	1	64	-1	65	66	1
65	1	1	65	-1	66	67	1
66	1	1	66	-1	67	68	1
67	1	1	67	-1	68	69	1
68	1	1	68	-1	69	70	1
69	1	1	69	-1	70	71	1
70	1	1	70	-1	71	72	1
71	1	1	71	-1	72	73	1
72	1	1	72	-1	73	74	1
73	1	1	73	-1	74	75	1
74	1	1	74	-1	75	76	1
75	1	1	75	-1	76	77	1
76	1	1	76	-1	77	78	1
77	1	1	77	-1	78	79	1
78	1	1	78	-1	79	80	1
79	1	1	79	-1	80	81	1
80	1	1	80	-1	81	82	1
81	1	1	81	-1	82	83	1
82	1	1	82	-1	83	84	1
83	1	1	83	-1	84	85	1
84	1	1	84	-1	85	86	1
85	1	1	85	-1	86	87	1
86	1	1	86	-1	87	88	1
87	1	1	87	-1	88	89	1
88	1	1	88	-1	89	90	1
89	1	1	89	-1	90	91	1
90	1	1	90	-1	91	92	1
91	1	1	91	-1	92	93	1
92	1	1	92	-1	93	94	1
93	1	1	93	-1	94	95	1
94	1	1	94	-1	95	96	1
95	1	1	95	-1	96	97	1
96	1	1	96	-1	97	98	1
97	1	1	97	-1	98	99	1
98	1	1	98	-1	99	100	1
99	1	1	99	-1	100	101	1
100	1	1	100	-1	101	102	1
101	1	3	101	-1	103	2	1
102	1	3	101	-1	2	104	1
103	1	3	101	-1	105	22	1
104	1	3	101	-1	22	106	1
105	1	3	101	-1	107	42	1
106	1	3	101	-1	42	108	1
107	1	3	101	-1	109	62	1
108	1	3	101	-1	62	110	1
109	1	3	101	-1	111	82	1
110	1	3	101	-1	82	112	1
111	1	3	101	-1	113	102	1
112	1	3	101	-1	102	114	1
113	1	3	102	-1	103	115	1
114	1	3	102	-1	104	116	1
115	1	3	102	-1	105	117	1
116	1	3	102	-1	106	118	1
117	1	3	102	-1	107	119	1
118	1	3	102	-1	108	120	1
119	1	3	102	-1	109	121	1
120	1	3	102	-1	110	122	1
121	1	3	102	-1	111	123	1
122	1	3	102	-1	112	124	1
123	1	3	102	-1	113	125	1
124	1	3	102	-1	114	126	1

CONTROL INFORMATION
NUMBER OF LOAD CASES .....(NLCASE) = 1
SOLUTION MODE .....(MODEX) = 2
EQ. 0, STATIC ANALYSIS
EQ. 1, BUCKLING ANALYSIS
EQ. 2, DYNAMIC ANALYSIS
THERMAL LOADING FLAG .....(ITHERM) = 0
EQ. 0, NO THERMAL EFFECTS CONSIDERED
EQ. 1, ADD TEMPERATURE EFFECT
GRAVITY LOADING FLAG .....(IGRAV) = 0
EQ. 0, NO GRAVITY LOADING CONSIDERED
EQ. 1, ADD GRAVITY LOADING EFFECT
CENTRIFUGAL LOADING FLAG .....(ICNTRF) = 0
EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
IN-PLANE STIFFENING FLAG .....(INPLN) = 0
EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
EQ. 1, IN-PLANE EFFECTS CONSIDERED
SOFT SPRING ADDITION FLAG .....(ISOFT) = 0
EQ. 0, NO SOFT SPRING OPTION
EQ. 1, SOFT SPRING ADDED

SAVE DECOMPOSED STIFFNESS MATRIX FLAG ...(ISAVK) = 0
EQ. 0, DO NOT SAVE DECOMPOSED K
EQ. 1, SAVE DECOMPOSED K
FORM STIFFNESS MATRIX FLAG .....(IFORMK) = 0
EQ. 0, FORM STIFFNESS MATRIX
EQ. 1, USE EXISTING DECOMPOSED STIFFNESS MATRIX

SPIN SOFTENING FLAG .....(ISPIN) = 0
EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
INERTIA RELIEF FLAG .....(IFORMK) = 0
EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
RIGID CONNECTIONS FLAG .....(IRIGID) = 0
EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS & SHELLS
EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS & SHELLS

TOTAL SYSTEM DATA
NUMBER OF EQUATIONS .....(NEQ) = 702
NUMBER OF MATRIX ELEMENTS .....(NWK) = 7323
MAXIMUM HALF BANDWIDTH .....(MK) = 34
MEAN HALF BANDWIDTH .....(MM) = 10
NUMBER OF ELEMENTS.....(NUME) = 124
NUMBER OF NODAL POINTS.....(NUMNP)= 126
ADJUSTED BLOCK SIZE .....(MTBLK)= 7324
EXTRA MEMORY AVAILABLE (in 8-byte words) . . (XMTBLK)= 4508604
NUMBER OF STIFFNESS BLOCKS.....(NBLK) = 1

MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE = .251274E+11 (568)
MINIMUM DIAGONAL STIFFNESS MATRIX VALUE = .145833E+02 (3)

MASS MOMENT INFORMATION		
MASS .510456E+03	VOLUME .205553E+05	WEIGHT .000000E+00
MASS MOMENT OF INERTIA W.R.T. C.G.		
IX .436848E+05	IY .831660E+06	IZ .884843E+06
MASS PRODUCT OF INERTIA W.R.T. C.G.		
PXY -.200986E+06	PXZ .000000E+00	PYZ .000000E+00
RADII OF GYRATION W.R.T. C.G.		
RX .925095E+01	RY .403640E+02	RZ .416346E+02
CENTER OF GRAVITY		
CGx .227043E+04	CGy .885536E+04	CGz .000000E+00
PRINCIPAL MASS MOMENT OF INERTIA		
P1 .884843E+06	P2 .879964E+06	P3 .461898E+04
PRINCIPAL RADII OF GYRATION		
R1 .416346E+02	R2 .415196E+02	R3 .300811E+01
PRINCIPAL AXES (DIRECTION COSINES IN ROWS W.R.T C.G)		
N_11 .255806E+00	N_12 .966728E+00	N_13 .000000E+00
N_21 .233681E+00	N_22 .972313E+00	N_23 .000000E+00
N_31 .000000E+00	N_32 .000000E+00	N_33 .228176E-01

Note: In the above table, WEIGHT is computed based on the user defined acceleration for the first active Load Case

SOLUTION PARAMETERS
NUMBER OF EIGENVALUES.....(NFR)= 10
MASS TYPE: 1-LUMPED,2-CONSISTENT....(MASS)= 1
MODE SHAPE PRINT FLAG.....(MPRNT)= 1
INTERMEDIATE SOLUTION PRINT FLAG ....(IFPR)= 0
STURM SEQUENCE CHECK FLAG.....(IFSS)= 0
MAXIMUM NUMBER OF ITERATIONS .....(ITMAX)= 16

FREQUENCY SHIFT FLAG . . . . . (IFRSH)= 0
FREQUENCY SHIFT. . . . . .(FRSH)= .0000000E+00
CONVERGENCE TOLERANCE. . . . . .(RTOL)= .1000000E-04
COMPOSITE MODAL DAMPING CALC. FLAG . . .(IMDC)= 0
MODAL ACCELERATION FLAG. . . . . .(IMAM)= 0

SUBSPACE ITERATION

ITERATION NUMBER 1

ITERATION NUMBER 2

ITERATION NUMBER 3

ITERATION NUMBER 4

ITERATION NUMBER 5

ITERATION NUMBER 6

CONVERGENCE REACHED FOR RTOL .1000E-04

FREQUENCY ANALYSIS
by
SUBSPACE ALGORITHM

NUMBER	FREQUENCY (RAD/SEC)	FREQUENCY (CYCLES/SEC)	PERIOD (SECONDS)
1	.2214347E+02	.3524242E+01	.2837490E+00
2	.2879510E+02	.4582883E+01	.2182033E+00
3	.3748671E+02	.5966195E+01	.1676110E+00
4	.4920367E+02	.7831008E+01	.1276975E+00
5	.5781676E+02	.9201822E+01	.1086741E+00
6	.7164443E+02	.1140256E+02	.8769957E-01
7	.8512126E+02	.1354747E+02	.7381453E-01
8	.8751734E+02	.1392882E+02	.7179361E-01
9	.9893687E+02	.1574629E+02	.6350702E-01
10	.1085462E+03	.1727566E+02	.5788491E-01

SOLUTION TIME LOG (sec)
INPUT PHASE 2
ASSEMBLAGE OF THE STIFFNESS MATRIX 0
ASSEMBLAGE OF THE MASS MATRIX 0
DECOMPOSITION OF THE STIFFNESS MATRIX 0
EIGENVALUE SOLUTION 1
OUTPUT PHASE 1
TOTAL SOLUTION TIME 4

Se realizarán las siguientes comprobaciones:

a) Durante las fases constructivas

Combinacion: $PP + \binom{0,9}{1,1} Pret + SC_{,constructiv.}$

Condiciones $\sigma_{max} = f_{ck}/1,60 = 2500\ t/m^2$

$\sigma_{min} = f_{ctk} = -244\ t/m^2$

b) En las fases finales:

Combinacion frecuente:

$PP + CM + \binom{0,9}{1,1} Pret + 0,60\ SC + 0,5\ Grad$

Condicion: $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = 0$

Combinacion rara:

$PP + CM + \binom{0,9}{1,1} \times Pret + SC + 0,6\ Grad.$

Condicione $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = f_{ctk}$

PUENTES CONSTRUIDOS POR FASES: Datos previos.

PROYECTO: L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508.5. TABLERO IZQUIERDO

Datos necesarios para la generación del modelo:

Directorio de los archivos "GEO" que se generarán :	g:\MAZAXV.3\E-1508.5\TABLERO2\PRETENSA\COSMOS
Directorio de ejecución del COSMOS (donde se encuentran los listados) :	g:\MAZAXV.3\E-1508.5\TABLERO2\PRETENSA\COSMOS
Directorio con los datos de replanteo (salidas del REPLOSA) :	G:\MAZAXV.3\E-1508.5\TABLERO2\PRETENSA
Camino + nombre del archivo "GENER.XLS" (con extensión) :	G:\MAZAXV.3\E-1508.5\TABLERO2\PRETENSA\GENERtiz.XLS
Camino + nombre del archivo "SALIDA" para envolvente de SC :	G:\MAZAXV.3\E-1508.5\TABLERO2\PRETENSA\SALIDA
Directorio donde se ejecutaran los calculos de pilas posteriores :	

Valor del los prefijos a restar a las coordenadas X-Y para obtener número mas manejables:

Xo=	670000
Yo=	4600000

Número de vanos:	5	(el máximo de vanos posible es 20)
Número de punto del replanteo que genera el eje del tablero:	2	
Número de FASES de construccion del tablero:	5	(el máximo es el número de vanos)

(nota: dejar vacias las celdas que no tengan valores)
(*)(número de izquierda a derecha en sentido de avance del p.k.)

DEFINICION DE APOYOS DEL TABLERO

Linea de apoyos N	Número de apoyos de la line (máximo 2)	N° del punto de replanteo que corresponde a cada apoyo(*)	
1	2	1	3
2	2	1	3
3	2	1	3
4	2	1	3
5	2	1	3
6	2	1	3
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

DEFINICION DE FASES CONTRUCTIVAS

Extremo de comienzo de la construccion de fases
Comienzo=1 , se empieza por en E-1
Comienzo=2 , se empieza por en E-2

Comienzo =	1

Fase N°	Fin de cada Fase	
	Vano N°	Seccion N°
1	2	7
2	3	7
3	4	7
4	5	7
5	5	21
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Datos de combinacion de hipotesis de pretensado:

Combinacion	Acciones					
	PP	Pret	CM	SC(+)	SC(-)	Grad
1	1.00	0.90	1.00	0.60	0.00	0.50
2	1.00	1.10	1.00	0.60	0.00	0.50
3	1.00	0.90	1.00	0.00	0.60	0.00
4	1.00	1.10	1.00	0.00	0.60	0.00
5	1.00	0.90	1.00	1.00	0.00	0.60
6	1.00	1.10	1.00	1.00	0.00	0.60
7	1.00	0.90	1.00	0.00	1.00	0.00
8	1.00	1.10	1.00	0.00	1.00	0.00

PUENTES CONSTRUIDOS POR FASES: Acciones

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508.5. TABLERO IZQUIERDO

Datos de las acciones actuantes sobre los modelos:

Coeficiente de impacto del ferrocarril	1.19	

Cargas permanentes

Peso especifico del hormigón:	2.50	(t/m3)
Carga muerta (barrera+aceras+pavimento)	11.20	(t/m)

Sobrecarga repartida

Valor de la sobrecarga uniforme durante la construcción	0.10	(t/m2)
Ancho de actuacion de la sobrecarga	8.30	(m.)

Gradiente Térmico

Gradiente termico a considerar	5.00	(ºC)

Pretensado

Camino de los ficheros de familias:
G:\MAZAXV.3\E-1508.5\TABLERO2\PRETENSA

Coeficiente por el que hay que multiplicar el pretensado inicial para obtener el final:	0.84

Introduzca para cada fase constructiva el nombre de los ficheros "*.LIS" creados por el programa "CABLE.EXE"
No hay que poner la extension de los ficheros (el programa busca archivos LIS). El máximo número de caracteres es 8.

FAMILIA Nº	Nombre del archivo	Fase de comienzo actuacion de la familia	Situacion del Extremo dorsal del cable	
			Vano	Seccion
1	FAM-1	1	1	1
2	FAM-2	2	2	7
3	FAM-2	3	3	7
4	FAM-3	4	4	7
5	FAM-4	5	5	7
6	FAM-5	1	1	1
7	FAM-6	2	2	7
8	FAM-6	3	3	7
9	FAM-7	4	4	7
10	FAM-8	5	5	7
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-1.LIS

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 2

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=1
Parametros del tramo:
S0= 0.000 S1= 10.100 S2= 0.000 S3= 10.100 S4= 3.570 SR= 0.000
H1= 1.100 H2= 1.600 H3= 1.600 H4= 0.700

Tipo de cableado(1-2-3-4) para tramo nº2 TIPO=2
Parametros del tramo:
S0= 0.000 S1= 1.000 S2= 0.500 S3= 4.100 S4= 4.100 SR= 0.000
H1= 1.400 H2= 1.330 H3= 1.295 H4= 0.700

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...1
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1
Anclaje desde el que se tesa primero..(1=IZDO.)(2=DCHO.)...1

Fuerza de tesado inicial P0(ton)= 5272.0
Fuerza de tesado final P1(ton)= 4944.0
Area del cable (cm2)=347.200012
Coef.rozamiento cable-vaina NU=0.210000
Coef.rozamientos parasitos (K/NU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=7

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	10.100000	-0.004901	0.099010	1.100000
2	10.100000	20.200001	-0.006519	0.131675	0.935040
3	20.200001	23.770000	0.018442	-0.876728	11.119917
4	23.770000	27.870001	0.013429	-0.638438	8.287836
5	27.870001	31.970001	-0.004893	0.382851	-5.943832
6	31.970001	32.470001	0.000000	0.070000	-0.942906
7	32.470001	33.470001	-0.000000	0.070016	-0.943157

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	10.100000	0.000000	0.098688
2	10.100000	20.200001	0.098688	0.229610
3	20.200001	23.770000	0.229610	0.360532
4	23.770000	27.870001	0.360532	0.470212
5	27.870001	31.970001	0.470212	0.510006
6	31.970001	32.470001	0.510006	0.510006
7	32.470001	33.470001	0.510006	0.510006

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	10.100000	0.510006	0.411318
2	10.100000	20.200001	0.411318	0.280396
3	20.200001	23.770000	0.280396	0.149474
4	23.770000	27.870001	0.149474	0.039794
5	27.870001	31.970001	0.039794	0.000000
6	31.970001	32.470001	0.000000	0.000000
7	32.470001	33.470001	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por izda. a_izda= 5.000(mm.)
Penetracion por retesado por izda. retesado _izda= 2.374(mm.)
Penetracion de cuñas ficticia por izda. a_ficticia_izda= 7.374(mm.)

Alcance de penetracion de cuñas+retesado por izda. x= 16.076(m.) perdidas= 5.546%

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 2.498(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 7.498(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 21.471(m.) perdidas= 6.209%

Punto de interseccion de curvas de perdidas x= 20.308(m.) perdidas= 7.191%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	10.100000	12.1	8.8	4632.3	4805.7
2	10.100000	16.076075	8.8	6.6	4805.7	4924.7
3	16.076075	20.200001	6.6	8.1	4924.7	4842.6
4	20.200001	20.307850	8.1	8.2	4842.6	4837.9
5	20.307850	21.470528	8.2	7.3	4837.9	4889.7
6	21.470528	23.770000	7.3	9.2	4889.7	4787.3
7	23.770000	27.870001	9.2	11.9	4787.3	4643.0
8	27.870001	31.970001	11.9	13.3	4643.0	4572.3
9	31.970001	32.470001	13.3	13.3	4572.3	4569.0
10	32.470001	33.470001	13.3	13.5	4569.0	4562.4

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 249.873
Alargamiento por la dcha.(mm.)= 9.200
ALARGAMIENTO TOTAL(mm.)= 259.073

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	10.100000	44.751	47.110
2	10.100000	16.076075	62.653	63.623

3	16.076075	20.200001	63.623	61.527
4	20.200001	20.307850	-174.067	-174.164
5	20.307850	21.470528	-174.164	-178.422
6	21.470528	23.770000	-178.422	-176.575
7	23.770000	27.870001	-128.583	-122.472
8	27.870001	31.970001	44.621	44.417
9	31.970001	32.470001	0.000	0.000
10	32.470001	33.470001	0.002	0.002

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion		Componente Vertical	Componente Longitudinal
x=	0.000	-456.413	4609.767
x=	33.470	318.584	-4551.224

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-2.LIS

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 2

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=1
Parametros del tramo:
S0= 0.000 S1= 1.000 S2= 0.500 S3= 17.710 S4= 3.500 SR= 0.000
H1= 1.400 H2= 1.470 H3= 1.505 H4= 0.700

Tipo de cableado(1-2-3-4) para tramo nº2 TIPO=2
Parametros del tramo:
S0= 0.000 S1= 1.000 S2= 0.500 S3= 4.100 S4= 4.100 SR= 0.000
H1= 1.600 H2= 1.600 H3= 1.600 H4= 1.600

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 2

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=1
Parametros del tramo:
S0= 0.000 S1= 1.000 S2= 0.500 S3= 17.710 S4= 3.500 SR= 0.000
H1= 1.400 H2= 1.470 H3= 1.505 H4= 0.700

Tipo de cableado(1-2-3-4) para tramo nº2 TIPO=2
Parametros del tramo:
S0= 0.000 S1= 1.000 S2= 0.500 S3= 4.100 S4= 4.100 SR= 0.000
H1= 1.400 H2= 1.330 H3= 1.295 H4= 0.700

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...2
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1

Fuerza de tesado inicial P0(ton)= 5272.0
Fuerza de tesado final P1(ton)= 4944.0
Area del cable (cm2)=347.200012
Coef.rozamiento cable-vaina NU=0.210000
Coef.rozamientos parasitos (K/NU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=8

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	1.000000	-0.000000	0.070000	1.400000
2	1.000000	1.500000	0.000000	0.070000	1.400000
3	1.500000	19.209999	-0.005770	0.087308	1.387019
4	19.209999	22.709999	0.019194	-0.871781	10.599072
5	22.709999	26.809999	0.013429	-0.609967	7.626180
6	26.809999	30.910000	-0.004893	0.372478	-5.543507

7	30.910000	31.410000	0.000000	0.070000	-0.868705
8	31.410000	32.410000	-0.000000	0.070015	-0.868941

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	1.000000	0.000000	0.000000
2	1.000000	1.500000	0.000000	0.000000
3	1.500000	19.209999	0.000000	0.203443
4	19.209999	22.709999	0.203443	0.336999
5	22.709999	26.809999	0.336999	0.446679
6	26.809999	30.910000	0.446679	0.486473
7	30.910000	31.410000	0.486473	0.486473
8	31.410000	32.410000	0.486473	0.486474

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	1.000000	0.486474	0.486473
2	1.000000	1.500000	0.486473	0.486473
3	1.500000	19.209999	0.486473	0.283031
4	19.209999	22.709999	0.283031	0.149474
5	22.709999	26.809999	0.149474	0.039794
6	26.809999	30.910000	0.039794	0.000000
7	30.910000	31.410000	0.000000	0.000000
8	31.410000	32.410000	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 2.498(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 7.498(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 20.480(m.) perdidas= 6.215%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	1.000000	14.4	14.3	4514.6	4520.3
2	1.000000	1.500000	14.3	14.2	4520.3	4523.2
3	1.500000	19.209999	14.2	8.4	4523.2	4830.9
4	19.209999	20.480240	8.4	7.3	4830.9	4889.4
5	20.480240	22.709999	7.3	9.2	4889.4	4786.7
6	22.709999	26.809999	9.2	11.9	4786.7	4642.3
7	26.809999	30.910000	11.9	13.3	4642.3	4571.7
8	30.910000	31.410000	13.3	13.3	4571.7	4568.3
9	31.410000	32.410000	13.3	13.5	4568.3	4561.7

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 240.065
ALARGAMIENTO TOTAL(mm.)= 240.065

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	1.000000	0.001	0.001
2	1.000000	1.500000	0.000	0.000
3	1.500000	19.209999	51.812	54.268
4	19.209999	20.480240	-180.535	-185.647
5	20.480240	22.709999	-185.647	-183.749
6	22.709999	26.809999	-128.565	-122.454
7	26.809999	30.910000	44.615	44.410
8	30.910000	31.410000	0.000	0.000
9	31.410000	32.410000	0.002	0.002

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	-315.249	4503.552
x= 32.410	318.538	-4550.566

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GIMPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-3.LIS

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 2

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=1
Parametros del tramo:
S0= 0.000 S1= 1.000 S2= 0.500 S3= 17.710 S4= 3.500 SR= 0.000
H1= 1.400 H2= 1.470 H3= 1.505 H4= 0.700

Tipo de cableado(1-2-3-4) para tramo nº2 TIPO=2
Parametros del tramo:
S0= 0.000 S1= 1.000 S2= 0.500 S3= 2.250 S4= 2.250 SR= 0.000
H1= 1.200 H2= 1.130 H3= 1.095 H4= 0.700

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...2
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1

Fuerza de tesado inicial P0(ton)= 5272.0
Fuerza de tesado final P1(ton)= 4944.0
Area del cable (cm2)=347.200012
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=8

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	1.000000	-0.000000	0.070000	1.400000
2	1.000000	1.500000	0.000000	0.070000	1.400000
3	1.500000	19.209999	-0.005770	0.087308	1.387019
4	19.209999	22.709999	0.019194	-0.871781	10.599072
5	22.709999	24.959999	0.031235	-1.418674	16.809048
6	24.959999	27.209999	-0.015679	0.923253	-12.418209
7	27.209999	27.709999	0.000000	0.070000	-0.809698
8	27.709999	28.709999	0.000000	0.069993	-0.809606

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	1.000000	0.000000	0.000000
2	1.000000	1.500000	0.000000	0.000000
3	1.500000	19.209999	0.000000	0.203443
4	19.209999	22.709999	0.203443	0.336999
5	22.709999	24.959999	0.336999	0.476640
6	24.959999	27.209999	0.476640	0.546395
7	27.209999	27.709999	0.546395	0.546395
8	27.709999	28.709999	0.546395	0.546395

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	1.000000	0.546395	0.546395
2	1.000000	1.500000	0.546395	0.546395
3	1.500000	19.209999	0.546395	0.342953
4	19.209999	22.709999	0.342953	0.209396
5	22.709999	24.959999	0.209396	0.069755
6	24.959999	27.209999	0.069755	0.000000
7	27.209999	27.709999	0.000000	0.000000
8	27.709999	28.709999	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 1.545(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 6.545(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 19.503(m.) perdidas= 7.802%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	1.000000	15.1	14.9	4478.5	4484.2
2	1.000000	1.500000	14.9	14.9	4484.2	4487.1
3	1.500000	19.209999	14.9	9.1	4487.1	4792.3
4	19.209999	19.502613	9.1	8.8	4792.3	4805.7
5	19.502613	22.709999	8.8	11.6	4805.7	4659.1
6	22.709999	24.959999	11.6	14.7	4659.1	4495.5
7	24.959999	27.209999	14.7	16.5	4495.5	4404.3
8	27.209999	27.709999	16.5	16.5	4404.3	4401.0
9	27.709999	28.709999	16.5	16.6	4401.0	4394.3

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 209.621
ALARGAMIENTO TOTAL(mm.)= 209.621

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	q1	q2
1	0.000000	1.000000	0.001	0.001
2	1.000000	1.500000	0.000	0.000
3	1.500000	19.209999	51.398	53.834
4	19.209999	19.502613	-179.094	-180.362
5	19.502613	22.709999	-180.362	-178.853
6	22.709999	24.959999	-291.053	-272.709
7	24.959999	27.209999	136.894	137.101
8	27.209999	27.709999	0.000	0.000
9	27.709999	28.709999	-0.001	-0.001

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	-312.732	4467.585
x= 28.710	306.854	-4383.618

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-4.LIS

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 1

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=6
Parametros del tramo:
S1= 0.000 S2= 12.500 S3= 1.500 SR= 0.000
H1= 1.100 H2= 1.305 H3= 1.200

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...2
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1

Fuerza de tesado inicial P0(ton)= 5272.0
Fuerza de tesado final P1(ton)= 4944.0
Area del cable (cm2)=347.200012
Coef.rozamiento cable-vaina NU=0.210000
Coef.rozamientos parasitos (K/NU)=0.002000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=2

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	1.500000	0.000000	0.070000	1.200000
2	1.500000	14.000000	-0.006912	0.090736	1.184448

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	1.500000	0.000000	0.000000
2	1.500000	14.000000	0.000000	0.172326

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	1.500000	0.172326	0.172326
2	1.500000	14.000000	0.172326	0.000000

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:fam-5.LIS

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...1
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1
Anclaje desde el que se tesa primero..(1=IZDO.)(2=DCHO.)...1

Fuerza de tesado inicial P0(ton)= 955.0
Fuerza de tesado final P1(ton)= 895.0
Area del cable (cm2)=63.000000
Coef.rozamiento cable-vaina NU=0.210000
Coef.rozamientos parasitos (K/NU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=1

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	33.470001	0.000000	0.000000	0.250000

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	33.470001	0.000000	0.000000

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	33.470001	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por izda. a_izda= 5.000(mm.)
Penetracion por retesado por izda. retesado _izda= 6.381(mm.)
Penetracion de cuñas ficticia por izda. a_ficticia_izda= 11.381(mm.)

Alcance de penetracion de cuñas+retesado por izda. x= 33.470(m.) perdidas= 4.196%

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 6.381(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 11.381(mm.)

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 2.382(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 7.382(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 0.000(m.) perdidas= 5.549%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	1.500000	8.0	8.1	4849.1	4845.9
2	1.500000	14.000000	8.1	12.1	4845.9	4631.9

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 109.367
ALARGAMIENTO TOTAL(mm.)= 109.367

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	q1	q2
1	0.000000	1.500000	0.000	0.000
2	1.500000	14.000000	66.501	63.030

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	-338.610	4837.289
x= 14.000	-473.667	-4607.658

Alcance de penetracion de cuñas+retesado por dcha. x= 0.000(m.) perdidas= 4.196%

Punto de interseccion de curvas de perdidas x= 16.735(m.) perdidas= 6.327%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	16.735001	9.4	7.4	864.9	884.6
2	16.735001	33.470001	7.4	9.4	884.6	864.9

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 261.519
Alargamiento por la dcha.(mm.)= 8.624
ALARGAMIENTO TOTAL(mm.)= 270.144

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	q1	q2
1	0.000000	16.735001	0.000	0.000
2	16.735001	33.470001	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	0.000	864.885
x= 33.470	0.000	-864.885

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:fam-6.LIS

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...2
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1

Fuerza de tesado inicial P0(ton)= 955.0
Fuerza de tesado final P1(ton)= 895.0
Area del cable (cm2)=63.000000
Coef.rozamiento cable-vaina NU=0.210000
Coef.rozamientos parasitos (K/NU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=1

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	32.410000	0.000000	0.000000	0.250000

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	32.410000	0.000000	0.000000

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	32.410000	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 6.377(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 11.377(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 0.000(m.) perdidas= 4.201%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:fam-7.LIS

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...2
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1

Fuerza de tesado inicial P0(ton)= 955.0
Fuerza de tesado final P1(ton)= 895.0
Area del cable (cm2)=63.000000
Coef.rozamiento cable-vaina NU=0.210000
Coef.rozamientos parasitos (K/NU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=1

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	28.709999	0.000000	0.000000	0.250000

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	28.709999	0.000000	0.000000

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	28.709999	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 6.362(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 11.362(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 0.000(m.) perdidas= 4.257%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	32.410000	903.0	864.8

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 253.403
ALARGAMIENTO TOTAL(mm.)= 253.403

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	32.410000	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	0.000	903.007
x= 32.410	0.000	-864.793

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:fam-8.LIS

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...2
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1

Fuerza de tesado inicial P0(ton)= 955.0
Fuerza de tesado final P1(ton)= 895.0
Area del cable (cm2)=63.000000
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=1

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	14.000000	0.000000	0.000000	0.250000

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	14.000000	0.000000	0.000000

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	14.000000	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 5.065(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 10.065(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 0.000(m.) perdidas= 5.380%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	28.709999	6.0	9.6	897.7	863.7

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 224.987
ALARGAMIENTO TOTAL(mm.)= 224.987

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	Q1	Q2
1	0.000000	28.709999	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	0.000	897.653
x= 28.710	0.000	-863.724

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	14.000000	10.1	11.8	859.0	842.3

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 0.000
Alargamiento por la dcha.(mm.)= 110.719
ALARGAMIENTO TOTAL(mm.)= 110.719

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	q1	q2
1	0.000000	14.000000	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	0.000	858.973
x= 14.000	0.000	-842.275

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase nº: 1

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1506.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	867	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1137	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	867	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1126	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	221.6	0.0	0.0	8.2	5497.0	88.9	-458.6	0.0	0.0	221.6	5497.0	88.9	-458.6	434.4	396.8	530.9	485.0	434.4	396.8	530.9	485.0
1	2	0.0	245.0	190.9	0.0	9.2	7.2	5497.0	-423.9	-404.7	0.0	245.0	190.9	5497.0	-423.9	-404.7	530.0	600.1	634.8	748.5	532.2	597.6	637.0	746.0
1	3	0.0	456.5	164.7	0.0	17.2	6.2	5497.0	-928.3	-350.7	0.0	456.5	164.7	5497.0	-928.3	-350.7	472.3	667.0	553.2	843.2	476.4	662.2	557.3	838.4
1	4	0.0	636.7	138.6	0.0	24.0	5.3	5497.0	-1313.0	-296.8	0.0	636.7	138.6	5497.0	-1313.0	-296.8	432.9	712.8	495.4	910.2	438.6	706.1	501.1	903.6
1	5	0.0	785.8	112.5	0.0	29.7	4.3	5497.0	-1633.0	-242.8	0.0	785.8	112.5	5497.0	-1633.0	-242.8	399.8	751.1	447.2	966.1	406.9	742.9	454.2	958.0
1	6	0.0	904.0	86.3	0.0	34.2	3.3	5497.0	-1890.0	-188.8	0.0	904.0	86.3	5497.0	-1890.0	-188.8	372.9	782.3	406.0	1011.5	381.1	772.8	416.2	1002.1
1	7	0.0	991.1	60.2	0.0	37.5	2.3	5498.0	-2082.0	-134.9	0.0	991.1	60.2	5498.0	-2082.0	-134.9	352.7	806.0	378.7	1045.9	361.6	795.7	387.6	1035.5
1	8	0.0	1047.0	34.1	0.0	39.6	1.3	5498.0	-2211.0	-80.9	0.0	1047.0	34.1	5498.0	-2211.0	-80.9	338.3	822.6	358.2	1069.6	347.8	811.7	367.6	1058.7
1	9	0.0	1072.0	8.0	0.0	40.6	0.3	5498.0	-2275.0	-26.9	0.0	1072.0	8.0	5498.0	-2275.0	-26.9	330.6	831.6	347.4	1082.1	340.2	820.4	357.1	1070.9
1	10	0.0	1066.0	-18.2	0.0	40.4	-0.7	5671.0	-2380.0	34.8	0.0	1066.0	-18.2	5671.0	-2380.0	34.8	324.4	877.0	340.1	1137.2	334.0	865.9	349.8	1126.1
1	11	0.0	1029.0	-44.3	0.0	39.0	-1.7	5671.0	-2291.0	111.9	0.0	1029.0	-44.3	5671.0	-2291.0	111.9	334.6	865.1	354.6	1120.4	343.9	854.4	363.9	1109.7
1	12	0.0	960.6	-70.5	0.0	36.5	-2.6	5671.0	-2114.0	186.4	0.0	960.6	-70.5	5671.0	-2114.0	186.4	356.3	840.1	384.7	1085.6	364.9	830.0	393.3	1075.6
1	13	0.0	861.4	-96.6	0.0	32.7	-3.6	5671.0	-1848.0	260.8	0.0	861.4	-96.6	5671.0	-1848.0	260.8	389.6	801.4	430.7	1032.3	397.4	792.4	438.4	1023.2
1	14	0.0	731.0	-122.7	0.0	27.8	-4.6	5671.0	-1494.0	335.3	0.0	731.0	-122.7	5671.0	-1494.0	335.3	434.4	749.5	492.2	960.8	441.0	741.8	498.9	953.2
1	15	0.0	569.7	-148.9	0.0	21.8	-5.6	5671.0	-1051.0	409.8	0.0	569.7	-148.9	5671.0	-1051.0	409.8	490.8	684.0	569.8	870.9	496.0	678.0	574.9	864.9
1	16	0.0	377.3	-175.0	0.0	14.6	-6.6	5809.0	-534.4	496.2	0.0	377.3	-175.0	5809.0	-534.4	496.2	569.7	623.0	676.4	784.5	573.2	619.0	679.9	780.5
1	17	0.0	153.7	-201.1	0.0	6.1	-7.6	5809.0	101.1	572.5	0.0	153.7	-201.1	5809.0	101.1	572.5	652.6	526.9	789.5	653.4	654.8	525.2	790.9	651.7
1	18	0.0	-100.8	-227.3	0.0	-3.4	-8.6	5809.0	825.4	646.0	0.0	-100.8	-227.3	5809.0	825.4	646.0	747.1	417.3	918.4	503.9	746.3	418.3	917.6	504.8
1	19	0.0	-386.6	-253.4	0.0	-14.2	-9.5	5722.0	1452.0	424.0	0.0	-386.6	-253.4	5722.0	1452.0	424.0	804.3	331.7	1003.5	381.7	800.9	335.6	1000.1	385.6
1	20	0.0	-705.9	-284.1	0.0	-26.1	-10.5	5774.0	1901.0	214.3	0.0	-705.9	-284.1	5774.0	1901.0	214.3	660.3	189.2	841.8	192.4	654.5	195.6	836.0	198.9
1	21	0.0	-1065.0	-319.4	0.0	-39.2	-11.5	5774.0	2088.0	4.0	0.0	-1065.0	-319.4	5774.0	2088.0	4.0	618.0	236.3	807.8	230.3	609.3	246.0	799.1	240.0
2	1	0.0	-1065.0	232.5	0.0	-39.2	8.1	5672.0	2058.0	0.1	0.0	-1065.0	232.5	5672.0	2058.0	0.1	604.3	235.3	791.0	229.0	595.6	245.0	782.3	238.7
2	2	0.0	-726.8	184.4	0.0	-27.2	6.7	5672.0	1889.0	-206.3	0.0	-726.8	184.4	5672.0	1889.0	-206.3	645.5	189.3	824.8	191.4	639.5	196.0	816.7	198.1
2	3	0.0	-461.9	142.5	0.0	-17.4	5.4	5672.0	1326.0	-416.6	0.0	-461.9	142.5	5672.0	1326.0	-416.6	754.3	378.6	946.4	434.5	750.2	383.4	942.2	439.3
2	4	0.0	-255.8	106.9	0.0	-9.8	4.0	5672.0	474.3	-533.4	0.0	-259.8	106.9	5672.0	474.3	-533.4	620.1	534.3	771.6	637.1	617.8	537.0	769.3	639.8
2	5	0.0	-115.5	71.3	0.0	-4.4	2.7	5527.0	-233.5	-403.0	0.0	-115.5	71.3	5527.0	-233.5	-403.0	488.1	655.3	602.7	793.9	487.1	656.5	601.6	795.1
2	6	0.0	-28.9	35.6	0.0	-1.1	1.3	5527.0	-826.9	-329.4	0.0	-28.9	35.6	5527.0	-826.9	-329.4	381.7	778.7	468.0	950.0	381.4	779.0	467.8	950.3
2	7	0.0	0.0	0.0	0.0	0.0	0.0	5453.0	-1324.0	-318.7	0.0	0.0	0.0	5453.0	-1324.0	-318.7	274.6	886.6	335.6	1083.6	274.6	886.6	335.6	1083.6
2	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase nº: 1

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	887	8
2	Σ pp(i) + 1.1 x Σ pret(i)	1137	8
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nºase)	887	8
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nºase)	1126	0

i= 1 al nºase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
4	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase nº: 2

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	899	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1138	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	893	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1132	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	-39.9	0.0	0.0	6.6	0.0	0.0	35.9	0.0	0.0	181.7	5497.0	89.0	-422.7	434.4	396.8	530.9	485.0	434.4	396.8	530.9	485.0
1	2	0.0	-47.4	-39.9	0.0	7.3	5.6	0.0	42.7	35.9	0.0	197.6	151.0	5497.0	-381.2	-368.8	527.9	602.6	634.7	748.6	529.6	600.6	636.5	746.6
1	3	0.0	-94.8	-39.9	0.0	13.4	4.6	0.0	85.4	35.9	0.0	361.7	124.8	5497.0	-842.9	-314.8	468.1	671.9	553.0	843.4	471.3	668.2	556.2	839.7
1	4	0.0	-142.2	-39.9	0.0	18.3	3.6	0.0	128.0	35.9	0.0	494.5	98.7	5497.0	-1185.0	-260.9	426.4	720.2	495.1	910.6	430.8	715.2	499.4	905.5
1	5	0.0	-189.6	-39.9	0.0	22.0	2.7	0.0	170.7	35.9	0.0	596.2	72.6	5497.0	-1462.3	-206.9	391.3	761.0	446.7	966.6	396.5	754.9	452.0	960.6
1	6	0.0	-237.0	-39.9	0.0	24.6	1.7	0.0	213.4	35.9	0.0	667.0	46.5	5497.0	-1676.6	-152.9	362.2	794.7	407.5	1012.1	368.1	787.9	413.4	1005.3
1	7	0.0	-284.4	-39.9	0.0	26.0	0.7	0.0	256.1	35.9	0.0	706.7	20.3	5498.0	-1825.9	-99.0	339.8	820.9	378.0	1046.6	346.0	813.7	384.2	1039.4
1	8	0.0	-331.8	-39.9	0.0	26.3	-0.3	0.0	298.8	35.9	0.0	715.2	-5.8	5498.0	-1912.2	-45.0	323.4	839.9	357.5	1070.4	329.6	832.7	363.7	1063.2
1	9	0.0	-379.2	-39.9	0.0	25.3	-1.3	0.0	341.4	35.9	0.0	692.8	-31.9	5498.0	-1933.6	9.0	313.5	851.4	346.5	1083.1	319.5	844.5	352.6	1076.1
1	10	0.0	-426.6	-39.9	0.0	23.2	-2.3	0.0	384.1	35.9	0.0	639.4	-58.1	5671.0	-1995.9	70.7	305.2	899.3	339.2	1138.4	310.7	892.9	344.7	1132.0
1	11	0.0	-474.0	-39.9	0.0	19.9	-3.3	0.0	426.8	35.9	0.0	555.0	-84.2	5671.0	-1864.2	147.8	313.3	889.9	353.6	1121.7	318.0	884.4	358.3	1116.2
1	12	0.0	-521.4	-39.9	0.0	15.5	-4.2	0.0	469.5	35.9	0.0	439.2	-110.4	5671.0	-1644.5	222.3	332.8	867.3	383.5	1087.0	336.4	863.1	387.2	1082.7
1	13	0.0	-568.8	-39.9	0.0	9.8	-5.2	0.0	512.1	35.9	0.0	292.6	-136.5	5671.0	-1335.9	296.7	363.9	831.2	429.4	1033.8	366.3	828.4	431.7	1031.1
1	14	0.0	-616.2	-39.9	0.0	3.0	-6.2	0.0	554.8	35.9	0.0	114.8	-162.6	5671.0	-939.2	371.2	406.6	781.7	490.8	962.5	407.3	780.9	491.6	961.6
1	15	0.0	-663.6	-39.9	0.0	-4.9	-7.2	0.0	597.5	35.9	0.0	-93.9	-188.8	5671.0	-453.5	445.7	460.9	718.7	568.3	872.7	459.7	720.1	567.1	874.1
1	16	0.0	-711.0	-39.9	0.0	-14.1	-8.2	0.0	640.1	35.9	0.0	-333.7	-214.9	5809.0	105.7	532.1	537.7	660.2	674.8	786.4	534.3	664.1	671.4	790.3
1	17	0.0	-758.4	-39.9	0.0	-24.4	-9.2	0.0	682.8	35.9	0.0	-604.7	-241.0	5809.0	783.9	608.4	618.4	566.6	787.7	655.4	612.6	573.3	781.9	662.2
1	18	0.0	-805.8	-39.9	0.0	-35.9	-10.2	0.0	725.5	35.9	0.0	-906.6	-267.2	5809.0	1550.9	681.9	710.7	459.5	916.6	506.0	702.2	469.4	908.0	515.9
1	19	0.0	-853.2	-39.9	0.0	-48.6	-11.2	0.0	768.2	35.9	0.0	-1239.8	-293.3	5722.0	2220.2	459.9	765.8	376.3	1001.5	384.0	754.3	389.7	990.0	397.4
1	20	0.0	-900.6	-39.9	0.0	-62.4	-12.1	0.0	810.8	35.9	0.0	-1606.5	-324.0	5774.0	2711.8	250.2	622.4	231.4	839.8	194.6	608.6	246.8	826.0	210.0
1	21	0.0	-948.0	-39.9	0.0	-77.4	-13.1	0.0	853.5	35.9	0.0	-2013.0	-359.3	5774.0	2941.5	39.9	578.2	280.8	805.7	232.6	561.0	299.9	788.6	251.7
2	1	0.0	-948.2	171.8	0.0	-77.4	14.6	0.0	853.7	-26.3	0.0	-2013.2	404.3	5672.0	2911.7	-26.2	564.4	279.7	789.0	231.3	547.3	298.9	771.8	250.4
2	2	0.0	-669.8	171.8	0.0	-54.8	13.3	0.0	811.0	-26.3	0.0	-1396.6	356.2	5672.0	2700.0	-234.6	658.8	174.4	874.0	136.4	646.7	188.0	861.9	150.0
2	3	0.0	-391.4	171.8	0.0	-34.4	11.9	0.0	768.3	-26.3	0.0	-853.3	314.3	5672.0	2094.3	-442.9	825.7	295.9	1054.3	309.3	817.5	305.4	1046.1	318.8
2	4	0.0	-113.0	171.8	0.0	-16.1	10.6	0.0	725.7	-26.3	0.0	-372.8	278.7	5672.0	1200.0	-559.7	748.5	385.3	934.6	448.1	744.7	389.8	930.8	452.6
2	5	0.0	165.4	171.8	0.0	0.0	9.2	0.0	683.0	-26.3	0.0	49.9	243.1	5527.0	449.5	-429.3	673.6	440.2	820.7	541.1	673.6	440.2	820.6	541.1
2	6	0.0	443.7	171.8	0.0	13.9	7.9	0.0	640.3	-26.3	0.0	414.8	207.4	5527.0	-186.6	-355.7	624.2	497.4	741.0	633.4	627.5	493.6	744.3	629.6
2	7	0.0	722.1	171.8	0.0	25.6	6.6	0.0	597.6	-26.3	0.0	722.1	171.8	5453.0	-726.4	-345.0	574.2	539.1	663.7	703.2	580.3	532.1	669.7	696.1
2	8	0.0	971.6	136.2	0.0	35.1	5.2	5418.0	-1235.0	-341.6	0.0	971.6	136.2	5418.0	-1235.0	-341.6	521.1	593.0	585.6	784.3	529.5	583.3	593.9	774.6
2	9	0.0	1163.0	100.5	0.0	42.5	3.9	5426.0	-1717.0	-252.1	0.0	1163.0	100.5	5426.0	-1717.0	-252.1	464.3	660.6	506.0	878.7	474.4	648.9	516.1	867.0
2	10	0.0	1297.0	64.9	0.0	47.7	2.5	5426.0	-2057.0	-167.5	0.0	1297.0	64.9	5426.0	-2057.0	-167.5	423.4	708.1	448.9	944.9	434.7	694.9	460.3	931.8
2	11	0.0	1374.0	29.3	0.0	50.7	1.2	5426.0	-2260.0	-82.9	0.0	1374.0	29.3	5426.0	-2260.0	-82.9	398.3	737.2	414.1	985.3	410.3	723.3	426.2	971.3
2	12	0.0	1392.0	-6.4	0.0	51.5	-0.2	5426.0	-2326.0	1.7	0.0	1392.0	-6.4	5426.0	-2326.0	1.7	388.4	748.6	401.2	1000.3	400.6	734.4	413.4	986.1
2	13	0.0	1353.0	-42.0	0.0	50.1	-1.5	5426.0	-2255.0	86.3	0.0	1353.0	-42.0	5426.0	-2255.0	86.3	394.3	741.8	410.5	989.5	406.2	728.0	422.4	975.7
2	14	0.0	1256.0	-77.7	0.0	46.6	-2.9	5426.0	-2047.0	170.9	0.0	1256.0	-77.6	5426.0	-2047.0	170.9	415.8	716.9	441.8	953.2	426.9	704.1	452.9	940.3
2	15	0.0	1101.0	-113.3	0.0	40.9	-4.2	5426.0	-1701.0	255.5	0.0	1101.0	-113.3	5426.0	-1701.0	255.5	453.0	673.8	495.4	891.0	462.7	662.5	505.2	879.7
2	16	0.0	889.0	-148.9	0.0	33.0	-5.5	5426.0	-1219.0	340.1	0.0	889.0	-148.9	5426.0	-1219.0	340.1	505.7	612.6	571.1	803.2	513.5	603.5	578.9	794.1
2	17	0.0	618.8	-184.5	0.0	22.9	-6.9	5426.0	-599.2	424.7	0.0	618.8	-184.5	5426.0	-599.2	424.7	574.1	533.3	669.0	689.7	579.5	527.0	674.4	683.4
2	18	0.0	290.8	-220.2	0.0	10.6	-8.2	5426.0	157.7	509.3	0.0	290.8	-220.2	5426.0	157.7	509.3	658.1	435.9	789.0	550.5	660.6	432.9	791.5	547.6
2	19	0.0	-94.8	-255.8	0.0	-3.8	-9.6	5426.0	1044.0	580.0	0.0	-94.8	-255.8	5426.0	1044.0	580.0	756.1	322.2	929.1	388.0	755.2	323.3	928.2	389.1
2	20	0.0	-543.3	-297.7	0.0	-20.4	-10.9	5733.0	1617.0	278.4	0.0	-543.3	-297.7	5733.0	1617.0	278.4	676.4	164.5	853.5	171.3	671.9	169.6	849.0	176.3
2	21	0.0	-1065.0	-345.8	0.0	-39.2	-12.3	5791.0	2100.0	-22.0	0.0	-1065.0	-345.8	5791.0	2100.0	-22.0	621.7	235.0	812.3	228.7	613.0	244.6	803.6	236.3
3	1	0.0	-1065.0	232.5	0.0	-39.2	8.1	5689.0	2069.0	6.3	0.0	-1065.0	232.5	5689.0	2069.0	6.3	607.8	234.1	795.3	227.6	599.1	243.8	786.6	237.3
3	2	0.0	-727.0	184.4	0.0	-27.3	6.7	5689.0	1907.0	-206.4	0.0	-727.0	184.4	5689.0	1907.0	-206.4	650.4	186.6	830.7	188.1	644.3	193.3	824.6	194.9
3	3	0.0	-462.1	142.6	0.0	-17.4	5.4	5689.0	1348.0	-413.6	0.0	-462.1	142.6	5689.0	1348.0	-413.6	760.7	375.0	954.2	430.0	756.6	379.8	950.0	434.8
3	4	0.0	-260.0	106.9	0.0	-9.8	4.0	5688.0	498.6	-535.7	0.0	-260.0	106.9	5688.0	498.6	-535.7	626.9	530.0	779.9	631.8	624.6	532.7	777.6	534.5
3	5	0.0	-115.6	71.3	0.0	-4.4	2.7	5544.0	-211.1	-404.0	0.0	-115.6	71.3	5544.0	-211.1	-404.0	494.6	651.5	610.6	769.3	493.6	652.8	609.6	790.5
3	6	0.0	-28.9	35.7	0.0	-1.1	1.3	5544.0	-806.2	-330.4	0.0	-28.9	35.7	5544.0	-806.2	-330.4	387.9	775.4	475.6	945.9	387.6	775.7	475.3	946.2
3	7	0.0	0.0	0.0	0.0	0.0	0.0	5470.0	-1304.0	-318.7	0.0	0.0	0.0	5470.0	-1304.0	-318.7	280.6	883.4	343.0	1079.7	280.6	883.4	343.0	1079.7
3	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase nº: 2

PROYECTO: L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1568.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	899	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1138	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	893	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1132	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
4	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase nº: 3

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1548.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	893	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1138	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	885	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1130	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	10.9	0.0	0.0	7.2	0.0	0.0	-9.8	0.0	0.0	192.6	5497.0	89.0	-432.5	434.4	396.8	530.9	485.0	434.4	396.8	530.9	485.0
1	2	0.0	12.9	10.9	0.0	7.9	6.2	0.0	-11.6	-9.8	0.0	210.5	161.9	5497.0	-392.9	-378.6	528.5	601.9	634.8	748.6	530.3	599.7	636.6	746.4
1	3	0.0	25.9	10.9	0.0	14.7	5.2	0.0	-23.3	-9.8	0.0	387.6	135.7	5497.0	-866.2	-324.6	469.2	670.6	553.0	843.4	472.7	666.5	556.5	839.3
1	4	0.0	38.8	10.9	0.0	20.3	4.2	0.0	-35.0	-9.8	0.0	533.3	109.6	5497.0	-1220.9	-270.7	428.2	718.2	495.2	910.5	433.0	712.6	500.0	904.9
1	5	0.0	51.7	10.9	0.0	24.7	3.2	0.0	-46.7	-9.8	0.0	647.9	83.5	5497.0	-1509.0	-216.7	393.6	758.3	446.8	966.5	399.5	751.5	452.7	959.7
1	6	0.0	64.7	10.9	0.0	27.9	2.2	0.0	-58.3	-9.8	0.0	731.7	57.4	5497.0	-1734.9	-162.7	365.1	791.3	407.6	1012.0	371.8	783.6	414.3	1004.3
1	7	0.0	77.6	10.9	0.0	30.0	1.2	0.0	-70.0	-9.8	0.0	784.3	31.2	5496.0	-1895.9	-108.8	343.3	816.8	378.2	1046.4	350.4	808.6	385.3	1038.2
1	8	0.0	90.6	10.9	0.0	30.9	0.3	0.0	-81.7	-9.8	0.0	805.8	5.1	5498.0	-1993.9	-54.8	327.4	835.2	357.6	1070.2	334.8	826.7	365.0	1061.7
1	9	0.0	103.5	10.9	0.0	30.6	-0.7	0.0	-93.4	-9.8	0.0	796.3	-21.0	5498.0	-2027.0	-0.9	318.1	846.1	346.7	1082.9	325.4	837.6	354.0	1074.5
1	10	0.0	116.4	10.9	0.0	29.1	-1.7	0.0	-105.0	-9.8	0.0	755.8	-47.2	5671.0	-2100.9	60.9	310.4	893.3	339.4	1138.1	317.3	885.3	346.3	1130.1
1	11	0.0	129.4	10.9	0.0	26.5	-2.7	0.0	-116.7	-9.8	0.0	684.4	-73.3	5671.0	-1980.9	138.0	319.1	883.2	353.8	1121.4	325.4	875.9	360.1	1114.1
1	12	0.0	142.3	10.9	0.0	22.7	-3.7	0.0	-128.4	-9.8	0.0	581.5	-99.5	5671.0	-1772.9	212.5	339.1	859.9	383.7	1086.7	344.5	853.7	389.1	1080.4
1	13	0.0	155.3	10.9	0.0	17.7	-4.7	0.0	-140.1	-9.8	0.0	447.9	-125.6	5671.0	-1476.0	286.9	370.9	823.1	429.6	1033.5	375.1	818.2	433.8	1028.6
1	14	0.0	168.2	10.9	0.0	11.6	-5.7	0.0	-151.7	-9.8	0.0	283.0	-151.7	5671.0	-1090.9	361.4	414.1	773.0	491.2	962.1	416.8	769.8	493.9	958.9
1	15	0.0	181.1	10.9	0.0	4.3	-6.6	0.0	-163.4	-9.8	0.0	87.2	-177.9	5671.0	-616.9	435.9	469.0	709.3	568.6	872.3	470.0	708.2	569.6	871.1
1	16	0.0	194.1	10.9	0.0	-4.2	-7.6	0.0	-175.1	-9.8	0.0	-139.6	-204.0	5809.0	-69.4	522.3	546.3	650.1	675.1	786.0	545.3	651.3	674.1	787.2
1	17	0.0	207.0	10.9	0.0	-13.9	-8.6	0.0	-186.8	-9.8	0.0	-397.7	-230.1	5809.0	597.1	598.6	627.6	555.9	788.1	655.0	624.3	559.7	784.8	658.8
1	18	0.0	220.0	10.9	0.0	-24.7	-9.6	0.0	-198.4	-9.8	0.0	-686.6	-256.3	5809.0	1352.5	672.1	720.6	448.8	917.0	505.5	714.7	454.9	911.1	512.3
1	19	0.0	232.9	10.9	0.0	-36.7	-10.6	0.0	-210.1	-9.8	0.0	-1006.9	-282.4	5722.0	2010.1	450.1	776.2	364.3	1002.0	383.5	767.5	374.4	993.2	393.6
1	20	0.0	245.8	10.9	0.0	-49.9	-11.6	0.0	-221.8	-9.8	0.0	-1360.7	-313.1	5774.0	2490.0	240.4	632.7	220.0	840.2	194.1	621.6	232.3	829.2	206.5
1	21	0.0	258.8	10.9	0.0	-64.3	-12.6	0.0	-233.5	-9.8	0.0	-1754.2	-348.4	5774.0	2708.0	30.1	588.9	268.8	806.2	232.1	574.7	284.7	791.9	248.0
2	1	0.0	258.8	-35.4	0.0	-64.3	12.8	0.0	-233.5	31.9	0.0	-1754.4	368.9	5672.0	2678.2	5.6	575.2	267.7	789.4	230.8	561.0	283.6	775.2	246.7
2	2	0.0	201.5	-35.4	0.0	-44.6	11.5	0.0	-181.8	31.9	0.0	-1195.1	320.8	5672.0	2518.2	-202.8	667.2	165.0	874.3	136.1	657.4	176.1	864.5	147.1
2	3	0.0	144.2	-35.4	0.0	-27.0	10.1	0.0	-130.2	31.9	0.0	-709.1	278.9	5672.0	1964.1	-411.1	832.1	288.4	1054.5	309.1	825.7	295.9	1048.1	316.5
2	4	0.0	86.9	-35.4	0.0	-11.7	8.8	0.0	-78.6	31.9	0.0	-285.9	243.3	5672.0	1121.4	-527.9	752.4	380.9	934.7	448.0	749.6	384.1	931.9	451.2
2	5	0.0	29.6	-35.4	0.0	1.5	7.5	0.0	-27.0	31.9	0.0	79.5	207.7	5527.0	422.5	-397.5	674.9	438.7	820.6	541.1	675.2	438.3	821.0	540.7
2	6	0.0	-27.7	-35.4	0.0	12.5	6.1	0.0	24.6	31.9	0.0	387.1	172.1	5527.0	-162.0	-323.9	622.9	499.0	740.9	633.6	625.9	495.5	743.9	630.1
2	7	0.0	-85.0	-35.4	0.0	21.3	4.8	0.0	76.3	31.9	0.0	637.1	136.4	5453.0	-650.1	-313.2	570.3	543.6	663.4	703.5	575.4	537.8	668.4	697.6
2	8	0.0	-142.3	-35.4	0.0	27.9	3.4	0.0	127.9	31.9	0.0	829.3	100.8	5418.0	-1107.1	-309.7	514.6	600.5	585.2	784.7	521.3	592.8	591.8	777.0
2	9	0.0	-199.7	-35.4	0.0	32.3	2.1	0.0	179.5	31.9	0.0	963.3	65.1	5426.0	-1537.5	-220.2	455.2	671.2	505.5	879.3	462.9	662.2	513.2	870.4
2	10	0.0	-257.0	-35.4	0.0	34.6	0.7	0.0	231.1	31.9	0.0	1040.0	29.5	5426.0	-1825.9	-135.6	411.7	721.6	448.3	945.7	420.0	712.0	456.5	936.1
2	11	0.0	-314.3	-35.4	0.0	34.7	-0.6	0.0	282.7	31.9	0.0	1059.7	-6.1	5426.0	-1977.3	-51.0	384.0	753.7	413.3	986.2	392.3	744.2	421.6	976.6
2	12	0.0	-371.6	-35.4	0.0	32.6	-2.0	0.0	334.4	31.9	0.0	1020.4	-41.8	5426.0	-1991.6	33.6	371.6	768.1	400.3	1001.3	379.4	759.1	408.0	992.4
2	13	0.0	-428.9	-35.4	0.0	28.3	-3.3	0.0	386.0	31.9	0.0	924.1	-77.4	5426.0	-1869.0	118.2	374.9	764.2	409.4	990.7	381.7	756.4	416.2	982.9
2	14	0.0	-486.2	-35.4	0.0	21.9	-4.7	0.0	437.6	31.9	0.0	769.8	-113.0	5426.0	-1609.4	202.8	393.8	742.4	440.6	954.5	399.0	736.3	445.8	948.5
2	15	0.0	-543.5	-35.4	0.0	13.2	-6.0	0.0	489.3	31.9	0.0	557.5	-148.7	5426.0	-1211.7	287.4	428.4	702.2	494.2	892.4	431.6	698.6	497.3	888.8
2	16	0.0	-600.9	-35.4	0.0	2.4	-7.3	0.0	540.9	31.9	0.0	288.1	-184.3	5426.0	-676.1	372.0	478.6	644.1	569.7	804.8	479.2	643.4	570.3	804.2
2	17	0.0	-658.2	-35.4	0.0	-10.6	-8.7	0.0	592.5	31.9	0.0	-39.4	-219.9	5426.0	-6.7	456.6	544.4	567.7	667.5	691.5	541.9	570.6	664.9	694.4
2	18	0.0	-715.5	-35.4	0.0	-25.8	-10.0	0.0	644.1	31.9	0.0	-424.7	-255.6	5426.0	801.8	541.2	625.8	473.3	787.3	552.5	619.7	480.4	781.2	559.6
2	19	0.0	-772.8	-35.4	0.0	-43.1	-11.4	0.0	695.7	31.9	0.0	-867.6	-291.2	5426.0	1739.7	611.9	721.2	362.7	927.3	390.1	711.9	374.6	917.1	402.0
2	20	0.0	-830.1	-35.4	0.0	-62.6	-12.7	0.0	747.4	31.9	0.0	-1373.4	-333.1	5733.0	2564.4	310.3	641.6	203.5	851.8	173.2	627.7	219.0	837.9	188.7
2	21	0.0	-887.4	-35.4	0.0	-84.3	-14.1	0.0	799.0	31.9	0.0	-1952.4	-381.2	5791.0	2899.0	9.8	584.4	276.6	810.4	230.8	565.7	297.4	791.7	251.6
3	1	0.0	-887.6	169.9	0.0	-84.4	14.8	0.0	799.2	-24.6	0.0	-1952.6	402.4	5689.0	2868.2	-18.4	570.5	275.7	793.4	229.7	551.8	296.6	774.7	250.6
3	2	0.0	-612.3	169.9	0.0	-61.4	13.5	0.0	759.2	-24.6	0.0	-1339.3	354.3	5689.0	2666.2	-231.0	666.1	169.1	880.0	133.0	652.5	184.2	866.4	148.2
3	3	0.0	-337.1	169.9	0.0	-40.6	12.2	0.0	719.3	-24.6	0.0	-799.2	312.5	5689.0	2067.3	-438.2	834.5	269.4	1062.2	304.7	824.8	300.6	1052.5	315.9
3	4	0.0	-61.8	169.9	0.0	-22.0	10.8	0.0	679.4	-24.6	0.0	-321.8	276.8	5688.0	1176.0	-560.3	757.6	378.4	943.0	442.7	752.4	384.4	937.7	448.8
3	5	0.0	213.5	169.9	0.0	-5.6	9.5	0.0	639.5	-24.6	0.0	97.9	241.2	5544.0	428.4	-428.6	682.2	433.9	828.7	536.4	680.9	435.5	827.3	537.9
3	6	0.0	488.8	169.9	0.0	8.6	8.1	0.0	599.5	-24.6	0.0	459.9	205.6	5544.0	-206.7	-355.0	632.4	491.7	748.6	629.2	634.5	489.4	750.7	626.8
3	7	0.0	764.3	169.9	0.0	20.7	6.8	0.0	559.6	-24.6	0.0	764.3	169.9	5470.0	-744.4	-343.3	582.1	533.7	671.1	699.1	587.1	526.0	676.0	693.4
3	8	0.0	1011.0	134.3	0.0	30.6	5.4	5418.0	-1271.0	-339.9	0.0	1011.0	134.3	5418.0	-1271.0	-339.9	522.8	591.0	585.5	784.3	530.1	582.6	592.8	775.9
3	9	0.0	1199.0	98.6	0.0	38.3	4.1	5426.0	-1750.0	-250.4	0.0	1199.0	98.6	5426.0	-1750.0	-250.4	465.8	658.9	505.9	878.8	474.9	648.3	515.0	868.2
3	10	0.0	1330.0	63.0	0.0	43.8	2.7	5426.0	-2087.0	-165.8	0.0	1330.0	63.0	5426.0	-2087.0	-165.8	424.8	706.4	448.9	944.9	435.2	694.3	459.4	932.8
3	11	0.0	1404.0	27.4	0.0	47.2	1.4	5426.0	-2287.0	-81.2	0.0	1404.0	27.4	5426.0	-2287.0	-81.2	399.6	735.6	414.2	985.2	410.8	722.6	425.4	972.2
3	12	0.0	1419.0	-8.3	0.0	48.3	0.0	5426.0	-2350.0	3.4	0.0	1419.0	-8.3	5426.0	-2350.0	3.4	389.7	747.1	401.3	1000.1	401.2	733.8	412.8	986.8
3	13	0.0	1377.0	-43.9	0.0	47.3	-1.3	5426.0	-2276.0	88.0	0.0	1377.0	-43.9	5426.0	-2276.0	88.0	395.5	740.4	410.7	989.3	406.8	727.3	421.9	976.2
3	14	0.0	1277.0	-79.5	0.0	44.1	-2.6	5426.0	-2066.0	172.6	0.0	1277.0	-79.5	5426.0	-2066.0	172.6	416.7	715.8	441.8	953.2	427.2	703.6	452.3	941.0
3	15	0.0	1119.0	-115.2	0.0	38.8	-4.0	5426.0	-1717.0	257.2	0.0	1119.0	-115.2	5426.0	-1717.0	257.2	453.8	672.8	495.5	890.9	463.0	662.1	504.8	880.2
3	16	0.0	903.5	-150.8	0.0	31.2	-5.3	5426.0	-1232.0	341.8	0.0	903.5	-150.8	5426.0	-1232.0	341.8	506.4	611.8	571.2	803.1	513.8	603.2	576.6	794.5
3	17	0.0	630.3	-186.4	0.0	21.5	-6.7	5426.0	-610.0	426.4	0.0	630.3	-186.4	5426.0	-610.0	426.4	574.5	532.8	668.9	689.8	579.6	526.9	674.0	683.9
3	18	0.0	299.3	-222.1	0.0	9.6	-8.0	5426.0	149.3	511.0	0.0	299.3	-222.1	5426.0	149.3	511.0	658.3	435.6	788.8	550.7	660.6	433.0	791.1	548.1
3	19	0.0	-89.4	-257.7	0.0	-4.5	-9.4	5426.0	1038.0	581.6	0.0	-89.4	-257.7	5426.0	1038.0	581.6	756.1	322.2	928.8	388.3	755.0	323.5	927.8	389.6
3	20	0.0	-541.1	-299.6	0.0	-20.8	-10.7	5733.0	1814.0	279.9	0.0	-541.1	-299.6	5733.0	1814.0	279.9	676.3	164.7	853.3	171.5	671.7	169.8	848.7	176.7
3	21	0.0	-1066.0	-347.7	0.0	-39.3	-12.1	5791.0	2099.0	-20.6	0.0	-1066.0	-347.7	5791.0	2099.0	-20.6	621.3	235.4	811.8	229.2	612.6	245.1	803.1	238.9
4	1	0.0	-1065.0	232.5	0.0	-39.2	8.1	5689.0	2069.0	6.3	0.0	-1065.0	232.5	5689.0	2069.0	6.3	607.8	234.1	795.3	227.6	599.1	243.8	786.6	237.3

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase nº: 3

PROYECTO: L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1568.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	893	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1138	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	885	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1130	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
4	2	0.0	-726.8	184.4	0.0	-27.2	6.7	5689.0	1907.0	-206.3	0.0	-726.8	184.4	5689.0	1907.0	-206.3	650.4	186.6	830.7	188.1	644.4	193.3	824.7	194.8
4	3	0.0	-461.9	142.5	0.0	-17.4	5.4	5689.0	1348.0	-413.6	0.0	-461.9	142.5	5689.0	1348.0	-413.6	760.8	374.9	954.2	429.9	756.6	379.7	950.1	434.7
4	4	0.0	-259.8	106.9	0.0	-9.8	4.0	5688.0	498.2	-535.7	0.0	-259.8	106.9	5688.0	498.2	-535.7	626.8	530.0	779.9	631.9	624.5	532.7	777.5	634.6
4	5	0.0	-115.5	71.3	0.0	-4.4	2.7	5544.0	-211.5	-404.0	0.0	-115.5	71.3	5544.0	-211.5	-404.0	494.5	651.6	610.5	789.3	493.5	652.8	609.5	790.5
4	6	0.0	-28.9	35.6	0.0	-1.1	1.3	5544.0	-806.6	-330.4	0.0	-28.9	35.6	5544.0	-806.6	-330.4	387.8	775.4	475.5	946.0	387.5	775.7	475.2	946.3
4	7	0.0	0.0	0.0	0.0	0.0	0.0	5470.0	-1304.0	-318.7	0.0	0.0	0.0	5470.0	-1304.0	-318.7	280.6	883.4	343.0	1079.7	280.6	883.4	343.0	1079.7
4	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase nº: 4

PROYECTO: L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508,5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	896	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1140	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	889	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1132	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	-3.4	0.0	0.0	7.0	0.0	0.0	2.6	0.0	0.0	189.2	5497.0	89.0	-429.9	434.4	396.8	530.9	485.0	434.4	396.8	530.9	485.0
1	2	0.0	-4.1	-3.4	0.0	7.7	6.0	0.0	3.2	2.6	0.0	206.4	158.5	5497.0	-389.7	-376.0	528.2	602.3	634.6	748.7	530.0	600.1	636.4	746.6
1	3	0.0	-8.2	-3.4	0.0	14.3	5.0	0.0	6.3	2.6	0.0	379.4	132.3	5497.0	-659.9	-322.0	468.6	671.3	552.7	843.7	472.0	667.3	556.1	839.8
1	4	0.0	-12.3	-3.4	0.0	19.7	4.0	0.0	9.5	2.6	0.0	521.0	106.2	5497.0	-1210.5	-268.1	427.3	719.2	494.7	911.0	432.0	713.8	499.4	905.6
1	5	0.0	-16.4	-3.4	0.0	23.9	3.1	0.0	12.6	2.6	0.0	631.6	80.1	5497.0	-1496.4	-214.1	392.4	759.7	446.2	967.2	398.1	753.1	451.9	960.6
1	6	0.0	-20.5	-3.4	0.0	26.9	2.1	0.0	15.7	2.6	0.0	711.2	53.9	5497.0	-1719.2	-160.1	363.6	793.0	406.9	1012.9	370.0	785.6	413.3	1005.4
1	7	0.0	-24.6	-3.4	0.0	28.8	1.1	0.0	18.9	2.6	0.0	759.8	27.8	5498.0	-1877.0	-106.2	341.5	818.9	377.3	1047.5	348.4	811.0	384.1	1039.5
1	8	0.0	-28.7	-3.4	0.0	29.5	0.1	0.0	22.0	2.6	0.0	777.1	1.6	5498.0	-1971.9	-52.2	325.3	837.7	356.6	1071.5	332.4	829.6	363.6	1063.3
1	9	0.0	-32.8	-3.4	0.0	29.0	-0.9	0.0	25.2	2.6	0.0	763.6	-24.5	5498.0	-2001.8	1.8	315.7	848.8	345.5	1084.3	322.6	840.9	352.4	1076.3
1	10	0.0	-36.8	-3.4	0.0	27.3	-1.9	0.0	28.3	2.6	0.0	719.0	-50.6	5671.0	-2072.6	63.5	307.7	896.4	338.0	1139.7	314.2	888.9	344.5	1132.1
1	11	0.0	-40.9	-3.4	0.0	24.5	-2.9	0.0	31.5	2.6	0.0	643.5	-76.8	5671.0	-1949.4	140.6	316.1	886.7	352.3	1123.2	321.9	879.9	358.1	1116.4
1	12	0.0	-45.0	-3.4	0.0	20.5	-3.9	0.0	34.6	2.6	0.0	536.5	-102.9	5671.0	-1738.3	215.1	335.8	863.8	382.1	1088.6	340.7	858.1	387.0	1082.9
1	13	0.0	-49.1	-3.4	0.0	15.4	-4.8	0.0	37.8	2.6	0.0	398.8	-129.0	5671.0	-1438.3	289.5	367.3	827.3	427.8	1035.6	370.9	823.0	431.5	1031.3
1	14	0.0	-53.2	-3.4	0.0	9.0	-5.8	0.0	40.9	2.6	0.0	229.8	-155.1	5671.0	-1050.0	364.0	410.2	777.5	489.2	964.4	412.3	775.0	491.3	961.9
1	15	0.0	-57.3	-3.4	0.0	1.5	-6.8	0.0	44.0	2.6	0.0	29.9	-181.3	5671.0	-572.9	438.5	464.8	714.2	566.5	874.8	465.1	713.8	566.8	874.3
1	16	0.0	-61.4	-3.4	0.0	-7.2	-7.8	0.0	47.2	2.6	0.0	-201.0	-207.4	5809.0	-22.2	524.9	541.8	655.3	672.9	788.6	540.1	657.3	671.2	790.6
1	17	0.0	-65.5	-3.4	0.0	-17.1	-8.8	0.0	50.3	2.6	0.0	-463.2	-233.5	5809.0	647.4	601.2	622.8	561.4	785.7	657.8	618.8	566.1	781.6	662.5
1	18	0.0	-69.6	-3.4	0.0	-26.1	-9.8	0.0	53.5	2.6	0.0	-756.2	-259.7	5809.0	1406.0	674.7	715.5	454.0	914.4	508.5	706.8	461.7	907.8	516.2
1	19	0.0	-73.7	-3.4	0.0	-40.3	-10.8	0.0	56.6	2.6	0.0	-1080.6	-285.8	5722.0	2066.7	452.7	770.8	370.5	999.2	386.6	761.3	381.6	989.7	397.7
1	20	0.0	-77.8	-3.4	0.0	-53.7	-11.8	0.0	59.8	2.6	0.0	-1438.5	-316.5	5774.0	2549.8	243.0	627.3	225.9	837.6	197.1	615.5	239.2	825.7	210.4
1	21	0.0	-81.9	-3.4	0.0	-68.2	-12.7	0.0	62.9	2.6	0.0	-1836.1	-351.8	5774.0	2770.9	32.7	583.4	275.0	803.4	235.2	568.2	291.9	786.3	252.1
2	1	0.0	-81.9	11.2	0.0	-68.2	13.4	0.0	62.9	-8.6	0.0	-1836.3	380.1	5672.0	2741.1	-3.0	569.6	274.0	786.6	233.9	554.5	290.8	771.5	250.8
2	2	0.0	-63.8	11.2	0.0	-47.6	12.0	0.0	49.0	-8.6	0.0	-1258.9	332.0	5672.0	2567.2	-211.4	662.9	169.9	872.2	138.5	652.3	181.7	861.6	150.3
2	3	0.0	-45.6	11.2	0.0	-29.2	10.7	0.0	35.1	-8.6	0.0	-754.7	290.1	5672.0	1999.2	-419.7	828.8	292.3	1052.8	311.0	821.8	300.4	1045.9	319.1
2	4	0.0	-27.5	11.2	0.0	-13.0	9.3	0.0	21.2	-8.6	0.0	-313.4	254.5	5672.0	1142.6	-536.5	750.4	383.2	933.7	449.2	747.3	386.8	930.6	452.8
2	5	0.0	-9.4	11.2	0.0	1.0	8.0	0.0	7.2	-8.6	0.0	70.1	218.9	5527.0	429.7	-406.1	674.2	439.5	820.3	541.5	674.4	439.3	820.5	541.2
2	6	0.0	8.7	11.2	0.0	12.9	6.6	0.0	-6.7	-8.6	0.0	395.6	183.2	5527.0	-168.7	-332.5	623.6	498.2	741.2	633.2	626.6	494.7	744.3	629.7
2	7	0.0	26.9	11.2	0.0	22.6	5.3	0.0	-20.6	-8.6	0.0	663.9	147.6	5453.0	-670.8	-321.8	572.3	541.4	664.4	702.3	577.6	535.1	669.7	696.1
2	8	0.0	45.0	11.2	0.0	30.1	4.0	0.0	-34.6	-8.6	0.0	874.3	112.0	5418.0	-1141.7	-318.3	517.9	596.6	586.8	782.8	525.1	588.3	594.0	774.5
2	9	0.0	63.1	11.2	0.0	35.4	2.6	0.0	-48.5	-8.6	0.0	1026.4	76.3	5426.0	-1586.0	-228.8	459.8	665.8	507.8	876.6	468.3	656.0	516.2	866.9
2	10	0.0	81.2	11.2	0.0	38.5	1.3	0.0	-62.4	-8.6	0.0	1121.2	40.7	5426.0	-1888.3	-144.2	417.7	714.7	451.3	942.2	426.8	704.1	460.4	931.6
2	11	0.0	99.3	11.2	0.0	39.5	-0.1	0.0	-76.4	-8.6	0.0	1159.0	5.1	5426.0	-2053.7	-59.6	391.3	745.3	417.0	981.9	400.7	734.4	426.4	971.1
2	12	0.0	117.5	11.2	0.0	38.3	-1.4	0.0	-90.3	-8.6	0.0	1137.9	-30.6	5426.0	-2061.9	25.0	380.2	758.1	404.6	996.3	389.3	747.6	413.7	985.8
2	13	0.0	135.6	11.2	0.0	34.9	-2.8	0.0	-104.2	-8.6	0.0	1059.7	-66.2	5426.0	-1973.2	109.6	384.9	752.7	414.4	984.9	393.2	743.1	422.7	975.3
2	14	0.0	153.7	11.2	0.0	29.3	-4.1	0.0	-118.2	-8.6	0.0	923.5	-101.8	5426.0	-1727.6	194.2	405.1	729.3	446.3	948.0	412.0	721.2	453.2	939.9
2	15	0.0	171.8	11.2	0.0	21.5	-5.5	0.0	-132.1	-8.6	0.0	729.3	-137.5	5426.0	-1343.8	278.8	441.0	687.6	500.5	885.1	446.1	681.7	505.6	879.2
2	16	0.0	190.0	11.2	0.0	11.6	-6.8	0.0	-146.0	-8.6	0.0	478.1	-173.1	5426.0	-824.1	363.4	492.5	627.9	576.7	796.7	495.3	624.7	579.5	793.5
2	17	0.0	208.1	11.2	0.0	-0.5	-8.2	0.0	-159.9	-8.6	0.0	168.7	-208.7	5426.0	-166.6	448.0	559.7	550.0	675.1	682.6	559.5	550.2	675.0	682.7
2	18	0.0	226.2	11.2	0.0	-14.8	-9.5	0.0	-173.9	-8.6	0.0	-196.5	-244.4	5426.0	627.9	532.6	642.4	454.1	795.6	542.8	638.9	458.2	792.1	546.9
2	19	0.0	244.3	11.2	0.0	-31.3	-10.8	0.0	-187.8	-8.6	0.0	-623.3	-280.0	5426.0	1551.9	603.3	739.1	341.9	936.3	379.7	731.7	350.5	928.8	388.3
2	20	0.0	262.4	11.2	0.0	-50.0	-12.2	0.0	-201.7	-8.6	0.0	-1111.0	-321.9	5733.0	2362.7	301.7	659.5	183.5	860.7	163.2	648.4	195.8	849.7	175.6
2	21	0.0	280.6	11.2	0.0	-70.8	-13.5	0.0	-215.7	-8.6	0.0	-1671.8	-370.0	5791.0	2683.3	1.2	603.6	255.2	820.0	220.0	587.9	272.7	804.3	237.5
3	1	0.0	280.6	-40.4	0.0	-70.8	12.9	0.0	-215.7	31.0	0.0	-1672.0	362.0	5689.0	2652.5	12.6	589.6	254.4	803.0	219.0	574.0	271.9	787.3	236.5
3	2	0.0	215.2	-40.4	0.0	-51.0	11.6	0.0	-165.5	31.0	0.0	-1124.1	313.9	5689.0	2500.7	-200.1	680.8	152.7	887.4	124.8	669.5	165.3	876.1	137.4
3	3	0.0	149.8	-40.4	0.0	-33.4	10.2	0.0	-115.3	31.0	0.0	-649.4	272.1	5689.0	1952.0	-407.3	845.4	276.7	1067.6	298.4	837.5	285.9	1059.7	307.6
3	4	0.0	84.4	-40.4	0.0	-17.9	8.9	0.0	-65.1	31.0	0.0	-237.4	236.4	5688.0	1112.9	-529.4	763.7	371.2	946.0	439.2	759.5	376.2	941.7	444.1
3	5	0.0	19.0	-40.4	0.0	-4.7	7.5	0.0	-14.9	31.0	0.0	116.9	200.8	5544.0	413.5	-397.7	683.6	432.4	829.3	535.6	682.5	433.7	828.2	536.9
3	6	0.0	-46.4	-40.4	0.0	6.4	6.2	0.0	35.3	31.0	0.0	413.5	165.2	5544.0	-171.4	-324.1	628.9	495.8	746.8	631.3	630.4	494.0	748.4	629.5
3	7	0.0	-111.8	-40.4	0.0	15.3	4.8	0.0	85.5	31.0	0.0	652.5	129.5	5470.0	-658.9	-312.4	573.9	543.3	666.9	704.0	577.5	539.1	670.5	699.8
3	8	0.0	-177.2	-40.4	0.0	22.1	3.5	0.0	135.7	31.0	0.0	833.8	93.9	5418.0	-1135.3	-308.9	509.7	606.2	578.9	792.0	514.9	600.1	584.1	786.0
3	9	0.0	-242.6	-40.4	0.0	26.6	2.1	0.0	185.9	31.0	0.0	956.4	58.3	5426.0	-1564.1	-219.4	447.9	679.7	496.9	889.3	454.2	672.3	503.2	882.0
3	10	0.0	-308.0	-40.4	0.0	29.0	0.8	0.0	236.1	31.0	0.0	1022.0	22.6	5426.0	-1850.9	-134.8	402.1	732.8	437.4	958.2	409.0	724.8	444.3	950.2
3	11	0.0	-373.4	-40.4	0.0	29.2	-0.6	0.0	286.3	31.0	0.0	1030.6	-13.0	5426.0	-2000.7	-50.2	372.1	767.6	400.3	1001.3	379.0	759.5	407.2	993.3
3	12	0.0	-438.8	-40.4	0.0	27.2	-1.9	0.0	336.5	31.0	0.0	980.2	-48.6	5426.0	-2013.5	34.3	357.4	784.6	385.0	1019.1	363.8	777.2	391.4	1011.6
3	13	0.0	-504.2	-40.4	0.0	23.0	-3.2	0.0	386.7	31.0	0.0	872.8	-84.3	5426.0	-1889.3	118.9	358.4	783.4	391.9	1011.0	363.9	777.1	397.4	1004.7
3	14	0.0	-569.6	-40.4	0.0	16.5	-4.6	0.0	436.9	31.0	0.0	707.4	-119.9	5426.0	-1629.1	203.6	374.8	764.5	420.7	977.7	378.7	759.9	424.6	973.1
3	15	0.0	-635.1	-40.4	0.0	8.1	-5.9	0.0	487.1	31.0	0.0	483.9	-155.6	5426.0	-1229.9	288.2	407.0	727.0	471.9	918.2	409.0	724.8	473.9	916.0
3	16	0.0	-700.5	-40.4	0.0	-2.6	-7.3	0.0	537.3	31.0	0.0	203.0	-191.2	5426.0	-694.7	372.8	454.8	671.6	545.1	833.3	454.2	672.4	544.5	834.1
3	17	0.0	-765.9	-40.4	0.0	-15.5	-8.6	0.0	587.5	31.0	0.0	-135.6	-226.8	5426.0	-22.5	457.4	518.1	598.2	640.4	722.8	514.5	602.5	636.8	727.1
3	18	0.0	-831.3	-40.4	0.0	-30.6	-10.0	0.0	637.7	31.0	0.0	-532.0	-262.5	5426.0	787.0	542.0	597.1	506.6	757.9	586.5	589.9	515.0	750.7	595.0
3	19	0.0	-896.7	-40.4	0.0	-47.8	-11.3	0.0	687.9	31.0	0.0	-986.1	-298.1	5426.0	1725.9	612.6	690.1	398.8	895.6	426.9	678.7	411.9	884.2	440.1
3	20	0.0	-962.1	-40.4	0.0	-67.3	-12.7	0.0	738.1	31.0	0.0	-1503.2	-340.0	5733.0	2552.1	310.9	610.4	238.3	820.0	208.7	595.5	254.9	805.1	225.3
3	21	0.0	-1027.0	-40.4	0.0	-88.9	-14.0	0.0	788.3	31.0	0.0	-2093.0	-388.1	5791.0	2887.3	10.4	550.9	313.9	776.4	268.7	531.2	335.9	756.7	290.7
4	1	0.0	-1027.0	190.6	0.0	-88.8	15.7	0.0	788.4	-24.3	0.0	-2092.0	423.1	5689.0	2857.4	-18.1	537.4	312.6	759.9	267.1	517.8	334.6	740.2	289.1

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase nº: 4

PROYECTO: L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1568.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	896	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1140	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	889	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1132	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
4	2	0.0	-718.5	190.6	0.0	-64.4	14.4	0.0	749.0	-24.3	0.0	-1445.3	375.0	5689.0	2656.0	-230.6	640.6	197.5	854.1	162.0	626.3	213.5	839.8	177.9
4	3	0.0	-409.6	190.6	0.0	-42.2	13.0	0.0	709.5	-24.3	0.0	-871.5	333.1	5689.0	2057.5	-437.9	815.2	311.8	1042.4	327.6	805.2	323.4	1032.4	339.3
4	4	0.0	-100.8	190.6	0.0	-22.2	11.7	0.0	670.1	-24.3	0.0	-360.6	297.5	5688.0	1168.3	-560.0	746.3	391.5	931.2	456.4	741.0	397.6	925.9	462.5
4	5	0.0	208.1	190.6	0.0	-4.3	10.4	0.0	630.7	-24.3	0.0	92.6	261.9	5544.0	419.2	-428.3	679.0	437.7	825.0	540.6	678.0	438.9	824.0	541.8
4	6	0.0	516.9	190.6	0.0	11.4	9.0	0.0	591.2	-24.3	0.0	488.0	226.2	5544.0	-215.4	-354.7	637.2	486.1	753.0	624.1	639.9	483.0	755.7	620.9
4	7	0.0	825.7	190.6	0.0	24.9	7.7	0.0	551.8	-24.3	0.0	825.7	190.6	5470.0	-752.2	-343.0	595.1	518.7	683.7	684.6	601.0	511.8	689.6	677.7
4	8	0.0	1106.0	155.0	0.0	36.2	6.3	5376.0	-1262.0	-337.1	0.0	1106.0	155.0	5376.0	-1262.0	-337.1	543.0	558.3	605.2	750.2	551.6	548.3	613.8	740.2
4	9	0.0	1328.0	119.3	0.0	45.3	5.0	5385.0	-1737.0	-248.3	0.0	1328.0	119.3	5385.0	-1737.0	-248.3	495.1	615.9	534.9	834.2	505.8	603.4	545.7	821.6
4	10	0.0	1492.0	83.7	0.0	52.3	3.6	5385.0	-2072.0	-164.4	0.0	1492.0	83.7	5385.0	-2072.0	-164.4	462.4	653.8	486.3	890.6	474.8	639.4	498.7	876.1
4	11	0.0	1599.0	48.1	0.0	57.1	2.3	5385.0	-2270.0	-80.5	0.0	1599.0	48.1	5385.0	-2270.0	-80.5	445.4	673.5	459.9	921.1	459.0	657.7	473.5	905.4
4	12	0.0	1648.0	12.4	0.0	59.7	0.9	5385.0	-2333.0	3.4	0.0	1648.0	12.4	5385.0	-2333.0	3.4	443.6	675.6	455.1	926.7	457.8	659.1	469.3	910.2
4	13	0.0	1639.0	-23.2	0.0	60.1	-0.4	5385.0	-2259.0	87.4	0.0	1639.0	-23.2	5385.0	-2259.0	87.4	457.3	659.7	472.3	906.7	471.6	643.1	486.6	890.2
4	14	0.0	1573.0	-58.8	0.0	58.4	-1.8	5385.0	-2050.0	171.3	0.0	1573.0	-58.8	5385.0	-2050.0	171.3	486.3	626.0	511.3	861.5	500.2	609.9	525.1	845.4
4	15	0.0	1449.0	-94.5	0.0	54.4	-3.1	5385.0	-1704.0	255.3	0.0	1449.0	-94.5	5385.0	-1704.0	255.3	530.9	574.3	572.3	790.8	543.8	559.3	585.2	775.8
4	16	0.0	1267.0	-130.1	0.0	48.3	-4.4	5385.0	-1222.0	339.2	0.0	1267.0	-130.1	5385.0	-1222.0	339.2	590.8	504.9	655.1	694.7	602.3	491.6	666.6	681.4
4	17	0.0	1027.0	-165.8	0.0	40.0	-5.8	5385.0	-604.9	423.1	0.0	1027.0	-165.8	5385.0	-604.9	423.1	665.8	417.9	759.4	573.7	675.3	406.9	769.0	562.7
4	18	0.0	729.5	-201.4	0.0	29.6	-7.1	5385.0	148.7	507.1	0.0	729.5	-201.4	5385.0	148.7	507.1	756.3	312.9	885.8	427.2	763.3	304.8	892.8	419.0
4	19	0.0	374.3	-237.0	0.0	16.9	-8.5	5385.0	1031.0	577.1	0.0	374.3	-237.0	5385.0	1031.0	577.1	860.7	191.9	1032.1	257.4	864.7	187.2	1036.2	252.8
4	20	0.0	-43.7	-278.9	0.0	2.1	-9.8	5703.0	1804.0	278.8	0.0	-43.7	-278.9	5703.0	1804.0	278.8	782.3	41.6	958.3	48.5	782.7	41.1	958.7	48.0
4	21	0.0	-534.5	-327.0	0.0	-15.0	-11.2	5702.0	2071.0	-20.1	0.0	-534.5	-327.0	5702.0	2071.0	-20.1	726.7	103.5	914.5	97.1	723.4	107.2	911.2	100.8
																	0.0	0.0	0.0	0.0				
5	1	0.0	-534.3	178.1	0.0	-14.9	5.0	5556.0	2028.0	5.1	0.0	-534.3	178.1	5556.0	2028.0	5.1	707.1	102.0	890.5	95.3	703.8	105.6	887.2	99.0
5	2	0.0	-371.1	148.4	0.0	-10.4	4.2	5556.0	1888.0	-283.7	0.0	-371.1	148.4	5556.0	1888.0	-283.7	715.3	92.8	892.6	93.0	713.0	95.3	890.3	95.5
5	3	0.0	-237.4	118.7	0.0	-6.6	3.3	5556.0	1458.0	-575.5	0.0	-237.4	118.7	5556.0	1458.0	-575.5	659.2	155.4	817.4	176.9	657.7	157.0	815.9	178.5
5	4	0.0	-133.6	89.1	0.0	-3.7	2.5	5392.0	847.6	-546.3	0.0	-133.6	89.1	5392.0	847.6	-546.3	548.1	253.1	676.4	302.0	547.2	254.0	675.6	302.9
5	5	0.0	-59.4	59.4	0.0	-1.7	1.7	5392.0	388.7	-388.5	0.0	-59.4	59.4	5392.0	388.7	-388.5	473.0	336.9	581.1	408.5	472.6	337.3	580.7	408.9
5	6	0.0	-14.8	29.7	0.0	-0.4	0.8	5392.0	54.5	-295.3	0.0	-14.8	29.7	5392.0	54.5	-295.3	416.3	400.2	509.5	488.3	416.2	400.3	509.4	488.4
5	7	0.0	0.0	0.0	0.0	0.0	0.0	5298.0	-240.1	-308.5	0.0	0.0	0.0	5298.0	-240.1	-308.5	353.7	455.0	432.3	556.1	353.7	455.0	432.3	556.1
5	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase nº: 5

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1560.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	896	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1140	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	888	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1132	0

i= 1 al nºfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	0.4	0.0	0.0	7.0	0.0	0.0	-0.3	0.0	0.0	189.6	5497.0	89.0	-430.2	434.4	396.8	530.9	485.0	434.4	396.8	530.9	485.0
1	2	0.0	0.5	0.4	0.0	7.8	6.1	0.0	-0.4	-0.3	0.0	206.9	158.9	5497.0	-390.1	-376.3	528.2	602.2	634.6	748.7	530.0	600.1	636.5	746.6
1	3	0.0	0.9	0.4	0.0	14.4	5.1	0.0	-0.8	-0.3	0.0	380.3	132.7	5497.0	-860.7	-322.3	468.7	671.2	552.7	843.7	472.1	667.2	556.2	839.7
1	4	0.0	1.4	0.4	0.0	19.8	4.1	0.0	-1.2	-0.3	0.0	522.4	106.6	5497.0	-1211.7	-268.4	427.4	719.1	494.7	911.0	432.1	713.7	499.4	905.5
1	5	0.0	1.9	0.4	0.0	24.1	3.1	0.0	-1.6	-0.3	0.0	633.4	80.5	5497.0	-1497.9	-214.4	392.5	759.6	446.3	967.2	398.2	752.9	452.0	960.5
1	6	0.0	2.4	0.4	0.0	27.2	2.1	0.0	-2.0	-0.3	0.0	713.6	54.3	5497.0	-1721.2	-160.4	363.8	792.9	406.9	1012.8	370.2	785.4	413.4	1005.3
1	7	0.0	2.8	0.4	0.0	29.1	1.1	0.0	-2.4	-0.3	0.0	762.6	28.2	5498.0	-1879.4	-106.5	341.7	818.7	377.3	1047.4	348.6	810.7	384.2	1039.4
1	8	0.0	3.3	0.4	0.0	29.8	0.1	0.0	-2.8	-0.3	0.0	780.4	2.0	5498.0	-1974.6	-52.5	325.5	837.5	356.6	1071.4	332.6	829.2	363.7	1063.2
1	9	0.0	3.8	0.4	0.0	29.4	-0.9	0.0	-3.2	-0.3	0.0	767.3	-24.1	5498.0	-2005.0	1.5	315.9	848.6	345.6	1084.2	322.9	840.5	352.6	1076.1
1	10	0.0	4.3	0.4	0.0	27.8	-1.8	0.0	-3.6	-0.3	0.0	723.2	-50.2	5671.0	-2076.2	63.2	307.9	896.1	338.1	1139.6	314.5	888.5	344.7	1131.9
1	11	0.0	4.7	0.4	0.0	25.0	-2.6	0.0	-4.0	-0.3	0.0	648.2	-76.4	5671.0	-1953.4	140.3	316.3	886.4	352.4	1123.1	322.3	879.5	358.3	1116.2
1	12	0.0	5.2	0.4	0.0	21.1	-3.8	0.0	-4.4	-0.3	0.0	541.7	-102.5	5671.0	-1742.7	214.8	336.1	863.4	382.2	1088.5	341.1	857.6	387.2	1082.7
1	13	0.0	5.7	0.4	0.0	16.0	-4.8	0.0	-4.8	-0.3	0.0	404.5	-128.6	5671.0	-1443.0	289.2	367.6	826.9	427.9	1035.4	371.4	822.5	431.7	1031.0
1	14	0.0	6.2	0.4	0.0	9.7	-5.8	0.0	-5.2	-0.3	0.0	235.9	-154.7	5671.0	-1055.2	363.7	410.5	777.1	489.3	964.3	412.8	774.4	491.6	961.6
1	15	0.0	6.6	0.4	0.0	2.2	-6.8	0.0	-5.6	-0.3	0.0	36.5	-180.9	5671.0	-578.5	438.2	465.2	713.8	566.6	874.6	465.7	713.2	567.1	874.0
1	16	0.0	7.1	0.4	0.0	-6.4	-7.8	0.0	-6.0	-0.3	0.0	-193.9	-207.0	5809.0	-28.2	524.6	542.2	654.9	673.0	788.5	540.7	656.6	671.5	790.3
1	17	0.0	7.6	0.4	0.0	-16.3	-8.7	0.0	-6.4	-0.3	0.0	-455.6	-233.1	5809.0	641.0	600.9	623.2	560.9	785.8	657.7	619.4	565.4	781.9	662.1
1	18	0.0	8.1	0.4	0.0	-27.2	-9.7	0.0	-6.8	-0.3	0.0	-748.1	-259.3	5809.0	1399.2	674.4	715.9	453.4	914.6	508.3	709.5	460.9	908.1	515.8
1	19	0.0	8.5	0.4	0.0	-39.4	-10.7	0.0	-7.2	-0.3	0.0	-1072.0	-285.4	5722.0	2059.5	452.4	771.3	369.9	999.4	386.5	762.0	380.8	990.0	397.3
1	20	0.0	9.0	0.4	0.0	-52.7	-11.7	0.0	-7.6	-0.3	0.0	-1429.4	-316.1	5774.0	2542.2	242.7	627.8	225.4	837.7	196.9	616.1	238.4	826.0	210.0
1	21	0.0	9.5	0.4	0.0	-67.2	-12.7	0.0	-8.0	-0.3	0.0	-1826.6	-351.4	5774.0	2762.9	32.4	583.9	274.4	803.5	235.1	569.0	291.1	788.6	251.7
2	1	0.0	9.5	-1.3	0.0	-67.2	13.2	0.0	-8.0	1.1	0.0	-1826.8	378.8	5672.0	2733.2	-1.9	570.1	273.4	786.8	233.8	555.2	290.0	771.9	250.4
2	2	0.0	7.4	-1.3	0.0	-46.9	11.9	0.0	-6.2	1.1	0.0	-1251.5	330.7	5672.0	2561.0	-210.3	663.3	169.5	872.3	138.4	652.9	181.0	861.9	149.9
2	3	0.0	5.3	-1.3	0.0	-28.7	10.5	0.0	-4.4	1.1	0.0	-749.5	288.8	5672.0	1994.7	-418.6	829.1	291.9	1052.9	310.9	822.2	299.9	1046.1	318.8
2	4	0.0	3.2	-1.3	0.0	-12.7	9.2	0.0	-2.7	1.1	0.0	-310.2	253.2	5672.0	1139.9	-535.4	750.5	383.0	933.7	449.1	747.5	386.5	930.7	452.6
2	5	0.0	1.1	-1.3	0.0	1.1	7.9	0.0	-0.9	1.1	0.0	71.2	217.6	5527.0	426.8	-405.0	674.2	439.5	820.3	541.5	674.5	439.1	820.6	541.2
2	6	0.0	-1.0	-1.3	0.0	12.6	6.5	0.0	0.9	1.1	0.0	394.8	181.9	5527.0	-167.8	-331.4	623.5	498.3	741.2	633.2	626.5	494.8	744.2	629.7
2	7	0.0	-3.1	-1.3	0.0	22.2	5.2	0.0	2.6	1.1	0.0	660.8	146.3	5453.0	-668.2	-320.7	572.1	541.6	664.3	702.4	577.4	535.4	669.6	696.3
2	8	0.0	-5.2	-1.3	0.0	29.5	3.8	0.0	4.4	1.1	0.0	869.1	110.7	5418.0	-1137.3	-317.2	517.6	597.0	586.7	782.9	524.7	588.8	593.8	774.8
2	9	0.0	-7.3	-1.3	0.0	34.6	2.5	0.0	6.2	1.1	0.0	1019.1	75.0	5426.0	-1579.8	-227.7	459.4	666.3	507.7	876.8	467.7	656.7	515.9	867.2
2	10	0.0	-9.4	-1.3	0.0	37.5	1.1	0.0	7.9	1.1	0.0	1111.8	39.4	5426.0	-1880.4	-143.1	417.1	715.3	451.1	942.4	426.1	705.0	460.0	932.1
2	11	0.0	-11.5	-1.3	0.0	38.3	-0.2	0.0	9.7	1.1	0.0	1147.5	3.8	5426.0	-2044.0	-58.6	390.6	746.0	416.8	982.2	399.7	735.5	425.9	971.6
2	12	0.0	-13.6	-1.3	0.0	36.8	-1.6	0.0	11.5	1.1	0.0	1124.3	-31.9	5426.0	-2070.4	26.1	379.4	759.0	404.4	996.6	388.2	748.9	413.1	986.4
2	13	0.0	-15.7	-1.3	0.0	33.2	-2.9	0.0	13.2	1.1	0.0	1044.0	-67.5	5426.0	-1960.0	110.7	384.0	753.8	414.2	985.2	391.9	744.6	422.1	976.1
2	14	0.0	-17.8	-1.3	0.0	27.4	-4.3	0.0	15.0	1.1	0.0	905.7	-103.1	5426.0	-1712.6	195.3	404.0	730.5	446.0	948.3	410.6	722.9	452.5	940.8
2	15	0.0	-19.9	-1.3	0.0	19.4	-5.6	0.0	16.8	1.1	0.0	709.4	-138.8	5426.0	-1327.0	279.9	439.9	688.9	500.1	885.5	444.5	683.6	504.8	880.1
2	16	0.0	-22.0	-1.3	0.0	9.3	-6.9	0.0	18.5	1.1	0.0	456.1	-174.4	5426.0	-805.6	364.5	491.3	629.4	576.3	797.2	493.5	626.8	578.5	794.6
2	17	0.0	-24.1	-1.3	0.0	-3.1	-8.3	0.0	20.3	1.1	0.0	144.6	-210.0	5426.0	-146.3	449.1	558.3	551.6	674.7	683.1	557.6	552.5	674.0	683.9
2	18	0.0	-26.2	-1.3	0.0	-17.6	-9.6	0.0	22.1	1.1	0.0	-224.7	-245.7	5426.0	650.0	533.7	640.9	455.8	795.2	543.4	636.7	460.7	791.0	548.2
2	19	0.0	-28.3	-1.3	0.0	-34.3	-11.0	0.0	23.8	1.1	0.0	-651.6	-281.3	5426.0	1575.7	604.4	737.5	343.8	935.8	380.3	729.3	353.2	927.7	389.7
2	20	0.0	-30.4	-1.3	0.0	-53.1	-12.3	0.0	25.6	1.1	0.0	-1141.4	-323.2	5733.0	2388.3	302.8	657.9	185.3	860.2	163.8	646.1	198.4	848.5	176.9
2	21	0.0	-32.5	-1.3	0.0	-74.2	-13.7	0.0	27.4	1.1	0.0	-1704.3	-371.3	5791.0	2710.7	2.3	601.8	257.1	819.5	220.6	585.4	275.5	803.0	239.0
3	1	0.0	-32.5	4.7	0.0	-74.2	13.4	0.0	27.4	-3.9	0.0	-1704.5	366.7	5689.0	2679.9	8.7	587.9	256.3	802.5	219.6	571.5	274.6	786.0	237.9
3	2	0.0	-24.9	4.7	0.0	-53.6	12.0	0.0	21.0	-3.9	0.0	-1149.0	318.6	5689.0	2521.7	-204.0	679.4	154.2	887.0	125.3	667.6	167.4	875.1	138.5
3	3	0.0	-17.3	4.7	0.0	-35.2	10.7	0.0	14.6	-3.9	0.0	-666.7	276.8	5689.0	1966.6	-411.2	844.5	277.8	1067.3	298.7	836.1	287.6	1059.0	308.4
3	4	0.0	-9.8	4.7	0.0	-19.0	9.3	0.0	8.3	-3.9	0.0	-247.1	241.1	5688.0	1121.2	-533.3	763.2	371.9	945.8	439.4	758.7	377.1	941.3	444.6
3	5	0.0	-2.2	4.7	0.0	-4.9	8.0	0.0	1.9	-3.9	0.0	114.7	205.5	5544.0	415.4	-401.6	683.4	432.5	829.3	535.7	682.3	433.9	828.1	537.0
3	6	0.0	5.4	4.7	0.0	7.0	6.7	0.0	-4.5	-3.9	0.0	418.8	169.9	5544.0	-175.9	-328.0	629.2	495.4	746.9	631.2	630.9	493.5	748.6	629.3
3	7	0.0	12.9	4.7	0.0	16.7	5.3	0.0	-10.9	-3.9	0.0	665.4	134.2	5470.0	-669.8	-316.3	574.6	542.4	667.1	703.7	578.6	537.8	671.1	699.1
3	8	0.0	20.5	4.7	0.0	24.2	4.0	0.0	-17.3	-3.9	0.0	854.3	98.6	5418.0	-1152.6	-312.9	510.9	604.9	579.2	791.6	516.6	598.2	585.0	785.0
3	9	0.0	28.1	4.7	0.0	29.5	2.6	0.0	-23.7	-3.9	0.0	984.4	62.9	5426.0	-1587.7	-223.4	449.5	677.8	497.4	868.7	456.5	669.6	504.4	860.6
3	10	0.0	35.6	4.7	0.0	32.7	1.3	0.0	-30.0	-3.9	0.0	1057.6	27.3	5426.0	-1880.9	-138.8	404.1	730.4	438.1	957.5	411.9	721.4	445.8	948.5
3	11	0.0	43.2	4.7	0.0	33.7	-0.1	0.0	-36.4	-3.9	0.0	1073.8	-8.3	5426.0	-2037.1	-54.2	374.6	764.7	401.1	1000.4	382.6	755.4	409.1	991.1
3	12	0.0	50.7	4.7	0.0	32.5	-1.4	0.0	-42.8	-3.9	0.0	1030.9	-44.0	5426.0	-2056.3	30.4	360.3	781.3	385.8	1018.1	368.0	772.3	393.6	1009.1
3	13	0.0	58.3	4.7	0.0	29.1	-2.8	0.0	-49.2	-3.9	0.0	931.1	-79.6	5426.0	-1938.5	115.0	361.7	779.6	392.9	1009.9	368.7	771.5	399.8	1001.8
3	14	0.0	65.9	4.7	0.0	23.5	-4.1	0.0	-55.6	-3.9	0.0	773.3	-115.2	5426.0	-1684.6	199.6	378.5	760.1	421.8	976.4	384.1	753.6	427.4	969.9
3	15	0.0	73.4	4.7	0.0	15.8	-5.4	0.0	-61.9	-3.9	0.0	557.3	-150.9	5426.0	-1291.8	284.2	411.3	722.1	473.2	916.8	415.0	717.8	476.9	912.4
3	16	0.0	81.0	4.7	0.0	5.9	-6.8	0.0	-68.3	-3.9	0.0	284.0	-186.5	5426.0	-763.0	368.8	459.4	666.3	546.5	831.7	460.8	664.6	547.9	830.1
3	17	0.0	88.6	4.7	0.0	-6.2	-8.1	0.0	-74.7	-3.9	0.0	-47.0	-222.1	5426.0	-97.2	453.4	523.2	592.3	642.0	721.0	521.7	594.0	640.5	722.8
3	18	0.0	96.1	4.7	0.0	-20.5	-9.5	0.0	-81.1	-3.9	0.0	-435.9	-257.8	5426.0	705.9	538.0	602.6	500.2	759.6	584.6	597.8	505.8	754.7	590.3
3	19	0.0	103.7	4.7	0.0	-37.0	-10.8	0.0	-87.5	-3.9	0.0	-882.4	-293.4	5426.0	1638.5	608.6	696.0	391.9	897.3	424.9	687.2	402.1	888.5	435.1
3	20	0.0	111.3	4.7	0.0	-55.6	-12.2	0.0	-93.8	-3.9	0.0	-1391.9	-335.3	5733.0	2458.3	306.9	616.3	231.7	821.8	206.7	604.0	245.4	809.5	220.4
3	21	0.0	118.8	4.7	0.0	-76.4	-13.5	0.0	-100.2	-3.9	0.0	-1974.2	-383.4	5791.0	2787.1	6.5	557.3	306.8	778.3	266.6	540.3	325.7	761.4	285.5
4	1	0.0	118.8	-17.2	0.0	-76.4	13.9	0.0	-100.2	14.5	0.0	-1973.2	405.9	5689.0	2757.2	-3.6	543.8	305.5	761.8	265.0	526.9	324.4	744.9	283.9

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase nº: 5

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1506.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	896	0
2	Σ pp(i) + 1.1 x Σ pret(i)	1140	0
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	888	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1132	0

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
4	2	0.0	91.0	-17.2	0.0	-54.9	12.6	0.0	-76.8	14.5	0.0	-1354.4	357.8	5689.0	2579.2	-216.2	645.4	192.1	855.5	160.4	633.2	205.7	843.3	174.0
4	3	0.0	63.1	-17.2	0.0	-35.6	11.2	0.0	-53.4	14.5	0.0	-808.4	315.9	5689.0	2004.1	-423.5	818.8	307.6	1043.5	326.4	810.3	317.4	1035.0	336.2
4	4	0.0	35.2	-17.2	0.0	-16.5	9.9	0.0	-29.9	14.5	0.0	-325.4	280.3	5688.0	1138.4	-545.6	748.3	389.2	931.7	455.7	743.9	394.3	927.4	460.8
4	5	0.0	7.4	-17.2	0.0	-3.5	8.6	0.0	-6.5	14.5	0.0	100.0	244.7	5544.0	412.7	-413.9	679.4	437.3	825.1	540.6	678.5	438.2	824.2	541.5
4	6	0.0	-20.5	-17.2	0.0	9.3	7.2	0.0	16.9	14.5	0.0	467.6	209.0	5544.0	-198.5	-340.3	636.0	487.6	752.6	624.6	636.2	485.0	754.8	622.0
4	7	0.0	-48.3	-17.2	0.0	19.9	5.9	0.0	40.3	14.5	0.0	777.4	173.4	5470.0	-711.9	-328.6	592.2	522.0	682.7	685.6	596.9	516.5	687.4	680.2
4	8	0.0	-76.2	-17.2	0.0	28.3	4.5	0.0	63.7	14.5	0.0	1029.8	137.8	5376.0	-1198.3	-322.6	538.5	563.5	603.8	751.8	545.2	555.7	610.5	744.0
4	9	0.0	-104.0	-17.2	0.0	34.5	3.2	0.0	87.2	14.5	0.0	1224.0	102.1	5385.0	-1649.8	-233.8	489.0	622.9	533.0	836.4	497.2	613.4	541.2	826.9
4	10	0.0	-131.9	-17.2	0.0	38.6	1.8	0.0	110.6	14.5	0.0	1360.1	66.5	5385.0	-1961.4	-149.9	454.7	662.7	483.8	893.4	463.8	652.1	493.0	882.7
4	11	0.0	-159.7	-17.2	0.0	40.4	0.5	0.0	134.0	14.5	0.0	1439.3	30.9	5385.0	-2136.0	-66.0	436.1	684.2	457.0	924.5	445.7	673.1	466.6	913.3
4	12	0.0	-187.6	-17.2	0.0	40.1	-0.9	0.0	157.4	14.5	0.0	1460.4	-4.8	5385.0	-2175.6	17.9	432.7	688.2	451.6	930.7	442.2	677.2	461.2	919.6
4	13	0.0	-215.5	-17.2	0.0	37.6	-2.2	0.0	180.8	14.5	0.0	1423.5	-40.4	5385.0	-2078.2	101.8	444.7	674.2	468.3	911.3	453.7	663.9	477.3	900.9
4	14	0.0	-243.3	-17.2	0.0	33.0	-3.6	0.0	204.3	14.5	0.0	1329.7	-76.0	5385.0	-1845.7	185.8	472.2	642.4	506.9	866.7	480.0	633.3	514.7	857.6
4	15	0.0	-271.2	-17.2	0.0	26.1	-4.9	0.0	227.7	14.5	0.0	1177.8	-111.7	5385.0	-1476.3	269.8	515.1	592.6	567.4	796.5	521.3	585.4	573.6	789.3
4	16	0.0	-299.0	-17.2	0.0	17.1	-6.2	0.0	251.1	14.5	0.0	968.0	-147.3	5385.0	-970.9	353.7	573.4	525.0	649.7	701.0	577.5	520.3	653.7	696.3
4	17	0.0	-326.9	-17.2	0.0	5.9	-7.6	0.0	274.5	14.5	0.0	700.1	-183.0	5385.0	-330.4	437.6	646.8	439.9	753.5	580.6	648.2	438.3	754.9	579.0
4	18	0.0	-354.8	-17.2	0.0	-7.5	-8.9	0.0	297.9	14.5	0.0	374.7	-218.6	5385.0	446.6	521.6	735.7	336.8	879.4	434.6	733.9	338.9	877.6	436.7
4	19	0.0	-382.6	-17.2	0.0	-23.0	-10.3	0.0	321.4	14.5	0.0	-8.3	-254.2	5385.0	1352.4	591.6	838.5	217.6	1025.2	265.5	833.0	224.0	1019.8	271.8
4	20	0.0	-410.5	-17.2	0.0	-40.8	-11.6	0.0	344.8	14.5	0.0	-454.2	-296.1	5703.0	2148.8	293.3	760.1	66.4	951.3	56.2	751.0	76.5	942.3	66.3
4	21	0.0	-438.3	-17.2	0.0	-60.7	-13.0	0.0	368.2	14.5	0.0	-972.8	-344.2	5702.0	2439.2	-5.6	703.0	129.9	907.1	105.4	689.6	144.9	893.7	120.4
																	0.0	0.0	0.0	0.0				
5	1	0.0	-438.4	167.4	0.0	-60.7	11.3	0.0	368.3	-18.4	0.0	-972.7	345.5	5556.0	2396.3	-13.3	683.4	128.4	883.2	103.5	670.0	143.4	869.7	118.5
5	2	0.0	-271.0	167.4	0.0	-49.8	10.5	0.0	349.9	-18.4	0.0	-642.1	315.8	5556.0	2237.9	-302.1	725.1	81.9	917.8	64.8	714.0	94.2	906.8	77.1
5	3	0.0	-103.5	167.4	0.0	-39.7	9.7	0.0	331.5	-18.4	0.0	-340.9	286.1	5556.0	1789.5	-593.9	702.4	107.2	875.3	112.3	693.6	117.0	866.5	122.1
5	4	0.0	63.8	167.4	0.0	-30.4	8.8	0.0	313.1	-18.4	0.0	-69.8	256.5	5392.0	1160.7	-564.7	624.6	167.7	766.9	201.1	617.9	175.2	760.1	208.6
5	5	0.0	231.1	167.4	0.0	-22.0	8.0	0.0	294.7	-18.4	0.0	171.7	226.8	5392.0	683.4	-406.9	583.0	214.2	704.1	271.2	578.1	219.6	699.2	276.6
5	6	0.0	398.6	167.4	0.0	-14.4	7.2	0.0	276.3	-18.4	0.0	383.8	197.1	5392.0	330.8	-313.7	559.7	240.2	665.1	314.6	556.5	243.7	661.9	318.2
5	7	0.0	565.9	167.4	0.0	-7.6	6.4	0.0	258.0	-18.4	0.0	565.9	167.4	5298.0	17.9	-326.9	530.5	257.7	620.5	346.0	528.8	259.5	618.8	347.9
5	8	0.0	718.5	137.7	0.0	-1.7	5.5	5708.0	-468.7	-357.8	0.0	718.5	137.7	5708.0	-468.7	-357.8	498.3	359.3	573.7	478.6	498.0	359.7	573.3	479.0
5	9	0.0	841.3	108.0	0.0	3.4	4.7	5705.0	-816.9	-332.5	0.0	841.3	108.0	5705.0	-816.9	-332.5	455.9	406.2	515.8	542.6	456.7	405.3	516.5	541.8
5	10	0.0	934.4	78.3	0.0	7.7	3.9	5705.0	-1107.0	-257.2	0.0	934.4	78.3	5705.0	-1107.0	-257.2	418.7	447.7	465.7	598.5	420.4	445.8	467.4	596.6
5	11	0.0	998.0	48.6	0.0	11.2	3.0	5705.0	-1331.0	-190.1	0.0	998.0	48.6	5705.0	-1331.0	-190.1	388.1	481.8	425.2	643.7	390.6	479.1	427.7	641.0
5	12	0.0	1032.0	18.9	0.0	13.8	2.2	5705.0	-1488.0	-123.1	0.0	1032.0	18.9	5705.0	-1488.0	-123.1	364.3	508.3	394.5	678.0	367.4	504.9	397.5	674.6
5	13	0.0	1036.0	-10.7	0.0	15.6	1.4	5705.0	-1577.0	-56.2	0.0	1036.0	-10.7	5705.0	-1577.0	-56.2	347.5	527.2	373.7	701.2	350.9	523.3	377.1	697.4
5	14	0.0	1010.0	-40.4	0.0	16.5	0.5	5705.0	-1600.0	10.9	0.0	1010.0	-40.4	5705.0	-1600.0	10.9	337.1	538.7	362.3	713.9	340.8	534.6	366.0	709.8
5	15	0.0	955.0	-70.1	0.0	16.7	-0.3	5704.0	-1556.0	77.8	0.0	955.0	-70.1	5704.0	-1556.0	77.8	333.6	542.4	360.8	715.4	337.3	538.3	364.5	711.3
5	16	0.0	870.0	-99.8	0.0	16.0	-1.1	5704.0	-1444.0	144.8	0.0	870.0	-99.8	5704.0	-1444.0	144.8	337.1	538.5	369.2	706.0	340.7	534.6	372.8	702.1
5	17	0.0	755.3	-129.5	0.0	14.4	-1.9	5704.0	-1266.0	211.8	0.0	755.3	-129.5	5704.0	-1266.0	211.8	347.2	527.3	387.2	685.9	350.4	523.7	390.4	682.4
5	18	0.0	611.0	-159.2	0.0	12.1	-2.8	5704.0	-1021.0	278.8	0.0	611.0	-159.2	5704.0	-1021.0	278.8	364.1	508.4	414.9	655.0	366.8	505.5	417.6	652.0
5	19	0.0	437.1	-188.9	0.0	8.9	-3.6	5704.0	-708.8	345.7	0.0	437.1	-188.9	5704.0	-708.8	345.7	387.8	482.0	452.5	613.1	389.8	479.8	454.5	610.9
5	20	0.0	233.2	-218.6	0.0	4.8	-4.4	5704.0	-329.3	412.7	0.0	233.2	-218.6	5704.0	-329.3	412.7	418.3	447.9	499.8	560.3	419.4	446.7	500.9	559.1
5	21	0.0	-0.1	-248.2	0.0	0.0	-5.3	5704.0	116.7	479.7	0.0	-0.1	-248.2	5704.0	116.7	479.7	455.6	406.4	556.8	496.7	455.6	406.4	556.8	496.7

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INICIAL

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	PP,inicial + CM + 0.9 x Pret,inicial + 0.4° SC(+) + GRAD	844	117
2	PP,inicial + CM + 1.1 x Pret,inicial + 0.4° SC(+) + GRAD	1038	106
3	PP,inicial + CM + 0.9 x Pret,inicial + 0.4° SC(-) + GRAD	868	117
4	PP,inicial + CM + 1.1 x Pret,inicial + 0.4° SC(-) + GRAD	1105	323
5	PP,inicial + CM + 0.9 x Pret,inicial + 1.0° SC(+) + GRAD	944	42
6	PP,inicial + CM + 1.1 x Pret,inicial + 1.0° SC(+) + GRAD	1106	32
7	PP,inicial + CM + 0.9 x Pret,inicial + 1.0° SC(-) + GRAD	931	-16
8	PP,inicial + CM + 1.1 x Pret,inicial + 1.0° SC(-) + GRAD	1155	202

PP,inicial= Peso propio en tiempo inicial
Pret,inicial = Pretensado en tiempo inicial
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INICIAL																		TENSIONES EN FIBRAS SUPERIOR E INFERIOR															
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	189.6	5497.0	89.0	-430.2	0.0	0.0	95.0	0.0	0.0	133.4	0.0	0.0	-32.6	0.0	0.0	17.83	434	397	531	485	434	397	531	485	434	397	531	485	434	397	531	485
1	2	0.0	206.9	158.9	5497.0	-390.1	-376.3	0.0	104.9	81.7	0.0	175.8	135.3	0.0	-45.4	-38.2	0.0	21.2	17.83	581	541	687	688	547	581	653	727	600	519	706	665	542	586	649	732
1	3	0.0	380.3	132.7	5497.0	-860.7	-322.3	0.0	194.1	68.3	0.0	329.0	118.7	0.0	-90.7	-38.2	0.0	42.4	17.83	587	557	651	730	502	633	586	805	603	515	687	688	493	643	577	815
1	4	0.0	522.4	106.6	5497.0	-1211.7	-268.4	0.0	267.4	55.0	0.0	463.9	107.0	0.0	-136.1	-38.2	0.0	63.6	17.83	565	560	632	752	472	668	539	860	616	500	684	692	459	683	526	875
1	5	0.0	633.4	80.5	5497.0	-1497.9	-214.4	0.0	324.8	41.7	0.0	577.7	86.4	0.0	-181.4	-38.2	0.0	84.8	17.83	562	563	616	770	444	700	498	908	627	487	681	695	427	720	480	928
1	6	0.0	713.6	54.3	5497.0	-1721.2	-160.4	0.0	366.5	28.4	0.0	674.0	74.8	0.0	-226.8	-38.2	0.0	106.0	17.83	560	566	603	786	419	729	462	949	636	477	680	697	397	754	440	974
1	7	0.0	762.6	28.2	5498.0	-1879.4	-106.5	0.0	392.3	15.1	0.0	748.5	51.5	0.0	-272.1	-38.2	0.0	127.2	17.83	557	569	593	798	396	756	432	984	643	469	679	698	370	786	406	1014
1	8	0.0	780.4	2.0	5498.0	-1974.6	-52.5	0.0	402.4	1.8	0.0	802.9	39.9	0.0	-317.5	-38.2	0.0	148.3	17.83	553	573	585	807	376	779	407	1013	647	464	679	698	346	814	377	1048
1	9	0.0	767.3	-24.1	5498.0	-2005.0	1.5	0.0	396.6	-11.5	0.0	838.6	19.2	0.0	-362.8	-38.2	0.0	169.5	17.83	550	577	580	813	358	799	388	1035	650	461	680	697	324	839	354	1075
1	10	0.0	723.2	-50.2	5671.0	-2076.2	63.2	0.0	375.0	-24.9	0.0	853.0	5.1	0.0	-408.2	-38.2	0.0	190.7	17.83	541	625	572	869	339	860	369	1104	645	505	675	748	300	905	330	1149
1	11	0.0	648.2	-76.4	5671.0	-1953.4	140.3	0.0	337.5	-38.2	0.0	850.7	-9.1	0.0	-453.5	-38.2	0.0	211.9	17.83	543	623	579	860	332	868	368	1105	649	500	685	737	289	918	325	1155
1	12	0.0	541.7	-102.5	5671.0	-1742.7	214.8	0.0	284.3	-51.5	0.0	824.5	-29.7	0.0	-498.9	-38.2	0.0	233.1	17.83	549	616	595	842	333	868	379	1093	655	493	701	718	285	923	331	1148
1	13	0.0	404.5	-128.6	5671.0	-1443.0	289.2	0.0	215.2	-64.8	0.0	780.7	-43.9	0.0	-544.2	-38.2	0.0	254.3	17.83	560	603	621	812	341	858	401	1066	665	482	725	691	289	918	350	1126
1	14	0.0	235.9	-154.7	5671.0	-1055.2	363.7	0.0	130.3	-78.1	0.0	717.2	-64.6	0.0	-589.6	-38.2	0.0	275.5	17.83	577	584	655	772	357	839	436	1026	678	467	756	655	301	904	380	1091
1	15	0.0	36.5	-180.9	5671.0	-578.5	438.2	0.0	29.6	-91.4	0.0	632.1	-78.7	0.0	-634.9	-38.2	0.0	296.7	17.83	598	560	699	721	382	811	483	972	693	449	794	610	321	881	423	1042
1	16	0.0	-193.9	-207.0	5809.0	-28.2	524.6	0.0	-86.9	-104.7	0.0	530.1	-92.9	0.0	-680.3	-38.2	0.0	317.8	17.83	635	547	766	681	425	791	555	925	723	445	854	579	360	866	491	1000
1	17	0.0	-455.6	-233.1	5809.0	641.0	600.9	0.0	-219.3	-118.0	0.0	414.4	-91.4	0.0	-725.6	-38.2	0.0	339.0	17.83	671	506	833	603	468	741	630	838	750	414	913	510	399	822	561	918
1	18	0.0	-748.1	-259.3	5809.0	1399.2	674.4	0.0	-367.4	-131.3	0.0	317.6	-62.9	0.0	-791.2	-80.8	0.0	360.2	17.83	717	453	915	507	516	686	714	741	790	368	988	423	440	773	639	828
1	19	0.0	-1072.0	-285.4	5722.0	2059.5	452.4	0.0	-531.5	-144.6	0.0	260.8	-38.1	0.0	-913.5	-119.7	0.0	381.4	17.83	727	421	956	437	515	668	743	684	798	339	1026	358	428	768	656	785
1	20	0.0	-1429.4	-316.1	5774.0	2542.2	242.7	0.0	-711.3	-158.0	0.0	236.7	-3.3	0.0	-1085.3	-168.6	0.0	402.6	17.83	546	316	756	288	326	562	536	534	612	243	822	215	230	670	440	641
1	21	0.0	-1826.6	-351.4	5774.0	2762.9	32.4	0.0	-907.0	-171.3	0.0	238.3	10.0	0.0	-1315.3	-216.0	0.0	423.8	17.83	462	411	681	372	208	694	428	654	530	335	749	296	92	824	311	784
2	1	0.0	-1826.8	378.8	5672.0	2733.2	-1.9	0.0	-907.0	178.6	0.0	238.3	-32.4	0.0	-1315.3	251.3	0.0	423.8	-2.898	448	410	664	370	194	693	411	653	516	334	733	294	78	823	294	783
2	2	0.0	-1251.5	330.7	5672.0	2561.0	-210.3	0.0	-632.3	160.4	0.0	200.7	-14.4	0.0	-943.0	209.1	0.0	419.1	-2.898	596	244	805	213	398	466	607	435	661	173	870	141	314	559	523	528
2	3	0.0	-749.5	288.8	5672.0	1994.7	-416.6	0.0	-387.0	142.3	0.0	197.4	16.3	0.0	-645.0	151.3	0.0	414.4	-2.898	814	309	1038	328	645	505	869	524	883	230	1106	249	584	577	807	596
2	4	0.0	-310.2	253.2	5672.0	1139.9	-535.4	0.0	-171.2	124.1	0.0	242.2	70.7	0.0	-444.7	96.7	0.0	409.7	-2.898	793	334	976	400	646	504	830	570	865	250	1048	317	604	553	787	619
2	5	0.0	71.2	217.6	5527.0	428.8	-405.0	0.0	15.3	106.0	0.0	375.3	88.9	0.0	-330.8	44.0	0.0	405.0	-2.898	780	317	926	419	631	490	777	592	863	220	1009	322	599	526	745	628
2	6	0.0	394.8	181.9	5527.0	-167.8	-331.4	0.0	172.3	87.8	0.0	557.6	126.5	0.0	-311.1	-10.7	0.0	400.3	-2.898	792	303	909	438	620	502	738	637	892	187	1010	322	590	537	708	672
2	7	0.0	660.8	146.3	5453.0	-668.2	-320.7	0.0	300.0	69.7	0.0	738.5	102.9	0.0	-328.5	-10.7	0.0	395.6	-2.898	796	282	888	443	597	513	689	674	913	146	1005	307	565	549	658	710
2	8	0.0	869.1	110.7	5418.0	-1137.3	-317.2	0.0	398.2	51.6	0.0	883.9	74.8	0.0	-347.0	-17.0	0.0	390.9	-2.898	785	287	854	473	563	545	632	731	915	136	985	322	530	583	599	769
2	9	0.0	1019.1	75.0	5426.0	-1579.8	-227.7	0.0	467.0	33.4	0.0	991.4	57.7	0.0	-374.5	-17.0	0.0	386.2	-2.898	758	320	806	531	517	599	565	810	898	158	946	368	481	641	530	851
2	10	0.0	1111.8	39.4	5426.0	-1880.4	-143.1	0.0	506.5	15.3	0.0	1061.5	29.7	0.0	-402.0	-17.0	0.0	381.5	-2.898	734	347	768	574	480	642	514	869	881	178	915	405	442	686	476	914
2	11	0.0	1147.5	3.8	5426.0	-2044.0	-58.6	0.0	516.5	-2.9	0.0	1096.6	12.6	0.0	-429.5	-17.0	0.0	376.8	-2.898	715	370	741	606	452	675	478	911	864	197	890	433	411	722	437	958
2	12	0.0	1124.3	-31.9	5426.0	-2070.4	26.1	0.0	497.0	-21.1	0.0	1091.9	-11.0	0.0	-457.0	-17.0	0.0	372.1	-2.898	698	390	723	628	432	698	457	935	846	218	871	456	389	748	414	986
2	13	0.0	1044.0	-67.5	5426.0	-1960.0	110.7	0.0	448.2	-39.2	0.0	1052.5	-39.0	0.0	-484.6	-17.0	0.0	367.4	-2.898	684	405	715	637	421	710	452	942	828	239	858	470	375	764	406	995
2	14	0.0	905.7	-103.1	5426.0	-1712.6	195.3	0.0	370.0	-57.4	0.0	975.2	-56.1	0.0	-512.1	-17.0	0.0	362.7	-2.898	674	417	716	635	419	713	461	931	810	259	852	477	370	770	412	988
2	15	0.0	709.4	-138.8	5426.0	-1327.0	279.9	0.0	262.3	-75.5	0.0	860.5	-84.1	0.0	-539.6	-17.0	0.0	358.0	-2.898	668	425	728	621	425	706	486	902	792	281	852	477	374	765	434	962
2	16	0.0	456.1	-174.4	5426.0	-805.6	364.5	0.0	125.3	-93.7	0.0	710.2	-107.8	0.0	-567.1	-17.0	0.0	353.3	-2.898	664	429	749	596	440	689	525	856	774	302	859	469	388	751	471	919
2	17	0.0	144.6	-210.0	5426.0	-146.3	449.1	0.0	-41.2	-111.8	0.0	530.0	-100.4	0.0	-603.8	-41.5	0.0	348.6	-2.898	666	427	782	559	462	663	579	794	757	321	874	452	405	730	521	861
2	18	0.0	-224.7	-245.7	5426.0	650.0	533.7	0.0	-237.1	-130.0	0.0	378.6	-56.7	0.0	-703.5	-85.0	0.0	343.9	-2.898	679	411	834	499	484	638	638	725	756	322	911	409	417	715	571	803
2	19	0.0	-651.6	-281.3	5426.0	1575.7	604.4	0.0	-462.4	-148.1	0.0	311.7	-24.4	0.0	-881.8	-136.5	0.0	339.2	-2.898	712	373	911	409	502	617	700	654	782	292	981	328	418	715	616	751
2	20	0.0	-1141.4	-323.2	5733.0	2388.3	302.8	0.0	-717.0	-166.3	0.0	292.3	5.8	0.0	-1138.9	-186.0	0.0	334.5	-2.898	575	278	777	256	348	531	550	510	638	208	840	186	247	644	449	623
2	21	0.0	-1704.3	-371.3	5791.0	2710.7	2.3	0.0	-1001.0	-184.4	0.0	313.5	23.7	0.0	-1496.7	-246.7	0.0	329.8	-2.898	458	417	676	381	181	727	399	690	523	346	740	309	48	875	266	838
3	1	0.0	-1704.5	366.7	5689.0	2679.9	8.7	0.0	-1001.0	180.6	0.0	313.5	-33.7	0.0	-1496.7	253.8	0.0	329.8	-0.051	444	416	659	380	167	726	382	689	509	345	723	308	35	874	249	837
3	2	0.0	-1149.0	318.6	5689.0	2521.7	-204.0	0.0	-723.4	162.4	0.0	275.7	-15.8	0.0	-1131.7	188.5	0.0	329.8	-0.051	592	251	800	222	369	501	576	472	653	183	861	154	268	613	476	584
3	3	0.0	-666.7	276.8	5689.0	1966.6	-411.2	0.0	-474.9	144.3	0.0	277.8	14.6	0.0	-869.5	138.9	0.0	329.7	-0.051	810	317	1033	338	607	553	830	574	876	241	1099	262	525	649	748	670
3	4	0.0	-247.1	241.1	5688.0	1121.2	-533.3	0.0	-255.8	126.1	0.0	342.0	73.4	0.0	-685.7	86.9	0.0	329.6	-0.051	790	340	973	408	605	556	787	623	862	257	1045	325	539	632	722	699
3	5	0.0	114.7	205.5	5544.0	415.4	-401.6	0.0	-66.2	108.0	0.0	483.2	100.5	0.0	-581.5	42.6	0.0	329.5	-0.051	776	325	922	429	585	547	731	650	861	227	1007	330	529	611	675	714
3	6	0.0	418.8	169.9	5544.0	-175.9	-328.0	0.0	94.1	89.8	0.0	667.6	109.5	0.0	-556.3	5.7	0.0	329.4	-0.051	786	314	904	449	572	562	690	697	889	195	1006	330	519	623	637	759
3	7	0.0	665.4	134.2	5470.0	-669.8	-316.3	0.0	225.0	71.7	0.0	831.3	92.4	0.0	-547.1	5.7	0.0	329.3	-0.051	786	297	878	459	550	571	643	732	904	160	997	322	498	631	591	793

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INICIAL

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	PP,inicial + CM + 0.9 x Pret,inicial + 0.4° SC(+) + GRAD	844	117
2	PP,inicial + CM + 1.1 x Pret,inicial + 0.4° SC(+) + GRAD	1038	106
3	PP,inicial + CM + 0.9 x Pret,inicial + 0.4° SC(-) + GRAD	868	117
4	PP,inicial + CM + 1.1 x Pret,inicial + 0.4° SC(-) + GRAD	1105	323
5	PP,inicial + CM + 0.9 x Pret,inicial + 1.0° SC(+) + GRAD	944	42
6	PP,inicial + CM + 1.1 x Pret,inicial + 1.0° SC(+) + GRAD	1106	32
7	PP,inicial + CM + 0.9 x Pret,inicial + 1.0° SC(-) + GRAD	931	-16
8	PP,inicial + CM + 1.1 x Pret,inicial + 1.0° SC(-) + GRAD	1155	202

PP,inicial= Peso propio en tiempo inicial
Pret,inicial = Pretensado en tiempo inicial
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INICIAL																		TENSIONES EN FIBRAS SUPERIOR E INFERIOR															
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	8	0.0	854.3	98.6	5418.0	-1152.6	-312.9	0.0	326.5	53.5	0.0	956.5	64.4	0.0	-537.9	5.7	0.0	329.3	-0.051	764	311	832	498	512	604	580	791	894	160	963	347	461	663	529	850
3	9	0.0	984.4	62.9	5426.0	-1587.7	-223.4	0.0	398.5	35.4	0.0	1046.7	40.7	0.0	-528.7	5.7	0.0	329.2	-0.051	733	349	781	560	469	655	517	866	871	188	919	399	419	714	466	925
3	10	0.0	1057.6	27.3	5426.0	-1880.9	-138.8	0.0	441.1	17.2	0.0	1098.1	23.7	0.0	-519.5	5.7	0.0	329.1	-0.051	705	382	739	609	435	695	469	922	848	215	882	442	386	752	419	979
3	11	0.0	1073.8	-8.3	5426.0	-2037.1	-54.2	0.0	454.3	-0.9	0.0	1113.7	-4.4	0.0	-510.3	5.7	0.0	329.0	-0.051	681	410	707	645	410	724	436	960	826	242	852	477	361	780	388	1016
3	12	0.0	1030.9	-44.0	5426.0	-2056.3	30.4	0.0	438.1	-19.1	0.0	1092.5	-28.0	0.0	-514.9	-3.7	0.0	328.9	-0.051	659	434	685	671	391	746	417	982	802	268	828	505	342	802	368	1039
3	13	0.0	931.1	-79.6	5426.0	-1938.5	115.0	0.0	392.5	-37.2	0.0	1033.3	-45.1	0.0	-520.8	-3.7	0.0	328.8	-0.051	642	455	673	685	381	757	412	988	779	296	810	526	331	815	362	1045
3	14	0.0	773.3	-115.2	5426.0	-1684.6	199.6	0.0	317.5	-55.4	0.0	937.7	-73.1	0.0	-526.8	-3.7	0.0	328.8	-0.051	627	472	670	688	379	760	422	976	755	323	798	540	329	818	372	1034
3	15	0.0	557.3	-150.9	5426.0	-1291.8	284.2	0.0	213.0	-73.5	0.0	805.7	-90.3	0.0	-532.7	-3.7	0.0	328.7	-0.051	616	485	678	679	386	752	448	946	732	351	794	545	335	810	397	1005
3	16	0.0	284.0	-186.5	5426.0	-763.0	368.8	0.0	79.2	-91.7	0.0	635.4	-113.9	0.0	-538.6	-3.7	0.0	328.6	-0.051	608	494	695	659	401	734	488	899	708	379	795	544	350	793	437	958
3	17	0.0	-47.0	-222.1	5426.0	-97.2	453.4	0.0	-84.1	-109.8	0.0	448.7	-102.3	0.0	-563.7	-43.3	0.0	328.5	-0.051	606	496	725	625	423	709	542	838	688	401	807	530	369	771	488	900
3	18	0.0	-435.9	-257.8	5426.0	705.9	536.0	0.0	-276.7	-128.0	0.0	306.4	-74.9	0.0	-671.0	-87.8	0.0	328.4	-0.051	620	481	777	565	441	688	598	772	688	401	845	486	377	762	534	846
3	19	0.0	-882.4	-293.4	5426.0	1638.5	608.6	0.0	-498.8	-146.1	0.0	245.0	-15.2	0.0	-858.0	-139.9	0.0	328.3	-0.051	651	444	853	477	455	671	656	704	714	371	915	404	373	786	575	799
3	20	0.0	-1391.9	-335.3	5733.0	2458.3	306.9	0.0	-750.4	-164.3	0.0	243.0	15.2	0.0	-1122.9	-189.6	0.0	328.3	-0.051	519	341	724	316	301	584	506	559	577	276	782	251	201	695	407	670
3	21	0.0	-1974.2	-383.4	5791.0	2787.1	6.5	0.0	-1031.0	-182.4	0.0	280.0	33.1	0.0	-1493.6	-253.9	0.0	328.2	-0.051	402	480	623	439	130	783	351	743	464	411	685	371	-2	931	219	891
4	1	0.0	-1973.2	405.9	5689.0	2757.2	-3.6	0.0	-1031.0	188.0	0.0	280.0	-18.1	0.0	-1493.6	245.8	0.0	328.2	3.102	389	478	607	438	117	782	335	741	450	410	668	370	-16	930	202	889
4	2	0.0	-1354.4	357.8	5689.0	2579.2	-216.2	0.0	-740.8	169.9	0.0	268.1	-0.3	0.0	-1140.4	184.5	0.0	333.2	3.102	554	294	764	263	330	544	540	513	614	227	825	195	229	657	439	625
4	3	0.0	-806.4	315.9	5689.0	2004.1	-423.5	0.0	-460.2	151.7	0.0	297.4	29.7	0.0	-886.8	135.2	0.0	338.2	3.102	787	344	1012	363	578	587	803	606	856	265	1080	284	494	685	718	703
4	4	0.0	-325.4	280.3	5688.0	1138.4	-545.6	0.0	-249.1	133.6	0.0	374.4	61.2	0.0	-712.1	84.4	0.0	343.3	3.102	783	349	967	415	587	576	771	642	860	260	1043	327	520	654	703	721
4	5	0.0	100.0	244.7	5544.0	412.7	-413.9	0.0	-47.3	115.4	0.0	534.3	102.5	0.0	-614.1	42.4	0.0	348.3	3.102	786	314	931	417	581	552	726	655	878	207	1024	310	522	620	668	723
4	6	0.0	467.6	209.0	5544.0	-198.5	-340.3	0.0	125.0	97.3	0.0	709.3	103.1	0.0	-568.2	24.7	0.0	353.3	3.102	809	287	926	424	585	547	701	684	918	160	1035	297	531	610	647	747
4	7	0.0	777.4	173.4	5470.0	-711.9	-328.6	0.0	268.0	79.1	0.0	853.5	75.1	0.0	-528.3	24.7	0.0	358.3	3.102	820	257	911	421	581	536	671	699	944	114	1035	278	530	594	621	757
4	8	0.0	1029.8	137.8	5376.0	-1198.3	-322.6	0.0	381.5	61.0	0.0	961.6	58.0	0.0	-488.3	24.7	0.0	363.4	3.102	810	249	875	437	560	539	625	727	944	93	1010	281	513	593	578	781
4	9	0.0	1224.0	102.1	5385.0	-1649.8	-233.8	0.0	465.6	42.8	0.0	1031.4	34.3	0.0	-448.3	24.7	0.0	368.4	3.102	791	273	835	487	536	569	580	782	933	108	977	322	493	618	537	832
4	10	0.0	1360.1	66.5	5385.0	-1961.4	-149.9	0.0	520.3	24.7	0.0	1065.0	6.3	0.0	-408.3	24.7	0.0	373.4	3.102	775	292	804	522	520	587	549	817	920	123	950	353	481	632	510	862
4	11	0.0	1439.3	30.9	5385.0	-2136.0	-66.0	0.0	545.6	6.5	0.0	1061.8	-10.8	0.0	-368.4	24.7	0.0	378.4	3.102	762	306	783	546	513	595	534	835	908	137	929	377	478	635	499	876
4	12	0.0	1460.4	-4.8	5385.0	-2175.6	17.9	0.0	541.5	-11.6	0.0	1020.2	-38.8	0.0	-328.4	24.7	0.0	383.5	3.102	753	317	772	560	515	593	534	836	895	152	914	394	483	629	502	872
4	13	0.0	1423.5	-40.4	5385.0	-2078.2	101.8	0.0	508.0	-29.8	0.0	944.3	-62.5	0.0	-288.4	24.7	0.0	388.5	3.102	746	324	770	561	524	582	548	819	882	167	906	404	497	614	521	851
4	14	0.0	1329.7	-76.0	5385.0	-1845.7	185.8	0.0	445.0	-47.9	0.0	828.7	-79.5	0.0	-255.3	17.8	0.0	393.5	3.102	743	328	778	553	542	562	576	786	869	183	903	407	517	590	552	814
4	15	0.0	1177.8	-111.7	5385.0	-1476.3	269.8	0.0	352.6	-66.1	0.0	677.6	-107.6	0.0	-226.4	17.8	0.0	398.6	3.102	743	328	795	532	567	533	619	737	855	199	907	402	545	558	597	762
4	16	0.0	968.0	-147.3	5385.0	-970.9	353.7	0.0	230.9	-84.2	0.0	489.5	-124.6	0.0	-197.5	17.8	0.0	403.6	3.102	746	325	822	501	600	494	676	670	841	215	917	391	581	516	658	692
4	17	0.0	700.1	-183.0	5385.0	-330.4	437.6	0.0	79.7	-102.4	0.0	335.8	-80.0	0.0	-241.3	-54.8	0.0	408.6	3.102	762	306	869	447	631	458	738	599	843	213	949	353	608	484	715	625
4	18	0.0	374.7	-218.6	5385.0	446.6	521.6	0.0	-100.9	-120.5	0.0	234.2	-25.1	0.0	-361.6	-99.6	0.0	413.6	3.102	794	269	938	387	660	424	804	522	866	186	1009	284	626	464	789	562
4	19	0.0	-8.3	-254.2	5385.0	1352.4	591.6	0.0	-310.9	-138.7	0.0	211.4	0.6	0.0	-570.8	-169.2	0.0	418.7	3.102	844	211	1031	258	683	398	870	446	914	130	1101	177	629	461	816	509
4	20	0.0	-454.2	-296.1	5703.0	2148.8	293.3	0.0	-550.3	-156.8	0.0	225.8	15.9	0.0	-878.6	-208.7	0.0	423.7	3.102	715	117	906	106	521	333	713	323	782	42	973	32	444	420	635	409
4	21	0.0	-972.8	-344.2	5702.0	2439.2	-5.6	0.0	-819.1	-175.0	0.0	269.0	34.0	0.0	-1253.5	-249.1	0.0	428.7	3.102	605	240	809	215	355	518	559	494	676	160	880	135	244	642	448	618
5	1	0.0	-972.7	345.5	5556.0	2396.3	-13.3	0.0	-819.0	153.0	0.0	269.0	-13.4	0.0	-1253.5	197.4	0.0	428.7	-21.43	585	238	785	213	335	517	535	492	657	158	856	133	224	641	424	616
5	2	0.0	-642.1	315.8	5556.0	2237.9	-302.1	0.0	-671.7	141.8	0.0	265.4	8.6	0.0	-1081.3	147.4	0.0	407.3	-21.43	657	158	849	141	433	408	625	391	725	82	918	65	337	515	529	498
5	3	0.0	-340.9	286.1	5556.0	1789.5	-593.9	0.0	-535.5	130.5	0.0	284.6	35.4	0.0	-950.4	108.7	0.0	385.9	-21.43	664	150	837	155	457	381	630	386	732	74	905	79	373	475	546	480
5	4	0.0	-69.8	256.5	5392.0	1160.7	-564.7	0.0	-410.6	119.4	0.0	332.9	64.4	0.0	-860.6	67.8	0.0	364.4	-21.43	618	175	761	208	419	397	562	430	688	97	830	130	343	482	485	515
5	5	0.0	171.7	226.8	5392.0	683.4	-406.9	0.0	-296.9	108.2	0.0	410.5	83.9	0.0	-807.4	50.5	0.0	343.0	-21.43	610	184	731	241	410	407	531	464	684	101	805	158	338	487	459	544
5	6	0.0	383.8	197.1	5392.0	330.8	-313.7	0.0	-194.2	97.0	0.0	490.4	69.7	0.0	-756.9	50.5	0.0	321.5	-21.43	617	176	723	250	416	400	521	475	697	87	802	162	349	475	454	550
5	7	0.0	565.9	167.4	5298.0	17.9	-326.9	0.0	-102.9	85.8	0.0	555.7	55.8	0.0	-706.5	50.5	0.0	300.1	-21.43	615	164	705	252	414	388	504	478	697	72	787	160	351	458	441	546
5	8	0.0	718.5	137.7	5708.0	-468.7	-357.8	0.0	-22.7	74.5	0.0	608.5	41.6	0.0	-656.0	50.5	0.0	278.7	-21.43	605	240	680	359	406	462	481	582	690	146	765	265	348	527	423	646
5	9	0.0	841.3	108.0	5705.0	-816.9	-332.5	0.0	46.2	63.4	0.0	645.8	27.4	0.0	-605.6	50.5	0.0	257.2	-21.43	580	267	640	404	386	485	446	621	666	172	726	308	332	544	392	681
5	10	0.0	934.4	78.3	5705.0	-1107.0	-257.2	0.0	103.9	52.2	0.0	669.4	13.5	0.0	-555.1	50.5	0.0	235.8	-21.43	557	294	604	444	368	504	415	655	642	198	689	349	319	559	366	710
5	11	0.0	998.0	48.6	5705.0	-1331.0	-190.1	0.0	150.5	40.9	0.0	679.8	-0.6	0.0	-504.6	50.5	0.0	214.4	-21.43	536	317	573	479	354	519	391	681	620	224	657	385	310	569	347	731
5	12	0.0	1032.0	18.9	5705.0	-1488.0	-123.1	0.0	185.8	29.8	0.0	674.4	-14.8	0.0	-454.2	50.5	0.0	192.9	-21.43	517	339	547	508	345	530	375	699	598	248	628	418	305	575	335	744
5	13	0.0	1036.0	-10.7	5705.0	-1577.0	-56.2	0.0	210.0	18.6	0.0	656.4	-28.7	0.0	-403.7	50.5	0.0	171.5	-21.43	500	357	526	531	340	535	367	709	577	271	604	445	305	575	331	749
5	14	0.0	1010.0	-40.4	5705.0	-1600.0	10.9	0.0	222.9	7.3	0.0	624.4	-42.9	0.0	-353.2	50.5	0.0	150.1	-21.43	486	372	511	548	340	536	365	711	558	292	583	467	308	571	333	746

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INICIAL

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	PP,inicial + CM + 0.9 x Pret,inicial + 0.4° SC(+) + GRAD	844	117
2	PP,inicial + CM + 1.1 x Pret,inicial + 0.4° SC(+) + GRAD	1038	106
3	PP,inicial + CM + 0.9 x Pret,inicial + 0.4° SC(-) + GRAD	868	117
4	PP,inicial + CM + 1.1 x Pret,inicial + 0.4° SC(-) + GRAD	1105	323
5	PP,inicial + CM + 0.9 x Pret,inicial + 1.0° SC(+) + GRAD	944	42
6	PP,inicial + CM + 1.1 x Pret,inicial + 1.0° SC(+) + GRAD	1106	32
7	PP,inicial + CM + 0.9 x Pret,inicial + 1.0° SC(-) + GRAD	931	-16
8	PP,inicial + CM + 1.1 x Pret,inicial + 1.0° SC(-) + GRAD	1155	202

PP,inicial= Peso propio en tiempo inicial
Pret,inicial = Pretensado en tiempo inicial
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INICIAL																		TENSIONES EN FIBRAS SUPERIOR E INFERIOR															
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
5	15	0.0	955.0	-70.1	5704.0	-1556.0	77.6	0.0	224.7	-3.9	0.0	576.4	-57.1	0.0	-302.8	50.5	0.0	128.6	-21.43	474	385	501	559	343	532	370	705	540	313	567	486	316	562	343	735
5	16	0.0	870.0	-99.8	5704.0	-1444.0	144.8	0.0	215.2	-15.1	0.0	516.7	-71.0	0.0	-252.3	50.5	0.0	107.2	-21.43	465	395	497	563	351	523	383	690	523	331	555	499	329	548	361	715
5	17	0.0	755.3	-129.5	5704.0	-1266.0	211.8	0.0	194.6	-26.3	0.0	442.2	-85.1	0.0	-201.8	50.5	0.0	85.8	-21.43	459	403	499	562	364	509	403	668	507	349	547	507	346	529	386	688
5	18	0.0	611.0	-159.2	5704.0	-1021.0	278.8	0.0	162.7	-37.5	0.0	351.5	-99.3	0.0	-151.4	50.5	0.0	64.3	-21.43	454	408	505	555	380	491	431	637	492	365	543	512	367	506	417	652
5	19	0.0	437.1	-188.9	5704.0	-708.8	345.7	0.0	119.7	-48.7	0.0	250.2	-113.2	0.0	-100.9	50.5	0.0	42.9	-21.43	452	410	517	541	401	467	466	598	479	380	544	511	392	477	457	608
5	20	0.0	233.2	-218.6	5704.0	-329.3	412.7	0.0	65.4	-59.9	0.0	133.3	-127.4	0.0	-50.5	50.5	0.0	21.5	-21.43	453	409	534	522	426	439	508	552	467	394	549	506	422	444	503	557
5	21	0.0	-0.1	-248.2	5704.0	116.7	479.7	0.0	0.0	-71.1	0.0	0.0	-128.9	0.0	0.0	34.9	0.0	0.0	-21.43	456	406	557	497	456	406	557	497	456	406	557	497	456	406	557	497

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES | **Fase : PUENTE COMPLETO EN TIEMPO INFINITO**

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima (t/m2)	Tension mínima (t/m2)
1	PP,final + CM + 0.9 x Pret,final + 0.4* SC(+) + GRAD	730	159
2	PP,final + CM + 1.1 x Pret,final + 0.4* SC(+) + GRAD	852	227
3	PP,final + CM + 0.9 x Pret,final + 0.4* SC(-) + GRAD	800	-29
4	PP,final + CM + 1.1 x Pret,final + 0.4* SC(-) + GRAD	888	158
5	PP,final + CM + 0.9 x Pret,final + 1.0* SC(+) + GRAD	861	8
6	PP,final + CM + 1.1 x Pret,final + 1.0* SC(+) + GRAD	926	155
7	PP,final + CM + 0.9 x Pret,final + 1.0* SC(-) + GRAD	948	-161
8	PP,final + CM + 1.1 x Pret,final + 1.0* SC(-) + GRAD	940	26

PP,final= Peso propio en tiempo final
Pret,final = Pretensado en tiempo final
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	190.8	4618.0	74.9	-360.0	0.0	0.0	95.0	0.0	0.0	133.4	0.0	0.0	-32.6	0.0	0.0	17.83	365	333	446	407	365	333	446	407	365	333	446	407	365	333	446	407
1	2	0.0	208.4	160.1	4618.0	-325.9	-314.7	0.0	104.9	81.7	0.0	175.8	135.3	0.0	-45.4	-38.2	0.0	21.2	17.83	505	435	594	558	471	475	560	597	524	413	614	536	466	480	556	602
1	3	0.0	383.3	133.9	4618.0	-719.6	-269.4	0.0	194.1	68.3	0.0	329.0	116.7	0.0	-90.7	-38.2	0.0	42.4	17.83	508	432	579	576	443	507	514	652	544	389	615	534	434	517	505	662
1	4	0.0	526.8	107.8	4618.0	-1013.0	-224.1	0.0	267.4	55.0	0.0	463.9	107.0	0.0	-136.1	-38.2	0.0	63.6	17.83	518	419	575	580	425	527	482	688	570	359	627	520	412	542	469	703
1	5	0.0	639.4	81.7	4618.0	-1252.0	-178.7	0.0	324.8	41.7	0.0	577.7	86.4	0.0	-181.4	-38.2	0.0	84.8	17.83	526	410	572	584	408	547	453	721	591	335	637	509	391	567	436	741
1	6	0.0	721.0	55.5	4618.0	-1438.0	-133.4	0.0	366.5	28.4	0.0	674.0	74.8	0.0	-226.8	-38.2	0.0	106.0	17.83	532	403	569	588	391	567	428	751	609	314	645	499	369	592	406	776
1	7	0.0	771.5	29.4	4618.0	-1569.0	-88.1	0.0	392.3	15.1	0.0	748.5	51.5	0.0	-272.1	-38.2	0.0	127.2	17.83	535	400	566	591	375	586	405	778	622	299	652	491	349	616	379	808
1	8	0.0	790.9	3.3	4618.0	-1647.0	-42.7	0.0	402.4	1.8	0.0	802.9	39.9	0.0	-317.5	-38.2	0.0	148.3	17.83	536	399	563	595	359	605	385	801	630	290	657	486	328	640	355	836
1	9	0.0	779.3	-22.9	4618.0	-1671.0	2.6	0.0	396.6	-11.5	0.0	838.6	19.2	0.0	-362.8	-38.2	0.0	169.5	17.83	534	401	560	598	343	623	368	820	634	285	660	482	308	663	334	860
1	10	0.0	736.6	-49.0	4763.0	-1729.0	54.5	0.0	375.0	-24.9	0.0	853.0	5.1	0.0	-408.2	-38.2	0.0	190.7	17.83	526	442	552	646	323	677	349	881	630	322	656	526	285	723	311	926
1	11	0.0	662.8	-75.1	4764.0	-1624.0	119.2	0.0	337.5	-38.2	0.0	850.7	-9.1	0.0	-453.5	-38.2	0.0	211.9	17.83	524	445	555	643	313	690	344	888	630	322	662	520	270	740	301	938
1	12	0.0	558.0	-101.3	4764.0	-1446.0	181.8	0.0	284.3	-51.5	0.0	824.5	-29.7	0.0	-498.9	-38.2	0.0	233.1	17.83	524	446	563	634	307	697	347	885	630	322	669	510	260	752	299	940
1	13	0.0	422.1	-127.4	4764.0	-1192.0	244.3	0.0	215.2	-64.8	0.0	780.7	-43.9	0.0	-544.2	-38.2	0.0	254.3	17.83	526	443	577	617	306	698	358	872	630	322	682	496	254	758	306	932
1	14	0.0	255.1	-153.5	4764.0	-864.7	306.9	0.0	130.3	-78.1	0.0	717.2	-64.6	0.0	-589.6	-38.2	0.0	275.5	17.83	529	439	596	595	310	693	377	849	630	322	697	478	254	758	321	914
1	15	0.0	57.2	-179.7	4764.0	-462.9	369.4	0.0	29.6	-91.4	0.0	632.1	-78.7	0.0	-634.9	-38.2	0.0	296.7	17.83	534	433	621	567	318	683	405	817	630	322	716	456	258	754	344	887
1	16	0.0	-171.8	-205.8	4880.0	1.0	442.0	0.0	-86.9	-104.7	0.0	530.1	-92.9	0.0	-680.3	-38.2	0.0	317.8	17.83	551	439	662	550	341	683	452	794	640	337	751	447	276	758	387	869
1	17	0.0	-432.0	-231.9	4880.0	564.7	506.1	0.0	-219.3	-118.0	0.0	414.4	-91.4	0.0	-725.6	-38.2	0.0	339.0	17.83	565	423	703	503	362	659	500	739	644	331	782	411	293	739	431	819
1	18	0.0	-723.1	-258.1	4880.0	1203.0	567.9	0.0	-367.4	-131.3	0.0	317.6	-62.9	0.0	-791.2	-80.8	0.0	360.2	17.83	586	399	754	444	385	632	553	677	659	315	827	359	309	720	478	764
1	19	0.0	-1045.0	-284.2	4807.0	1760.0	381.4	0.0	-531.5	-144.6	0.0	260.8	-38.1	0.0	-913.5	-119.7	0.0	381.4	17.83	576	394	769	406	363	641	556	653	646	313	839	325	276	742	469	754
1	20	0.0	-1401.0	-314.9	4850.0	2167.0	205.2	0.0	-711.3	-158.0	0.0	236.7	-3.3	0.0	-1085.3	-168.6	0.0	402.6	17.83	408	323	585	297	187	569	365	543	473	250	651	224	91	676	269	651
1	21	0.0	-1797.0	-350.2	4850.0	2354.0	28.6	0.0	-907.0	-171.3	0.0	238.3	10.0	0.0	-1315.3	-216.0	0.0	423.8	17.83	317	425	503	390	63	707	249	673	385	349	571	314	-53	837	133	803
2	1	0.0	-1797.0	368.7	4764.0	2329.0	1.7	0.0	-907.0	178.6	0.0	238.3	-32.4	0.0	-1315.3	251.3	0.0	423.8	-2.898	305	424	488	389	52	706	235	672	373	348	557	313	-65	837	118	802
2	2	0.0	-1238.0	320.6	4764.0	2190.0	-173.3	0.0	-632.3	160.4	0.0	200.7	-14.4	0.0	-943.0	209.1	0.0	419.1	-2.898	456	255	634	227	258	476	435	448	521	183	698	155	174	569	352	541
2	3	0.0	-752.6	278.8	4764.0	1719.0	-348.3	0.0	-387.0	142.3	0.0	197.4	16.3	0.0	-645.0	151.3	0.0	414.4	-2.898	662	285	852	299	492	482	682	495	730	206	920	220	431	553	621	566
2	4	0.0	-329.8	243.1	4764.0	1007.0	-446.4	0.0	-171.2	124.1	0.0	242.2	70.7	0.0	-444.7	96.7	0.0	409.7	-2.898	667	279	823	332	520	449	677	502	739	196	895	249	478	498	634	551
2	5	0.0	35.3	207.5	4643.0	414.7	-336.9	0.0	15.3	106.0	0.0	375.3	88.9	0.0	-330.8	44.0	0.0	405.0	-2.898	678	240	803	323	529	413	654	496	761	143	887	226	497	449	623	532
2	6	0.0	342.7	171.9	4643.0	-81.0	-275.0	0.0	172.3	87.8	0.0	557.6	126.5	0.0	-311.1	-10.7	0.0	400.3	-2.898	707	206	809	316	536	405	638	515	808	89	910	199	506	439	608	549
2	7	0.0	592.3	136.2	4581.0	-495.8	-266.0	0.0	300.0	69.7	0.0	738.5	102.9	0.0	-328.5	-10.7	0.0	395.6	-2.898	727	169	808	300	528	400	609	532	845	33	925	164	497	436	577	568
2	8	0.0	784.2	100.6	4551.0	-884.8	-263.2	0.0	398.2	51.6	0.0	883.9	74.8	0.0	-347.0	-17.0	0.0	390.9	-2.898	730	159	791	311	508	417	569	569	861	8	922	160	475	455	536	607
2	9	0.0	918.3	65.0	4556.0	-1251.0	-188.0	0.0	467.0	33.4	0.0	991.4	57.7	0.0	-374.5	-17.0	0.0	386.2	-2.898	715	178	760	350	475	457	519	629	856	15	900	188	439	498	483	671
2	10	0.0	994.7	29.3	4556.0	-1498.0	-116.9	0.0	506.5	15.3	0.0	1061.5	29.7	0.0	-402.0	-17.0	0.0	381.5	-2.898	700	196	732	382	445	491	478	677	846	26	878	212	407	535	440	721
2	11	0.0	1013.0	-6.3	4556.0	-1630.0	-45.9	0.0	516.5	-2.9	0.0	1096.6	12.6	0.0	-429.5	-17.0	0.0	376.8	-2.898	683	216	709	409	420	520	446	714	832	43	858	236	379	568	405	761
2	12	0.0	974.3	-42.0	4556.0	-1647.0	25.2	0.0	497.0	-21.1	0.0	1091.9	-11.0	0.0	-457.0	-17.0	0.0	372.1	-2.898	664	237	689	432	399	545	424	740	812	66	837	260	355	595	380	790
2	13	0.0	877.4	-77.6	4556.0	-1548.0	96.3	0.0	448.2	-39.2	0.0	1052.5	-39.0	0.0	-484.6	-17.0	0.0	367.4	-2.898	644	260	674	449	381	565	411	754	788	93	818	282	335	619	365	808
2	14	0.0	722.8	-113.2	4558.0	-1335.0	167.4	0.0	370.0	-57.4	0.0	975.2	-56.1	0.0	-512.1	-17.0	0.0	362.7	-2.898	623	285	663	462	367	581	408	758	759	127	799	305	319	638	359	815
2	15	0.0	510.5	-148.9	4558.0	-1006.0	238.4	0.0	262.3	-75.5	0.0	860.5	-84.1	0.0	-539.6	-17.0	0.0	358.0	-2.898	600	311	656	470	358	592	414	751	725	167	780	326	307	652	362	811
2	16	0.0	240.4	-184.5	4558.0	-562.5	309.5	0.0	125.3	-93.7	0.0	710.2	-107.8	0.0	-567.1	-17.0	0.0	353.3	-2.898	576	339	653	474	352	599	429	734	686	212	763	347	298	662	375	796
2	17	0.0	-87.4	-220.1	4558.0	-3.5	380.6	0.0	-41.2	-111.8	0.0	530.0	-100.4	0.0	-603.8	-41.5	0.0	348.6	-2.898	552	367	656	471	349	603	452	706	644	260	747	364	291	669	395	773
2	18	0.0	-473.0	-255.8	4558.0	670.8	451.6	0.0	-237.1	-130.0	0.0	378.6	-56.7	0.0	-703.5	-85.0	0.0	343.9	-2.898	536	386	672	452	341	612	476	679	613	296	748	363	274	690	409	756
2	19	0.0	-916.3	-291.4	4558.0	1454.0	511.0	0.0	-462.4	-148.1	0.0	311.7	-24.4	0.0	-881.8	-136.5	0.0	339.2	-2.898	535	387	707	411	324	632	497	655	604	306	777	330	240	729	413	752
2	20	0.0	-1422.0	-333.3	4816.0	2142.0	257.7	0.0	-717.0	-166.3	0.0	292.3	5.8	0.0	-1138.9	-186.0	0.0	334.5	-2.898	394	333	570	308	167	586	343	561	457	262	633	237	66	699	242	674
2	21	0.0	-2001.0	-381.4	4865.0	2418.0	5.3	0.0	-1001.0	-184.4	0.0	313.5	23.7	0.0	-1496.7	-246.7	0.0	329.8	-2.898	264	486	453	448	-13	795	176	757	328	414	517	376	-146	943	43	905
3	1	0.0	-2002.0	374.8	4778.0	2392.0	5.8	0.0	-1001.0	180.6	0.0	313.5	-33.7	0.0	-1496.7	253.8	0.0	329.8	-0.051	252	485	438	447	-25	794	161	757	316	413	503	375	-158	942	29	905
3	2	0.0	-1433.0	326.7	4778.0	2257.0	-172.7	0.0	-723.4	162.4	0.0	275.7	-15.8	0.0	-1131.7	188.5	0.0	329.8	-0.051	408	311	588	280	184	561	364	530	469	243	649	212	84	673	264	642
3	3	0.0	-937.8	284.8	4778.0	1789.0	-346.8	0.0	-474.9	144.3	0.0	277.8	14.6	0.0	-869.5	138.9	0.0	329.7	-0.051	615	343	808	353	412	578	606	588	680	267	874	277	329	674	523	684
3	4	0.0	-505.1	249.2	4778.0	1076.0	-449.4	0.0	-255.8	126.1	0.0	342.0	73.4	0.0	-685.7	86.9	0.0	329.6	-0.051	626	330	786	379	440	545	600	594	698	246	858	296	375	621	535	670
3	5	0.0	-130.2	213.6	4657.0	480.7	-338.8	0.0	-66.2	108.0	0.0	483.2	100.5	0.0	-581.5	42.6	0.0	329.5	-0.051	641	286	770	365	450	508	578	587	726	187	855	267	394	572	523	651
3	6	0.0	187.0	177.9	4657.0	-18.2	-276.9	0.0	94.1	89.8	0.0	667.6	109.5	0.0	-556.3	5.7	0.0	329.4	-0.051	674	248	779	355	460	496	565	602	777	129	882	235	407	557	512	664
3	7	0.0	446.7	142.3	4595.0	-435.0	-267.1	0.0	225.0	71.7	0.0	831.3	92.4	0.0	-547.1	5.7	0.0	329.3	-0.051	695	210	778	338	459	483	543	612	813	73	897	201	407	544	490	672

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES | **Fase : PUENTE COMPLETO EN TIEMPO INFINITO**

PROYECTO: L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima (t/m2)	Tension mínima (t/m2)
1	PP,final + CM + 0.9 x Pret,final + 0.4° SC(+) + GRAD	730	159
2	PP,final + CM + 1.1 x Pret,final + 0.4° SC(+) + GRAD	852	227
3	PP,final + CM + 0.9 x Pret,final + 0.4° SC(-) + GRAD	800	-29
4	PP,final + CM + 1.1 x Pret,final + 0.4° SC(-) + GRAD	888	158
5	PP,final + CM + 0.9 x Pret,final + 1.0° SC(+) + GRAD	861	8
6	PP,final + CM + 1.1 x Pret,final + 1.0° SC(+) + GRAD	926	155
7	PP,final + CM + 0.9 x Pret,final + 1.0° SC(-) + GRAD	948	-161
8	PP,final + CM + 1.1 x Pret,final + 1.0° SC(-) + GRAD	940	26

PP,final= Peso propio en tiempo final
Pret,final = Pretensado en tiempo final
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INFINITO																		TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	8	0.0	648.4	106.7	4551.0	-842.8	-264.3	0.0	326.5	53.5	0.0	956.5	64.4	0.0	-537.9	5.7	0.0	329.3	-0.051	693	202	756	352	440	495	504	645	823	51	886	201	389	554	453	704
3	9	0.0	792.3	71.0	4556.0	-1211.0	-189.0	0.0	398.5	35.4	0.0	1046.7	40.7	0.0	-528.7	5.7	0.0	329.2	-0.051	679	220	725	390	415	526	461	696	818	59	864	230	365	584	411	755
3	10	0.0	878.5	35.4	4558.0	-1460.0	-118.0	0.0	441.1	17.2	0.0	1098.1	23.7	0.0	-519.5	5.7	0.0	329.1	-0.051	664	238	698	422	394	551	428	735	807	71	841	255	344	608	378	792
3	11	0.0	907.0	-0.2	4558.0	-1593.0	-46.9	0.0	454.3	-0.9	0.0	1113.7	-4.4	0.0	-510.3	5.7	0.0	329.0	-0.051	647	257	675	448	376	571	404	762	792	88	820	280	328	627	356	819
3	12	0.0	877.8	-35.9	4558.0	-1612.0	24.1	0.0	438.1	-19.1	0.0	1092.5	-28.0	0.0	-514.9	-3.7	0.0	328.9	-0.051	629	277	656	470	361	589	388	781	772	112	799	304	312	646	339	838
3	13	0.0	790.8	-71.5	4558.0	-1515.0	95.2	0.0	392.5	-37.2	0.0	1033.3	-45.1	0.0	-520.8	-3.7	0.0	328.8	-0.051	610	300	642	487	349	602	381	789	747	140	779	328	300	660	331	847
3	14	0.0	646.0	-107.1	4558.0	-1304.0	166.2	0.0	317.5	-55.4	0.0	937.7	-73.1	0.0	-526.8	-3.7	0.0	328.8	-0.051	589	324	631	499	341	611	383	787	718	175	759	351	291	670	333	845
3	15	0.0	443.5	-142.8	4558.0	-976.7	237.3	0.0	213.0	-73.5	0.0	805.7	-90.3	0.0	-532.7	-3.7	0.0	328.7	-0.051	568	349	625	507	337	616	395	773	683	215	740	372	287	675	344	832
3	16	0.0	183.3	-178.4	4558.0	-534.7	308.4	0.0	79.2	-91.7	0.0	635.4	-113.9	0.0	-538.6	-3.7	0.0	328.6	-0.051	544	376	622	509	338	616	416	749	644	261	722	394	286	675	364	808
3	17	0.0	-134.6	-214.0	4558.0	22.5	379.4	0.0	-84.1	-109.8	0.0	448.7	-102.3	0.0	-563.7	-43.3	0.0	328.5	-0.051	522	402	627	504	339	614	443	717	604	307	709	409	285	677	390	779
3	18	0.0	-510.3	-249.7	4558.0	694.8	450.5	0.0	-276.7	-128.0	0.0	306.4	-74.9	0.0	-671.0	-87.8	0.0	328.4	-0.051	511	415	647	480	332	622	469	687	579	336	716	401	268	696	405	761
3	19	0.0	-943.8	-285.3	4558.0	1476.0	509.9	0.0	-498.8	-146.1	0.0	245.0	-15.2	0.0	-858.0	-139.9	0.0	328.3	-0.051	513	412	687	434	317	640	491	662	576	340	749	362	235	735	409	757
3	20	0.0	-1440.0	-327.2	4816.0	2162.0	256.4	0.0	-750.4	-164.3	0.0	243.0	15.2	0.0	-1122.9	-189.6	0.0	328.3	-0.051	379	349	556	323	162	592	338	566	437	284	614	258	62	703	239	677
3	21	0.0	-2009.0	-375.3	4865.0	2436.0	4.0	0.0	-1031.0	-182.4	0.0	280.0	33.1	0.0	-1493.6	-253.9	0.0	328.2	-0.051	255	496	444	458	-18	800	172	761	316	428	506	389	-150	948	40	909
4	1	0.0	-2008.0	382.2	4778.0	2411.0	0.5	0.0	-1031.0	188.0	0.0	280.0	-18.1	0.0	-1493.6	245.8	0.0	328.2	3.102	243	495	430	456	-29	799	158	760	304	427	492	388	-161	946	26	908
4	2	0.0	-1428.0	334.1	4778.0	2267.0	-178.1	0.0	-740.8	169.9	0.0	268.1	-0.3	0.0	-1140.4	184.5	0.0	333.2	3.102	406	313	587	281	182	563	363	531	467	245	648	214	81	676	262	644
4	3	0.0	-920.5	292.3	4778.0	1790.0	-352.2	0.0	-480.2	151.7	0.0	297.4	29.7	0.0	-886.8	135.2	0.0	338.2	3.102	622	335	815	345	412	578	606	588	690	256	884	266	328	675	522	685
4	4	0.0	-475.8	256.6	4778.0	1068.0	-454.7	0.0	-249.1	133.6	0.0	374.4	61.2	0.0	-712.1	84.4	0.0	343.3	3.102	639	314	799	364	443	542	603	591	716	226	875	276	376	620	535	670
4	5	0.0	-88.8	221.0	4657.0	464.4	-344.1	0.0	-47.3	115.4	0.0	534.3	102.5	0.0	-614.1	42.4	0.0	348.3	3.102	661	262	789	343	456	500	584	581	753	155	881	236	398	568	525	648
4	6	0.0	240.4	185.3	4657.0	-43.1	-282.3	0.0	125.0	97.3	0.0	709.3	103.1	0.0	-568.2	24.7	0.0	353.3	3.102	697	220	801	329	473	480	577	589	807	93	911	202	419	543	523	651
4	7	0.0	511.9	149.7	4595.0	-468.3	-272.5	0.0	268.0	79.1	0.0	853.5	75.1	0.0	-528.3	24.7	0.0	358.3	3.102	720	181	802	311	480	459	562	589	844	37	926	167	430	517	512	647
4	8	0.0	725.6	114.1	4516.0	-871.6	-267.5	0.0	381.5	61.0	0.0	961.6	58.0	0.0	-488.3	24.7	0.0	363.4	3.102	719	164	780	315	469	454	530	605	854	8	915	158	423	508	484	659
4	9	0.0	881.6	78.5	4523.0	-1245.0	-192.9	0.0	465.6	42.8	0.0	1031.4	34.3	0.0	-448.3	24.7	0.0	368.4	3.102	708	179	751	350	453	474	496	646	850	14	893	186	410	524	454	695
4	10	0.0	979.9	42.8	4523.0	-1501.0	-122.4	0.0	520.3	24.7	0.0	1065.0	6.3	0.0	-408.3	24.7	0.0	373.4	3.102	695	194	726	380	440	489	472	675	840	25	872	211	401	534	433	720
4	11	0.0	1020.0	7.2	4523.0	-1642.0	-51.9	0.0	545.6	6.5	0.0	1061.8	-10.8	0.0	-368.4	24.7	0.0	378.4	3.102	680	211	705	404	431	500	456	693	826	41	851	235	396	540	421	734
4	12	0.0	1003.0	-28.4	4523.0	-1669.0	18.6	0.0	541.5	-11.6	0.0	1020.2	-38.8	0.0	-328.4	24.7	0.0	383.5	3.102	664	229	688	424	426	505	450	700	807	64	830	259	395	542	418	737
4	13	0.0	928.2	-64.1	4523.0	-1582.0	89.1	0.0	508.0	-29.8	0.0	944.3	-62.5	0.0	-288.4	24.7	0.0	388.5	3.102	647	250	674	440	425	507	452	697	783	92	810	282	397	539	425	729
4	14	0.0	795.5	-99.7	4523.0	-1381.0	159.6	0.0	445.0	-47.9	0.0	828.7	-79.5	0.0	-255.3	17.8	0.0	393.5	3.102	627	272	664	451	426	506	463	685	753	126	790	305	402	534	439	713
4	15	0.0	604.9	-135.4	4523.0	-1065.0	230.1	0.0	352.6	-66.1	0.0	677.6	-107.6	0.0	-226.4	17.8	0.0	398.6	3.102	607	296	659	458	430	501	482	662	718	166	771	328	409	526	461	687
4	16	0.0	356.7	-171.0	4523.0	-635.0	300.6	0.0	230.9	-84.2	0.0	489.5	-124.6	0.0	-197.5	17.8	0.0	403.6	3.102	584	322	657	460	438	491	511	629	679	212	752	350	420	513	492	651
4	17	0.0	50.8	-206.6	4523.0	-90.9	371.1	0.0	79.7	-102.4	0.0	335.8	-80.0	0.0	-241.3	-54.8	0.0	408.6	3.102	571	337	669	445	440	489	538	597	651	244	750	352	417	516	516	624
4	18	0.0	-312.9	-242.3	4523.0	567.5	441.6	0.0	-100.9	-120.5	0.0	234.2	-25.1	0.0	-361.6	-99.6	0.0	413.6	3.102	568	340	698	412	434	496	564	567	640	257	770	329	400	536	530	607
4	19	0.0	-734.3	-277.9	4523.0	1334.0	500.5	0.0	-310.9	-138.7	0.0	211.4	0.6	0.0	-570.8	-169.2	0.0	418.7	3.102	580	327	746	356	418	514	585	544	650	246	816	275	364	577	530	607
4	20	0.0	-1219.0	-319.8	4790.0	2009.0	249.9	0.0	-550.3	-156.8	0.0	225.8	15.9	0.0	-878.6	-208.7	0.0	423.7	3.102	449	268	618	249	255	484	425	465	516	193	685	174	177	571	347	552
4	21	0.0	-1776.0	-367.9	4790.0	2258.0	-1.2	0.0	-819.1	-175.0	0.0	269.0	34.0	0.0	-1253.5	-249.1	0.0	428.7	3.102	322	409	502	378	72	688	252	657	393	330	574	299	-39	812	141	781
5	1	0.0	-1776.0	385.6	4667.0	2222.0	-21.6	0.0	-819.0	153.0	0.0	269.0	-13.4	0.0	-1253.5	197.4	0.0	428.7	-21.43	305	408	482	377	55	687	232	656	376	328	554	297	-56	811	121	779
5	2	0.0	-1405.0	356.0	4667.0	2079.0	-264.2	0.0	-671.7	141.8	0.0	265.4	8.6	0.0	-1081.3	147.4	0.0	407.3	-21.43	389	315	559	291	164	565	335	541	457	238	628	214	69	672	239	648
5	3	0.0	-1064.0	326.3	4667.0	1692.0	-509.3	0.0	-535.5	130.5	0.0	284.6	35.4	0.0	-950.4	108.7	0.0	385.9	-21.43	417	283	571	278	210	514	364	509	485	207	639	202	126	608	280	603
5	4	0.0	-752.3	296.6	4529.0	1153.0	-484.8	0.0	-410.6	119.4	0.0	332.9	64.4	0.0	-860.6	67.8	0.0	364.4	-21.43	400	280	528	299	201	502	328	521	470	202	597	221	125	587	252	606
5	5	0.0	-470.6	266.9	4529.0	741.7	-352.2	0.0	-296.9	108.2	0.0	410.5	83.9	0.0	-807.4	50.5	0.0	343.0	-21.43	414	265	523	304	214	488	323	527	488	182	597	221	142	568	251	607
5	6	0.0	-218.4	237.2	4529.0	435.1	-273.9	0.0	-194.2	97.0	0.0	490.4	69.7	0.0	-756.9	50.5	0.0	321.5	-21.43	439	236	535	291	238	461	334	516	518	148	614	203	171	536	266	590
5	7	0.0	3.9	207.5	4450.0	161.7	-285.0	0.0	-102.9	85.8	0.0	555.7	55.8	0.0	-706.5	50.5	0.0	300.1	-21.43	455	206	537	273	254	431	336	498	537	114	619	181	191	500	273	567
5	8	0.0	196.7	177.8	4795.0	-257.5	-311.0	0.0	-22.7	74.5	0.0	608.5	41.6	0.0	-656.0	50.5	0.0	278.7	-21.43	462	253	532	346	263	475	333	569	547	158	617	252	205	540	275	633
5	9	0.0	359.6	148.1	4792.0	-560.5	-289.8	0.0	46.2	63.4	0.0	645.8	27.4	0.0	-605.6	50.5	0.0	257.2	-21.43	456	260	512	368	261	477	317	586	541	164	597	273	207	537	263	646
5	10	0.0	492.8	118.5	4792.0	-814.9	-226.5	0.0	103.9	52.2	0.0	669.4	13.5	0.0	-555.1	50.5	0.0	235.8	-21.43	448	269	493	390	259	479	304	600	533	173	578	294	210	534	255	655
5	11	0.0	596.5	88.8	4792.0	-1013.0	-170.2	0.0	150.5	40.9	0.0	679.8	-0.6	0.0	-504.6	50.5	0.0	214.4	-21.43	441	277	477	407	260	479	295	610	525	183	561	314	215	529	251	659
5	12	0.0	670.4	59.1	4792.0	-1155.0	-113.9	0.0	185.8	29.8	0.0	674.4	-14.8	0.0	-454.2	50.5	0.0	192.9	-21.43	434	285	463	422	262	476	292	614	515	194	544	332	222	521	252	659
5	13	0.0	714.7	29.4	4792.0	-1241.0	-57.7	0.0	210.0	18.6	0.0	656.4	-28.7	0.0	-403.7	50.5	0.0	171.5	-21.43	427	292	453	434	267	471	293	613	504	206	530	348	231	511	257	653
5	14	0.0	729.2	-0.3	4792.0	-1271.0	-1.4	0.0	222.9	7.3	0.0	624.4	-42.9	0.0	-353.2	50.5	0.0	150.1	-21.43	420	299	445	443	274	463	298	607	492	219	517	363	242	498	267	642

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase : PUENTE COMPLETO EN TIEMPO INFINITO

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508.5. TABLERO IZQUIERDO

Resumen de combinaciones:

		Tension máxima (t/m2)	Tension mínima (t/m2)
1	PP,final + CM + 0.9 x Pret,final + 0.4* SC(+) + GRAD	730	159
2	PP,final + CM + 1.1 x Pret,final + 0.4* SC(+) + GRAD	852	227
3	PP,final + CM + 0.9 x Pret,final + 0.4* SC(-) + GRAD	800	-29
4	PP,final + CM + 1.1 x Pret,final + 0.4* SC(-) + GRAD	888	158
5	PP,final + CM + 0.9 x Pret,final + 1.0* SC(+) + GRAD	861	8
6	PP,final + CM + 1.1 x Pret,final + 1.0* SC(+) + GRAD	926	155
7	PP,final + CM + 0.9 x Pret,final + 1.0* SC(-) + GRAD	948	-161
8	PP,final + CM + 1.1 x Pret,final + 1.0* SC(-) + GRAD	940	26

PP,final= Peso propio en tiempo final
Pret,final = Pretensado en tiempo final
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
5	15	0.0	714.1	-30.0	4792.0	-1244.0	54.9	0.0	224.7	-3.9	0.0	576.4	-57.1	0.0	-302.6	50.5	0.0	128.6	-21.43	414	307	440	449	283	453	308	595	479	234	505	376	256	483	282	625
5	16	0.0	669.3	-59.7	4792.0	-1161.0	111.1	0.0	215.2	-15.1	0.0	516.7	-71.0	0.0	-252.3	50.5	0.0	107.2	-21.43	408	313	437	451	294	440	323	578	466	249	495	387	272	465	301	603
5	17	0.0	594.8	-89.4	4792.0	-1021.0	167.4	0.0	194.6	-26.3	0.0	442.2	-85.1	0.0	-201.8	50.5	0.0	85.8	-21.43	403	319	438	450	308	425	343	556	451	265	487	396	290	445	325	576
5	18	0.0	490.6	-119.0	4792.0	-825.9	223.7	0.0	162.7	-37.5	0.0	351.5	-99.3	0.0	-151.4	50.5	0.0	64.3	-21.43	397	325	441	447	323	408	367	529	435	283	480	404	310	423	354	544
5	19	0.0	356.8	-148.7	4792.0	-574.3	279.9	0.0	119.7	-48.7	0.0	250.2	-113.2	0.0	-100.9	50.5	0.0	42.9	-21.43	392	331	448	440	341	388	396	497	419	301	474	410	332	398	387	507
5	20	0.0	193.1	-178.4	4791.0	-266.0	336.2	0.0	65.4	-59.9	0.0	133.3	-127.4	0.0	-50.5	50.5	0.0	21.5	-21.43	387	336	456	430	361	366	430	460	402	320	471	414	356	371	425	465
5	21	0.0	0.0	-208.1	4791.0	98.2	392.5	0.0	0.0	-71.1	0.0	0.0	-128.9	0.0	0.0	34.9	0.0	0.0	-21.43	383	341	468	417	383	341	468	417	383	341	468	417	383	341	468	417

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO: SUBTRAMO XV.
ESTRUCTURA: E-1508.5.TABLERO IZQUIERDO

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)	Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./m2.)	Tens.inf. σ i (t./m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)
1	1	0.1	0.0	11.875	2.100	8.300	5.100	410.200	0.969	1.131	7.27	0.00	19.976	8.92	0.00	0.000	5	365	333	0.000	0.00	0.00
1	2	765.5	213.9	8.796	2.100	8.300	5.100	410.200	1.063	1.037	0.00	0.00	19.976	6.60	0.00	0.000	5	524	413	0.000	0.00	0.00
1	3	1423.2	383.6	8.796	2.100	8.300	5.100	410.200	1.145	0.955	0.00	0.00	19.976	6.60	0.00	0.000	5	544	389	0.000	0.00	0.00
1	4	1982.5	510.7	8.796	2.100	8.300	5.100	410.200	1.216	0.884	0.00	0.00	19.976	6.60	0.00	0.000	5	570	359	0.000	0.00	0.00
1	5	2440.1	595.7	8.796	2.100	8.300	5.100	410.200	1.274	0.826	0.00	0.00	19.976	6.60	0.00	0.000	5	591	335	0.000	0.00	0.00
1	6	2801.2	638.6	8.796	2.100	8.300	5.100	410.200	1.321	0.779	0.00	0.00	19.976	6.60	0.00	0.000	5	609	314	0.000	0.00	0.00
1	7	3059.3	639.3	8.796	2.100	8.300	5.100	410.200	1.356	0.744	0.00	0.00	19.976	6.60	0.00	0.000	5	622	299	0.000	0.00	0.00
1	8	3216.7	597.8	8.796	2.100	8.300	5.100	410.200	1.380	0.720	0.00	0.00	19.976	6.60	0.00	0.000	5	630	290	0.000	0.00	0.00
1	9	3276.0	514.1	8.796	2.100	8.300	5.100	410.200	1.391	0.709	0.00	0.00	19.976	6.60	0.00	0.000	5	634	285	0.000	0.00	0.00
1	10	3233.0	388.2	8.796	2.100	8.300	5.100	410.200	1.391	0.709	0.00	0.00	19.976	6.60	0.00	0.000	5	630	322	0.000	0.00	0.00
1	11	3094.3	220.0	8.796	2.100	8.300	5.100	410.200	1.375	0.725	0.00	0.00	19.976	6.60	0.00	0.000	5	630	322	0.000	0.00	0.00
1	12	2849.8	9.8	8.796	2.100	8.300	5.100	410.200	1.344	0.756	0.00	0.00	19.976	6.60	0.00	0.000	5	630	322	0.000	0.00	0.00
1	13	2508.5	-242.8	8.796	2.100	8.300	5.100	410.200	1.297	0.803	0.00	0.69	19.976	6.60	0.00	0.000	5	630	322	0.000	0.00	0.00
1	14	2067.2	-537.5	8.796	2.100	8.300	5.100	410.200	1.235	0.865	0.00	0.00	19.976	6.60	0.00	0.000	5	630	322	0.000	0.00	0.00
1	15	1523.4	-874.3	8.796	2.100	8.300	5.100	410.200	1.157	0.943	0.00	0.00	19.976	6.60	0.00	0.000	5	630	322	0.000	0.00	0.00
1	16	1039.1	-1408.4	8.796	2.100	8.300	5.100	410.200	1.063	1.037	0.00	0.00	19.976	6.60	0.00	0.000	5	640	337	0.000	0.00	0.00
1	17	543.9	-2065.4	8.796	2.100	8.300	5.100	410.200	0.954	1.146	0.00	0.00	19.976	6.60	0.00	0.000	5	644	331	0.000	0.00	0.00
1	18	35.3	-2822.6	8.796	2.100	8.300	5.100	410.200	0.829	1.271	0.00	0.00	19.976	6.60	0.00	0.000	5	659	315	0.000	0.00	0.00
1	19	-455.6	-3735.0	8.796	2.100	8.300	5.100	410.200	0.719	1.381	0.00	0.00	19.976	6.60	0.00	0.000	5	646	313	0.000	0.00	0.00
1	20	-942.2	-4796.4	11.875	2.100	8.300	5.100	410.200	0.653	1.447	0.00	0.00	19.976	8.92	0.00	0.000	5	473	250	0.000	0.00	0.00
1	21	-1440.5	-6028.9	11.875	2.100	8.300	5.100	410.200	0.631	1.469	0.00	0.00	19.976	8.92	0.00	0.000	5	385	349	0.000	0.00	0.00

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)	Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./m2.)	Tens.inf. σ i (t./m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)
2	1	-1440.5	-6028.9	11.875	2.100	8.300	5.100	410.200	0.631	1.469	0.00	0.00	19.976	8.92	0.00	0.000	5	373	348	0.000	0.00	0.00
2	2	-753.6	-4219.9	11.875	2.100	8.300	5.100	410.200	0.660	1.440	0.00	0.00	19.976	8.92	0.00	0.000	5	521	183	0.000	0.00	0.00
2	3	-108.0	-2676.9	8.796	2.100	8.300	5.100	410.200	0.750	1.350	0.00	0.00	19.976	6.60	0.00	0.000	5	730	206	0.000	0.00	0.00
2	4	527.0	-1418.6	8.796	2.100	8.300	5.100	410.200	0.890	1.210	0.00	0.00	19.976	6.60	0.00	0.000	5	739	196	0.000	0.00	0.00
2	5	1246.3	-450.6	8.796	2.100	8.300	5.100	410.200	1.020	1.080	0.00	0.00	19.976	6.60	0.00	0.000	5	761	143	0.000	0.00	0.00
2	6	2209.4	-3.2	8.796	2.100	8.300	5.100	410.200	1.129	0.971	0.00	0.00	19.976	6.60	0.00	0.000	5	808	89	0.000	0.00	0.00
2	7	3039.6	310.4	8.796	2.100	8.300	5.100	410.200	1.225	0.875	0.00	0.00	19.976	6.60	0.00	0.000	5	845	33	0.000	0.00	0.00
2	8	3685.8	543.7	8.796	2.100	8.300	5.100	410.200	1.319	0.781	0.00	0.00	19.976	6.60	0.00	0.000	5	861	8	0.000	0.00	0.00
2	9	4144.4	685.0	8.796	2.100	8.300	5.100	410.200	1.401	0.699	0.00	0.00	19.976	6.60	0.00	0.000	5	856	15	0.000	0.00	0.00
2	10	4416.3	748.1	8.796	2.100	8.300	5.100	410.200	1.456	0.644	0.00	0.00	19.976	6.60	0.00	0.000	5	846	26	0.000	0.00	0.00
2	11	4504.3	732.3	8.796	2.100	8.300	5.100	410.200	1.486	0.614	0.00	0.00	19.976	6.60	0.00	0.000	5	832	43	0.000	0.00	0.00
2	12	4402.9	638.6	8.796	2.100	8.300	5.100	410.200	1.491	0.609	0.00	0.00	19.976	6.60	0.00	0.000	5	812	66	0.000	0.00	0.00
2	13	4118.3	466.2	8.796	2.100	8.300	5.100	410.200	1.469	0.631	0.00	0.00	19.976	6.60	0.00	0.000	5	788	93	0.000	0.00	0.00
2	14	3646.0	215.4	8.796	2.100	8.300	5.100	410.200	1.422	0.678	0.00	0.00	19.976	6.60	0.00	0.000	5	759	127	0.000	0.00	0.00
2	15	2987.0	-113.9	8.796	2.100	8.300	5.100	410.200	1.350	0.750	0.00	2.31	19.976	6.60	0.00	0.000	5	725	167	0.000	0.00	0.00
2	16	2143.7	-521.5	8.796	2.100	8.300	5.100	410.200	1.251	0.849	0.00	0.00	19.976	6.60	0.00	0.000	5	686	212	0.000	0.00	0.00
2	17	1202.2	-1098.5	8.796	2.100	8.300	5.100	410.200	1.127	0.973	0.00	0.00	19.976	6.60	0.00	0.000	5	644	260	0.000	0.00	0.00
2	18	444.7	-2120.5	8.796	2.100	8.300	5.100	410.200	0.978	1.122	0.00	0.00	19.976	6.60	0.00	0.000	5	613	296	0.000	0.00	0.00
2	19	-264.5	-3390.8	8.796	2.100	8.300	5.100	410.200	0.804	1.296	0.00	0.00	19.976	6.60	0.00	0.000	5	604	306	0.000	0.00	0.00
2	20	-984.9	-4916.9	11.875	2.100	8.300	5.100	410.200	0.675	1.425	0.00	0.00	19.976	8.92	0.00	0.000	5	457	262	0.000	0.00	0.00
2	21	-1736.8	-6748.1	11.875	2.100	8.300	5.100	410.200	0.631	1.469	0.00	0.00	19.976	8.92	0.00	0.000	5	328	414	0.000	0.00	0.00

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)	Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./m2.)	Tens.inf. σ i (t./m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)
3	1	-1737.7	-6749.6	11.875	2.100	8.300	5.100	410.200	0.631	1.469	0.00	0.00	19.976	8.92	0.00	0.000	5	316	413	0.000	0.00	0.00
3	2	-1032.4	-4932.2	11.875	2.100	8.300	5.100	410.200	0.660	1.440	0.00	0.00	19.976	8.92	0.00	0.000	5	469	243	0.000	0.00	0.00
3	3	-360.2	-3423.3	8.796	2.100	8.300	5.100	410.200	0.748	1.352	0.00	0.00	19.976	6.60	0.00	0.000	5	680	267	0.000	0.00	0.00
3	4	322.5	-2169.9	8.796	2.100	8.300	5.100	410.200	0.888	1.212	0.00	0.00	19.976	6.60	0.00	0.000	5	698	246	0.000	0.00	0.00
3	5	1042.3	-1166.8	8.796	2.100	8.300	5.100	410.200	1.019	1.081	0.00	0.00	19.976	6.60	0.00	0.000	5	726	187	0.000	0.00	0.00
3	6	1917.1	-581.4	8.796	2.100	8.300	5.100	410.200	1.127	0.973	0.00	0.00	19.976	6.60	0.00	0.000	5	777	129	0.000	0.00	0.00
3	7	2748.4	-216.1	8.796	2.100	8.300	5.100	410.200	1.224	0.876	0.00	0.00	19.976	6.60	0.00	0.000	5	813	73	0.000	0.00	0.00
3	8	3391.0	70.6	8.796	2.100	8.300	5.100	410.200	1.319	0.781	0.00	0.00	19.976	6.60	0.00	0.000	5	823	51	0.000	0.00	0.00
3	9	3850.1	278.7	8.796	2.100	8.300	5.100	410.200	1.401	0.699	0.00	0.00	19.976	6.60	0.00	0.000	5	818	59	0.000	0.00	0.00
3	10	4120.2	408.4	8.796	2.100	8.300	5.100	410.200	1.456	0.644	0.00	0.00	19.976	6.60	0.00	0.000	5	807	71	0.000	0.00	0.00
3	11	4206.0	459.7	8.796	2.100	8.300	5.100	410.200	1.486	0.614	0.00	0.00	19.976	6.60	0.00	0.000	5	792	88	0.000	0.00	0.00
3	12	4106.0	412.0	8.796	2.100	8.300	5.100	410.200	1.491	0.609	0.00	0.00	19.976	6.60	0.00	0.000	5	772	112	0.000	0.00	0.00
3	13	3818.1	283.7	8.796	2.100	8.300	5.100	410.200	1.469	0.631	0.00	0.00	19.976	6.60	0.00	0.000	5	747	140	0.000	0.00	0.00

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : SUBTRAMO XV.
ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

3	14	3345.0	77.0	8.796	2.100	8.300	5.100	410.200	1.422	0.678	0.00	0.00	19.976	6.60	0.00	0.000	5	718	175	0.000	0.00	0.00
3	15	2686.3	-208.2	8.796	2.100	8.300	5.100	410.200	1.350	0.750	0.00	2.31	19.976	6.60	0.00	0.000	5	683	215	0.000	0.00	0.00
3	16	1839.7	-571.7	8.796	2.100	8.300	5.100	410.200	1.251	0.849	0.00	0.00	19.976	6.60	0.00	0.000	5	644	261	0.000	0.00	0.00
3	17	969.1	-1173.6	8.796	2.100	8.300	5.100	410.200	1.127	0.973	0.00	0.00	19.976	6.60	0.00	0.000	5	604	307	0.000	0.00	0.00
3	18	244.0	-2187.0	8.796	2.100	8.300	5.100	410.200	0.978	1.122	0.00	0.00	19.976	6.60	0.00	0.000	5	579	336	0.000	0.00	0.00
3	19	-438.3	-3451.0	8.796	2.100	8.300	5.100	410.200	0.804	1.296	0.00	0.00	19.976	6.60	0.00	0.000	5	576	340	0.000	0.00	0.00
3	20	-1114.4	-4970.0	11.875	2.100	8.300	5.100	410.200	0.675	1.425	0.00	0.00	19.976	8.92	0.00	0.000	5	437	284	0.000	0.00	0.00
3	21	-1823.6	-6800.4	11.875	2.100	8.300	5.100	410.200	0.631	1.469	0.00	0.00	19.976	8.92	0.00	0.000	5	316	428	0.000	0.00	0.00

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)	Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t/m2.)	Tens.inf. σ i (t/m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)
4	1	-1822.7	-6798.9	11.875	2.100	8.300	5.100	410.200	0.631	1.469	0.00	0.00	19.976	8.92	0.00	0.000	5	304	427	0.000	0.00	0.00
4	2	-1050.0	-4963.8	11.875	2.100	8.300	5.100	410.200	0.660	1.440	0.00	0.00	19.976	8.92	0.00	0.000	5	467	245	0.000	0.00	0.00
4	3	-307.3	-3431.2	8.796	2.100	8.300	5.100	410.200	0.748	1.352	0.00	0.00	19.976	6.60	0.00	0.000	5	690	256	0.000	0.00	0.00
4	4	424.1	-2155.5	8.796	2.100	8.300	5.100	410.200	0.888	1.212	0.00	0.00	19.976	6.60	0.00	0.000	5	716	226	0.000	0.00	0.00
4	5	1201.4	-1125.3	8.796	2.100	8.300	5.100	410.200	1.019	1.081	0.00	0.00	19.976	6.60	0.00	0.000	5	753	155	0.000	0.00	0.00
4	6	2142.0	-523.5	8.796	2.100	8.300	5.100	410.200	1.127	0.973	0.00	0.00	19.976	6.60	0.00	0.000	5	807	93	0.000	0.00	0.00
4	7	2987.6	-90.5	8.796	2.100	8.300	5.100	410.200	1.224	0.876	0.00	0.00	19.976	6.60	0.00	0.000	5	844	37	0.000	0.00	0.00
4	8	3648.2	264.0	8.796	2.100	8.300	5.100	410.200	1.319	0.781	0.00	0.00	19.976	6.60	0.00	0.000	5	854	8	0.000	0.00	0.00
4	9	4120.5	540.0	8.796	2.100	8.300	5.100	410.200	1.401	0.699	0.00	0.00	19.976	6.60	0.00	0.000	5	850	14	0.000	0.00	0.00
4	10	4407.9	737.7	8.796	2.100	8.300	5.100	410.200	1.456	0.644	0.00	0.00	19.976	6.60	0.00	0.000	5	840	25	0.000	0.00	0.00
4	11	4508.8	856.5	8.796	2.100	8.300	5.100	410.200	1.486	0.614	0.00	0.00	19.976	6.60	0.00	0.000	5	826	41	0.000	0.00	0.00
4	12	4422.3	897.5	8.796	2.100	8.300	5.100	410.200	1.491	0.609	0.00	0.00	19.976	6.60	0.00	0.000	5	807	64	0.000	0.00	0.00
4	13	4153.4	860.0	8.796	2.100	8.300	5.100	410.200	1.469	0.631	0.00	0.00	19.976	6.60	0.00	0.000	5	783	92	0.000	0.00	0.00
4	14	3694.1	733.5	8.796	2.100	8.300	5.100	410.200	1.422	0.678	0.00	0.00	19.976	6.60	0.00	0.000	5	753	126	0.000	0.00	0.00
4	15	3050.5	522.1	8.796	2.100	8.300	5.100	410.200	1.350	0.750	0.00	0.00	19.976	6.60	0.00	0.000	5	718	166	0.000	0.00	0.00
4	16	2221.1	232.6	8.796	2.100	8.300	5.100	410.200	1.251	0.849	0.00	0.00	19.976	6.60	0.00	0.000	5	679	212	0.000	0.00	0.00
4	17	1312.3	-244.5	8.796	2.100	8.300	5.100	410.200	1.127	0.973	0.00	0.00	19.976	6.60	0.00	0.000	5	651	244	0.000	0.00	0.00
4	18	599.3	-1163.1	8.796	2.100	8.300	5.100	410.200	0.978	1.122	0.00	0.00	19.976	6.60	0.00	0.000	5	640	257	0.000	0.00	0.00
4	19	4.4	-2424.1	8.796	2.100	8.300	5.100	410.200	0.804	1.296	1.07	0.00	19.976	6.60	0.00	0.000	5	650	246	0.000	0.00	0.00
4	20	-618.1	-3971.9	11.875	2.100	8.300	5.100	410.200	0.675	1.425	0.00	0.00	19.976	8.92	0.00	0.000	5	516	193	0.000	0.00	0.00
4	21	-1289.0	-5772.8	11.875	2.100	8.300	5.100	410.200	0.631	1.469	0.00	0.00	19.976	8.92	0.00	0.000	5	393	330	0.000	0.00	0.00

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)	Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t/m2.)	Tens.inf. σ i (t/m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)
5	1	-1288.9	-5772.7	11.875	2.100	8.300	5.100	410.200	0.631	1.469	0.00	0.00	19.976	8.92	0.00	0.000	5	376	328	0.000	0.00	0.00
5	2	-860.0	-4737.0	11.875	2.100	8.300	5.100	410.200	0.656	1.444	0.00	0.00	19.976	8.92	0.00	0.000	5	457	238	0.000	0.00	0.00
5	3	-433.8	-3824.9	11.875	2.100	8.300	5.100	410.200	0.734	1.366	0.00	0.00	19.976	8.92	0.00	0.000	5	485	207	0.000	0.00	0.00
5	4	-0.6	-3035.3	11.875	2.100	8.300	5.100	410.200	0.844	1.256	0.00	0.00	19.976	8.92	0.00	0.000	5	470	202	0.000	0.00	0.00
5	5	439.5	-2362.4	11.875	2.100	8.300	5.100	410.200	0.931	1.169	9.22	0.00	19.976	8.92	0.00	0.000	5	488	182	0.000	0.00	0.00
5	6	846.5	-1754.3	11.875	2.100	8.300	5.100	410.200	0.993	1.107	6.06	0.23	19.976	8.92	0.00	0.000	5	518	148	0.000	0.00	0.00
5	7	1196.8	-1210.6	11.875	2.100	8.300	5.100	410.200	1.053	1.047	3.09	2.06	19.976	8.92	0.00	0.000	5	537	114	0.000	0.00	0.00
5	8	1605.4	-841.1	11.875	2.100	8.300	5.100	410.200	1.113	0.987	0.04	3.94	19.976	8.92	0.00	0.000	5	547	158	0.000	0.00	0.00
5	9	1963.1	-543.1	11.875	2.100	8.300	5.100	410.200	1.171	0.929	0.00	5.72	19.976	8.92	0.00	0.000	5	541	164	0.000	0.00	0.00
5	10	2252.9	-295.6	11.875	2.100	8.300	5.100	410.200	1.219	0.881	0.00	7.19	19.976	8.92	0.00	0.000	5	533	173	0.000	0.00	0.00
5	11	2461.8	-84.6	11.875	2.100	8.300	5.100	410.200	1.255	0.845	0.00	8.30	19.976	8.92	0.00	0.000	5	525	183	0.000	0.00	0.00
5	12	2585.3	89.3	11.875	2.100	8.300	5.100	410.200	1.279	0.821	0.00	0.00	19.976	8.92	0.00	0.000	5	515	194	0.000	0.00	0.00
5	13	2628.9	226.7	11.875	2.100	8.300	5.100	410.200	1.291	0.809	0.00	0.00	19.976	8.92	0.00	0.000	5	504	206	0.000	0.00	0.00
5	14	2589.9	327.0	11.875	2.100	8.300	5.100	410.200	1.292	0.808	0.00	0.00	19.976	8.92	0.00	0.000	5	492	219	0.000	0.00	0.00
5	15	2465.6	390.7	11.875	2.100	8.300	5.100	410.200	1.281	0.819	0.00	0.00	19.976	8.92	0.00	0.000	5	479	234	0.000	0.00	0.00
5	16	2262.6	417.6	11.875	2.100	8.300	5.100	410.200	1.258	0.842	0.00	0.00	19.976	8.92	0.00	0.000	5	466	249	0.000	0.00	0.00
5	17	1976.1	407.7	11.875	2.100	8.300	5.100	410.200	1.224	0.876	0.00	0.00	19.976	8.92	0.00	0.000	5	451	265	0.000	0.00	0.00
5	18	1603.8	360.9	11.875	2.100	8.300	5.100	410.200	1.178	0.922	0.00	0.00	19.976	8.92	0.00	0.000	5	435	283	0.000	0.00	0.00
5	19	1154.5	277.5	11.875	2.100	8.300	5.100	410.200	1.120	0.980	0.00	0.00	19.976	8.92	0.00	0.000	5	419	301	0.000	0.00	0.00
5	20	619.9	157.0	11.875	2.100	8.300	5.100	410.200	1.051	1.049	3.19	0.00	19.976	8.92	0.00	0.000	5	402	320	0.000	0.00	0.00
5	21	0.0	-0.1	11.875	2.100	8.300	5.100	410.200	0.969	1.131	7.27	0.00	19.976	8.92	0.00	0.000	5	383	341	0.000	0.00	0.00

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : SUBTRAMO XV.
ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

ART.51.5.1 As min.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./m2.)	Tens.inf. σ i (t./m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.00	0.000	7	365	333	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	466	480	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	434	517	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	412	542	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	391	567	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	369	592	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	349	616	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	328	640	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	308	663	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	285	723	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	270	740	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	260	752	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	254	758	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	254	758	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	258	754	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	276	758	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	293	739	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	309	720	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	276	742	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	91	676	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	-53	837	0.126	0.00	1.046	6.30	8.92	8.92	8.92	8.92	8.92

ART.51.5.1 As min.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./m2.)	Tens.inf. σ i (t./m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.00	0.000	7	-65	837	0.151	0.00	1.257	7.57	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	174	569	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	431	553	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	478	498	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	497	449	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	506	439	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	497	436	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	475	455	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	439	498	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	407	535	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	379	568	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	355	595	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	335	619	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	319	638	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	307	652	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	298	662	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	291	669	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	274	690	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	240	729	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	66	699	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	-146	943	0.281	0.00	2.334	14.06	14.06	14.06	8.92	8.92	8.92

ART.51.5.1 As min.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./m2.)	Tens.inf. σ i (t./m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.00	0.000	7	-158	942	0.301	0.00	2.500	15.06	15.06	15.06	8.92	8.92	8.92
0.00	0.00	0.000	7	84	673	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	329	674	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	375	621	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	394	572	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	407	557	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	407	544	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	389	554	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	365	584	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	344	608	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	328	627	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	312	646	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	300	660	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : SUBTRAMO XY.
ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

0.00	0.00	0.000	7	291	670	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	287	675	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	286	675	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	285	677	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	268	696	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	235	735	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	62	703	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	-150	948	0.287	0.00	2.381	14.35	14.35	14.35	8.92	8.92	8.92

ART.51.5.1	Pretensado	Dist. pret.	Número	Tens.sup.	Tens.inf.	Fibra neutra	Pret.preteso	Ac.Traccion.	ART.51.5.1	ENVOLVENTE TOTAL				
As min.inf. (cm2/m.)	preteso sup. (cm2.)	preteso.Ds (m.)	hipótesis combinacion	σ s (t./m2.)	σ i (t./m2.)	x (m.)	traccionado (cm2)	Act. (m2.)	As min.sup. (cm2/m.)	As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.00	0.000	7	-161	946	0.306	0.00	2.539	15.29	15.29	15.29	8.92	8.92	8.92
0.00	0.00	0.000	7	81	676	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	328	675	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	376	620	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	398	568	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	419	543	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	430	517	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	423	508	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	410	524	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	401	534	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	396	540	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	395	542	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	397	539	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	402	534	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	409	526	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	420	513	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	417	516	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	400	536	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	364	577	0.000	0.00	0.000	0.00	6.60	6.60	6.60	6.60	6.60
0.00	0.00	0.000	7	177	571	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	-39	812	0.097	0.00	0.806	4.85	8.92	8.92	8.92	8.92	8.92

ART.51.5.1	Pretensado	Dist. pret.	Número	Tens.sup.	Tens.inf.	Fibra neutra	Pret.preteso	Ac.Traccion.	ART.51.5.1	ENVOLVENTE TOTAL				
As min.inf. (cm2/m.)	preteso sup. (cm2.)	preteso.Ds (m.)	hipótesis combinacion	σ s (t./m2.)	σ i (t./m2.)	x (m.)	traccionado (cm2)	Act. (m2.)	As min.sup. (cm2/m.)	As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.00	0.000	7	-56	811	0.135	0.00	1.123	6.77	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	69	672	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	126	608	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	125	587	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	142	568	0.000	0.00	0.000	0.00	8.92	8.92	9.22	8.92	8.92
0.00	0.00	0.000	7	171	536	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	191	500	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	205	540	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	207	537	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	210	534	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	215	529	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	222	521	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	231	511	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	242	498	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	256	483	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	272	465	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	290	445	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	310	423	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	332	398	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	356	371	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92
0.00	0.00	0.000	7	383	341	0.000	0.00	0.000	0.00	8.92	8.92	8.92	8.92	8.92

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 23.77 tg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
1	1	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
1	2	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	3	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	4	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	5	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	6	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	7	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	8	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	9	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	10	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	11	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	12	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	13	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	14	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	15	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	16	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	17	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	18	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	19	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
1	20	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
1	21	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
1	1	0.0	190.8	0.0	95.0	159	0	-38	0	0.0	17.83	0.00	0.00	74.92	-360	4618
1	2	208.4	160.1	104.9	81.7	140	166	-39	-37	21.2	17.83	0.00	0.00	-325.9	-314.7	4618
1	3	383.3	133.9	194.1	68.3	125	298	-40	-61	42.4	17.83	0.00	0.00	-719.6	-269.4	4618
1	4	526.8	107.8	267.4	55.0	111	402	-42	-74	63.6	17.83	0.00	0.00	-1013	-224.1	4618
1	5	639.4	81.7	324.8	41.7	97	476	-45	-80	84.8	17.83	0.00	0.00	-1252	-178.7	4618
1	6	721.0	55.5	366.5	28.4	86	528	-49	-81	106.0	17.83	0.00	0.00	-1438	-133.4	4618
1	7	771.5	29.4	392.3	15.1	72	513	-54	-81	127.2	17.83	0.00	0.00	-1569	-88.08	4618
1	8	790.9	3.3	402.4	1.8	62	513	-59	-81	148.3	17.83	0.00	0.00	-1647	-42.72	4618
1	9	779.3	-22.9	396.6	-11.5	52	498	-66	-86	169.5	17.83	0.00	0.00	-1671	2.59	4618
1	10	736.6	-49.0	375.0	-24.9	44	470	-73	-98	190.7	17.83	0.00	0.00	-1729	54.46	4763
1	11	662.8	-75.1	337.5	-38.2	36	433	-81	31	211.9	17.83	0.00	0.00	-1624	119.2	4764
1	12	558.0	-101.3	284.3	-51.5	31	401	-94	5	233.1	17.83	0.00	0.00	-1446	181.8	4764
1	13	422.1	-127.4	215.2	-64.8	26	369	-106	-52	254.3	17.83	0.00	0.00	-1192	244.3	4764
1	14	255.1	-153.5	130.3	-78.1	22	338	-118	-112	275.5	17.83	0.00	0.00	-864.7	306.9	4764
1	15	57.2	-179.7	29.6	-91.4	18	307	-131	-209	296.7	17.83	0.00	0.00	-462.9	369.4	4764
1	16	-171.8	-205.8	-86.9	-104.7	16	280	-145	-330	317.8	17.83	0.00	0.00	1.002	442	4880
1	17	-432.0	-231.9	-219.3	-118.0	14	258	-161	-461	339.0	17.83	0.00	0.00	564.7	506.1	4880
1	18	-723.1	-258.1	-367.4	-131.3	12	241	-176	-632	360.2	17.83	0.00	0.00	1203	567.9	4880
1	19	-1045.0	-284.2	-531.5	-144.6	11	232	-191	-814	381.4	17.83	0.00	0.00	1760	381.4	4807
1	20	-1401.0	-314.9	-711.3	-158.0	10	231	-207	-1040	402.6	17.83	0.00	0.00	2167	205.2	4850
1	21	-1797.0	-350.2	-907.0	-171.3	10	238	-223	-1294	423.8	17.83	0.00	0.00	2354	28.56	4850

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 32.41 tg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
2	1	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
2	2	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
2	3	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	4	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	5	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	6	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	7	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	8	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	9	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	10	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	11	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	12	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	13	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	14	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	15	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	16	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	17	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	18	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	19	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
2	20	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
2	21	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)
2	1	-1797.0	368.7	-907.0	178.6	256	-1299	-32	238	423.8	-2.898	0.00	0.00
2	2	-1238.0	320.6	-632.3	160.4	232	-917	-33	193	419.1	-2.898	0.00	0.00
2	3	-752.6	278.8	-387.0	142.3	210	-585	-34	162	414.4	-2.898	0.00	0.00
2	4	-329.8	243.1	-171.2	124.1	190	-299	-35	143	409.7	-2.898	0.00	0.00
2	5	35.3	207.5	15.3	106.0	169	-76	-38	135	405.0	-2.898	0.00	0.00
2	6	342.7	171.9	172.3	87.8	151	110	-42	136	400.3	-2.898	0.00	0.00
2	7	592.3	136.2	300.0	69.7	132	242	-46	143	395.6	-2.898	0.00	0.00
2	8	784.2	100.6	398.2	51.6	115	332	-52	151	390.9	-2.898	0.00	0.00
2	9	918.3	65.0	467.0	33.4	101	399	-58	157	386.2	-2.898	0.00	0.00
2	10	994.7	29.3	506.5	15.3	86	421	-66	158	381.5	-2.898	0.00	0.00
2	11	1013.0	-6.3	516.5	-2.9	74	431	-76	256	376.8	-2.898	0.00	0.00
2	12	974.3	-42.0	497.0	-21.1	62	406	-89	254	372.1	-2.898	0.00	0.00
2	13	877.4	-77.6	448.2	-39.2	52	367	-103	228	367.4	-2.898	0.00	0.00
2	14	722.8	-113.2	370.0	-57.4	44	312	-117	160	362.7	-2.898	0.00	0.00
2	15	510.5	-148.9	262.3	-75.5	38	289	-134	69	358.0	-2.898	0.00	0.00
2	16	240.4	-184.5	125.3	-93.7	33	267	-152	-62	353.3	-2.898	0.00	0.00
2	17	-87.4	-220.1	-41.2	-111.8	30	250	-170	-247	348.6	-2.898	0.00	0.00
2	18	-473.0	-255.8	-237.1	-130.0	27	242	-191	-467	343.9	-2.898	0.00	0.00
2	19	-916.3	-291.4	-462.4	-148.1	25	245	-210	-753	339.2	-2.898	0.00	0.00
2	20	-1422.0	-333.3	-717.0	-166.3	24	261	-233	-1082	334.5	-2.898	0.00	0.00
2	21	-2001.0	-381.4	-1001.0	-184.4	24	291	-256	-1470	329.8	-2.898	0.00	0.00

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 32.41 tg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
3	1	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
3	2	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
3	3	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
3	4	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
3	5	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
3	6	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
3	7	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
3	8	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
3	9	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
3	10	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
3	11	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
3	12	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
3	13	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
3	14	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)
3	1	-2002.0	374.8	-1001.0	180.6	258	-1472	-34	314	329.8	-0.05136	0.00	0.00
3	2	-1433.0	326.7	-723.4	162.4	237	-1080	-34	267	329.8	-0.05136	0.00	0.00
3	3	-937.8	284.8	-474.9	144.3	214	-745	-35	234	329.7	-0.05136	0.00	0.00
3	4	-505.1	249.2	-255.8	126.1	192	-455	-37	215	329.6	-0.05136	0.00	0.00
3	5	-130.2	213.6	-66.2	108.0	174	-227	-40	207	329.5	-0.05136	0.00	0.00
3	6	187.0	177.9	94.1	89.8	154	-46	-43	208	329.4	-0.05136	0.00	0.00
3	7	446.7	142.3	225.0	71.7	137	100	-48	214	329.3	-0.05136	0.00	0.00
3	8	648.4	106.7	326.5	53.5	120	195	-54	221	329.3	-0.05136	0.00	0.00
3	9	792.3	71.0	398.5	35.4	104	253	-60	226	329.2	-0.05136	0.00	0.00
3	10	878.5	35.4	441.1	17.2	91	294	-68	224	329.1	-0.05136	0.00	0.00
3	11	907.0	-0.2	454.3	-0.9	78	297	-79	323	329.0	-0.05136	0.00	0.00
3	12	877.8	-35.9	438.1	-19.1	68	198	-93	319	328.9	-0.05136	0.00	0.00
3	13	790.8	-71.5	392.5	-37.2	60	199	-106	275	328.8	-0.05136	0.00	0.00
3	14	646.0	-107.1	317.5	-55.4	53	193	-122	215	328.8	-0.05136	0.00	0.00

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

3	15	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90	3	15	443.5	-142.8	213.0	-73.5	47	185	-137	107	328.7	-0.05136	0.00	0.00	-976.7	237.3	4558
3	16	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90	3	16	183.3	-178.4	79.2	-91.7	43	178	-156	-31	328.6	-0.05136	0.00	0.00	-534.7	308.4	4558
3	17	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90	3	17	-134.6	-214.0	-84.1	-109.8	39	177	-175	-214	328.5	-0.05136	0.00	0.00	22.46	379.4	4558
3	18	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90	3	18	-510.3	-249.7	-276.7	-128.0	36	184	-194	-447	328.4	-0.05136	0.00	0.00	694.8	450.5	4558
3	19	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90	3	19	-943.8	-285.3	-498.8	-146.1	34	203	-216	-740	328.3	-0.05136	0.00	0.00	1476	509.9	4558
3	20	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90	3	20	-1440.0	-327.2	-750.4	-164.3	33	234	-236	-1077	328.3	-0.05136	0.00	0.00	2162	256.4	4816
3	21	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90	3	21	-2009.0	-375.3	-1031.0	-182.4	33	280	-260	-1471	328.2	-0.05136	0.00	0.00	2436	4.021	4865

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 32.41 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
4	1	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
4	2	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
4	3	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	4	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	5	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	6	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	7	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	8	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	9	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	10	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	11	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	12	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	13	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	14	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	15	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	16	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	17	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	18	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	19	8.796	4.089	0.972	-1.128	0.000	184.5	2.300	5.100	2.100	205.0	90
4	20	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
4	21	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)			
4	1	-2008.0	382.2	-1031.0	188.0	253	-1463	-18	259	328.2	3.102	0.00	0.00	2411	0.5065	4778
4	2	-1428.0	334.1	-740.8	169.9	230	-1087	-19	237	333.2	3.102	0.00	0.00	2267	-178.1	4778
4	3	-920.5	292.3	-480.2	151.7	210	-754	-20	229	338.2	3.102	0.00	0.00	1790	-352.2	4778
4	4	-475.8	256.6	-249.1	133.6	188	-477	-22	235	343.3	3.102	0.00	0.00	1068	-454.7	4778
4	5	-88.8	221.0	-47.3	115.4	168	-257	-25	252	348.3	3.102	0.00	0.00	464.4	-344.1	4657
4	6	240.4	185.3	125.0	97.3	150	-76	-29	277	353.3	3.102	0.00	0.00	-43.13	-282.3	4657
4	7	511.9	149.7	268.0	79.1	132	53	-33	306	358.3	3.102	0.00	0.00	-468.3	-272.5	4595
4	8	725.6	114.1	381.5	61.0	117	154	-39	336	363.4	3.102	0.00	0.00	-871.6	-267.5	4516
4	9	881.6	78.5	465.6	42.8	102	210	-47	403	368.4	3.102	0.00	0.00	-1245	-192.9	4523
4	10	979.9	42.8	520.3	24.7	88	237	-58	449	373.4	3.102	0.00	0.00	-1501	-122.4	4523
4	11	1020.0	7.2	545.6	6.5	77	255	-69	463	378.4	3.102	0.00	0.00	-1642	-51.91	4523
4	12	1003.0	-28.4	541.5	-11.6	66	147	-82	471	383.5	3.102	0.00	0.00	-1669	18.57	4523
4	13	928.2	-64.1	508.0	-29.8	58	150	-97	451	388.5	3.102	0.00	0.00	-1582	89.07	4523
4	14	795.5	-99.7	445.0	-47.9	52	147	-112	386	393.5	3.102	0.00	0.00	-1381	159.6	4523
4	15	604.9	-135.4	352.6	-66.1	47	143	-130	296	398.6	3.102	0.00	0.00	-1065	230.1	4523
4	16	356.7	-171.0	230.9	-84.2	42	142	-147	154	403.6	3.102	0.00	0.00	-635	300.6	4523
4	17	50.8	-206.6	79.7	-102.4	39	147	-167	-12	408.6	3.102	0.00	0.00	-90.88	371.1	4523
4	18	-312.9	-242.3	-100.9	-120.5	37	160	-188	-249	413.6	3.102	0.00	0.00	567.5	441.6	4523
4	19	-734.3	-277.9	-310.9	-138.7	35	184	-208	-532	418.7	3.102	0.00	0.00	1334	500.5	4523
4	20	-1219.0	-319.8	-550.3	-156.8	34	220	-231	-866	423.7	3.102	0.00	0.00	2009	249.9	4790
4	21	-1776.0	-367.9	-819.1	-175.0	34	269	-252	-1247	428.7	3.102	0.00	0.00	2258	-1.201	4790

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 20.00 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
5	1	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	2	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	3	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	4	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	5	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	6	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	7	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	8	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	9	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	10	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	11	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	12	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	13	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	14	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	15	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	16	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	17	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	18	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	19	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	20	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90
5	21	11.875	4.480	0.992	-1.108	0.000	184.5	5.100	5.100	2.100	205.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)			
5	1	-1776.0	385.6	-819.0	153.0	203	-1227	-13	269	428.7	-21.43	0.00	0.00	2222	-21.61	4667
5	2	-1405.0	356.0	-671.7	141.8	189	-1030	-14	259	407.3	-21.43	0.00	0.00	2079	-264.2	4667
5	3	-1064.0	326.3	-535.5	130.5	175	-871	-14	256	385.9	-21.43	0.00	0.00	1692	-509.3	4667
5	4	-752.3	296.6	-410.6	119.4	162	-715	-15	259	364.4	-21.43	0.00	0.00	1153	-484.8	4529
5	5	-470.6	266.9	-296.9	108.2	150	-578	-17	267	343.0	-21.43	0.00	0.00	741.7	-352.2	4529
5	6	-218.4	237.2	-194.2	97.0	138	-477	-19	279	321.5	-21.43	0.00	0.00	435.1	-273.9	4529
5	7	3.9	207.5	-102.9	85.8	126	-376	-21	295	300.1	-21.43	0.00	0.00	161.7	-285	4450
5	8	196.7	177.8	-22.7	74.5	115	-292	-24	313	278.7	-21.43	0.00	0.00	-257.5	-311	4795
5	9	359.6	148.1	46.2	63.4	104	-239	-28	332	257.2	-21.43	0.00	0.00	-560.5	-289.8	4792
5	10	492.8	118.5	103.9	52.2	95	-182	-32	350	235.8	-21.43	0.00	0.00	-814.9	-226.5	4792
5	11	596.5	88.8	150.5	40.9	85	-259	-37	365	214.4	-21.43	0.00	0.00	-1013	-170.2	4792
5	12	670.4	59.1	185.8	29.8	79	-228	-43	448	192.9	-21.43	0.00	0.00	-1155	-113.9	4792
5	13	714.7	29.4	210.0	18.6	73	-203	-51	456	171.5	-21.43	0.00	0.00	-1241	-57.66	4792
5	14	729.2	-0.3	222.9	7.3	68	-183	-60	454	150.1	-21.43	0.00	0.00	-1271	-1.352	4792
5	15	714.1	-30.0	224.7	-3.9	63	-165	-70	439	128.6	-21.43	0.00	0.00	-1244	54.9	4792
5	16	669.3	-59.7	215.2	-15.1	59	-148	-80	412	107.2	-21.43	0.00	0.00	-1161	111.1	4792
5	17	594.8	-89.4	194.6	-26.3	56	-129	-91	370	85.8	-21.43	0.00	0.00	-1021	167.4	4792
5	18	490.6	-119.0	162.7	-37.5	54	-107	-103	308	64.3	-21.43	0.00	0.00	-825.9	223.7	4792
5	19	356.8	-148.7	119.7	-48.7	52	-80	-115	229	42.9	-21.43	0.00	0.00	-574.3	279.9	4792
5	20	193.1	-178.4	65.4	-59.9	51	-45	-128	128	21.5	-21.43	0.00	0.00	-266	336.2	4791
5	21	0.0	-208.1	0.0	-71.1	50	0	-139	0	0.0	-21.43	0.00	0.00	98.21	392.5	4791

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO: L.A.V. MADRID - ZARAGOZA

ESTRUCTURA: E-1508.5.TABLERO IZQUIERDO

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
1	1	0.0	0.0	333.2	-160.1	75.0	74.9	333.2	75.0	405.5	370.4	-244.3	A-B
1	2	0.0	0.0	284.5	-155.0	425.2	-100.1	284.5	425.2	626.1	407.8	-244.3	A-B
1	3	0.0	0.0	248.9	-147.2	657.5	-291.8	248.9	657.5	681.4	343.7	-244.3	A-B
1	4	0.0	0.0	213.3	-140.7	877.0	-409.8	213.3	877.0	733.6	283.2	-244.3	A-B
1	5	0.0	0.0	179.3	-135.3	1035.7	-504.2	179.3	1035.7	771.3	239.4	-244.3	A-B
1	6	0.0	0.0	147.7	-131.4	1144.7	-580.9	147.7	1144.7	797.2	209.3	-244.3	A-B
1	7	0.0	0.0	113.3	-128.6	1136.7	-642.5	128.6	-642.5	372.2	702.2	-244.3	A-B
1	8	0.0	0.0	84.1	-127.1	1135.0	-695.2	127.1	-695.2	359.7	716.8	-244.3	A-B
1	9	0.0	0.0	76.9	-147.5	388.2	-36.8	147.5	-36.8	516.3	535.2	-244.3	A-B
1	10	0.0	0.0	80.7	-165.6	262.6	-208.9	165.6	-208.9	491.8	599.1	-244.3	A-B
1	11	0.0	0.0	98.6	-172.7	243.5	-77.2	172.7	-77.2	523.3	562.9	-244.3	A-B
1	12	0.0	0.0	117.0	-189.0	262.6	-175.3	189.0	-175.3	499.9	590.0	-244.3	A-B
1	13	0.0	0.0	136.9	-202.9	317.2	-314.5	202.9	-314.5	466.8	628.4	-244.3	A-B
1	14	0.0	0.0	158.0	-217.9	402.0	-455.0	217.9	-455.0	433.4	667.1	-244.3	A-B
1	15	0.0	0.0	179.9	-234.1	521.4	-646.6	234.1	-646.6	387.9	719.9	-244.3	A-B
1	16	0.0	0.0	212.9	-240.9	665.3	-881.5	240.9	-881.5	345.2	797.9	-244.3	A-B
1	17	0.0	0.0	238.3	-260.5	873.8	-1104.3	260.5	-1104.3	292.2	859.4	-244.3	A-B
1	18	0.0	0.0	262.1	-279.9	1124.0	-1381.5	279.9	-1381.5	226.3	935.8	-244.3	A-B
1	19	0.0	0.0	38.5	-548.4	1261.5	-1826.4	548.4	-1826.4	112.2	1050.2	-244.3	A-B
1	20	0.0	0.0	-178.3	-814.3	1216.2	-2561.8	814.3	-2561.8	-159.1	1041.8	-244.3	A-B
1	21	0.0	0.0	-399.0	-1088.0	913.5	-3643.4	1088.0	-3643.4	-398.7	1309.2	-244.3	C

VANO	SECCIÓN	Pdr. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
1	1	4618.0	388.9	1.61	31.85	90	VERIFICA	510.0	205.0	0.267	7497.7	333.2	VERIFICA
1	2	4618.0	525.0	1.77	29.40	90	VERIFICA	230.0	205.0	0.267	3226.6	284.5	VERIFICA
1	3	4618.0	525.0	1.77	29.40	90	VERIFICA	230.0	205.0	0.267	3226.6	248.9	VERIFICA
1	4	4618.0	525.0	1.77	29.40	90	VERIFICA	230.0	205.0	0.267	3226.6	213.3	VERIFICA
1	5	4618.0	525.0	1.77	29.40	90	VERIFICA	230.0	205.0	0.267	3226.6	179.3	VERIFICA
1	6	4618.0	525.0	1.77	29.40	90	VERIFICA	230.0	205.0	0.267	3226.6	147.7	VERIFICA
1	7	4618.0	525.0	1.77	29.40	90	VERIFICA	230.0	205.0	0.267	3226.6	128.6	VERIFICA
1	8	4618.0	525.0	1.77	29.40	90	VERIFICA	230.0	205.0	0.267	3226.6	127.1	VERIFICA
1	9	4618.0	525.0	1.77	29.40	90	VERIFICA	230.0	205.0	0.267	3226.6	147.5	VERIFICA
1	10	4763.0	541.5	1.79	29.14	90	VERIFICA	230.0	205.0	0.267	3208.8	165.6	VERIFICA
1	11	4764.0	541.6	1.79	29.14	90	VERIFICA	230.0	205.0	0.267	3208.6	172.7	VERIFICA
1	12	4764.0	541.6	1.79	29.14	90	VERIFICA	230.0	205.0	0.267	3208.6	189.0	VERIFICA
1	13	4764.0	541.6	1.79	29.14	90	VERIFICA	230.0	205.0	0.267	3208.6	202.9	VERIFICA
1	14	4764.0	541.6	1.79	29.14	90	VERIFICA	230.0	205.0	0.267	3208.6	217.9	VERIFICA
1	15	4764.0	541.6	1.79	29.14	90	VERIFICA	230.0	205.0	0.267	3208.6	234.1	VERIFICA
1	16	4880.0	554.8	1.81	28.94	90	VERIFICA	230.0	205.0	0.267	3194.6	240.9	VERIFICA
1	17	4880.0	554.8	1.81	28.94	90	VERIFICA	230.0	205.0	0.267	3194.6	260.5	VERIFICA
1	18	4880.0	554.8	1.81	28.94	90	VERIFICA	230.0	205.0	0.267	3194.6	279.9	VERIFICA
1	19	4807.0	546.5	1.80	29.07	90	VERIFICA	230.0	205.0	0.267	3203.4	548.4	VERIFICA
1	20	4850.0	408.4	1.63	31.46	90	VERIFICA	510.0	205.0	0.267	7446.7	814.3	VERIFICA
1	21	4850.0	408.4	1.63	31.46	90	VERIFICA	510.0	205.0	0.267	7446.7	1088.0	VERIFICA

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
2	1	0.0	0.0	1206.4	441.4	-3675.2	888.5	1206.4	-3675.2	-413.0	1309.8	-244.3	C
2	2	0.0	0.0	896.9	206.2	-1990.4	1425.0	896.9	-1990.4	-39.8	893.3	-244.3	A-B
2	3	0.0	0.0	598.0	-24.2	-868.4	1557.6	598.0	-868.4	335.1	781.1	-244.3	A-B
2	4	0.0	0.0	389.5	-173.4	-192.8	1385.3	389.5	-192.8	495.8	594.8	-244.3	A-B
2	5	0.0	0.0	386.9	-116.1	376.2	1270.8	386.9	376.2	617.3	424.1	-244.3	A-B
2	6	0.0	0.0	341.4	-107.8	855.9	1187.2	341.4	855.9	731.4	291.8	-244.3	A-B
2	7	0.0	0.0	241.6	-154.1	1205.5	1114.5	241.6	1205.5	807.5	188.3	-244.3	A-B
2	8	0.0	0.0	137.6	-208.0	1387.3	992.0	208.0	992.0	753.3	243.8	-244.3	A-B
2	9	0.0	0.0	110.5	-191.1	1425.1	811.1	191.1	811.1	711.1	294.5	-244.3	A-B
2	10	0.0	0.0	78.8	-180.1	1385.1	661.9	180.1	661.9	675.6	335.7	-244.3	A-B
2	11	0.0	0.0	56.9	-178.0	393.8	1612.8	178.0	1612.8	901.7	73.4	-244.3	A-B
2	12	0.0	0.0	61.6	-206.7	286.8	1499.2	206.7	1499.2	874.7	104.8	-244.3	A-B
2	13	0.0	0.0	68.5	-237.8	195.0	1333.9	237.8	1333.9	835.4	150.3	-244.3	A-B
2	14	0.0	0.0	80.0	-268.3	115.8	1088.0	268.3	1088.0	776.9	218.1	-244.3	A-B
2	15	0.0	0.0	93.7	-303.6	122.5	793.7	303.6	793.7	707.0	299.3	-244.3	A-B
2	16	0.0	0.0	109.4	-340.6	167.3	422.4	340.6	422.4	618.6	401.7	-244.3	A-B
2	17	0.0	0.0	126.5	-376.5	256.5	-44.0	376.5	-44.0	507.7	530.3	-244.3	A-B
2	18	0.0	0.0	144.8	-417.4	394.9	-579.5	417.4	-579.5	380.4	678.0	-244.3	A-B
2	19	0.0	0.0	153.1	-468.0	580.4	-1234.3	468.0	-1234.3	224.7	858.6	-244.3	A-B
2	20	0.0	0.0	-155.9	-845.3	607.9	-2188.4	845.3	-2188.4	-79.3	946.6	-244.3	A-B
2	21	0.0	0.0	-468.3	-1232.0	152.9	-3795.3	1232.0	-3795.3	-431.1	1348.0	-244.3	C

VANO	SECCIÓN	Pdr. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
2	1	4764.0	401.2	1.63	31.60	90	VERIFICA	510.0	205.0	0.267	7465.5	1206.4	VERIFICA
2	2	4764.0	401.2	1.63	31.60	90	VERIFICA	510.0	205.0	0.267	7465.5	896.9	VERIFICA
2	3	4764.0	541.6	1.79	29.14	90	VERIFICA	230.0	205.0	0.267	3208.6	598.0	VERIFICA
2	4	4764.0	541.6	1.79	29.14	90	VERIFICA	230.0	205.0	0.267	3208.6	389.5	VERIFICA
2	5	4643.0	527.9	1.78	29.36	90	VERIFICA	230.0	205.0	0.267	3223.5	386.9	VERIFICA
2	6	4643.0	527.9	1.78	29.36	90	VERIFICA	230.0	205.0	0.267	3223.5	341.4	VERIFICA
2	7	4581.0	520.8	1.77	29.47	90	VERIFICA	230.0	205.0	0.267	3231.1	241.6	VERIFICA
2	8	4551.0	517.4	1.77	29.52	90	VERIFICA	230.0	205.0	0.267	3234.9	208.0	VERIFICA
2	9	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	191.1	VERIFICA
2	10	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	180.1	VERIFICA
2	11	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	178.0	VERIFICA
2	12	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	206.7	VERIFICA
2	13	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	237.8	VERIFICA
2	14	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	268.3	VERIFICA
2	15	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	303.6	VERIFICA
2	16	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	340.6	VERIFICA
2	17	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	376.5	VERIFICA
2	18	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	417.4	VERIFICA
2	19	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	468.0	VERIFICA
2	20	4816.0	405.6	1.63	31.51	90	VERIFICA	510.0	205.0	0.267	7454.1	845.3	VERIFICA
2	21	4865.0	409.7	1.64	31.43	90	VERIFICA	510.0	205.0	0.267	7443.4	1232.0	VERIFICA

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
3	1	0.0	0.0	1225.7	455.0	-4321.1	654.3	1225.7	-4321.1	-554.9	1470.7	-244.3	C
3	2	0.0	0.0	916.0	216.3	-2597.5	1211.0	916.0	-2597.5	-173.1	1044.6	-244.3	A-B
3	3	0.0	0.0	618.0	-13.3	-1448.2	1363.9	618.0	-1448.2	198.8	942.6	-244.3	A-B
3	4	0.0	0.0	401.9	-167.1	-747.9	1208.7	401.9	-747.9	365.4	749.5	-244.3	A-B
3	5	0.0	0.0	404.0	-108.9	-153.7	1109.4	404.0	-153.7	492.9	571.9	-244.3	A-B
3	6	0.0	0.0	355.5	-101.0	334.3	1040.8	355.5	334.3	609.0	437.3	-244.3	A-B
3	7	0.0	0.0	259.8	-146.5	722.3	984.0	259.8	722.3	694.2	323.2	-244.3	A-B
3	8	0.0	0.0	156.1	-200.7	911.4	860.1	200.7	860.1	721.9	280.2	-244.3	A-B
3	9	0.0	0.0	126.9	-184.1	954.5	693.3	184.1	693.3	683.1	327.0	-244.3	A-B
3	10	0.0	0.0	97.8	-173.4	961.0	557.3	173.4	557.3	650.7	364.5	-244.3	A-B
3	11	0.0	0.0	69.2	-167.9	77.0	1426.5	167.9	1426.5	857.4	124.8	-244.3	A-B
3	12	0.0	0.0	76.2	-197.3	-130.2	1333.7	197.3	1333.7	835.4	150.4	-244.3	A-B
3	13	0.0	0.0	86.9	-226.4	-151.5	1166.1	226.4	1166.1	795.5	196.6	-244.3	A-B
3	14	0.0	0.0	99.4	-260.0	-147.1	956.7	260.0	956.7	745.7	254.4	-244.3	A-B

VANO	SECCIÓN	Pdr. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
3	1	4778.0	402.4	1.63	31.58	90	VERIFICA	510.0	205.0	0.267	7462.5	1225.7	VERIFICA
3	2	4778.0	402.4	1.63	31.58	90	VERIFICA	510.0	205.0	0.267	7462.5	916.0	VERIFICA
3	3	4778.0	543.2	1.80	29.12	90	VERIFICA	230.0	205.0	0.267	3206.9	618.0	VERIFICA
3	4	4778.0	543.2	1.80	29.12	90	VERIFICA	230.0	205.0	0.267	3206.9	401.9	VERIFICA
3	5	4657.0	529.5	1.78	29.33	90	VERIFICA	230.0	205.0	0.267	3221.8	404.0	VERIFICA
3	6	4657.0	529.5	1.78	29.33	90	VERIFICA	230.0	205.0	0.267	3221.8	355.5	VERIFICA
3	7	4595.0	522.4	1.77	29.44	90	VERIFICA	230.0	205.0	0.267	3229.4	259.8	VERIFICA
3	8	4551.0	517.4	1.77	29.52	90	VERIFICA	230.0	205.0	0.267	3234.9	200.7	VERIFICA
3	9	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	184.1	VERIFICA
3	10	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	173.4	VERIFICA
3	11	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	167.9	VERIFICA
3	12	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	197.3	VERIFICA
3	13	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	226.4	VERIFICA
3	14	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	260.0	VERIFICA

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

3	15	0.0	0.0	113.5	-292.8	-108.4	660.9	292.8	660.9	675.4	335.9	-244.3	A-B
3	16	0.0	0.0	129.3	-330.1	-30.8	305.5	330.1	305.5	590.9	433.9	-244.3	A-B
3	17	0.0	0.0	146.5	-369.3	91.4	-134.0	369.3	-134.0	486.3	555.1	-244.3	A-B
3	18	0.0	0.0	165.0	-407.2	263.1	-663.2	407.2	-663.2	360.5	701.1	-244.3	A-B
3	19	0.0	0.0	173.4	-461.1	481.7	-1304.7	461.1	-1304.7	207.9	878.0	-244.3	A-B
3	20	0.0	0.0	-135.7	-835.4	541.8	-2246.0	835.4	-2246.0	-92.0	960.8	-244.3	A-B
3	21	0.0	0.0	-448.2	-1222.0	120.1	-3838.3	1222.0	-3838.3	-440.6	1358.6	-244.3	C

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cl,k (t/m2.)	ZONA
4	1	0.0	0.0	1240.5	486.0	-3850.3	63.9	1240.5	-3850.3	-450.6	1354.3	-244.3	C
4	2	0.0	0.0	927.6	247.3	-2116.4	670.1	927.6	-2116.4	-66.5	925.6	-244.3	A-B
4	3	0.0	0.0	633.0	17.5	-934.7	873.6	633.0	-934.7	321.0	801.0	-244.3	A-B
4	4	0.0	0.0	417.2	-136.3	-220.5	768.6	417.2	-220.5	490.8	604.0	-244.3	A-B
4	5	0.0	0.0	416.4	-78.4	397.1	720.0	416.4	397.1	623.9	419.9	-244.3	A-B
4	6	0.0	0.0	371.4	-70.8	920.9	700.8	371.4	920.9	748.4	275.5	-244.3	A-B
4	7	0.0	0.0	273.5	-116.7	1318.4	692.5	273.5	1318.4	835.9	158.8	-244.3	A-B
4	8	0.0	0.0	175.3	-169.0	1565.5	628.5	175.3	1565.5	885.7	81.7	-244.3	A-B
4	9	0.0	0.0	146.2	-154.3	1643.4	572.1	154.3	572.1	650.3	356.5	-244.3	A-B
4	10	0.0	0.0	115.3	-148.4	1665.1	522.2	148.4	522.2	638.4	370.2	-244.3	A-B
4	11	0.0	0.0	88.5	-142.5	1656.1	462.3	142.5	462.3	624.2	386.7	-244.3	A-B
4	12	0.0	0.0	86.0	-165.0	517.0	1354.6	165.0	1354.6	836.3	140.6	-244.3	A-B
4	13	0.0	0.0	96.8	-197.9	518.0	1249.4	197.9	1249.4	811.3	169.7	-244.3	A-B
4	14	0.0	0.0	109.4	-230.1	546.4	1059.1	230.1	1059.1	766.1	222.1	-244.3	A-B
4	15	0.0	0.0	123.5	-267.0	609.7	815.2	267.0	815.2	708.1	289.4	-244.3	A-B
4	16	0.0	0.0	139.2	-302.7	712.6	477.9	302.7	477.9	627.9	382.4	-244.3	A-B
4	17	0.0	0.0	156.4	-343.1	860.0	86.2	343.1	86.2	534.7	490.5	-244.3	A-B
4	18	0.0	0.0	174.9	-385.2	1056.1	-426.7	385.2	-426.7	412.7	631.9	-244.3	A-B
4	19	0.0	0.0	182.9	-436.8	1298.0	-1032.1	436.8	-1032.1	268.8	798.9	-244.3	A-B
4	20	0.0	0.0	-123.0	-811.6	1382.9	-1943.4	811.6	-1943.4	-27.2	883.8	-244.3	A-B
4	21	0.0	0.0	-434.1	-1193.9	969.0	-3505.0	1193.9	-3505.0	-373.1	1269.9	-244.3	C

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cl,k (t/m2.)	ZONA
5	1	0.0	0.0	1090.7	410.8	-3511.1	933.1	1090.7	-3511.1	-384.8	1261.1	-244.3	C
5	2	0.0	0.0	765.9	131.2	-2580.4	1209.7	765.9	-2580.4	-178.6	1031.0	-244.3	A-B
5	3	0.0	0.0	439.1	-151.7	-2013.7	1215.2	439.1	-2013.7	-53.1	890.9	-244.3	A-B
5	4	0.0	0.0	382.9	-165.4	-1663.8	1041.1	382.9	-1663.8	12.8	792.7	-244.3	A-B
5	5	0.0	0.0	435.1	-71.8	-1276.6	965.8	435.1	-1276.6	98.6	697.0	-244.3	A-B
5	6	0.0	0.0	433.8	-33.2	-899.6	965.0	433.8	-899.6	182.1	603.8	-244.3	A-B
5	7	0.0	0.0	344.0	-84.8	-551.3	965.4	344.0	-551.3	252.6	511.0	-244.3	A-B
5	8	0.0	0.0	239.8	-152.1	-433.9	786.6	239.8	-433.9	307.7	511.1	-244.3	A-B
5	9	0.0	0.0	184.0	-173.1	-310.4	687.9	184.0	-310.4	334.8	480.3	-244.3	A-B
5	10	0.0	0.0	171.3	-152.7	-193.4	600.1	171.3	-193.4	360.7	451.4	-244.3	A-B
5	11	0.0	0.0	152.5	-140.4	-281.3	528.8	152.5	-281.3	341.2	473.1	-244.3	A-B
5	12	0.0	0.0	137.7	-131.0	-212.8	577.4	137.7	-212.8	356.4	456.2	-244.3	A-B
5	13	0.0	0.0	123.8	-123.5	-158.8	532.4	123.8	-158.8	368.4	442.8	-244.3	A-B
5	14	0.0	0.0	111.1	-117.6	-554.7	929.6	117.6	929.6	609.5	173.7	-244.3	A-B
5	15	0.0	0.0	119.3	-132.7	-646.7	1015.1	132.7	1015.1	628.4	152.6	-244.3	A-B
5	16	0.0	0.0	132.9	-152.9	-586.9	945.1	152.9	945.1	612.9	169.9	-244.3	A-B
5	17	0.0	0.0	147.6	-174.4	-504.7	846.4	174.4	846.4	591.1	194.3	-244.3	A-B
5	18	0.0	0.0	163.4	-196.9	-399.1	712.0	196.9	712.0	561.3	227.5	-244.3	A-B
5	19	0.0	0.0	180.1	-220.2	-265.4	548.7	220.2	548.7	525.1	267.9	-244.3	A-B
5	20	0.0	0.0	198.0	-244.9	-100.7	345.5	244.9	345.5	480.0	318.0	-244.3	A-B
5	21	0.0	0.0	217.0	-267.3	98.2	98.2	267.3	98.2	425.2	379.2	-244.3	A-B

3	15	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	292.8	VERIFICA
3	16	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	330.1	VERIFICA
3	17	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	369.3	VERIFICA
3	18	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	407.2	VERIFICA
3	19	4558.0	518.2	1.77	29.51	90	VERIFICA	230.0	205.0	0.267	3234.0	461.1	VERIFICA
3	20	4816.0	405.6	1.63	31.51	90	VERIFICA	510.0	205.0	0.267	7454.1	835.4	VERIFICA
3	21	4865.0	409.7	1.64	31.43	90	VERIFICA	510.0	205.0	0.267	7443.4	1222.0	VERIFICA

VANO	SECCIÓN	Pdf. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
4	1	4778.0	402.4	1.63	31.58	90	VERIFICA	510.0	205.0	0.267	7462.5	1240.5	VERIFICA
4	2	4778.0	402.4	1.63	31.58	90	VERIFICA	510.0	205.0	0.267	7462.5	927.6	VERIFICA
4	3	4778.0	543.2	1.80	29.12	90	VERIFICA	230.0	205.0	0.267	3206.9	633.0	VERIFICA
4	4	4778.0	543.2	1.80	29.12	90	VERIFICA	230.0	205.0	0.267	3206.9	417.2	VERIFICA
4	5	4657.0	529.5	1.78	29.33	90	VERIFICA	230.0	205.0	0.267	3221.8	416.4	VERIFICA
4	6	4657.0	529.5	1.78	29.33	90	VERIFICA	230.0	205.0	0.267	3221.8	371.4	VERIFICA
4	7	4595.0	522.4	1.77	29.44	90	VERIFICA	230.0	205.0	0.267	3229.4	273.5	VERIFICA
4	8	4516.0	513.4	1.76	29.59	90	VERIFICA	230.0	205.0	0.267	3239.2	175.3	VERIFICA
4	9	4523.0	514.2	1.76	29.58	90	VERIFICA	230.0	205.0	0.267	3238.3	154.3	VERIFICA
4	10	4523.0	514.2	1.76	29.58	90	VERIFICA	230.0	205.0	0.267	3238.3	148.4	VERIFICA
4	11	4523.0	514.2	1.76	29.58	90	VERIFICA	230.0	205.0	0.267	3238.3	142.5	VERIFICA
4	12	4523.0	514.2	1.76	29.58	90	VERIFICA	230.0	205.0	0.267	3238.3	165.0	VERIFICA
4	13	4523.0	514.2	1.76	29.58	90	VERIFICA	230.0	205.0	0.267	3238.3	197.9	VERIFICA
4	14	4523.0	514.2	1.76	29.58	90	VERIFICA	230.0	205.0	0.267	3238.3	230.1	VERIFICA
4	15	4523.0	514.2	1.76	29.58	90	VERIFICA	230.0	205.0	0.267	3238.3	267.0	VERIFICA
4	16	4523.0	514.2	1.76	29.58	90	VERIFICA	230.0	205.0	0.267	3238.3	302.7	VERIFICA
4	17	4523.0	514.2	1.76	29.58	90	VERIFICA	230.0	205.0	0.267	3238.3	343.1	VERIFICA
4	18	4523.0	514.2	1.76	29.58	90	VERIFICA	230.0	205.0	0.267	3238.3	385.2	VERIFICA
4	19	4523.0	514.2	1.76	29.58	90	VERIFICA	230.0	205.0	0.267	3238.3	436.8	VERIFICA
4	20	4790.0	403.4	1.63	31.56	90	VERIFICA	510.0	205.0	0.267	7459.8	811.6	VERIFICA
4	21	4790.0	403.4	1.63	31.56	90	VERIFICA	510.0	205.0	0.267	7459.8	1193.9	VERIFICA

VANO	SECCIÓN	Pdf. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
5	1	4667.0	393.0	1.62	31.76	90	VERIFICA	510.0	205.0	0.267	7486.9	1090.7	VERIFICA
5	2	4667.0	393.0	1.62	31.76	90	VERIFICA	510.0	205.0	0.267	7486.9	765.9	VERIFICA
5	3	4667.0	393.0	1.62	31.76	90	VERIFICA	510.0	205.0	0.267	7486.9	439.1	VERIFICA
5	4	4529.0	381.4	1.60	32.00	90	VERIFICA	510.0	205.0	0.267	7517.4	382.9	VERIFICA
5	5	4529.0	381.4	1.60	32.00	90	VERIFICA	510.0	205.0	0.267	7517.4	435.1	VERIFICA
5	6	4529.0	381.4	1.60	32.00	90	VERIFICA	510.0	205.0	0.267	7517.4	433.8	VERIFICA
5	7	4450.0	374.8	1.59	32.14	90	VERIFICA	510.0	205.0	0.267	7535.0	344.0	VERIFICA
5	8	4795.0	403.8	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7458.7	239.8	VERIFICA
5	9	4792.0	403.6	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.4	184.0	VERIFICA
5	10	4792.0	403.6	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.4	171.3	VERIFICA
5	11	4792.0	403.6	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.4	152.5	VERIFICA
5	12	4792.0	403.6	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.4	137.7	VERIFICA
5	13	4792.0	403.6	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.4	123.8	VERIFICA
5	14	4792.0	403.6	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.4	117.6	VERIFICA
5	15	4792.0	403.6	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.4	132.7	VERIFICA
5	16	4792.0	403.6	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.4	152.9	VERIFICA
5	17	4792.0	403.6	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.4	174.4	VERIFICA
5	18	4792.0	403.6	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.4	196.9	VERIFICA
5	19	4792.0	403.6	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.4	220.2	VERIFICA
5	20	4791.0	403.5	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.6	244.9	VERIFICA
5	21	4791.0	403.5	1.63	31.55	90	VERIFICA	510.0	205.0	0.267	7459.6	267.3	VERIFICA

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO: L.A.V. MADRID - ZARAGOZA

ESTRUCTURA: E-1508.5.TABLERO IZQUIERDO

VANO	SECCIÓN	fya,d (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
1	1	4.2	853.65	-1830.3	-	-	853.65	0.0	64.8	64.8
1	2	4.2	384.98	2229.6	-	-	384.98	0.0	64.8	64.8
1	3	4.2	384.98	2623.3	-	-	384.98	0.0	64.8	64.8
1	4	4.2	384.98	2916.7	-	-	384.98	0.0	64.8	64.8
1	5	4.2	384.98	3155.7	-	-	384.98	0.0	64.8	64.8
1	6	4.2	384.98	3341.7	-	-	384.98	0.0	64.8	64.8
1	7	4.2	384.98	3472.7	-	-	384.98	0.0	64.8	64.8
1	8	4.2	384.98	3550.7	-	-	384.98	0.0	64.8	64.8
1	9	4.2	384.98	3574.7	-	-	384.98	0.0	64.8	64.8
1	10	4.2	384.98	3692.5	-	-	384.98	0.0	64.8	64.8
1	11	4.2	384.98	3587.9	-	-	384.98	0.0	64.8	64.8
1	12	4.2	384.98	3409.9	-	-	384.98	0.0	64.8	64.8
1	13	4.2	384.98	3155.9	-	-	384.98	0.0	64.8	64.8
1	14	4.2	384.98	2828.6	-	-	384.98	0.0	64.8	64.8
1	15	4.2	384.98	2426.8	-	-	384.98	0.0	64.8	64.8
1	16	4.2	384.98	-2334.1	-	-	384.98	0.0	64.8	64.8
1	17	4.2	384.98	-2897.8	-	-	384.98	0.0	64.8	64.8
1	18	4.2	384.98	-3536.1	-	-	384.98	0.0	64.8	64.8
1	19	4.2	384.98	-4058.2	-	-	384.98	11.7	64.8	64.8
1	20	4.2	853.65	-4010.6	-	-	853.65	0.0	64.8	64.8
1	21	4.2	853.65	-4197.6	1.421	0.730	886.00	15.9	64.8	64.8

VANO	SECCIÓN	fya,d (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
2	1	4.2	853.65	-4139.9	1.422	0.705	856.11	27.8	64.8	64.8
2	2	4.2	853.65	-4000.9	-	-	853.65	3.4	64.8	64.8
2	3	4.2	384.98	-3996.6	-	-	384.98	15.3	64.8	64.8
2	4	4.2	384.98	-3284.6	-	-	384.98	0.3	64.8	64.8
2	5	4.2	384.98	-2634.5	-	-	384.98	0.1	64.8	64.8
2	6	4.2	384.98	1995.1	-	-	384.98	0.0	64.8	64.8
2	7	4.2	384.98	2384.3	-	-	384.98	0.0	64.8	64.8
2	8	4.2	384.98	2760.9	-	-	384.98	0.0	64.8	64.8
2	9	4.2	384.98	3130.0	-	-	384.98	0.0	64.8	64.8
2	10	4.2	384.98	3377.0	-	-	384.98	0.0	64.8	64.8
2	11	4.2	384.98	3509.0	-	-	384.98	0.0	64.8	64.8
2	12	4.2	384.98	3526.0	-	-	384.98	0.0	64.8	64.8
2	13	4.2	384.98	3427.0	-	-	384.98	0.0	64.8	64.8
2	14	4.2	384.98	3214.0	-	-	384.98	0.0	64.8	64.8
2	15	4.2	384.98	2885.0	-	-	384.98	0.0	64.8	64.8
2	16	4.2	384.98	2441.5	-	-	384.98	0.0	64.8	64.8
2	17	4.2	384.98	1882.5	-	-	384.98	0.0	64.8	64.8
2	18	4.2	384.98	-2850.0	-	-	384.98	2.4	64.8	64.8
2	19	4.2	384.98	-3633.2	-	-	384.98	6.1	64.8	64.8
2	20	4.2	853.65	-3972.7	-	-	853.65	0.0	64.8	64.8
2	21	4.2	853.65	-4267.3	1.409	0.694	834.73	31.3	64.8	64.8

VANO	SECCIÓN	fya,d (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
3	1	4.2	853.65	-4208.2	1.363	0.700	814.54	32.6	64.8	64.8
3	2	4.2	853.65	-4073.2	-	-	853.65	4.9	64.8	64.8
3	3	4.2	384.98	-4073.3	-	-	384.98	16.7	64.8	64.8
3	4	4.2	384.98	-3360.3	-	-	384.98	1.2	64.8	64.8
3	5	4.2	384.98	-2707.2	-	-	384.98	1.4	64.8	64.8
3	6	4.2	384.98	1938.0	-	-	384.98	0.0	64.8	64.8
3	7	4.2	384.98	2329.2	-	-	384.98	0.0	64.8	64.8
3	8	4.2	384.98	2718.9	-	-	384.98	0.0	64.8	64.8
3	9	4.2	384.98	3090.0	-	-	384.98	0.0	64.8	64.8
3	10	4.2	384.98	3339.0	-	-	384.98	0.0	64.8	64.8
3	11	4.2	384.98	3472.0	-	-	384.98	0.0	64.8	64.8

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1506.5.TABLERO IZQUIERDO

3	12	4.2	384.98	3491.0	-	-	384.98	0.0	64.8	64.8
3	13	4.2	384.98	3394.0	-	-	384.98	0.0	64.8	64.8
3	14	4.2	384.98	3183.0	-	-	384.98	0.0	64.8	64.8
3	15	4.2	384.98	2855.7	-	-	384.98	0.0	64.8	64.8
3	16	4.2	384.98	2413.7	-	-	384.98	0.0	64.8	64.8
3	17	4.2	384.98	-2201.6	-	-	384.98	0.0	64.8	64.8
3	18	4.2	384.98	-2874.0	-	-	384.98	1.6	64.8	64.8
3	19	4.2	384.98	-3655.2	-	-	384.98	5.6	64.8	64.8
3	20	4.2	853.65	-3992.7	-	-	853.65	0.0	64.8	64.8
3	21	4.2	853.65	-4285.3	1.406	0.696	836.00	30.4	64.8	64.8

VANO	SECCIÓN	$f_{yα,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. mínima (cm2/m.)	Aα. necesaria (cm2/m.)
4	1	4.2	853.65	-4227.2	1.410	0.696	837.81	31.9	64.8	64.8
4	2	4.2	853.65	-4083.2	-	-	853.65	5.9	64.8	64.8
4	3	4.2	384.98	-4074.3	-	-	384.98	17.8	64.8	64.8
4	4	4.2	384.98	-3352.3	-	-	384.98	2.3	64.8	64.8
4	5	4.2	384.98	-2690.9	-	-	384.98	2.3	64.8	64.8
4	6	4.2	384.98	1962.9	-	-	384.98	0.0	64.8	64.8
4	7	4.2	384.98	2362.5	-	-	384.98	0.0	64.8	64.8
4	8	4.2	384.98	2733.3	-	-	384.98	0.0	64.8	64.8
4	9	4.2	384.98	3109.6	-	-	384.98	0.0	64.8	64.8
4	10	4.2	384.98	3365.6	-	-	384.98	0.0	64.8	64.8
4	11	4.2	384.98	3506.6	-	-	384.98	0.0	64.8	64.8
4	12	4.2	384.98	3533.6	-	-	384.98	0.0	64.8	64.8
4	13	4.2	384.98	3446.6	-	-	384.98	0.0	64.8	64.8
4	14	4.2	384.98	3245.6	-	-	384.98	0.0	64.8	64.8
4	15	4.2	384.98	2929.6	-	-	384.98	0.0	64.8	64.8
4	16	4.2	384.98	2499.6	-	-	384.98	0.0	64.8	64.8
4	17	4.2	384.98	1955.4	-	-	384.98	0.0	64.8	64.8
4	18	4.2	384.98	-2729.9	-	-	384.98	0.0	64.8	64.8
4	19	4.2	384.98	-3496.4	-	-	384.98	3.8	64.8	64.8
4	20	4.2	853.65	-3829.8	-	-	853.65	0.0	64.8	64.8
4	21	4.2	853.65	-4078.8	1.433	0.707	864.76	26.1	64.8	64.8

VANO	SECCIÓN	$f_{yα,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. mínima (cm2/m.)	Aα. necesaria (cm2/m.)
5	1	4.2	853.65	-3996.0	1.438	0.738	905.91	14.8	64.8	64.8
5	2	4.2	853.65	-3853.0	-	-	853.65	0.0	64.8	64.8
5	3	4.2	853.65	-3466.0	-	-	853.65	0.0	64.8	64.8
5	4	4.2	853.65	-2874.6	-	-	853.65	0.0	64.8	64.8
5	5	4.2	853.65	-2463.3	-	-	853.65	0.0	64.8	64.8
5	6	4.2	853.65	-2156.7	-	-	853.65	0.0	64.8	64.8
5	7	4.2	853.65	-1853.2	-	-	853.65	0.0	64.8	64.8
5	8	4.2	853.65	1890.8	-	-	853.65	0.0	64.8	64.8
5	9	4.2	853.65	2192.8	-	-	853.65	0.0	64.8	64.8
5	10	4.2	853.65	2447.2	-	-	853.65	0.0	64.8	64.8
5	11	4.2	853.65	2645.3	-	-	853.65	0.0	64.8	64.8
5	12	4.2	853.65	2787.3	-	-	853.65	0.0	64.8	64.8
5	13	4.2	853.65	2873.3	-	-	853.65	0.0	64.8	64.8
5	14	4.2	853.65	2903.3	-	-	853.65	0.0	64.8	64.8
5	15	4.2	853.65	2876.3	-	-	853.65	0.0	64.8	64.8
5	16	4.2	853.65	2793.3	-	-	853.65	0.0	64.8	64.8
5	17	4.2	853.65	2653.3	-	-	853.65	0.0	64.8	64.8
5	18	4.2	853.65	2458.2	-	-	853.65	0.0	64.8	64.8
5	19	4.2	853.65	2206.6	-	-	853.65	0.0	64.8	64.8
5	20	4.2	853.65	1898.0	-	-	853.65	0.0	64.8	64.8
5	21	4.2	853.65	-1919.4	-	-	853.65	0.0	64.8	64.8

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
1	1	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	333.2	-160.1	75.0	74.9
1	2	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	284.5	-155.0	425.2	-100.1
1	3	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	248.9	-147.2	657.5	-291.8
1	4	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	213.3	-140.7	877.0	-409.8
1	5	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	179.3	-135.3	1035.7	-504.2
1	6	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	147.7	-131.4	1144.7	-580.9
1	7	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	113.3	-128.6	1136.7	-642.5
1	8	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	84.1	-127.1	1135.0	-695.2
1	9	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	76.9	-147.5	388.2	-36.8
1	10	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	80.7	-165.6	262.6	-208.9
1	11	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	98.6	-172.7	243.5	-77.2
1	12	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	117.0	-189.0	262.6	-175.3
1	13	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	136.9	-202.9	317.2	-314.5
1	14	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	158.0	-217.9	402.0	-455.0
1	15	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	179.9	-234.1	521.4	-646.6
1	16	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	212.9	-240.9	665.3	-881.5
1	17	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	238.3	-260.5	873.8	-1104.3
1	18	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	262.1	-279.9	1124.0	-1381.5
1	19	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	38.5	-548.4	1261.5	-1826.4
1	20	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	-178.3	-814.3	1216.2	-2561.8
1	21	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	-399.0	-1088.0	913.5	-3643.4

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
2	1	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	1206.4	441.4	-3675.2	868.5
2	2	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	896.9	206.2	-1990.4	1425.0
2	3	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	598.0	-24.2	-868.4	1557.6
2	4	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	389.5	-173.4	-192.8	1385.3
2	5	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	386.9	-116.1	376.2	1270.8
2	6	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	341.4	-107.8	855.9	1187.2
2	7	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	241.6	-154.1	1205.5	1114.5
2	8	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	137.6	-208.0	1387.3	992.0
2	9	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	110.5	-191.1	1425.1	811.1
2	10	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	78.8	-180.1	1385.1	661.9
2	11	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	56.9	-178.0	393.8	1612.8
2	12	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	61.6	-206.7	286.8	1499.2
2	13	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	68.5	-237.8	195.0	1333.9
2	14	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	80.0	-268.3	115.8	1088.0
2	15	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	93.7	-303.6	122.5	793.7
2	16	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	109.4	-340.6	167.3	422.4
2	17	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	126.5	-376.5	256.5	-44.0
2	18	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	144.8	-417.4	394.9	-579.5
2	19	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	153.1	-468.0	580.4	-1234.3
2	20	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	-155.9	-845.3	607.9	-2188.4
2	21	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	-468.3	-1232.0	152.9	-3795.3

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
3	1	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	1225.7	455.0	-4321.1	654.3
3	2	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	916.0	216.3	-2597.5	1211.0
3	3	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	618.0	-13.3	-1448.2	1363.9
3	4	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	401.9	-167.1	-747.9	1208.7
3	5	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	404.0	-108.9	-153.7	1109.4
3	6	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	355.5	-101.0	334.3	1040.8
3	7	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	259.8	-146.5	722.3	984.0
3	8	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	156.1	-200.7	911.4	860.1
3	9	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	126.9	-184.1	954.5	693.3
3	10	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	97.8	-173.4	961.0	557.3
3	11	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	69.2	-167.9	77.0	1426.5
3	12	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	76.2	-197.3	-130.2	1333.7
3	13	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	86.9	-226.4	-151.5	1166.1
3	14	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	99.4	-260.0	-147.1	956.7
3	15	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	113.5	-292.8	-108.4	660.9
3	16	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	129.3	-330.1	-30.8	305.5

ARMADURA DE RASANTE

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA

ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN Md. (+) (t x m.)	MOMEN Md. (-) (t x m.)
3	17	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	146.5	-369.3	91.4	-134.0
3	18	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	165.0	-407.2	263.1	-663.2
3	19	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	173.4	-461.1	481.7	-1304.7
3	20	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	-135.7	-835.4	541.8	-2246.0
3	21	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	-448.2	-1222.0	120.1	-3838.3

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN Md. (+) (t x m.)	MOMEN Md. (-) (t x m.)
4	1	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	1240.5	486.0	-3850.3	63.9
4	2	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	927.6	247.3	-2116.4	670.1
4	3	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	633.0	17.5	-934.7	873.6
4	4	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	417.2	-136.3	-220.5	768.6
4	5	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	416.4	-78.4	397.1	720.0
4	6	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	371.4	-70.8	920.9	700.8
4	7	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	273.5	-116.7	1318.4	692.5
4	8	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	175.3	-169.0	1565.5	628.5
4	9	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	146.2	-154.3	1643.4	572.1
4	10	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	115.3	-148.4	1665.1	522.2
4	11	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	88.5	-142.5	1656.1	462.3
4	12	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	86.0	-165.0	517.0	1354.6
4	13	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	96.8	-197.9	518.0	1249.4
4	14	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	109.4	-230.1	546.4	1059.1
4	15	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	123.5	-267.0	609.7	815.2
4	16	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	139.2	-302.7	712.6	477.9
4	17	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	156.4	-343.1	860.0	86.2
4	18	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	174.9	-385.2	1056.1	-426.7
4	19	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	182.9	-436.8	1298.0	-1032.1
4	20	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	-123.0	-811.6	1382.9	-1943.4
4	21	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	-434.1	-1193.9	969.0	-3505.0

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2)	A'o (cm2)	Ap (cm2)	fyd (Kp/cm2)	fya,d (Kp/cm2)	f pd (Kp/cm2)	CORT Vrd. (+) (t.)	CORT Vrd. (-) (t.)	MOMEN Md. (+) (t x m.)	MOMEN Md. (-) (t x m.)
5	1	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	1090.7	410.8	-3511.1	933.1
5	2	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	765.9	131.2	-2580.4	1209.7
5	3	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	439.1	-151.7	-2013.7	1215.2
5	4	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	382.9	-165.4	-1663.8	1041.1
5	5	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	435.1	-71.8	-1276.6	965.8
5	6	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	433.8	-33.2	-899.6	965.0
5	7	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	344.0	-84.8	-551.3	965.4
5	8	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	239.8	-152.1	-433.9	786.6
5	9	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	184.0	-173.1	-310.4	687.9
5	10	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	171.3	-152.7	-193.4	600.1
5	11	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	152.5	-140.4	-281.3	528.8
5	12	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	137.7	-131.0	-212.8	577.4
5	13	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	123.8	-123.5	-158.8	532.4
5	14	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	111.1	-117.6	-554.7	929.6
5	15	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	119.3	-132.7	-646.7	1015.1
5	16	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	132.9	-152.9	-586.9	945.1
5	17	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	147.6	-174.4	-504.7	846.4
5	18	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	163.4	-196.9	-399.1	712.0
5	19	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	180.1	-220.2	-265.4	548.7
5	20	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	198.0	-244.9	-100.7	345.5
5	21	8.300	5.500	2.100	0.378	90	5.65	13.4	7.9	73.7	63	4435	4200	15455	217.0	-267.3	98.2	98.2

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

VANO	SECCIÓN	A (cm2)	τd ala comp (Kp/cm2)	τd ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	τd ala comp. (Kp/cm2)	τd ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
1	1	-	8.9	-	30.0	4.60	ALA COMPRIMIDA	-	4.3	-	30.0	2.21	ALA COMPRIMIDA	4.60
1	2	-	7.6	-	30.0	3.93	ALA COMPRIMIDA	309.07	-	0.6	45.0	0.56	ALA TRACCIONADA	3.93
1	3	-	6.6	-	30.0	3.44	ALA COMPRIMIDA	309.07	-	0.6	45.0	0.53	ALA TRACCIONADA	3.44
1	4	-	5.7	-	30.0	2.94	ALA COMPRIMIDA	309.07	-	0.6	45.0	0.51	ALA TRACCIONADA	2.94
1	5	-	4.8	-	30.0	2.47	ALA COMPRIMIDA	309.07	-	0.5	45.0	0.49	ALA TRACCIONADA	2.47
1	6	-	3.9	-	30.0	2.04	ALA COMPRIMIDA	309.07	-	0.5	45.0	0.48	ALA TRACCIONADA	2.04
1	7	-	3.0	-	30.0	1.56	ALA COMPRIMIDA	309.07	-	0.5	45.0	0.47	ALA TRACCIONADA	1.56
1	8	-	2.2	-	30.0	1.16	ALA COMPRIMIDA	309.07	-	0.5	45.0	0.46	ALA TRACCIONADA	1.16
1	9	-	2.0	-	30.0	1.06	ALA COMPRIMIDA	309.07	-	0.6	45.0	0.53	ALA TRACCIONADA	1.06
1	10	-	2.1	-	30.0	1.11	ALA COMPRIMIDA	309.07	-	0.7	45.0	0.60	ALA TRACCIONADA	1.11
1	11	-	2.6	-	30.0	1.36	ALA COMPRIMIDA	309.07	-	0.7	45.0	0.63	ALA TRACCIONADA	1.36
1	12	-	3.1	-	30.0	1.62	ALA COMPRIMIDA	309.07	-	0.8	45.0	0.69	ALA TRACCIONADA	1.62
1	13	-	3.6	-	30.0	1.89	ALA COMPRIMIDA	309.07	-	0.8	45.0	0.74	ALA TRACCIONADA	1.89
1	14	-	4.2	-	30.0	2.18	ALA COMPRIMIDA	309.07	-	0.9	45.0	0.79	ALA TRACCIONADA	2.18
1	15	-	4.8	-	30.0	2.48	ALA COMPRIMIDA	309.07	-	0.9	45.0	0.85	ALA TRACCIONADA	2.48
1	16	-	5.7	-	30.0	2.94	ALA COMPRIMIDA	309.07	-	1.0	45.0	0.87	ALA TRACCIONADA	2.94
1	17	-	6.3	-	30.0	3.29	ALA COMPRIMIDA	309.07	-	1.0	45.0	0.94	ALA TRACCIONADA	3.29
1	18	-	7.0	-	30.0	3.62	ALA COMPRIMIDA	309.07	-	1.1	45.0	1.02	ALA TRACCIONADA	3.62
1	19	-	1.0	-	30.0	0.53	ALA COMPRIMIDA	309.07	-	2.2	45.0	1.99	ALA TRACCIONADA	1.99
1	20	-	4.7	-	30.0	2.46	ALA COMPRIMIDA	309.07	-	3.3	45.0	2.95	ALA TRACCIONADA	2.95
1	21	-	10.6	-	30.0	5.51	ALA COMPRIMIDA	309.07	-	4.4	45.0	3.95	ALA TRACCIONADA	5.51

VANO	SECCIÓN	b (°)	τd (Kp/cm2)	τmax (Kp/cm2)	e (cm)	armadura superior Aα,sup (cm2/m)	armadura inferior Aα,inf (cm2/m)
1	1	30	8.9	69.28	0.16	0.29	4.31
1	2	30	7.6	69.28	0.17	0.21	3.71
1	3	30	6.6	69.28	0.17	0.16	3.27
1	4	30	5.7	69.28	0.17	0.12	2.82
1	5	30	4.8	69.28	0.18	0.09	2.39
1	6	30	3.9	69.28	0.18	0.06	1.98
1	7	30	3.0	69.28	0.18	0.03	1.53
1	8	30	2.2	69.28	0.18	0.02	1.14
1	9	30	2.0	69.28	0.18	0.02	1.05
1	10	30	2.1	69.28	0.18	0.02	1.10
1	11	30	2.6	69.28	0.18	0.03	1.34
1	12	30	3.1	69.28	0.18	0.04	1.58
1	13	30	3.6	69.28	0.18	0.05	1.84
1	14	30	4.2	69.28	0.18	0.07	2.11
1	15	30	4.8	69.28	0.18	0.09	2.40
1	16	30	5.7	69.28	0.17	0.12	2.82
1	17	30	6.3	69.28	0.17	0.15	3.14
1	18	30	7.0	69.28	0.17	0.18	3.44
1	19	45	2.2	80.00	0.18	0.03	1.96
1	20	45	3.3	80.00	0.18	0.06	2.89
1	21	30	10.6	69.28	0.16	0.42	5.09

VANO	SECCIÓN	A (cm2)	τd ala comp (Kp/cm2)	τd ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	τd ala comp. (Kp/cm2)	τd ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
2	1	309.07	-	4.9	45.0	4.38	ALA TRACCIONADA	-	11.7	-	30.0	6.09	ALA COMPRIMIDA	6.09
2	2	309.07	-	3.6	45.0	3.25	ALA TRACCIONADA	-	5.5	-	30.0	2.85	ALA COMPRIMIDA	3.25
2	3	309.07	-	2.4	45.0	2.17	ALA TRACCIONADA	-	0.6	-	30.0	0.33	ALA COMPRIMIDA	2.17
2	4	309.07	-	1.6	45.0	1.41	ALA TRACCIONADA	-	4.6	-	30.0	2.39	ALA COMPRIMIDA	2.39
2	5	-	10.3	-	30.0	5.34	ALA COMPRIMIDA	-	3.1	-	30.0	1.60	ALA COMPRIMIDA	5.34
2	6	-	9.1	-	30.0	4.71	ALA COMPRIMIDA	-	2.9	-	30.0	1.49	ALA COMPRIMIDA	4.71
2	7	-	6.4	-	30.0	3.33	ALA COMPRIMIDA	-	4.1	-	30.0	2.13	ALA COMPRIMIDA	3.33
2	8	-	3.7	-	30.0	1.90	ALA COMPRIMIDA	-	5.5	-	30.0	2.87	ALA COMPRIMIDA	2.87
2	9	-	2.9	-	30.0	1.53	ALA COMPRIMIDA	-	5.1	-	30.0	2.64	ALA COMPRIMIDA	2.64
2	10	-	2.1	-	30.0	1.09	ALA COMPRIMIDA	-	4.8	-	30.0	2.49	ALA COMPRIMIDA	2.49
2	11	-	1.5	-	30.0	0.79	ALA COMPRIMIDA	-	4.7	-	30.0	2.46	ALA COMPRIMIDA	2.46
2	12	-	1.6	-	30.0	0.85	ALA COMPRIMIDA	-	5.5	-	30.0	2.85	ALA COMPRIMIDA	2.85
2	13	-	1.8	-	30.0	0.95	ALA COMPRIMIDA	-	6.3	-	30.0	3.28	ALA COMPRIMIDA	3.28
2	14	-	2.1	-	30.0	1.10	ALA COMPRIMIDA	-	7.1	-	30.0	3.70	ALA COMPRIMIDA	3.70
2	15	-	2.5	-	30.0	1.29	ALA COMPRIMIDA	-	8.1	-	30.0	4.19	ALA COMPRIMIDA	4.19
2	16	-	2.9	-	30.0	1.51	ALA COMPRIMIDA	-	9.0	-	30.0	4.70	ALA COMPRIMIDA	4.70
2	17	-	3.4	-	30.0	1.75	ALA COMPRIMIDA	309.07	-	1.5	45.0	1.37	ALA TRACCIONADA	1.75
2	18	-	3.8	-	30.0	2.00	ALA COMPRIMIDA	309.07	-	1.7	45.0	1.51	ALA TRACCIONADA	2.00
2	19	-	4.1	-	30.0	2.11	ALA COMPRIMIDA	309.07	-	1.9	45.0	1.70	ALA TRACCIONADA	2.11
2	20	-	4.1	-	30.0	2.15	ALA COMPRIMIDA	309.07	-	3.4	45.0	3.07	ALA TRACCIONADA	3.07
2	21	-	12.4	-	30.0	6.46	ALA COMPRIMIDA	309.07	-	5.0	45.0	4.47	ALA TRACCIONADA	6.46

VANO	SECCIÓN	b (°)	τd (Kp/cm2)	τmax (Kp/cm2)	e (cm)	armadura superior Aα,sup (cm2/m)	armadura inferior Aα,inf (cm2/m)
2	1	30	11.7	69.28	0.16	0.52	5.58
2	2	45	3.6	80.00	0.18	0.07	3.18
2	3	45	2.4	80.00	0.18	0.03	2.14
2	4	30	4.6	69.28	0.18	0.08	2.31
2	5	30	10.3	69.28	0.16	0.40	4.94
2	6	30	9.1	69.28	0.16	0.31	4.40
2	7	30	6.4	69.28	0.17	0.15	3.18
2	8	30	5.5	69.28	0.17	0.11	2.76
2	9	30	5.1	69.28	0.18	0.10	2.54
2	10	30	4.8	69.28	0.18	0.09	2.40
2	11	30	4.7	69.28	0.18	0.08	2.37
2	12	30	5.5	69.28	0.17	0.11	2.74
2	13	30	6.3	69.28	0.17	0.15	3.13
2	14	30	7.1	69.28	0.17	0.19	3.51
2	15	30	8.1	69.28	0.17	0.24	3.95
2	16	30	9.0	69.28	0.16	0.31	4.39
2	17	30	3.4	69.28	0.18	0.04	1.70
2	18	30	3.8	69.28	0.18	0.06	1.94
2	19	30	4.1	69.28	0.18	0.06	2.05
2	20	45	3.4	80.00	0.18	0.07	3.00
2	21	30	12.4	69.28	0.16	0.58	5.88

VANO	SECCIÓN	A (cm2)	τd ala comp (Kp/cm2)	τd ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	τd ala comp. (Kp/cm2)	τd ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
3	1	309.07	-	4.9	45.0	4.45	ALA TRACCIONADA	-	12.1	-	30.0	6.28	ALA COMPRIMIDA	6.28
3	2	309.07	-	3.7	45.0	3.32	ALA TRACCIONADA	-	5.7	-	30.0	2.99	ALA COMPRIMIDA	3.32
3	3	309.07	-	2.5	45.0	2.24	ALA TRACCIONADA	-	0.4	-	30.0	0.18	ALA COMPRIMIDA	2.24
3	4	309.07	-	1.6	45.0	1.46	ALA TRACCIONADA	-	4.4	-	30.0	2.31	ALA COMPRIMIDA	2.31
3	5	309.07	-	1.6	45.0	1.47	ALA TRACCIONADA	-	2.9	-	30.0	1.50	ALA COMPRIMIDA	1.50
3	6	-	9.4	-	30.0	4.91	ALA COMPRIMIDA	-	2.7	-	30.0	1.39	ALA COMPRIMIDA	4.91
3	7	-	6.9	-	30.0	3.59	ALA COMPRIMIDA	-	3.9	-	30.0	2.02	ALA COMPRIMIDA	3.59
3	8	-	4.1	-	30.0	2.15	ALA COMPRIMIDA	-	5.3	-	30.0	2.77	ALA COMPRIMIDA	2.77
3	9	-	3.4	-	30.0	1.75	ALA COMPRIMIDA	-	4.9	-	30.0	2.54	ALA COMPRIMIDA	2.54
3	10	-	2.6	-	30.0	1.35	ALA COMPRIMIDA	-	4.6	-	30.0	2.39	ALA COMPRIMIDA	2.39
3	11	-	1.8	-	30.0	0.96	ALA COMPRIMIDA	-	4.5	-	30.0	2.32	ALA COMPRIMIDA	2.32
3	12	309.07	-	0.3	45.0	0.28	ALA TRACCIONADA	-	5.2	-	30.0	2.72	ALA COMPRIMIDA	2.72
3	13	309.07	-	0.4	45.0	0.32	ALA TRACCIONADA	-	6.0	-	30.0	3.13	ALA COMPRIMIDA	3.13
3	14	309.07	-	0.4	45.0	0.36	ALA TRACCIONADA	-	6.9	-	30.0	3.59	ALA COMPRIMIDA	3.59
3	15	309.07	-	0.5	45.0	0.41	ALA TRACCIONADA	-	7.8	-	30.0	4.04	ALA COMPRIMIDA	4.04
3	16	309.07	-	0.5	45.0	0.47	ALA TRACCIONADA	-	8.8	-	30.0	4.56	ALA COMPRIMIDA	4.56

VANO	SECCIÓN	b (°)	τd (Kp/cm2)	τmax (Kp/cm2)	e (cm)	armadura superior Aα,sup (cm2/m)	armadura inferior Aα,inf (cm2/m)
3	1	30	12.1	69.28	0.16	0.55	5.73
3	2	45	3.7	80.00	0.18	0.08	3.25
3	3	45	2.5	80.00	0.18	0.03	2.21
3	4	30	4.4	69.28	0.18	0.07	2.23
3	5	30	2.9	69.28	0.18	0.03	1.47
3	6	30	9.4	69.28	0.16	0.33	4.57
3	7	30	6.9	69.28	0.17	0.18	3.41
3	8	30	5.3	69.28	0.17	0.11	2.66
3	9	30	4.9	69.28	0.18	0.09	2.45
3	10	30	4.6	69.28	0.18	0.08	2.31
3	11	30	4.5	69.28	0.18	0.07	2.24
3	12	30	5.2	69.28	0.17	0.10	2.62
3	13	30	6.0	69.28	0.17	0.14	2.99
3	14	30	6.9	69.28	0.17	0.18	3.41
3	15	30	7.8	69.28	0.17	0.23	3.81
3	16	30	8.8	69.28	0.17	0.29	4.27

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

VANO	SECCIÓN	A (cm2)	τ d ala comp (Kp/cm2)	τ d ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	τ d ala comp. (Kp/cm2)	τ d ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
3	17	-	3.9	-	30.0	2.02	ALA COMPRIMIDA	309.07	-	1.5	45.0	1.34	ALA TRACCIONADA	2.02
3	18	-	4.4	-	30.0	2.28	ALA COMPRIMIDA	309.07	-	1.6	45.0	1.48	ALA TRACCIONADA	2.28
3	19	-	4.6	-	30.0	2.39	ALA COMPRIMIDA	309.07	-	1.9	45.0	1.67	ALA TRACCIONADA	2.39
3	20	-	3.6	-	30.0	1.87	ALA COMPRIMIDA	309.07	-	3.4	45.0	3.03	ALA TRACCIONADA	3.03
3	21	-	11.9	-	30.0	6.19	ALA COMPRIMIDA	309.07	-	4.9	45.0	4.43	ALA TRACCIONADA	6.19

VANO	SECCIÓN	b (°)	τ d (Kp/cm2)	τ max (Kp/cm2)	e (cm)	armadura superior Aα,sup (cm2/m)	armadura inferior Aα,inf (cm2/m)
3	17	30	3.9	69.28	0.18	0.06	1.96
3	18	30	4.4	69.28	0.18	0.07	2.21
3	19	30	4.6	69.28	0.18	0.08	2.31
3	20	45	3.4	80.00	0.18	0.06	2.97
3	21	30	11.9	69.28	0.16	0.53	5.65

VANO	SECCIÓN	A (cm2)	τ d ala comp (Kp/cm2)	τ d ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	τ d ala comp. (Kp/cm2)	τ d ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
4	1	309.07	-	5.0	45.0	4.50	ALA TRACCIONADA	-	12.9	-	30.0	6.71	ALA COMPRIMIDA	6.71
4	2	309.07	-	3.7	45.0	3.36	ALA TRACCIONADA	-	6.6	-	30.0	3.41	ALA COMPRIMIDA	3.41
4	3	309.07	-	2.6	45.0	2.30	ALA TRACCIONADA	-	0.5	-	30.0	0.24	ALA COMPRIMIDA	2.30
4	4	309.07	-	1.7	45.0	1.51	ALA TRACCIONADA	-	3.6	-	30.0	1.88	ALA COMPRIMIDA	1.88
4	5	-	11.1	-	30.0	5.75	ALA COMPRIMIDA	-	2.1	-	30.0	1.08	ALA COMPRIMIDA	5.75
4	6	-	9.9	-	30.0	5.13	ALA COMPRIMIDA	-	1.9	-	30.0	0.98	ALA COMPRIMIDA	5.13
4	7	-	7.3	-	30.0	3.77	ALA COMPRIMIDA	-	3.1	-	30.0	1.61	ALA COMPRIMIDA	3.77
4	8	-	4.7	-	30.0	2.42	ALA COMPRIMIDA	-	4.5	-	30.0	2.33	ALA COMPRIMIDA	2.42
4	9	-	3.9	-	30.0	2.02	ALA COMPRIMIDA	-	4.1	-	30.0	2.13	ALA COMPRIMIDA	2.13
4	10	-	3.1	-	30.0	1.59	ALA COMPRIMIDA	-	3.9	-	30.0	2.05	ALA COMPRIMIDA	2.05
4	11	-	2.3	-	30.0	1.22	ALA COMPRIMIDA	-	3.8	-	30.0	1.97	ALA COMPRIMIDA	1.97
4	12	-	2.3	-	30.0	1.19	ALA COMPRIMIDA	-	4.4	-	30.0	2.28	ALA COMPRIMIDA	2.28
4	13	-	2.6	-	30.0	1.34	ALA COMPRIMIDA	-	5.3	-	30.0	2.73	ALA COMPRIMIDA	2.73
4	14	-	2.9	-	30.0	1.51	ALA COMPRIMIDA	-	6.1	-	30.0	3.18	ALA COMPRIMIDA	3.18
4	15	-	3.3	-	30.0	1.70	ALA COMPRIMIDA	-	7.1	-	30.0	3.69	ALA COMPRIMIDA	3.69
4	16	-	3.7	-	30.0	1.92	ALA COMPRIMIDA	-	8.0	-	30.0	4.18	ALA COMPRIMIDA	4.18
4	17	-	4.2	-	30.0	2.16	ALA COMPRIMIDA	-	9.1	-	30.0	4.74	ALA COMPRIMIDA	4.74
4	18	-	4.6	-	30.0	2.41	ALA COMPRIMIDA	309.07	-	1.6	45.0	1.40	ALA TRACCIONADA	2.41
4	19	-	4.9	-	30.0	2.52	ALA COMPRIMIDA	309.07	-	1.8	45.0	1.58	ALA TRACCIONADA	2.52
4	20	-	3.3	-	30.0	1.70	ALA COMPRIMIDA	309.07	-	3.3	45.0	2.94	ALA TRACCIONADA	2.94
4	21	-	11.5	-	30.0	5.99	ALA COMPRIMIDA	309.07	-	4.8	45.0	4.33	ALA TRACCIONADA	5.99

VANO	SECCIÓN	b (°)	τ d (Kp/cm2)	τ max (Kp/cm2)	e (cm)	armadura superior Aα,sup (cm2/m)	armadura inferior Aα,inf (cm2/m)
4	1	30	12.9	69.28	0.15	0.62	6.08
4	2	30	6.6	69.28	0.17	0.16	3.25
4	3	45	2.6	80.00	0.18	0.04	2.26
4	4	30	3.6	69.28	0.18	0.05	1.83
4	5	30	11.1	69.28	0.16	0.46	5.29
4	6	30	9.9	69.28	0.16	0.36	4.76
4	7	30	7.3	69.28	0.17	0.20	3.58
4	8	30	4.7	69.28	0.18	0.08	2.34
4	9	30	4.1	69.28	0.18	0.06	2.07
4	10	30	3.9	69.28	0.18	0.06	1.99
4	11	30	3.8	69.28	0.18	0.05	1.91
4	12	30	4.4	69.28	0.18	0.07	2.21
4	13	30	5.3	69.28	0.17	0.10	2.63
4	14	30	6.1	69.28	0.17	0.14	3.04
4	15	30	7.1	69.28	0.17	0.19	3.50
4	16	30	8.0	69.28	0.17	0.24	3.94
4	17	30	9.1	69.28	0.16	0.31	4.42
4	18	30	4.6	69.28	0.18	0.08	2.33
4	19	30	4.9	69.28	0.18	0.09	2.44
4	20	45	3.3	80.00	0.18	0.06	2.88
4	21	30	11.5	69.28	0.16	0.50	5.49

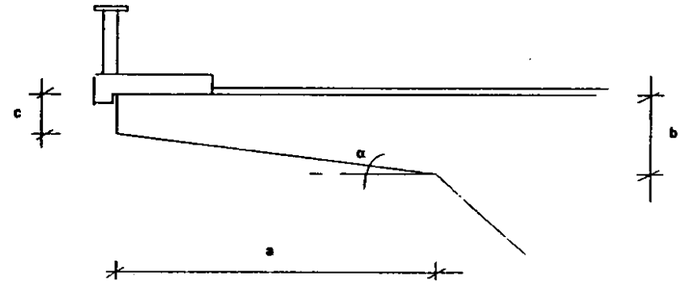
VANO	SECCIÓN	A (cm2)	τ d ala comp (Kp/cm2)	τ d ala tracc (Kp/cm2)	q (°)	Aα (+) (cm2/m)	Situacion del ala	A (cm2)	τ d ala comp. (Kp/cm2)	τ d ala tracc (Kp/cm2)	θ (°)	Aα (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aα (cm2/m)
5	1	309.07	-	4.4	45.0	3.96	ALA TRACCIONADA	-	10.9	-	30.0	5.67	ALA COMPRIMIDA	5.67
5	2	309.07	-	3.1	45.0	2.78	ALA TRACCIONADA	-	3.5	-	30.0	1.81	ALA COMPRIMIDA	2.78
5	3	309.07	-	1.8	45.0	1.59	ALA TRACCIONADA	-	4.0	-	30.0	2.09	ALA COMPRIMIDA	2.09
5	4	309.07	-	1.5	45.0	1.39	ALA TRACCIONADA	-	4.4	-	30.0	2.28	ALA COMPRIMIDA	2.28
5	5	309.07	-	1.8	45.0	1.58	ALA TRACCIONADA	-	1.9	-	30.0	0.99	ALA COMPRIMIDA	1.58
5	6	309.07	-	1.7	45.0	1.57	ALA TRACCIONADA	-	0.9	-	30.0	0.46	ALA COMPRIMIDA	1.57
5	7	309.07	-	1.4	45.0	1.25	ALA TRACCIONADA	-	2.3	-	30.0	1.17	ALA COMPRIMIDA	1.25
5	8	309.07	-	1.0	45.0	0.87	ALA TRACCIONADA	-	4.0	-	30.0	2.10	ALA COMPRIMIDA	2.10
5	9	309.07	-	0.7	45.0	0.67	ALA TRACCIONADA	-	4.6	-	30.0	2.39	ALA COMPRIMIDA	2.39
5	10	309.07	-	0.7	45.0	0.62	ALA TRACCIONADA	-	4.1	-	30.0	2.11	ALA COMPRIMIDA	2.11
5	11	309.07	-	0.6	45.0	0.55	ALA TRACCIONADA	-	3.7	-	30.0	1.94	ALA COMPRIMIDA	1.94
5	12	309.07	-	0.6	45.0	0.50	ALA TRACCIONADA	-	3.5	-	30.0	1.81	ALA COMPRIMIDA	1.81
5	13	309.07	-	0.5	45.0	0.45	ALA TRACCIONADA	-	3.3	-	30.0	1.71	ALA COMPRIMIDA	1.71
5	14	309.07	-	0.4	45.0	0.40	ALA TRACCIONADA	-	3.1	-	30.0	1.62	ALA COMPRIMIDA	1.62
5	15	309.07	-	0.5	45.0	0.43	ALA TRACCIONADA	-	3.5	-	30.0	1.83	ALA COMPRIMIDA	1.83
5	16	309.07	-	0.5	45.0	0.48	ALA TRACCIONADA	-	4.1	-	30.0	2.11	ALA COMPRIMIDA	2.11
5	17	309.07	-	0.6	45.0	0.54	ALA TRACCIONADA	-	4.6	-	30.0	2.41	ALA COMPRIMIDA	2.41
5	18	309.07	-	0.7	45.0	0.59	ALA TRACCIONADA	-	5.2	-	30.0	2.72	ALA COMPRIMIDA	2.72
5	19	309.07	-	0.7	45.0	0.65	ALA TRACCIONADA	-	5.8	-	30.0	3.04	ALA COMPRIMIDA	3.04
5	20	309.07	-	0.8	45.0	0.72	ALA TRACCIONADA	-	6.5	-	30.0	3.38	ALA COMPRIMIDA	3.38
5	21	-	5.8	-	30.0	2.99	ALA COMPRIMIDA	-	7.1	-	30.0	3.69	ALA COMPRIMIDA	3.69

VANO	SECCIÓN	b (°)	τ d (Kp/cm2)	τ max (Kp/cm2)	e (cm)	armadura superior Aα,sup (cm2/m)	armadura inferior Aα,inf (cm2/m)
5	1	30	10.9	69.28	0.16	0.45	5.22
5	2	45	3.1	80.00	0.18	0.05	2.72
5	3	30	4.0	69.28	0.18	0.06	2.03
5	4	30	4.4	69.28	0.18	0.07	2.21
5	5	45	1.8	80.00	0.18	0.02	1.56
5	6	45	1.7	80.00	0.18	0.02	1.56
5	7	45	1.4	80.00	0.19	0.01	1.24
5	8	30	4.0	69.28	0.18	0.06	2.04
5	9	30	4.6	69.28	0.18	0.08	2.31
5	10	30	4.1	69.28	0.18	0.06	2.05
5	11	30	3.7	69.28	0.18	0.05	1.89
5	12	30	3.5	69.28	0.18	0.05	1.76
5	13	30	3.3	69.28	0.18	0.04	1.66
5	14	30	3.1	69.28	0.18	0.04	1.59
5	15	30	3.5	69.28	0.18	0.05	1.79
5	16	30	4.1	69.28	0.18	0.06	2.05
5	17	30	4.6	69.28	0.18	0.08	2.33
5	18	30	5.2	69.28	0.17	0.10	2.62
5	19	30	5.8	69.28	0.17	0.13	2.91
5	20	30	6.5	69.28	0.17	0.16	3.22
5	21	30	7.1	69.28	0.17	0.19	3.50

CALCULO DE ARMADURA DE VOLADIZO

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

DATOS GEOMETRIA

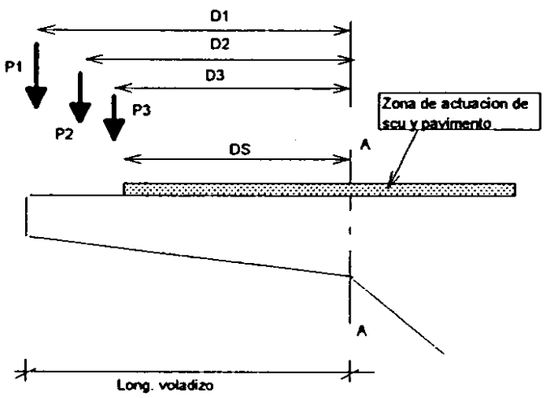


a (longitud voladizo) (m.) =	1.4
b (canto en base del voladizo) (m.) =	0.378
c (canto en extremo del voladizo) (m.) =	0.200
α (angulo cara inferior voladizo) (rad) =	0.126
Recubrimiento (c.d.g. armadura) (m.) =	0.050

DATOS MATERIALES

HORMIGONES		
	Fckl(kp/cm2)	γc
Tablero	400	1.5
ACEROS		
	Fk(kp/cm2)	γs
Acero pasivo	5100	1.15

DATOS CARGAS (P1, P2, P3 son cargas permanentes).



Cargas actuantes (valores caracteristicos)

Peso propio hormigón (t/m3) =	2.50

P1(t/m)=	0.75	D1(m.)=	1.40
P2(t/m)=	0.00	D2(m.)=	0.00
P3(t/m)=	0.00	D3(m)=	0.00

Peso pavimento (t/m2)=	0.64
Valor s.c.u. (t/m2)=	0.50

Distancia actuacion s.c. DS(m.)=	1.40

Esfuerzos debidos al carro en Seccion A-A

Momento Mk(m.t/m)=	0.00
Cortante Vk(m.t/m)=	0.00

Coeficientes de ponderacion de acciones

ESTADOS LIMITES ULTIMOS	
	γf
Acciones permanentes desfav.	1.5
Acciones variables desfavorables	1.5

CALCULO

ESFUERZOS (DE SERVICIO) DEBIDOS A LAS CARGAS:

Carga	Momento(mT/	ortante (T/m)
Peso propio	-0.64	1.01
P1	-1.05	0.75
P2	0.00	0.00
P3	0.00	0.00
Pavimento	-0.63	0.90
Sobrecarga repartida (s.c.u.)	-0.49	0.70
Carro	0.00	0.00
TOTAL	-2.80	3.36

ESFUERZOS DE DISEÑO PARA EL DIMENSIONAMIENTO

Carga	Momento(mT/	ortante (T/m	reducido (T/m
Peso propio	-0.95	1.52	1.15
P1	-1.58	1.13	0.51
P2	0.00	0.00	0.00
P3	0.00	0.00	0.00
Pavimento	-0.94	1.34	0.98
Sobrecarga repartida (s.c.u.)	-0.74	1.05	0.77
Carro	0.00	0.00	0.00
TOTAL	-4.20	5.04	3.41

ARMADO FLEXION (por metro)

As sup.(cm²)	omprobació	Def.sup.(o/oo	Def.inf.(o/oo)	ef. acero(o/oo)
2.95	Vale	-11.623	0.648	-10.000

ARMADO CORTANTE (como viga, por metro)

As 90°(cm²/m)	omprobació	Vu1 (T)	Vcu (T)	Vsu (T)
0.00	Vale	262.40	26.78	0.00

DISTRIBUCIÓN CONJUNTA DE ARMADURA DE RASANTE Y FLEXIÓN EN VOLADIZOS

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1566.5. TABLERO IZQUIERDO

ARMADURA SUPERIOR DISPUESTA=	20.01	CM2/M
ARMADURA INFERIOR DISPUESTA=	10.05	CM2/M

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
1	1	4.60	0.29	4.31	2.95	0.00	3.25	4.31	0.00	17.67	0.00	0.00
1	2	3.93	0.21	3.71	2.95	0.00	3.17	3.71	0.00	17.75	0.00	0.00
1	3	3.44	0.16	3.27	2.95	0.00	3.12	3.27	0.00	17.80	0.00	0.00
1	4	2.94	0.12	2.82	2.95	0.00	3.07	2.82	0.00	17.84	0.00	0.00
1	5	2.47	0.09	2.39	2.95	0.00	3.04	2.39	0.00	17.88	0.00	0.00
1	6	2.04	0.06	1.98	2.95	0.00	3.01	1.98	0.00	17.90	0.00	0.00
1	7	1.56	0.03	1.53	2.95	0.00	2.99	1.53	0.00	17.93	0.00	0.00
1	8	1.16	0.02	1.14	2.95	0.00	2.97	1.14	0.00	17.94	0.00	0.00
1	9	1.06	0.02	1.05	2.95	0.00	2.97	1.05	0.00	17.95	0.00	0.00
1	10	1.11	0.02	1.10	2.95	0.00	2.97	1.10	0.00	17.94	0.00	0.00
1	11	1.36	0.03	1.34	2.95	0.00	2.98	1.34	0.00	17.93	0.00	0.00
1	12	1.62	0.04	1.58	2.95	0.00	2.99	1.58	0.00	17.92	0.00	0.00
1	13	1.89	0.05	1.84	2.95	0.00	3.00	1.84	0.00	17.91	0.00	0.00
1	14	2.18	0.07	2.11	2.95	0.00	3.02	2.11	0.00	17.89	0.00	0.00
1	15	2.48	0.09	2.40	2.95	0.00	3.04	2.40	0.00	17.88	0.00	0.00
1	16	2.94	0.12	2.82	2.95	0.00	3.07	2.82	0.00	17.84	0.00	0.00
1	17	3.29	0.15	3.14	2.95	0.00	3.10	3.14	0.00	17.81	0.00	0.00
1	18	3.62	0.18	3.44	2.95	0.00	3.13	3.44	0.00	17.78	0.00	0.00
1	19	1.99	0.03	1.96	2.95	0.00	2.98	1.96	0.00	17.93	0.00	0.00
1	20	2.95	0.06	2.89	2.95	0.00	3.01	2.89	0.00	17.90	0.00	0.00
1	21	5.51	0.42	5.09	2.95	0.00	3.37	5.09	0.00	17.54	0.00	0.00

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
2	1	6.09	0.52	5.58	2.95	0.00	3.47	5.58	0.00	17.45	0.00	0.00
2	2	3.25	0.07	3.18	2.95	0.00	3.03	3.18	0.00	17.89	0.00	0.00
2	3	2.17	0.03	2.14	2.95	0.00	2.98	2.14	0.00	17.93	0.00	0.00
2	4	2.39	0.08	2.31	2.95	0.00	3.03	2.31	0.00	17.88	0.00	0.00
2	5	5.34	0.40	4.94	2.95	0.00	3.35	4.94	0.00	17.56	0.00	0.00
2	6	4.71	0.31	4.40	2.95	0.00	3.26	4.40	0.00	17.65	0.00	0.00
2	7	3.33	0.15	3.18	2.95	0.00	3.11	3.18	0.00	17.81	0.00	0.00
2	8	2.87	0.11	2.76	2.95	0.00	3.07	2.76	0.00	17.85	0.00	0.00
2	9	2.64	0.10	2.54	2.95	0.00	3.05	2.54	0.00	17.86	0.00	0.00
2	10	2.49	0.09	2.40	2.95	0.00	3.04	2.40	0.00	17.87	0.00	0.00
2	11	2.46	0.08	2.37	2.95	0.00	3.04	2.37	0.00	17.88	0.00	0.00
2	12	2.85	0.11	2.74	2.95	0.00	3.06	2.74	0.00	17.85	0.00	0.00
2	13	3.26	0.15	3.13	2.95	0.00	3.10	3.13	0.00	17.81	0.00	0.00
2	14	3.70	0.19	3.51	2.95	0.00	3.14	3.51	0.00	17.77	0.00	0.00
2	15	4.19	0.24	3.95	2.95	0.00	3.20	3.95	0.00	17.72	0.00	0.00
2	16	4.70	0.31	4.39	2.95	0.00	3.26	4.39	0.00	17.65	0.00	0.00
2	17	1.75	0.04	1.70	2.95	0.00	2.99	1.70	0.00	17.92	0.00	0.00
2	18	2.00	0.06	1.94	2.95	0.00	3.01	1.94	0.00	17.91	0.00	0.00
2	19	2.11	0.06	2.05	2.95	0.00	3.01	2.05	0.00	17.90	0.00	0.00
2	20	3.07	0.07	3.00	2.95	0.00	3.02	3.00	0.00	17.90	0.00	0.00
2	21	6.46	0.58	5.88	2.95	0.00	3.53	5.88	0.00	17.38	0.00	0.00

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
3	1	6.28	0.55	5.73	2.95	0.00	3.50	5.73	0.00	17.41	0.00	0.00
3	2	3.32	0.08	3.25	2.95	0.00	3.03	3.25	0.00	17.88	0.00	0.00
3	3	2.24	0.03	2.21	2.95	0.00	2.99	2.21	0.00	17.93	0.00	0.00
3	4	2.31	0.07	2.23	2.95	0.00	3.03	2.23	0.00	17.89	0.00	0.00
3	5	1.50	0.03	1.47	2.95	0.00	2.98	1.47	0.00	17.93	0.00	0.00
3	6	4.91	0.33	4.57	2.95	0.00	3.29	4.57	0.00	17.63	0.00	0.00
3	7	3.59	0.18	3.41	2.95	0.00	3.13	3.41	0.00	17.78	0.00	0.00
3	8	2.77	0.11	2.66	2.95	0.00	3.06	2.66	0.00	17.85	0.00	0.00
3	9	2.54	0.09	2.45	2.95	0.00	3.04	2.45	0.00	17.87	0.00	0.00
3	10	2.39	0.08	2.31	2.95	0.00	3.03	2.31	0.00	17.88	0.00	0.00
3	11	2.32	0.07	2.24	2.95	0.00	3.03	2.24	0.00	17.89	0.00	0.00
3	12	2.72	0.10	2.62	2.95	0.00	3.05	2.62	0.00	17.86	0.00	0.00
3	13	3.13	0.14	2.99	2.95	0.00	3.09	2.99	0.00	17.83	0.00	0.00
3	14	3.59	0.18	3.41	2.95	0.00	3.13	3.41	0.00	17.78	0.00	0.00
3	15	4.04	0.23	3.81	2.95	0.00	3.18	3.81	0.00	17.73	0.00	0.00
3	16	4.56	0.29	4.27	2.95	0.00	3.24	4.27	0.00	17.67	0.00	0.00
3	17	2.02	0.06	1.96	2.95	0.00	3.01	1.96	0.00	17.90	0.00	0.00
3	18	2.28	0.07	2.21	2.95	0.00	3.02	2.21	0.00	17.89	0.00	0.00
3	19	2.39	0.08	2.31	2.95	0.00	3.03	2.31	0.00	17.88	0.00	0.00

DISTRIBUCIÓN CONJUNTA DE ARMADURA DE RASANTE Y FLEXIÓN EN VOLADIZOS

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1586.5. TABLERO IZQUIERDO

ARMADURA SUPERIOR DISPUESTA=	20.91	CM2/M
ARMADURA INFERIOR DISPUESTA=	18.05	CM2/M

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
3	20	3.03	0.06	2.97	2.95	0.00	3.02	2.97	0.00	17.90	0.00	0.00
3	21	6.19	0.53	5.65	2.95	0.00	3.48	5.65	0.00	17.43	0.00	0.00

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
4	1	6.71	0.62	6.08	2.95	0.00	3.58	6.08	0.00	17.34	0.00	0.00
4	2	3.41	0.16	3.25	2.95	0.00	3.11	3.25	0.00	17.80	0.00	0.00
4	3	2.30	0.04	2.26	2.95	0.00	2.99	2.26	0.00	17.92	0.00	0.00
4	4	1.88	0.05	1.83	2.95	0.00	3.00	1.83	0.00	17.91	0.00	0.00
4	5	5.75	0.46	5.29	2.95	0.00	3.41	5.29	0.00	17.50	0.00	0.00
4	6	5.13	0.36	4.76	2.95	0.00	3.32	4.76	0.00	17.60	0.00	0.00
4	7	3.77	0.20	3.58	2.95	0.00	3.15	3.58	0.00	17.76	0.00	0.00
4	8	2.42	0.08	2.34	2.95	0.00	3.03	2.34	0.00	17.88	0.00	0.00
4	9	2.13	0.06	2.07	2.95	0.00	3.01	2.07	0.00	17.90	0.00	0.00
4	10	2.05	0.06	1.99	2.95	0.00	3.01	1.99	0.00	17.90	0.00	0.00
4	11	1.97	0.05	1.91	2.95	0.00	3.01	1.91	0.00	17.91	0.00	0.00
4	12	2.28	0.07	2.21	2.95	0.00	3.02	2.21	0.00	17.89	0.00	0.00
4	13	2.73	0.10	2.63	2.95	0.00	3.06	2.63	0.00	17.86	0.00	0.00
4	14	3.18	0.14	3.04	2.95	0.00	3.09	3.04	0.00	17.82	0.00	0.00
4	15	3.69	0.19	3.50	2.95	0.00	3.14	3.50	0.00	17.77	0.00	0.00
4	16	4.18	0.24	3.94	2.95	0.00	3.19	3.94	0.00	17.72	0.00	0.00
4	17	4.74	0.31	4.42	2.95	0.00	3.26	4.42	0.00	17.65	0.00	0.00
4	18	2.41	0.08	2.33	2.95	0.00	3.03	2.33	0.00	17.88	0.00	0.00
4	19	2.52	0.09	2.44	2.95	0.00	3.04	2.44	0.00	17.87	0.00	0.00
4	20	2.94	0.06	2.88	2.95	0.00	3.01	2.88	0.00	17.90	0.00	0.00
4	21	5.99	0.50	5.49	2.95	0.00	3.45	5.49	0.00	17.46	0.00	0.00

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
5	1	5.67	0.45	5.22	2.95	0.00	3.40	5.22	0.00	17.51	0.00	0.00
5	2	2.78	0.05	2.72	2.95	0.00	3.01	2.72	0.00	17.91	0.00	0.00
5	3	2.09	0.06	2.03	2.95	0.00	3.01	2.03	0.00	17.90	0.00	0.00
5	4	2.28	0.07	2.21	2.95	0.00	3.02	2.21	0.00	17.89	0.00	0.00
5	5	1.58	0.02	1.56	2.95	0.00	2.97	1.56	0.00	17.94	0.00	0.00
5	6	1.57	0.02	1.56	2.95	0.00	2.97	1.56	0.00	17.94	0.00	0.00
5	7	1.25	0.01	1.24	2.95	0.00	2.96	1.24	0.00	17.95	0.00	0.00
5	8	2.10	0.06	2.04	2.95	0.00	3.01	2.04	0.00	17.90	0.00	0.00
5	9	2.39	0.08	2.31	2.95	0.00	3.03	2.31	0.00	17.88	0.00	0.00
5	10	2.11	0.06	2.05	2.95	0.00	3.01	2.05	0.00	17.90	0.00	0.00
5	11	1.94	0.05	1.89	2.95	0.00	3.00	1.89	0.00	17.91	0.00	0.00
5	12	1.81	0.05	1.76	2.95	0.00	3.00	1.76	0.00	17.92	0.00	0.00
5	13	1.71	0.04	1.66	2.95	0.00	2.99	1.66	0.00	17.92	0.00	0.00
5	14	1.62	0.04	1.59	2.95	0.00	2.99	1.59	0.00	17.92	0.00	0.00
5	15	1.83	0.05	1.79	2.95	0.00	3.00	1.79	0.00	17.91	0.00	0.00
5	16	2.11	0.06	2.05	2.95	0.00	3.01	2.05	0.00	17.90	0.00	0.00
5	17	2.41	0.08	2.33	2.95	0.00	3.03	2.33	0.00	17.88	0.00	0.00
5	18	2.72	0.10	2.62	2.95	0.00	3.05	2.62	0.00	17.86	0.00	0.00
5	19	3.04	0.13	2.91	2.95	0.00	3.08	2.91	0.00	17.83	0.00	0.00
5	20	3.38	0.16	3.22	2.95	0.00	3.11	3.22	0.00	17.80	0.00	0.00
5	21	3.69	0.19	3.50	2.95	0.00	3.14	3.50	0.00	17.77	0.00	0.00

CÁLCULO DE ARMADURA DE TORSION . ART. 48.2 EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
1	1	0.00	218.74	8.614	0.350	2713.05	vale	2.86	3.02
1	2	1.19	197.96	8.666	0.330	2572.24	vale	2.58	2.72
1	3	2.38	179.37	8.666	0.330	2572.24	vale	2.33	2.46
1	4	3.57	162.96	8.666	0.330	2572.24	vale	2.12	2.24
1	5	4.75	148.75	8.666	0.330	2572.24	vale	1.94	2.04
1	6	5.94	136.71	8.666	0.330	2572.24	vale	1.78	1.88
1	7	7.13	126.87	8.666	0.330	2572.24	vale	1.65	1.74
1	8	8.32	119.22	8.666	0.330	2572.24	vale	1.55	1.64
1	9	9.51	113.75	8.666	0.330	2572.24	vale	1.48	1.56
1	10	10.70	110.47	8.666	0.330	2572.24	vale	1.44	1.52
1	11	11.89	109.37	8.666	0.330	2572.24	vale	1.42	1.50
1	12	10.70	110.47	8.666	0.330	2572.24	vale	1.44	1.52
1	13	9.51	113.75	8.666	0.330	2572.24	vale	1.48	1.56
1	14	8.32	119.22	8.666	0.330	2572.24	vale	1.55	1.64
1	15	7.13	126.87	8.666	0.330	2572.24	vale	1.65	1.74
1	16	5.94	136.71	8.666	0.330	2572.24	vale	1.78	1.88
1	17	4.75	148.75	8.666	0.330	2572.24	vale	1.94	2.04
1	18	3.57	162.96	8.666	0.330	2572.24	vale	2.12	2.24
1	19	2.38	179.37	8.666	0.330	2572.24	vale	2.33	2.46
1	20	1.19	197.96	8.614	0.350	2713.05	vale	2.59	2.74
1	21	0.00	218.74	8.614	0.350	2713.05	vale	2.86	3.02

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
2	1	0.00	298.25	8.614	0.350	2713.05	vale	3.90	4.12
2	2	1.62	269.92	8.614	0.350	2713.05	vale	3.53	3.73
2	3	3.24	244.57	8.666	0.330	2572.24	vale	3.18	3.36
2	4	4.86	222.20	8.666	0.330	2572.24	vale	2.89	3.05
2	5	6.48	202.81	8.666	0.330	2572.24	vale	2.64	2.79
2	6	8.10	186.41	8.666	0.330	2572.24	vale	2.43	2.56
2	7	9.72	172.99	8.666	0.330	2572.24	vale	2.25	2.38
2	8	11.34	162.55	8.666	0.330	2572.24	vale	2.11	2.23
2	9	12.96	155.09	8.666	0.330	2572.24	vale	2.02	2.13
2	10	14.58	150.62	8.666	0.330	2572.24	vale	1.96	2.07
2	11	16.21	149.13	8.666	0.330	2572.24	vale	1.94	2.05
2	12	14.58	150.62	8.666	0.330	2572.24	vale	1.96	2.07
2	13	12.96	155.09	8.666	0.330	2572.24	vale	2.02	2.13
2	14	11.34	162.55	8.666	0.330	2572.24	vale	2.11	2.23
2	15	9.72	172.99	8.666	0.330	2572.24	vale	2.25	2.38
2	16	8.10	186.41	8.666	0.330	2572.24	vale	2.43	2.56
2	17	6.48	202.81	8.666	0.330	2572.24	vale	2.64	2.79
2	18	4.86	222.20	8.666	0.330	2572.24	vale	2.89	3.05
2	19	3.24	244.57	8.666	0.330	2572.24	vale	3.18	3.36
2	20	1.62	269.92	8.614	0.350	2713.05	vale	3.53	3.73
2	21	0.00	298.25	8.614	0.350	2713.05	vale	3.90	4.12

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
3	1	0.00	298.25	8.614	0.350	2713.05	vale	3.90	4.12
3	2	1.62	269.92	8.614	0.350	2713.05	vale	3.53	3.73
3	3	3.24	244.57	8.666	0.330	2572.24	vale	3.18	3.36
3	4	4.86	222.20	8.666	0.330	2572.24	vale	2.89	3.05
3	5	6.48	202.81	8.666	0.330	2572.24	vale	2.64	2.79
3	6	8.10	186.41	8.666	0.330	2572.24	vale	2.43	2.56
3	7	9.72	172.99	8.666	0.330	2572.24	vale	2.25	2.38
3	8	11.34	162.55	8.666	0.330	2572.24	vale	2.11	2.23
3	9	12.96	155.09	8.666	0.330	2572.24	vale	2.02	2.13
3	10	14.58	150.62	8.666	0.330	2572.24	vale	1.96	2.07
3	11	16.21	149.13	8.666	0.330	2572.24	vale	1.94	2.05
3	12	14.58	150.62	8.666	0.330	2572.24	vale	1.96	2.07
3	13	12.96	155.09	8.666	0.330	2572.24	vale	2.02	2.13
3	14	11.34	162.55	8.666	0.330	2572.24	vale	2.11	2.23
3	15	9.72	172.99	8.666	0.330	2572.24	vale	2.25	2.38

CÁLCULO DE ARMADURA DE TORSION . ART. 48.2 EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1508.5.TABLERO IZQUIERDO

3	16	8.10	186.41	8.666	0.330	2572.24	vale	2.43	2.56
3	17	6.48	202.81	8.666	0.330	2572.24	vale	2.64	2.79
3	18	4.86	222.20	8.666	0.330	2572.24	vale	2.89	3.05
3	19	3.24	244.57	8.666	0.330	2572.24	vale	3.18	3.36
3	20	1.62	269.92	8.614	0.350	2713.05	vale	3.53	3.73
3	21	0.00	298.25	8.614	0.350	2713.05	vale	3.90	4.12

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
4	1	0.00	298.25	8.614	0.350	2713.05	vale	3.90	4.12
4	2	1.62	269.92	8.614	0.350	2713.05	vale	3.53	3.73
4	3	3.24	244.57	8.666	0.330	2572.24	vale	3.18	3.36
4	4	4.86	222.20	8.666	0.330	2572.24	vale	2.89	3.05
4	5	6.48	202.81	8.666	0.330	2572.24	vale	2.64	2.79
4	6	8.10	186.41	8.666	0.330	2572.24	vale	2.43	2.56
4	7	9.72	172.99	8.666	0.330	2572.24	vale	2.25	2.38
4	8	11.34	162.55	8.666	0.330	2572.24	vale	2.11	2.23
4	9	12.96	155.09	8.666	0.330	2572.24	vale	2.02	2.13
4	10	14.58	150.62	8.666	0.330	2572.24	vale	1.96	2.07
4	11	16.21	149.13	8.666	0.330	2572.24	vale	1.94	2.05
4	12	14.58	150.62	8.666	0.330	2572.24	vale	1.96	2.07
4	13	12.96	155.09	8.666	0.330	2572.24	vale	2.02	2.13
4	14	11.34	162.55	8.666	0.330	2572.24	vale	2.11	2.23
4	15	9.72	172.99	8.666	0.330	2572.24	vale	2.25	2.38
4	16	8.10	186.41	8.666	0.330	2572.24	vale	2.43	2.56
4	17	6.48	202.81	8.666	0.330	2572.24	vale	2.64	2.79
4	18	4.86	222.20	8.666	0.330	2572.24	vale	2.89	3.05
4	19	3.24	244.57	8.666	0.330	2572.24	vale	3.18	3.36
4	20	1.62	269.92	8.614	0.350	2713.05	vale	3.53	3.73
4	21	0.00	298.25	8.614	0.350	2713.05	vale	3.90	4.12

VANO	SECCIÓN	Xtramo(m.)	Torsor Td (m.t.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Torsor Tu1 (m.t.)	Td < Tu1	ARM.LONG.(cm2/m)	ARM.TRANSV.(cm2/m)
5	1	0.00	184.05	8.614	0.350	2713.05	vale	2.41	2.54
5	2	1.00	166.57	8.614	0.350	2713.05	vale	2.18	2.30
5	3	2.00	150.92	8.614	0.350	2713.05	vale	1.98	2.09
5	4	3.00	137.12	8.614	0.350	2713.05	vale	1.79	1.90
5	5	4.00	125.15	8.614	0.350	2713.05	vale	1.64	1.73
5	6	5.00	115.03	8.614	0.350	2713.05	vale	1.51	1.59
5	7	6.00	106.75	8.614	0.350	2713.05	vale	1.40	1.48
5	8	7.00	100.31	8.614	0.350	2713.05	vale	1.31	1.39
5	9	8.00	95.71	8.614	0.350	2713.05	vale	1.25	1.32
5	10	9.00	92.95	8.614	0.350	2713.05	vale	1.22	1.28
5	11	10.00	92.03	8.614	0.350	2713.05	vale	1.20	1.27
5	12	9.00	92.95	8.614	0.350	2713.05	vale	1.22	1.28
5	13	8.00	95.71	8.614	0.350	2713.05	vale	1.25	1.32
5	14	7.00	100.31	8.614	0.350	2713.05	vale	1.31	1.39
5	15	6.00	106.75	8.614	0.350	2713.05	vale	1.40	1.48
5	16	5.00	115.03	8.614	0.350	2713.05	vale	1.51	1.59
5	17	4.00	125.15	8.614	0.350	2713.05	vale	1.64	1.73
5	18	3.00	137.12	8.614	0.350	2713.05	vale	1.79	1.90
5	19	2.00	150.92	8.614	0.350	2713.05	vale	1.98	2.09
5	20	1.00	166.57	8.614	0.350	2713.05	vale	2.18	2.30
5	21	0.00	184.05	8.614	0.350	2713.05	vale	2.41	2.54

VERIFICACIÓN CONJUNTA A TORSIÓN Y FLEXIÓN .ART. 48.2.4. EP-93

PROYECTO : SUBTRAMO XV
OBRA : E-1508.5.TABLERO IZQUIERDO

VANO	SECCIÓN	Tu1. Tm	Td. Tm	Vu1. ton	Vrd. ton	(Td/Tu1+Vrd/Vu1)<=1
1	1	2713.05	218.74	7497.71	333.20	0.13
1	2	2572.24	197.96	3226.56	284.46	0.17
1	3	2572.24	179.37	3226.56	248.90	0.15
1	4	2572.24	162.96	3226.56	213.34	0.13
1	5	2572.24	148.75	3226.56	179.28	0.11
1	6	2572.24	136.71	3226.56	147.65	0.10
1	7	2572.24	126.87	3226.56	128.60	0.09
1	8	2572.24	119.22	3226.56	127.12	0.09
1	9	2572.24	113.75	3226.56	147.48	0.09
1	10	2572.24	110.47	3208.76	165.56	0.09
1	11	2572.24	109.37	3208.64	172.71	0.10
1	12	2572.24	110.47	3208.64	189.01	0.10
1	13	2572.24	113.75	3208.64	202.92	0.11
1	14	2572.24	119.22	3208.64	217.88	0.11
1	15	2572.24	126.87	3208.64	234.12	0.12
1	16	2572.24	136.71	3194.56	240.88	0.13
1	17	2572.24	148.75	3194.56	260.49	0.14
1	18	2572.24	162.96	3194.56	279.92	0.15
1	19	2572.24	179.37	3203.41	548.38	0.24
1	20	2713.05	197.96	7446.70	814.35	0.18
1	21	2713.05	218.74	7446.70	1087.98	0.23

VANO	SECCIÓN	Tu1. Tm	Td. Tm	Vu1. ton	Vrd. ton	(Td/Tu1+Vrd/Vu1)<=1
2	1	2713.05	298.25	7465.55	1206.43	0.27
2	2	2713.05	269.92	7465.55	896.94	0.22
2	3	2572.24	244.57	3208.64	598.05	0.28
2	4	2572.24	222.20	3208.64	389.52	0.21
2	5	2572.24	202.81	3223.48	386.94	0.20
2	6	2572.24	186.41	3223.48	341.45	0.18
2	7	2572.24	172.99	3231.14	241.57	0.14
2	8	2572.24	162.55	3234.86	207.96	0.13
2	9	2572.24	155.09	3233.99	191.15	0.12
2	10	2572.24	150.62	3233.99	180.09	0.11
2	11	2572.24	149.13	3233.99	177.99	0.11
2	12	2572.24	150.62	3233.99	206.75	0.12
2	13	2572.24	155.09	3233.99	237.77	0.13
2	14	2572.24	162.55	3233.99	268.31	0.15
2	15	2572.24	172.99	3233.99	303.61	0.16
2	16	2572.24	186.41	3233.99	340.64	0.18
2	17	2572.24	202.81	3233.99	376.51	0.20
2	18	2572.24	222.20	3233.99	417.42	0.22
2	19	2572.24	244.57	3233.99	467.99	0.24
2	20	2713.05	269.92	7454.14	845.30	0.21
2	21	2713.05	298.25	7443.42	1231.97	0.28

VANO	SECCIÓN	Tu1. Tm.	Td. Tm	Vu1. ton.	Vrd. ton	(Td/Tu1+Vrd/Vu1)<=1
3	1	2713.05	298.25	7462.47	1225.69	0.27
3	2	2713.05	269.92	7462.47	916.00	0.22
3	3	2572.24	244.57	3206.94	617.97	0.29
3	4	2572.24	222.20	3206.94	401.93	0.21
3	5	2572.24	202.81	3221.76	403.96	0.20
3	6	2572.24	186.41	3221.76	355.51	0.18
3	7	2572.24	172.99	3229.41	259.83	0.15
3	8	2572.24	162.55	3234.86	200.70	0.13
3	9	2572.24	155.09	3233.99	184.08	0.12
3	10	2572.24	150.62	3233.99	173.40	0.11
3	11	2572.24	149.13	3233.99	167.91	0.11
3	12	2572.24	150.62	3233.99	197.35	0.12
3	13	2572.24	155.09	3233.99	226.44	0.13
3	14	2572.24	162.55	3233.99	259.97	0.14

VERIFICACIÓN CONJUNTA A TORSIÓN Y FLEXIÓN .ART. 48.2.4. EP-93

PROYECTO : SUBTRAMO XV
OBRA : E-1508.5.TABLERO IZQUIERDO

3	15	2572.24	172.99	3233.99	292.80	0.16
3	16	2572.24	186.41	3233.99	330.10	0.17
3	17	2572.24	202.81	3233.99	369.33	0.19
3	18	2572.24	222.20	3233.99	407.19	0.21
3	19	2572.24	244.57	3233.99	461.08	0.24
3	20	2713.05	269.92	7454.14	835.41	0.21
3	21	2713.05	298.25	7443.42	1222.04	0.27

VANO	SECCIÓN	Tu1. Tm	Td. Tm	Vu1. ton	Vrd. ton	(Td/Tu1+Vrd/Vu1)<=1
4	1	2713.05	298.25	7462.47	1240.52	0.28
4	2	2713.05	269.92	7462.47	927.65	0.22
4	3	2572.24	244.57	3206.94	633.01	0.29
4	4	2572.24	222.20	3206.94	417.25	0.22
4	5	2572.24	202.81	3221.76	416.41	0.21
4	6	2572.24	186.41	3221.76	371.40	0.19
4	7	2572.24	172.99	3229.41	273.48	0.15
4	8	2572.24	162.55	3239.21	175.33	0.12
4	9	2572.24	155.09	3238.34	154.32	0.11
4	10	2572.24	150.62	3238.34	148.39	0.10
4	11	2572.24	149.13	3238.34	142.55	0.10
4	12	2572.24	150.62	3238.34	164.99	0.11
4	13	2572.24	155.09	3238.34	197.88	0.12
4	14	2572.24	162.55	3238.34	230.07	0.13
4	15	2572.24	172.99	3238.34	267.03	0.15
4	16	2572.24	186.41	3238.34	302.68	0.17
4	17	2572.24	202.81	3238.34	343.10	0.18
4	18	2572.24	222.20	3238.34	385.20	0.21
4	19	2572.24	244.57	3238.34	436.81	0.23
4	20	2713.05	269.92	7459.84	811.58	0.21
4	21	2713.05	298.25	7459.84	1193.90	0.27

VANO	SECCIÓN	Tu1. Tm	Td. Tm	Vu1. ton	Vrd. ton	(Td/Tu1+Vrd/Vu1)<=1
5	1	2713.05	184.05	7486.89	1090.69	0.21
5	2	2713.05	166.57	7486.89	765.90	0.16
5	3	2713.05	150.92	7486.89	439.13	0.11
5	4	2713.05	137.12	7517.41	382.69	0.10
5	5	2713.05	125.15	7517.41	435.06	0.10
5	6	2713.05	115.03	7517.41	433.80	0.10
5	7	2713.05	106.75	7534.96	343.98	0.08
5	8	2713.05	100.31	7458.75	239.83	0.07
5	9	2713.05	95.71	7459.40	183.99	0.06
5	10	2713.05	92.95	7459.40	171.26	0.06
5	11	2713.05	92.03	7459.40	152.48	0.05
5	12	2713.05	92.95	7459.40	137.67	0.05
5	13	2713.05	95.71	7459.40	123.79	0.05
5	14	2713.05	100.31	7459.40	117.62	0.05
5	15	2713.05	106.75	7459.40	132.74	0.06
5	16	2713.05	115.03	7459.40	152.87	0.06
5	17	2713.05	125.15	7459.40	174.36	0.07
5	18	2713.05	137.12	7459.40	196.93	0.08
5	19	2713.05	150.92	7459.40	220.24	0.09
5	20	2713.05	166.57	7459.62	244.90	0.09
5	21	2713.05	184.05	7459.62	267.27	0.10

REACCIONES EN APOYOS DE PUENTES

PROYECTO : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508.5. TABLERO IZQUIERDO

Las sobrecargas llevan el coeficiente de impacto incluido

Node	PP	PP,rios	CM	PRET	GRAD	SC1	SC2	SC3	SC4	SC5	SC6	SC7	SC8	SC8	SC9	SC,max	SC,min	E.L.Servicio Rmax	E.L.Servicio Rmin	E.L.Ultimo Rmax	E.L.Ultimo Rmin	
114	95	29	35	13	9	38	112	-20	-17	5	5	-1	-1	0	0	117	-21	300	151	442	125	POT 400 T
115	95	29	60	13	9	112	38	-17	-20	5	5	-1	-1	0	0	117	-21	324	176	479	147	POT 400 T
116	359	0	147	-12	-10	68	140	86	184	-22	-20	5	5	-1	-1	329	-22	824	460	1242	393	POT 1000 T
117	360	0	203	-12	-10	140	68	184	86	-20	-22	5	5	-1	-1	330	-22	880	515	1326	443	"
118	378	0	150	-1	1	-12	-11	81	179	82	181	-20	-18	2	2	362	-32	891	495	1337	426	"
119	378	0	215	-1	1	-11	-12	179	81	181	82	-18	-20	2	2	362	-32	955	560	1433	484	"
120	379	0	153	-3	2	3	3	-21	-19	83	182	78	177	-8	-6	361	-28	892	500	1339	433	"
121	379	0	218	-3	2	3	3	-19	-21	182	83	177	78	-7	-8	361	-28	957	565	1436	491	"
122	377	0	138	-11	-12	-1	-1	6	6	-24	-22	94	192	54	114	312	-25	816	465	1230	395	"
123	377	0	190	-11	-12	-1	-1	6	6	-22	-24	192	94	115	54	312	-25	868	517	1308	442	"
124	104	29	25	13	11	0	0	-2	-2	6	7	-26	-23	33	95	102	-27	286	143	421	114	POT 400 T
125	104	29	46	13	11	0	0	-2	-2	7	6	-23	-26	95	33	102	-27	307	164	452	133	POT 400 T
SUMA	3385	114	1579	0	0	339	339	463	463	463	463	463	463	286	286							

Para las sobrecargas se ha tomado:

q= -14.28 t/m
mt= (+/-)9.27 mt/m

Para la carga muerta se ha tomado:

q= -11.20 t/m
mt= 3.0 m.t/m

GINPROSA

ASUNTO	FECHA
E-1508.5. TABLERO IZQUIERDO TENDONES DE UNION TABLERO - ESTRIBO	PAG. /

Peso de tablero + Carga muerta = 5060 Ton

Fuerza de evacuación sobre punto fijo = 152 Ton.

Carga de frenado = $\left(\frac{143 \times 10 + 30 \times 2}{8}\right)$ = 187 Ton.

Fuerza total sobre punto fijo = 340 Tons.

Fuerzas de diseño por anclaje

En servicio $H_s = \frac{340}{2} = 170$ ton.

En rotura $H_d = 1{,}5 \times H_s = 255$ ton.

Se disponen tendones de $19 \times 0{,}6''$ con una carga de rotura de 505 ton.

$$P_u = 505 > 255 \text{ t.}$$

Se tesaron al 40 % de $P_u \rightarrow P_o = 202$ ton.

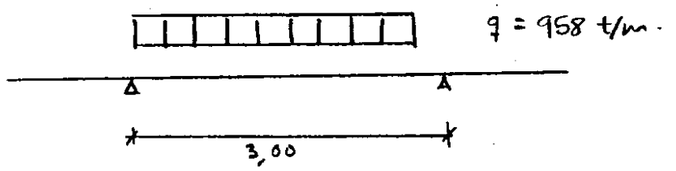
Se disponen 2 neoprenos de $300 \times 400 \times 71(32)$ por cada tendón.

GINPROSA

ASUNTO	FECHA
TABLERO IZQUIERDO RIOSTRA DE PILAS	PAG. 1

CALCULO DE LA ARMADURA INFERIOR

$R_{d,max} = 1436 \text{ ton} \times 2 = 2872 \text{ ton}.$

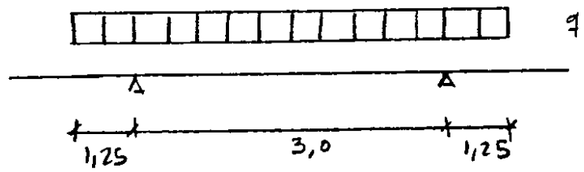


$M_d^+ = 958 \times \frac{3^2}{8} = 1077 \text{ mt} \longrightarrow m_d = \frac{1077}{6,00} = 180 \text{ mt/m} \rightarrow \phi 25/0,15$

$V_d = \frac{1436}{6,00} = 240 \text{ t/m} \longrightarrow V_{cu} = 163 \text{ t} \longrightarrow A_{sx} = 10,2 \text{ cm}^2/\text{m}.$

$2c\phi 12/0,20/\text{metro}$

CALCULO DE LA ARMADURA SUPERIOR



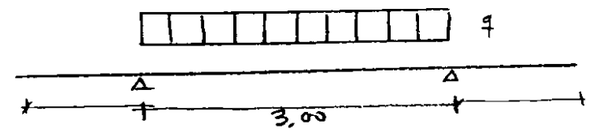
$M_d^- = 522,2 \times \frac{1,25^2}{2} = 408 \text{ mt} \longrightarrow m_d = 68 \text{ mt/m} \rightarrow \phi 20/0,15$

GINPROSA

ASUNTO	FECHA
E-1508.5 . TABLERO IZQUIERDO RIOSTRA DE ESTRIBOS	PAG. 1

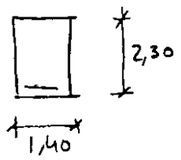
CALCULO DE LA ARMADURA INFERIOR

$R_{d,max} = 480 \text{ ton} \times 2 = 960 \text{ ton}.$



$q = \frac{960}{3} = 320 \text{ t/m}.$

$M_d^+ = 320 \times \frac{3^2}{8} = 360 \text{ mt}$

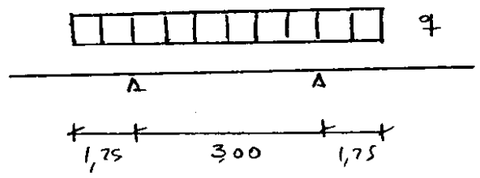


$A_{s,inf} = 37,34 \text{ cm}^2 \longrightarrow \phi 25/0,15$

$V_d = 480 \text{ ton} \longrightarrow V_{cu} = 251 \text{ ton} \longrightarrow A_{sx} = 27,47 \text{ cm}^2/\text{m}.$

$4c\phi 12/0,20$

CALCULO ARMADURA SUPERIOR



$q = \frac{980}{3,00 + 1,25 \times 2} = 175 \text{ t/m}. \quad M_d^- = 175 \cdot \frac{1,75^2}{2} = 137 \text{ mt}.$

$A_{s,sup} = 14,78 \text{ cm}^2 \longrightarrow \phi 20/0,15.$

GINPROSA

ASUNTO
ESTADO LIMITE DE DEFORMACIONES
E-1508.S_TABLERO 12DO

FECHA

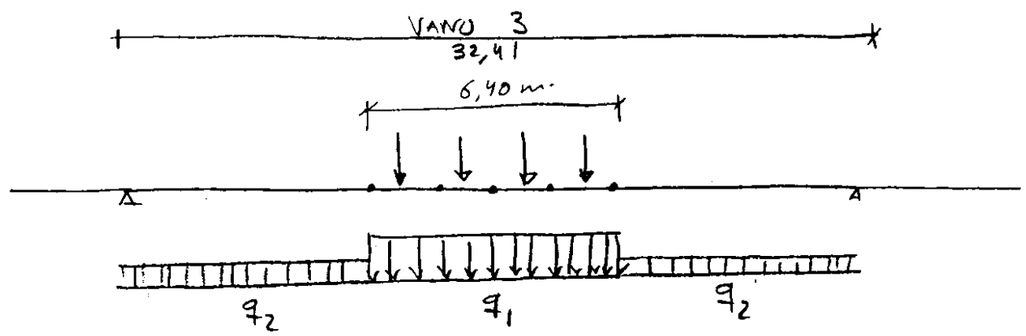
PAG. 1

Se aplica el tren de cargas LM71 con el coeficiente de impacto definido en el EC-2.

$$\phi_2 = \frac{1,44}{\sqrt{L\phi} - 0,2} + 0,82$$

$$L\phi = K \times L_m = 1,5 \times \frac{141}{5} = 42,3 \text{ m.}$$

$$\phi_2 = 1,048$$



$$q_1 = \frac{25 \times 4}{6,40} \times 1,048 = 16,40 \text{ t/m.}$$

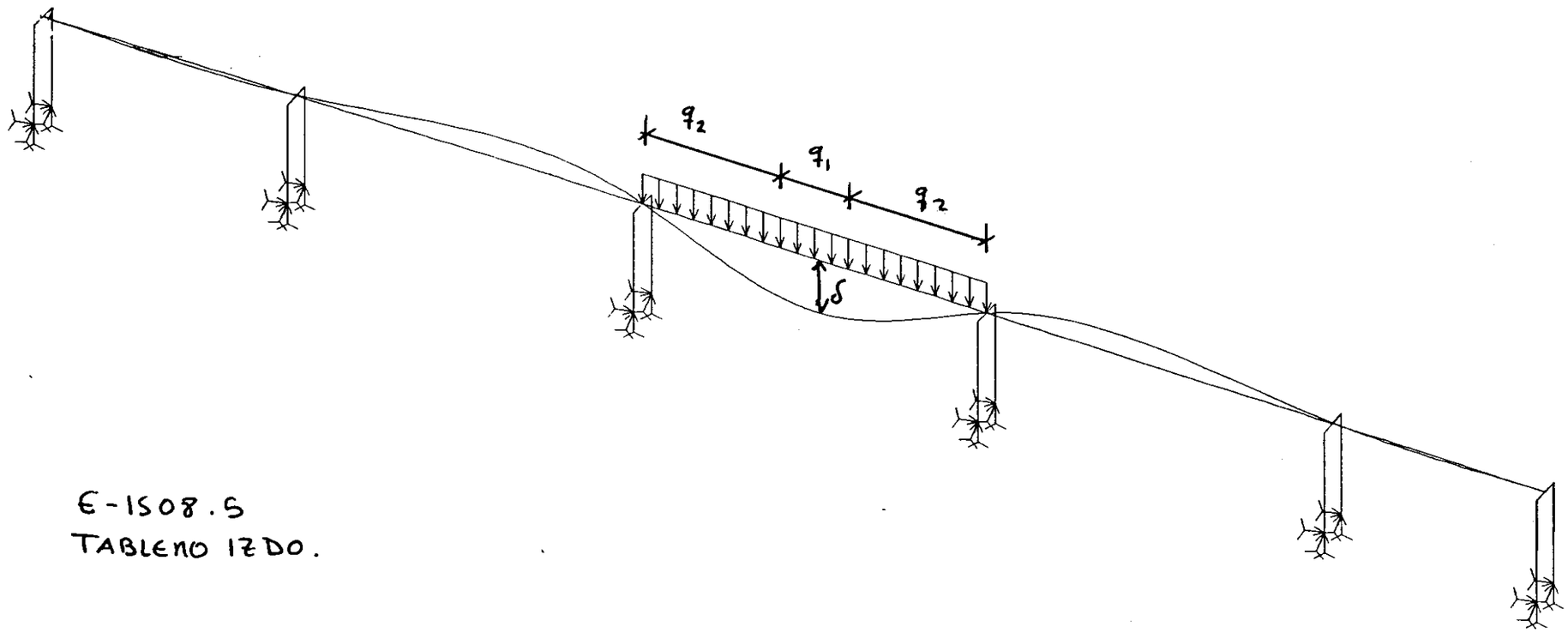
$$q_2 = 8 \times 1,048 = 8,40 \text{ t/m.}$

Lin DEF Lc=24

$\delta = 5{,}40$ mm.

$$\frac{\delta}{L} = \frac{5{,}40}{32410} = \frac{1}{6001} << \frac{1}{1909} \quad \underline{\text{ok}}$$

$q_1 = 16{,}40$ t/m.
$q_2 = 8{,}40$ t/m.



E-1508.5
TABLERO IZDO.

fechas

Load case 24 Node	UX	UY	UZ	RX	RY	RZ
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0001	-0.0001	0.0000	0.0000	0.0000
4	0.0000	0.0001	-0.0001	0.0000	0.0000	0.0000
5	0.0000	0.0001	-0.0002	0.0000	0.0000	0.0000
6	0.0000	0.0001	-0.0002	0.0000	0.0000	0.0000
7	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
8	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
9	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
10	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
11	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
12	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
13	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
14	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
15	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
16	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
17	0.0000	0.0001	-0.0004	0.0000	0.0000	0.0000
18	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
19	0.0000	0.0001	-0.0003	0.0000	-0.0001	0.0000
20	0.0000	0.0001	-0.0002	0.0000	-0.0001	0.0000
21	0.0000	0.0001	-0.0001	0.0000	-0.0001	0.0000
22	0.0000	0.0001	0.0000	0.0000	-0.0001	0.0000
23	0.0000	0.0001	0.0002	0.0000	-0.0001	0.0000
24	0.0000	0.0001	0.0004	0.0000	-0.0001	0.0000
25	0.0000	0.0001	0.0006	0.0000	-0.0001	0.0000
26	0.0000	0.0001	0.0008	0.0000	-0.0001	0.0000
27	0.0000	0.0001	0.0010	0.0000	-0.0001	0.0000
28	0.0000	0.0001	0.0012	0.0000	-0.0001	0.0000
29	0.0000	0.0001	0.0015	0.0000	-0.0001	0.0000
30	0.0000	0.0001	0.0017	0.0000	-0.0001	0.0000
31	0.0000	0.0001	0.0018	0.0000	-0.0001	0.0000
32	0.0000	0.0001	0.0020	0.0000	-0.0001	0.0000
33	0.0000	0.0001	0.0021	0.0000	0.0000	0.0000
34	0.0000	0.0001	0.0021	0.0000	0.0000	0.0000
35	0.0000	0.0001	0.0021	0.0000	0.0000	0.0000
36	0.0000	0.0001	0.0020	0.0000	0.0001	0.0000
37	0.0000	0.0001	0.0019	0.0000	0.0001	0.0000
38	0.0000	0.0001	0.0017	0.0000	0.0001	0.0000
39	0.0000	0.0001	0.0014	0.0000	0.0002	0.0000
40	0.0000	0.0001	0.0010	0.0001	0.0003	0.0000
41	0.0000	0.0001	0.0005	0.0001	0.0003	0.0000
42	0.0000	0.0001	0.0000	0.0001	0.0004	0.0000
43	0.0000	0.0001	-0.0007	0.0001	0.0004	0.0000
44	0.0000	0.0001	-0.0014	0.0001	0.0004	0.0000
45	0.0000	0.0001	-0.0022	0.0001	0.0004	0.0000
46	0.0000	0.0001	-0.0029	0.0001	0.0004	0.0000
47	0.0000	0.0001	-0.0036	0.0001	0.0004	0.0000
48	0.0000	0.0001	-0.0042	0.0001	0.0003	0.0000
49	0.0000	0.0001	-0.0047	0.0001	0.0003	0.0000
50	0.0000	0.0001	-0.0051	0.0000	0.0002	0.0000
51	0.0000	0.0001	-0.0053	0.0000	0.0001	0.0000
52	0.0000	0.0001	**-0.0054**	0.0000	0.0000	0.0000
53	0.0000	0.0001	-0.0053	0.0000	-0.0001	0.0000
54	0.0000	0.0001	-0.0051	0.0000	-0.0002	0.0000
55	0.0000	0.0001	-0.0047	-0.0001	-0.0003	0.0000
56	0.0000	0.0001	-0.0042	-0.0001	-0.0003	0.0000
57	0.0000	0.0001	-0.0036	-0.0001	-0.0004	0.0000
58	0.0000	0.0001	-0.0029	-0.0001	-0.0004	0.0000
59	0.0000	0.0001	-0.0022	-0.0001	-0.0004	0.0000
60	0.0000	0.0001	-0.0014	-0.0001	-0.0004	0.0000
61	0.0000	0.0001	-0.0007	-0.0001	-0.0004	0.0000
62	0.0000	0.0001	0.0000	-0.0001	-0.0004	0.0000
63	0.0000	0.0001	0.0005	-0.0001	-0.0003	0.0000
64	0.0000	0.0001	0.0010	-0.0001	-0.0003	0.0000
65	0.0000	0.0001	0.0014	0.0000	-0.0002	0.0000
66	0.0000	0.0001	0.0017	0.0000	-0.0001	0.0000
67	0.0000	0.0001	0.0019	0.0000	-0.0001	0.0000
68	0.0000	0.0001	0.0020	0.0000	-0.0001	0.0000
69	0.0000	0.0001	0.0021	0.0000	0.0000	0.0000
70	0.0000	0.0001	0.0021	0.0000	0.0000	0.0000
71	0.0000	0.0001	0.0020	0.0000	0.0000	0.0000
72	0.0000	0.0001	0.0019	0.0000	0.0001	0.0000
73	0.0000	0.0001	0.0018	0.0000	0.0001	0.0000
74	0.0000	0.0001	0.0016	0.0000	0.0001	0.0000
75	0.0000	0.0001	0.0014	0.0000	0.0001	0.0000
76	0.0000	0.0001	0.0012	0.0000	0.0001	0.0000
77	0.0000	0.0001	0.0010	0.0000	0.0001	0.0000
78	0.0000	0.0001	0.0007	0.0000	0.0001	0.0000
79	0.0000	0.0001	0.0005	0.0000	0.0001	0.0000
80	0.0000	0.0001	0.0003	0.0000	0.0001	0.0000
81	0.0000	0.0001	0.0002	0.0000	0.0001	0.0000
82	0.0000	0.0001	0.0000	0.0000	0.0001	0.0000
83	0.0000	0.0001	-0.0001	0.0000	0.0001	0.0000
84	0.0000	0.0001	-0.0001	0.0000	0.0001	0.0000
85	0.0000	0.0001	-0.0002	0.0000	0.0000	0.0000
86	0.0000	0.0001	-0.0002	0.0000	0.0000	0.0000
87	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
88	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
89	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
90	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
91	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
92	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
93	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
94	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
95	0.0000	0.0001	-0.0003	0.0000	0.0000	0.0000
96	0.0000	0.0001	-0.0002	0.0000	0.0000	0.0000
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100	0.0000	0.0001	-0.0001	0.0000	0.0000	0.0000
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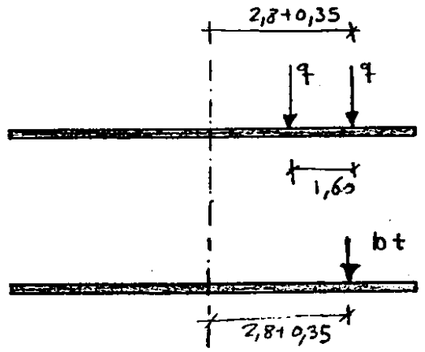
GINPROSA

ASUNTO: COMPROBACIONES FRENTE A DESCARRILAMIENTO SEGUN UIC - 776 - I . E-1508.5 TAB. 12DO.

FECHA:

PAG. 1 /

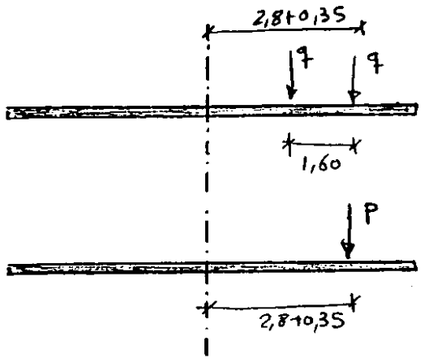
CASO A



q = 1,5 t/m.

P = 10 t

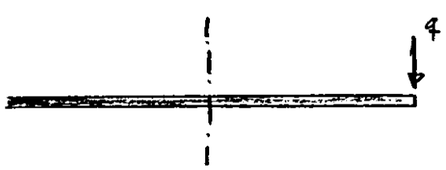
CASO B



q = 5 t/m.

P = 22 t

CASO C



q = 12 t/m.
en L = 30 m

ESTABILIDAD DEL CONJUNTO

Se carga el modelo de viga continua con las siguientes hipotesis:

Peso Propio ($\delta = 2,5$ t/m³)

Carga muerta ($q = 11,2$ t/m $mt = 2,90$ mt/m)

Caso C | Vano lateral $q = 12$ t/m $mt = 49,8$ mt/m.
Caso C | Vano central $q = 12$ t/m $mt = 49,8$ mt/m.

GINPROSA

ASUNTO: COMPROBACIONES FRENTE A DESCARRILAMIENTO SEGUN UIC - 776 - I . E-1508.5 . TAB. 12DO

PAG. 2 /

Los resultados del calculo son:

Reacciones en apoyos

Estribos	3 t	435 t
Pila 1	252 t	1219 t
Pila 2	360 t	960 t.

No hay levantamiento → ok.

El tensor maximo es de $T_d = 818$ mt < $T_u = 1520$ mt.

COMPROBACION DE VOLADIZO (CASO B)

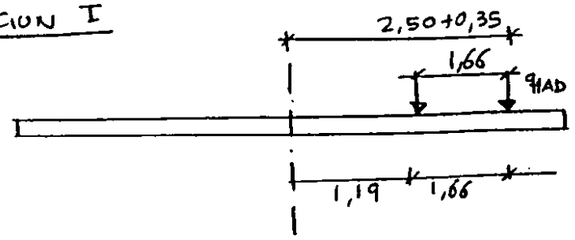
Carga mayore.

$$M_d = \underbrace{0,64 + 1,05 + 0,49}_{\text{Carga Permte}} + q \times 0,20 = 3,18 \text{ mt/m} < M_u$$

Carga puntual.

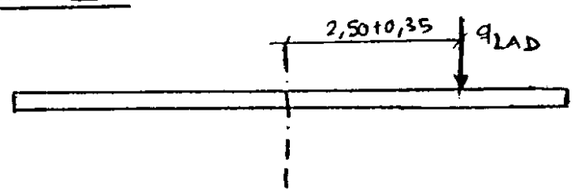
$$M_d = 0,64 + 1,05 + 0,49 + \frac{22}{11} = 9,18 \text{ mt/m} < M_u$$

SITUACION I



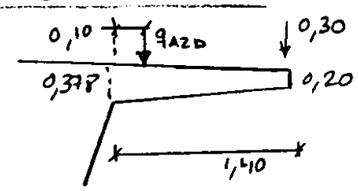
q_{1AD} = 50 KN/m y 6,40 m de longitud.

SITUACION II



q_{A2D} = 80 KN/m. y 20,00 m de longitud.

COMPROBACION DEL VOLADIZO



$V_d = \left(0,20 + \frac{0,178}{2}\right) \cdot 1,40 \cdot 2,5 + 3,37 + 8 = 11,40$ t/m.

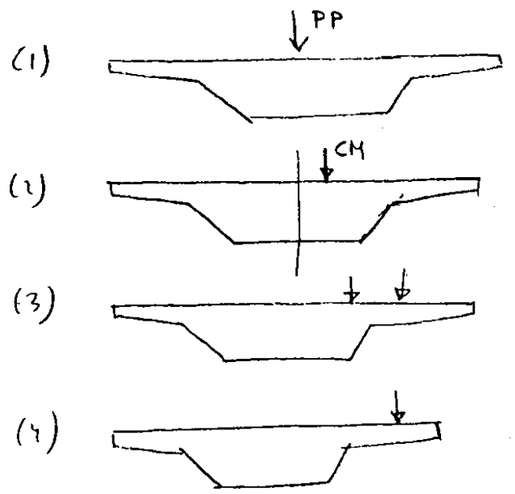
$V_{cu} = 20,6$ t/m $> V_d$ ok

$M_d = \left(0,20 \cdot \frac{1,40}{2} + \frac{0,178}{2} \cdot \frac{1,40}{3}\right) \cdot 1,40 \times 2,5 + 3,37 \times 1,40 + 8 \times 0,1 = 6,15$ mt

$M_d << M_u = 28$ mt/m.

ESTABILIDAD

Se aplica a la estructura las siguientes cargas:



(1) Peso Propio

(2) Carga Muerta { q = 11,20 T/m ; M_t = 2,90 mt/m.

(3) SITUACION I { q = 10 t/m. ; mt = 20,2 t.m/m

(4) SITUACION II { q = .8 t/m. ; mt = 22,8 tm/m en 20 m.

Las reacciones en apoyos debidas a (1)+(2)+(3) son:

E1	119	309
P1	476	905
P2	474	973
P3	487	887
E-2	119	281

. No existe levantamiento de apoyos.

El momento flector maximo es T_d = 330 mt << T_4

T_4 = 2 · 8,66 m² 20,9 cm²/m · 4,2 T/cm² = 1520 mt

PUENTE E-1508.5

3º CALCULO DE PILAS

PUENTE E-1508.5

3.1.- Tablero derecho

Al tratarse de un tablero recto en planta y con un punto fijo en el estribo 1 las unicas acciones a considerar son:

Cargas Remuretes

Sobrecarga

Coacción

Viento

COACCIÓN

Se considera un rozamiento de 0,03 en aparato tipo POT

VIENTO

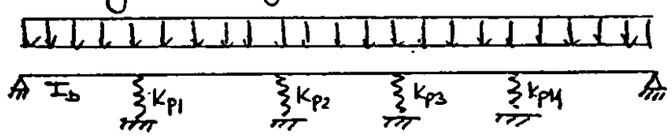
$f_W = 150\ (z - 0{,}7\ \lambda)$ $\qquad \lambda = \frac{A_n}{A_{tot}} = 1{,}00$

$f_W = 200\ Kp/m^2$

$W = f_W \cdot A$ $\qquad A = (2{,}00 + 0{,}70 + 3{,}50 + 1{,}50) = 7{,}70\ m.$

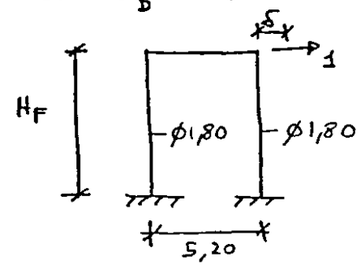
$W = 0{,}20 \times 7{,}70 = 1{,}50\ t/m.$

Se aplica esta carga al siguiente modelo de cálculo:



Inercia del dintel $I_D = 120{,}50\ m^4$

Kpilas



Pila	H_f
1	15,9
2	16,7
3	16,6
4	17,4

Caracteristicas fustes $\phi = 1{,}80$ $\quad A = 2{,}54\ m^2$ $\quad I = 0{,}515\ m^4$

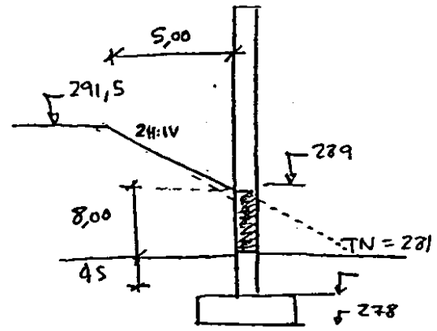
El resultado del calculo es el siguiente:

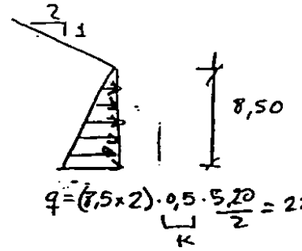
Apoyo	Fuerza horiz.	Axil
E1	45,8 t.	0
P1	23,80 t.	± 42 tm.
P2	37,40 t.	± 69 tm.
P3	38,20 t.	± 70 tm.
P4	18,90 t.	± 35 tm
E2	48,10 t.	0

La presion del viento sobre los fustes es

$q_W = 195\ kg/m^2 \times 1{,}80 = 0{,}36\ t/m.$ aplicados al fuste.

Sobre la pila 1 actua ademas una carga de tierras procedente de tapar del ramal 17 de enlace de la autovia Sumport - Sgurk





$q = (8{,}5 \times 2) \cdot 0{,}5 \cdot \frac{5{,}20}{2} = 22{,}1\ t/m$ /fust

$q_1 = 1{,}50 \times 22{,}1 = 33{,}1\ t/m.$

APOYO	PP T=0 (t.)	PP T=inf. (t.)	CM (t.)	GRAD. 5° (t.)	Pret T=0 (t.)	Pret T=inf. (t.)	INCLUIDA Y SC. EN PASEOS									
							TREN A		TREN B		TREN LM71		TREN SW/0		TREN SW/2	
							Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)
1	293	289	105	48	58	78	182	-24	282	-60	307	-59	343	-75	385	-84
2	1038	1034	367	-39	-62	-72	220	-24	776	-70	737	-67	1028	-89	1153	-100
3	1042	1057	374	-9	10	-3	224	-26	825	-104	778	-97	1093	-138	1226	-155
4	1088	1057	374	-9	-23	-20	224	-26	825	-104	778	-97	1093	-138	1226	-155
5	976	1034	367	-39	-22	-54	221	-24	780	-70	737	-67	1028	-89	1153	-100
6	324	289	105	-48	40	71	182	-24	284	-60	306	-59	343	-75	385	-84

APOYO	Reacciones por linea de apoyos				Reacciones por apoyo				
	E.L.S		E.L.U.		E.L.S		E.L.U.		
	Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)	
1	918	363	1326	288	459	182	663	144	Apoyos POT 500 t
2	2489	1197	3774	1003	1244	598	1887	502	Apoyos POT 1400 t
3	2668	1249	3996	1030	1334	624	1998	515	Apoyos POT 1400 t
4	2666	1246	4012	1024	1333	623	2006	512	Apoyos POT 1400 t
5	2530	1155	3809	969	1265	577	1904	484	Apoyos POT 1400 t
6	893	298	1293	226	446	149	646	113	Apoyos POT 500 t

Hipotesis I: Axil maximo (en KN y m.)

PILA	Cargas por apoyo en E.L.U para introducir al PYRUS							
	Cargas Permanentes G				Cargas Variables Q			
	FX	FY	FZ	qx	FX	FY	FZ	qy
1(*)	-10223	0	-307	-95	-8646	179	0	5.4
2	-10783	0	-323	-95	-9197	281	0	5.4
3	-10865	0	-326	-95	-9197	287	0	5.4
4	-10398	0	-312	-95	-8646	142	0	5.4

Hipotesis II: Axil minimo (en KN y m.)

PILA	Cargas por apoyo en E.L.U para introducir al PYRUS							
	Cargas Permanentes G				Cargas Variables Q			
	FX	FY	FZ	qx	FX	FY	FZ	qy
1(*)	-5769	0	-173	-57	753	179	0	5.4
2	-6316	0	-189	-57	1163	281	0	5.4
3	-6284	0	-189	-57	1163	287	0	5.4
4	-5597	0	-168	-57	753	142	0	5.4

(*)También actua una carga de empuje de tierras en los 8.5 m. inferiores de 38,1 t/m. en la parte inferior y cero en la superior.

```
**********************************************************************
**********************************************************************
**                                **
**                                **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS    /M    M **
** C    O  O  S     MM  MM  O  O  S       / MM  MM **
** C    O  O  SSSS  M MM M  O  O  SSSS   / M MM M **
** C    O  O     S  M    M  O  O     S  /  M    M **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS/   M    M **
**                                **
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**          COPYRIGHT 1988  S. R. A. C.           **
**                                **
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**********************************************************************
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Problem name: viento
Date : 07/24/1998 Time: 15:52:37
Title :
Subtitle :

Element group data

Element group number= 1
Element name:
BEAM3D Three dimensional Elastic Beam elements
Type of beam element =..... 0
EQ. 0 ; Symmetric beam element
EQ. 1 ; Unsymmetric beam element
EQ. 2 ; Symmetric tapered beam element
Element group number= 2
Element name:
BOUND Boundary elements

Real constant data

Real constant set 1
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 2
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 3
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 4
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 5
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 6
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
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Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 7
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 8
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 9
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 10
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 11
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 12
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 13
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 14
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 15
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 16
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 17
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 18
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 19
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 20
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 21
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 22
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 23
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 24
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 25
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 26
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 27
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 28
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 29
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 30
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 31
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 32
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 33
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 34
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 35
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 36
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 37
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 38
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 39
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 40
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 41
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 42
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 43
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 44
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 45
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 46
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 47
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 48
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 49
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 50
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 51
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 52
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 53
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 54
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 55
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 56
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 57
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 58
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 59
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 60
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 61
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 62
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 63
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 64
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 65
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 66
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 67
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 68
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 69
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 70
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 71
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 72
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 73
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 74
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 75
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 76
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 77
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 78
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 79
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 80
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 81
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 17.510
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.8737
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.522
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 82
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 83
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 84
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 85
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 86
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 87
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 88
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 89
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 90
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 91
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 92
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 93
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 94
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 95
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 96
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 97
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 98
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 99
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 12.892
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.2184
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 9.6456
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 100
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 15.201
Moment of Inertia about element Y-axis = 120.50
Moment of Inertia about element Z-axis = 5.5460
Depth of beam (y-axis) = 2.0000
Width of beam (z-axis) = 14.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 10.084
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 101
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 1000.0
Moment of Inertia about element Y-axis = 1000.0
Moment of Inertia about element Z-axis = 1000.0
Depth of beam (y-axis) = 10.000
Width of beam (z-axis) = 10.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1000.0
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 102
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 100.00
Moment of Inertia about element Y-axis = 100.00
Moment of Inertia about element Z-axis = 100.00
Depth of beam (y-axis) = .00000
Width of beam (z-axis) = .00000
End release code (I-node) [000000] = 111
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = .00000
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 103
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 2.5400
Moment of Inertia about element Y-axis = .51500
Moment of Inertia about element Z-axis = .51500
Depth of beam (y-axis) = .00000
Width of beam (z-axis) = .00000

End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = .00000
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 104
Associated with :
BOUND Boundary elements
Axial Stiffness = .00000
Rotational Stiffness = .17151E+07

Material propery data

Material property set 1

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0
ALPX : X thermal expansion	.10000E-04	0
DENS : Mass Density	2.5000	0

Material property set 2

	Value	Temp curve no.
EX : X Elastic Modulus	1.0000	0
NUXY : Poisson Ratio	.20000	0

Material property set 3

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0

Nodal input data

NODE	BOUNDARY CONDITION CODES (0 = FREE ; 1 = FIXED)						NODAL POINT COORDINATES		
	X	Y	Z	XX	YY	ZZ	X	Y	Z
1	1	1	1	1	1	1	.00000	.00000	.10000E+07
2	1	1	1	0	0	0	2199.5	8872.7	.00000
3	0	0	0	0	0	0	2200.7	8872.4	.00000
4	0	0	0	0	0	0	2201.8	8872.1	.00000
5	0	0	0	0	0	0	2203.0	8871.9	.00000
6	0	0	0	0	0	0	2204.2	8871.6	.00000
7	0	0	0	0	0	0	2205.3	8871.3	.00000
8	0	0	0	0	0	0	2206.5	8871.0	.00000
9	0	0	0	0	0	0	2207.7	8870.7	.00000
10	0	0	0	0	0	0	2208.8	8870.4	.00000
11	0	0	0	0	0	0	2210.0	8870.1	.00000
12	0	0	0	0	0	0	2211.2	8869.9	.00000
13	0	0	0	0	0	0	2212.3	8869.6	.00000
14	0	0	0	0	0	0	2213.5	8869.3	.00000
15	0	0	0	0	0	0	2214.7	8869.0	.00000
16	0	0	0	0	0	0	2215.8	8868.7	.00000
17	0	0	0	0	0	0	2217.0	8868.4	.00000
18	0	0	0	0	0	0	2218.2	8868.2	.00000
19	0	0	0	0	0	0	2219.3	8867.9	.00000
20	0	0	0	0	0	0	2220.5	8867.6	.00000
21	0	0	0	0	0	0	2221.7	8867.3	.00000
22	0	0	0	0	0	0	2222.8	8867.0	.00000
23	0	0	0	0	0	0	2224.3	8866.6	.00000
24	0	0	0	0	0	0	2225.8	8866.3	.00000
25	0	0	0	0	0	0	2227.3	8865.9	.00000
26	0	0	0	0	0	0	2228.8	8865.5	.00000
27	0	0	0	0	0	0	2230.3	8865.2	.00000
28	0	0	0	0	0	0	2231.9	8864.8	.00000
29	0	0	0	0	0	0	2233.4	8864.4	.00000
30	0	0	0	0	0	0	2234.9	8864.1	.00000
31	0	0	0	0	0	0	2236.4	8863.7	.00000
32	0	0	0	0	0	0	2237.9	8863.3	.00000
33	0	0	0	0	0	0	2239.4	8863.0	.00000
34	0	0	0	0	0	0	2240.9	8862.6	.00000
35	0	0	0	0	0	0	2242.4	8862.2	.00000
36	0	0	0	0	0	0	2243.9	8861.9	.00000
37	0	0	0	0	0	0	2245.4	8861.5	.00000
38	0	0	0	0	0	0	2246.9	8861.1	.00000
39	0	0	0	0	0	0	2248.4	8860.7	.00000
40	0	0	0	0	0	0	2249.9	8860.4	.00000
41	0	0	0	0	0	0	2251.4	8860.0	.00000
42	0	0	0	0	0	0	2252.9	8859.6	.00000
43	0	0	0	0	0	0	2254.4	8859.3	.00000
44	0	0	0	0	0	0	2255.9	8858.9	.00000
45	0	0	0	0	0	0	2257.4	8858.5	.00000
46	0	0	0	0	0	0	2259.0	8858.2	.00000
47	0	0	0	0	0	0	2260.5	8857.8	.00000
48	0	0	0	0	0	0	2262.0	8857.4	.00000
49	0	0	0	0	0	0	2263.5	8857.1	.00000
50	0	0	0	0	0	0	2265.0	8856.7	.00000
51	0	0	0	0	0	0	2266.5	8856.3	.00000
52	0	0	0	0	0	0	2268.0	8856.0	.00000
53	0	0	0	0	0	0	2269.5	8855.6	.00000
54	0	0	0	0	0	0	2271.0	8855.2	.00000
55	0	0	0	0	0	0	2272.5	8854.9	.00000
56	0	0	0	0	0	0	2274.0	8854.5	.00000
57	0	0	0	0	0	0	2275.5	8854.1	.00000
58	0	0	0	0	0	0	2277.0	8853.7	.00000
59	0	0	0	0	0	0	2278.5	8853.4	.00000
60	0	0	0	0	0	0	2280.0	8853.0	.00000
61	0	0	0	0	0	0	2281.5	8852.6	.00000
62	0	0	0	0	0	0	2283.0	8852.3	.00000
63	0	0	0	0	0	0	2284.5	8851.9	.00000
64	0	0	0	0	0	0	2286.1	8851.5	.00000
65	0	0	0	0	0	0	2287.6	8851.2	.00000
66	0	0	0	0	0	0	2289.1	8850.8	.00000
67	0	0	0	0	0	0	2290.6	8850.4	.00000
68	0	0	0	0	0	0	2292.1	8850.1	.00000
69	0	0	0	0	0	0	2293.6	8849.7	.00000
70	0	0	0	0	0	0	2295.1	8849.3	.00000
71	0	0	0	0	0	0	2296.6	8849.0	.00000
72	0	0	0	0	0	0	2298.1	8848.6	.00000
73	0	0	0	0	0	0	2299.6	8848.2	.00000
74	0	0	0	0	0	0	2301.1	8847.9	.00000
75	0	0	0	0	0	0	2302.6	8847.5	.00000
76	0	0	0	0	0	0	2304.1	8847.1	.00000
77	0	0	0	0	0	0	2305.6	8846.8	.00000
78	0	0	0	0	0	0	2307.1	8846.4	.00000
79	0	0	0	0	0	0	2308.6	8846.0	.00000
80	0	0	0	0	0	0	2310.1	8845.6	.00000
81	0	0	0	0	0	0	2311.6	8845.3	.00000
82	0	0	0	0	0	0	2313.2	8844.9	.00000
83	0	0	0	0	0	0	2314.3	8844.6	.00000
84	0	0	0	0	0	0	2315.5	8844.3	.00000
85	0	0	0	0	0	0	2316.6	8844.1	.00000
86	0	0	0	0	0	0	2317.8	8843.8	.00000
87	0	0	0	0	0	0	2319.0	8843.5	.00000
88	0	0	0	0	0	0	2320.1	8843.2	.00000
89	0	0	0	0	0	0	2321.3	8842.9	.00000
90	0	0	0	0	0	0	2322.5	8842.6	.00000
91	0	0	0	0	0	0	2323.6	8842.3	.00000
92	0	0	0	0	0	0	2324.8	8842.1	.00000
93	0	0	0	0	0	0	2326.0	8841.8	.00000
94	0	0	0	0	0	0	2327.1	8841.5	.00000
95	0	0	0	0	0	0	2328.3	8841.2	.00000
96	0	0	0	0	0	0	2329.5	8840.9	.00000
97	0	0	0	0	0	0	2330.6	8840.6	.00000
98	0	0	0	0	0	0	2331.8	8840.3	.00000
99	0	0	0	0	0	0	2333.0	8840.1	.00000
100	0	0	0	0	0	0	2334.1	8839.8	.00000
101	0	0	0	0	0	0	2335.3	8839.5	.00000
102	1	1	1	0	0	0	2336.5	8839.2	.00000
103	1	1	1	1	1	1	2200.1	8875.2	.00000
104	1	1	1	1	1	1	2198.9	8870.2	.00000
105	1	1	1	1	1	1	2223.4	8869.5	.00000
106	1	1	1	1	1	1	2222.2	8864.5	.00000
107	1	1	1	1	1	1	2253.5	8862.2	.00000
108	1	1	1	1	1	1	2252.3	8857.1	.00000
109	1	1	1	1	1	1	2283.7	8854.8	.00000
110	1	1	1	1	1	1	2282.4	8849.8	.00000
111	1	1	1	1	1	1	2313.8	8847.4	.00000
112	1	1	1	1	1	1	2312.5	8842.4	.00000
113	1	1	1	1	1	1	2337.1	8841.7	.00000
114	1	1	1	1	1	1	2335.8	8836.7	.00000
115	1	1	1	1	1	1	2199.5	8872.7	-1.0000
116	0	0	0	0	0	0	2222.8	8867.0	-1.0000
117	0	0	0	0	0	0	2252.9	8859.6	-1.0000
118	0	0	0	0	0	0	2283.0	8852.3	-1.0000
119	0	0	0	0	0	0	2313.2	8844.9	-1.0000
120	0	0	0	0	0	0	2223.4	8869.5	-1.0000
121	0	0	0	0	0	0	2222.2	8864.5	-1.0000
122	0	0	0	0	0	0	2253.5	8862.2	-1.0000
123	0	0	0	0	0	0	2252.3	8857.1	-1.0000
124	0	0	0	0	0	0	2283.7	8854.8	-1.0000
125	0	0	0	0	0	0	2282.4	8849.8	-1.0000
126	0	0	0	0	0	0	2313.8	8847.4	-1.0000
127	0	0	0	0	0	0	2312.5	8842.4	-1.0000
128	1	1	1	1	1	1	2223.4	8869.5	-17.900
129	1	1	1	1	1	1	2222.2	8864.5	-17.900
130	1	1	1	1	1	1	2253.5	8862.2	-18.700
131	1	1	1	1	1	1	2252.3	8857.1	-18.700
132	1	1	1	1	1	1	2283.7	8854.8	-18.600
133	1	1	1	1	1	1	2282.4	8849.8	-18.600
134	1	1	1	1	1	1	2313.8	8847.4	-19.400
135	1	1	1	1	1	1	2312.5	8842.4	-19.400

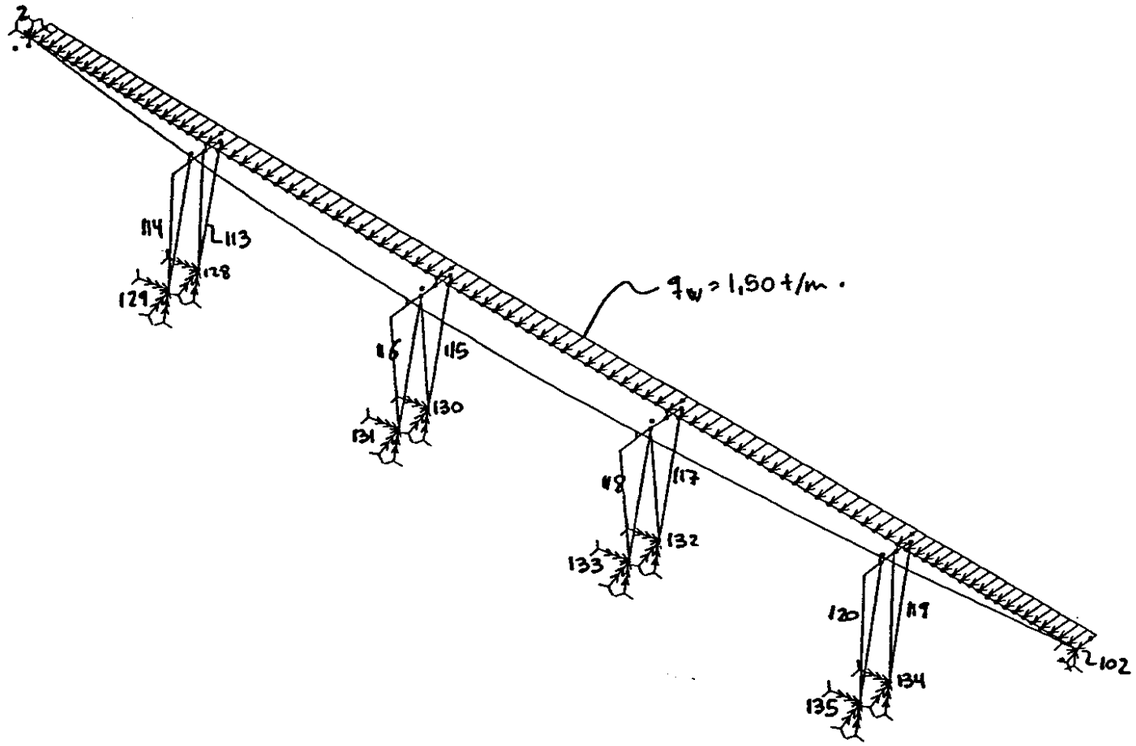
Element input data

ELEM	EGRP	MP	REAL	ECS	NODE 1	NODE 2	NODE 3	NODE 4	NODE 5	NODE 6	NODE 7	NODE 8	NODE 9	NODE10	NODE11	NODE12	NODE13	NODE14	NODE15	NODE16	NODE17	NODE18	NODE19	NODE20
1	1	1	1	-1	2	3	1																	
2	1	1	2	-1	3	4	1																	
3	1	1	3	-1	4	5	1																	
4	1	1	4	-1	5	6	1																	
5	1	1	5	-1	6	7	1																	
6	1	1	6	-1	7	8	1																	
7	1	1	7	-1	8	9	1																	
8	1	1	8	-1	9	10	1																	
9	1	1	9	-1	10	11	1																	
10	1	1	10	-1	11	12	1																	
11	1	1	11	-1	12	13	1																	
12	1	1	12	-1	13	14	1																	
13	1	1	13	-1	14	15	1																	
14	1	1	14	-1	15	16	1																	
15	1	1	15	-1	16	17	1																	
16	1	1	16	-1	17	18	1																	
17	1	1	17	-1	18	19	1																	
18	1	1	18	-1	19	20	1																	
19	1	1	19	-1	20	21	1																	
20	1	1	20	-1	21	22	1																	
21	1	1	21	-1	22	23	1																	
22	1	1	22	-1	23	24	1																	
23	1	1	23	-1	24	25	1																	
24	1	1	24	-1	25	26	1																	
25	1	1	25	-1	26	27	1																	
26	1	1	26	-1	27	28	1																	
27	1	1	27	-1	28	29	1																	
28	1	1	28	-1	29	30	1																	
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79	1	1	79	-1	80	81	1																	
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81	1	1	81	-1	82	83	1																	
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93	1	1	93	-1	94	95	1
94	1	1	94	-1	95	96	1
95	1	1	95	-1	96	97	1
96	1	1	96	-1	97	98	1
97	1	1	97	-1	98	99	1
98	1	1	98	-1	99	100	1
99	1	1	99	-1	100	101	1
100	1	1	100	-1	101	102	1
101	1	1	102	-1	22	116	2
102	1	1	102	-1	42	117	2
103	1	1	102	-1	62	118	2
104	1	1	102	-1	82	119	2
105	1	1	101	-1	121	116	1
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107	1	1	101	-1	123	117	1
108	1	1	101	-1	117	122	1
109	1	1	101	-1	125	118	1
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112	1	1	101	-1	119	126	1
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114	1	1	103	-1	121	129	22
115	1	1	103	-1	122	130	42
116	1	1	103	-1	123	131	42
117	1	1	103	-1	124	132	62
118	1	1	103	-1	125	133	62
119	1	1	103	-1	126	134	82
120	1	1	103	-1	127	135	82
121	2	1	104	-1	2	115	3

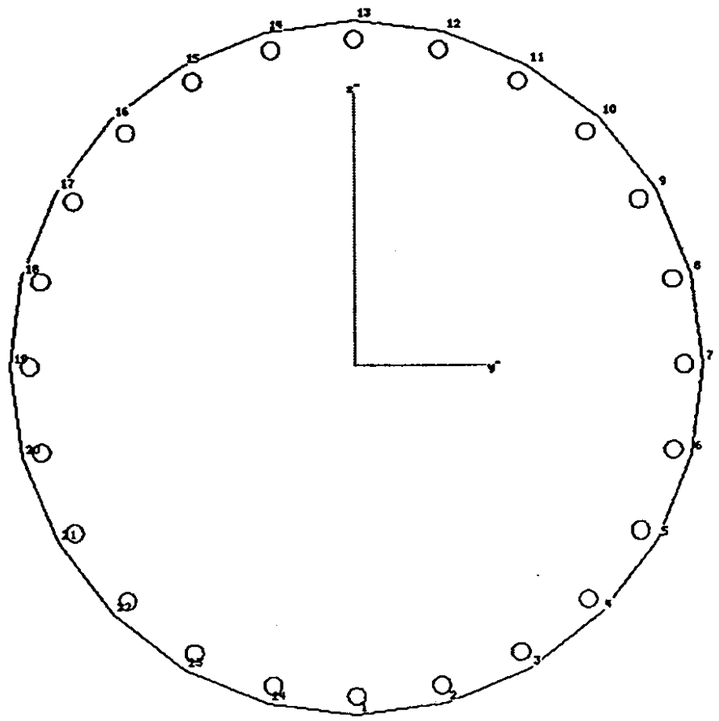
REACTION FORCE FOR LOAD CASE NO. 1

NODE	CSYS	Fx	Fy	Fz	Mx	My	Mz
2	3	.8622E-02	-45.10	-.4199	.0000	.0000	.0000
102	0	11.44	46.78	.4270	———	———	———
115	0	.0000	.0000	.0000	-.9412E-01	-.3849	.0000
128	0	2.822	11.55	-41.86	-100.8	24.64	.3107E-02
129	0	2.823	11.55	42.06	-100.8	24.64	.3107E-02
130	0	4.438	18.14	-68.54	-165.8	40.55	.1513E-01
131	0	4.442	18.14	68.88	-165.8	40.58	.1513E-01
132	0	4.546	18.58	-69.80	-168.8	41.30	-.3376E-02
133	0	4.545	18.58	70.17	-168.8	41.29	-.3376E-02
134	0	2.236	9.151	-35.79	-86.91	21.25	.1954E-04
135	0	2.236	9.151	35.97	-86.91	21.25	.1941E-04



MODELO DE REPARTO
DE CARGAS
HORIZONTALES

Mstb. 1 : 15.0



Sección :"FUSTE" Armadura :"B1"
Tipo : tipo viga/ Círculo/tubo Unidades :[cm]
Material :"H300PIL"

Diámetro exterior = 180.000 cm

Características mecánicas de la sección:
Area : Ax= 2.516 [m2]
Momentos de inercia : Iy= 0.503654 [m4] Iz= 0.503654 [m4]
Inercia a torsión : Ix= 1.031 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.900000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.900	-0.559616	0.222
dch.	Iz	0.900	0.559616	-0.222
abajo	Iy	-0.900	-0.559616	0.222
arriba	Iy	0.900	0.559616	-0.222

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	15.90	0.00	5.00		
2	AEH500	(2)	15.90	22.00	7.90		
3	AEH500	(2)	15.90	42.50	16.39		
4	AEH500	(2)	15.90	60.10	29.90		
5	AEH500	(2)	15.90	73.61	47.50		
6	AEH500	(2)	15.90	82.10	68.00		
7	AEH500	(2)	15.90	85.00	90.00		
8	AEH500	(2)	15.90	82.10	112.00		
9	AEH500	(2)	15.90	73.61	132.50		
10	AEH500	(2)	15.90	60.10	150.10		
11	AEH500	(2)	15.90	42.50	163.61		
12	AEH500	(2)	15.90	22.00	172.10		
13	AEH500	(2)	15.90	0.00	175.00		
14	AEH500	(2)	15.90	-22.00	172.10		
15	AEH500	(2)	15.90	-42.50	163.61		
16	AEH500	(2)	15.90	-60.10	150.10		
17	AEH500	(2)	15.90	-73.61	132.50		
18	AEH500	(2)	15.90	-82.10	112.00		
19	AEH500	(2)	15.90	-85.00	90.00		
20	AEH500	(2)	15.90	-82.10	68.00		
21	AEH500	(2)	15.90	-73.61	47.50		
22	AEH500	(2)	15.90	-60.10	29.90		
23	AEH500	(2)	15.90	-42.50	16.39		
24	AEH500	(2)	15.90	-22.00	7.90		

Total: 381.70 Cuantía de armadura: 1.517 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,min [kp/cm2]
"H300PIL"	312000.0	-153.000	-2.000	0.0	10.000	300.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Pila ''P1-N1'
****

Título : 'E-1508.5. CALCULO DE PILAS'
Altura de la pila : 15.900 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo
Nu [m] d-xyz r-xyz

Nu	[m]	d-xyz	r-xyz
3	15.900	---	--B
2	8.500		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
2	3-2	'FUSTE'	SecFAGUS			1	1.000
		''	undef				
1	2-1	''	undef			1	1.000
		'FUSTE'	SecFAGUS				

CARGAS :

Nu/Ba		Tipo Car.		Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :							
Nudo	3	Fuerza	x	[kN]	-10223.000		
		Fuerza	z	[kN]	307.000		
Barra	2	Fuerza	x	[kN/m]	-95.000		
Barra	1	Fuerza	x	[kN/m]	-95.000		
Barra	1	Fuerza trap.	z	[kN/m]	331.000	0.000	
Comp. Carga Q1 :							
Nudo	3	Fuerza	x	[kN]	-8646.000		
		Fuerza	y	[kN]	179.000		
Barra	2	Fuerza	y	[kN/m]	5.400		
Barra	1	Fuerza	y	[kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <B.P1-N1.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia.	1.000 * Carga permanente G1
No de elementos	13
Tolerancia desequi. fuerzas	0.204 [kN]
Tolerancia desequi. momentos	0.089 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1 + 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.
Fuerza en la armadura comprimida > 50% fuerza de comp. del hormigón.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	1.800	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-13.03	0.00	0.00	-0.217	-14.826	0.000
Máxima	0.00	9.24	164.89	0.000	0.000	0.850

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-20371.75	-264.59	-1697.14	-30.63	-0.00	-1789.15
Máxima	-18983.17	-185.66	-307.00	0.00	12076.87	1923.73

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	Ely [kNm²]	Elz [kNm²]
Mínima	-14.6	-443.5	-1.562	-3.220	4.255E+6	6.932E+6
Máxima	0.0	336.9	0.603	1.604	1.324E+7	9.134E+6

DIMENSIONAMIENTO SEGUN TEORIA DE 2º ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	15.90	FUSTE	381.7	1.52	40
	13.43	FUSTE	381.7	1.52	41
	10.97	FUSTE	381.7	1.52	44
	8.500	FUSTE	381.7	1.52	49
	6.000	FUSTE	381.7	1.52	55
	4.000	FUSTE	381.7	1.52	61
	2.000	FUSTE	381.7	1.52	71
	1.500	FUSTE	381.7	1.52	74
	1.200	FUSTE	381.7	1.52	76
	0.900	FUSTE	381.7	1.52	78
	0.600	FUSTE	381.7	1.52	81
	0.300	FUSTE	381.7	1.52	83
	0.100	FUSTE	381.7	1.52	85
	0.000	FUSTE	381.7	1.52	86

(≤) : Armadura ≤ ρ_min = 0.40%
(≥) : Armadura ≥ ρ_max = 8.00%

Pila ''P1-H2'
****

Título : 'E-1508.5. CALCULO DE PILAS'
Altura de la pila : 15.900 [m]
Long. max. de barra: Altura pila / 6

NUDOS

Nu	x [m]	Apoyo d-xyz	r-xyz
3	15.900	---	--B
2	8.500		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
2	3-2	'FUSTE'	SecFAGUS			1	1.000
		''	undef				
1	2-1	''	undef			1	1.000
		'FUSTE'	SecFAGUS				

CARGAS :

Nu/Ba		Tipo Car.	Dim.		Valor Val.arriba	Val.abajo	ey[m]	ez[m]
Comp. Carga G1 :								
Nudo	3	Fuerza	x	[kN]	-5769.000			
		Fuerza	z	[kN]	173.000			
Barra	2	Fuerza	x	[kN/m]	-57.000			
Barra	1	Fuerza	x	[kN/m]	-57.000			
Barra	1	Fuerza trap.	z	[kN/m]	331.000		0.000	
Comp. Carga Q1 :								
Nudo	3	Fuerza	x	[kN]	753.000			
		Fuerza	y	[kN]	179.000			
Barra	2	Fuerza	y	[kN/m]	5.400			
Barra	1	Fuerza	y	[kN/m]	5.400			

D I M E N S I O N A M I E N T O (global) <B.P1-H2.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia	1.000 * Carga permanente G1
Nº de elementos	20
Tolerancia desequi. fuerzas	0.059 [kN]
Tolerancia desequi. momentos	0.067 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1
	+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.
Fuerza en la armadura comprimida > 50% fuerza de comp. del hormigón.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	1.800	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-4.52	0.00	0.00	-0.109	-7.286	0.000
Máxima	0.00	9.07	85.47	0.000	0.000	0.827

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-5913.75	-264.05	-1530.69	-15.09	0.00	-1787.09
Máxima	-5086.30	-185.66	-173.00	0.00	7194.57	1793.95

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	EIy [kNm²]	EIz [kNm²]
Mínima	-7.9	-342.4	-0.614	-1.630	4.161E+6	6.491E+6
Máxima	0.0	279.3	0.584	1.330	8.789E+6	1.076E+7

Pila ''P2-H1'
****

Título : 'E-1508.5. CALCULO DE PILAS'
Altura de la pila : 16.700 [m]
Long. max. de barra: Altura pila / 6

NUDOS

Nu	x Apoyo [m]	d-xyz	r-xyz
2	16.700	---	--8
1	0.000	888	888

Apoyo: 8=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba		Tipo Car.		Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :							
Nudo	2	Fuerza	x	[kN]	-10783.000		
		Fuerza	z	[kN]	323.000		
Barra	1	Fuerza	x	[kN/m]	-95.000		
Comp. Carga Q1 :							
Nudo	2	Fuerza	x	[kN]	-9197.000		
		Fuerza	y	[kN]	281.000		
Barra	1	Fuerza	y	[kN/m]	5.400		

DIMENSIONAMIENTO SEGUN TEORIA DE 2º ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	15.90	FUSTE	381.7	1.52	15
	13.43	FUSTE	381.7	1.52	14
	10.97	FUSTE	381.7	1.52	14
	8.500	FUSTE	381.7	1.52	15
	6.500	FUSTE	381.7	1.52	17
	4.500	FUSTE	381.7	1.52	21
	4.200	FUSTE	381.7	1.52	22
	3.900	FUSTE	381.7	1.52	23
	3.600	FUSTE	381.7	1.52	24
	3.300	FUSTE	381.7	1.52	25
	3.000	FUSTE	381.7	1.52	26
	2.700	FUSTE	381.7	1.52	28
	2.400	FUSTE	381.7	1.52	29
	2.100	FUSTE	381.7	1.52	31
	1.800	FUSTE	381.7	1.52	33
	1.500	FUSTE	381.7	1.52	35
	1.200	FUSTE	381.7	1.52	37
	0.900	FUSTE	381.7	1.52	40
	0.600	FUSTE	381.7	1.52	43
	0.300	FUSTE	381.7	1.52	46
	0.000	FUSTE	381.7	1.52	49

(≤) : Armadura ≤ ρ_min = 0.40%
(≥) : Armadura ≥ ρ_max = 8.00%

Pila ''P2-N2'
****

Título : 'E-1508.5. CALCULO DE PILAS'
Altura de la pila : 16.700 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo

Nu	[m]	d-xyz	r-xyz
2	16.700	---	--B
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba		Tipo Car.	Dim.		Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :							
Nudo	2	Fuerza	x	[kN]	-6316.000		
		Fuerza	z	[kN]	189.000		
Barra	1	Fuerza	x	[kN/m]	-57.000		
Comp. Carga Q1 :							
Nudo	2	Fuerza	x	[kN]	1163.000		
		Fuerza	y	[kN]	281.000		
Barra	1	Fuerza	y	[kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <8.P2-M2.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia	1.000 * Carga permanente G1
Nº de elementos	6
Tolerancia desequi. fuerzas	0.060 [kN]
Tolerancia desequi. momentos	0.032 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1
	+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.
Fuerza en la armadura comprimida > 50% fuerza de comp. del hormigón.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	1.800	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-5.02	0.00	0.00	-0.150	-6.152	0.000
Máxima	0.00	16.68	69.25	0.000	0.000	1.442

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-6025.58	-363.67	-189.00	-18.70	-0.00	-2709.39
Máxima	-5232.33	-288.52	-189.00	0.00	3538.43	2830.31

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	EIy [kNm²]	EIz [kNm²]
Mínima	-6.6	-213.8	-0.496	-1.018	4.442E+6	6.746E+6
Máxima	0.0	107.7	0.448	0.513	7.140E+6	1.022E+7

Programm: P Y R U S V.2.20 Bn:2019. 1
GINPROSA Ingenieros Consultores 24.06.98
E-1508.5. CALCULO DE PILAS 18:18

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	16.70	FUSTE	381.7	1.52	20
	13.92	FUSTE	381.7	1.52	17
	11.13	FUSTE	381.7	1.52	15
	8.350	FUSTE	381.7	1.52	17
	5.567	FUSTE	381.7	1.52	20
	2.783	FUSTE	381.7	1.52	25
	0.000	FUSTE	381.7	1.52	30

(≤) : Armadura ≤ μ_min = 0.40%
(≥) : Armadura ≥ μ_max = 8.00%

Pila ''P3-N1'
****

Título : 'E-1508.5. CALCULO DE PILAS'
Altura de la pila : 16.700 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo
Nu [m] d-xyz r-xyz

Nu	[m]	d-xyz	r-xyz
2	16.700	---	--B
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba	Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :					
Nudo 2	Fuerza x	[kN]	-10865.000		
	Fuerza z	[kN]	326.000		
Barra 1	Fuerza x	[kN/m]	-95.000		
Comp. Carga Q1 :					
Nudo 2	Fuerza x	[kN]	-9197.000		
	Fuerza y	[kN]	287.000		
Barra 1	Fuerza y	[kN/m]	5.400		

Programm: P Y R U S V.2.20 Bn:2019. 1
GINPROSA Ingenieros Consultores 24.06.98
E-1508.5. CALCULO DE PILAS 17:32

D I M E N S I O N A N I E N T O (global) <B.P3-N1.1>

PARAMETROS DE CALCULO:
Norma..... EH
Criterio de rotura..... Agotamiento de secciones o del sistema
Rotura de secciones..... Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada).... -2.000 [o/oo]
- Hormigón (flexión)..... -3.500 [o/oo]
- Acero ..... 10.00 [o/oo]
Coef. min. resist. (gamma_r)... 1.000
Coeficiente de fluencia..... 2.000
Carga contribuyente a fluencia. 1.000 * Carga permanente G1
Nº de elementos 6
Tolerancia desequi. fuerzas.... 0.215 [kN]
Tolerancia desequi. momentos... 0.054 [kNm]
Mayoración de cargas..... 1.000 * Carga permanente G1
+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La armadura mínima (o existente) es suficiente.
Fuerza en la armadura comprimida > 50% fuerza de comp. del hormigón.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	1.800	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-14.50	0.00	0.00	-0.338	-14.518	0.000
Máxima	0.00	15.74	160.47	0.000	0.000	1.410

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-21521.29	-369.66	-326.00	-46.42	0.00	-2844.02
Máxima	-20199.21	-294.52	-326.00	-0.00	8762.69	3030.41

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	Ely [kNm²]	Elz [kNm²]
Mínima	-12.8	-443.5	-1.194	-2.330	5.123E+6	8.254E+6
Máxima	0.0	132.0	0.279	0.629	9.624E+6	9.025E+6

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	16.70	FUSTE	381.7	1.52	45
	13.92	FUSTE	381.7	1.52	45
	11.13	FUSTE	381.7	1.52	48
	8.350	FUSTE	381.7	1.52	54
	5.567	FUSTE	381.7	1.52	60
	2.783	FUSTE	381.7	1.52	67
	0.000	FUSTE	381.7	1.52	73

(≤) : Armadura ≤ ρ_min = 0.40%
(≥) : Armadura ≥ ρ_max = 8.00%

Programm: P Y R U S V.2.20 Bn:2019. 1
GINPROSA Ingenieros Consultores 24.06.98
E-1508.5. CALCULO DE PILAS 17:32

Pila ''P3-H2'
****

Título : 'E-1508.5. CALCULO DE PILAS'
Altura de la pila : 16.700 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo

Nu	[m]	d-xyz	r-xyz
2	16.700	---	--B
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba		Tipo Car.	Dim.		Valor	ey[m] Val.arriba	ez[m] Val.abajo
Comp. Carga G1 :							
Nudo	2	Fuerza	x	[kN]	-6284.000		
		Fuerza	z	[kN]	189.000		
Barra	1	Fuerza	x	[kN/m]	-57.000		
Comp. Carga Q1 :							
Nudo	2	Fuerza	x	[kN]	1163.000		
		Fuerza	y	[kN]	287.000		
Barra	1	Fuerza	y	[kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <B.P3-N2.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia	1.000 * Carga permanente G1
Nº de elementos	6
Tolerancia desequi. fuerzas	0.060 [kN]
Tolerancia desequi. momentos	0.032 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1
	+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.
Fuerza en la armadura comprimida > 50% fuerza de comp. del hormigón.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	1.800	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-4.97	0.00	0.00	-0.154	-6.160	0.000
Máxima	0.00	17.15	69.36	0.000	0.000	1.481

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-5993.58	-369.67	-189.00	-19.06	-0.00	-2759.33
Máxima	-5200.33	-294.52	-189.00	0.00	3536.84	2882.60

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	EIy [kNm²]	EIz [kNm²]
Mínima	-6.7	-214.2	-0.502	-1.020	4.428E+6	6.696E+6
Máxima	0.0	109.9	0.461	0.524	7.057E+6	1.021E+7

Programm: P Y R U S V.2.20 Bn:2019. 1
GINPROSA Ingenieros Consultores 24.06.98
E-1508.5. CALCULO DE PILAS 17:33

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	16.70	FUSTE	381.7	1.52	20
	13.92	FUSTE	381.7	1.52	17
	11.13	FUSTE	381.7	1.52	15
	8.350	FUSTE	381.7	1.52	17
	5.567	FUSTE	381.7	1.52	20
	2.783	FUSTE	381.7	1.52	25
	0.000	FUSTE	381.7	1.52	30

(≤) : Armadura ≤ ρ_min = 0.40%
(≥) : Armadura ≥ ρ_max = 8.00%

Pila ''P4-H1'
****

Título : 'E-1508.5. CALCULO DE PILAS'
Altura de la pila : 17.400 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo
Nu [m] d-xyz r-xyz

Nu	[m]	d-xyz	r-xyz
2	17.400	---	--B
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba	Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :					
Nudo 2	Fuerza	x [kN]	-10398.000		
	Fuerza	z [kN]	312.000		
Barra 1	Fuerza	x [kN/m]	-95.000		
Comp. Carga Q1 :					
Nudo 2	Fuerza	x [kN]	-8646.000		
	Fuerza	y [kN]	142.000		
Barra 1	Fuerza	y [kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <B.P4-H1.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia.	1.000 * Carga permanente G1
Nº de elementos	6
Tolerancia desequi. fuerzas	0.206 [kN]
Tolerancia desequi. momentos	0.054 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1 + 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La armadura mínima (o existente) es suficiente.
Fuerza en la armadura comprimida > 50% fuerza de comp. del hormigón.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Norm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	1.800	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-14.53	0.00	0.00	-0.211	-15.331	0.000
Máxima	0.00	10.04	176.54	0.000	0.000	0.863

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-20561.25	-228.13	-312.00	-28.21	-0.00	-1627.93
Máxima	-19183.75	-149.83	-312.00	0.00	8903.58	1860.05

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	Ely [kNm²]	Elz [kNm²]
Mínima	-12.3	-443.5	-1.113	-2.264	1.913E+5	8.414E+6
Máxima	0.0	136.7	0.250	0.651	5.750E+6	9.120E+6

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	17.40	FUSTE	381.7	1.52	40
	14.50	FUSTE	381.7	1.52	42
	11.60	FUSTE	381.7	1.52	46
	8.700	FUSTE	381.7	1.52	53
	5.800	FUSTE	381.7	1.52	59
	2.900	FUSTE	381.7	1.52	65
	0.000	FUSTE	381.7	1.52	71

(≤) : Armadura ≤ ρ_min = 0.40%
(≥) : Armadura ≥ ρ_max = 8.00%

Pila ''P4-H2'
****

Título : 'E-1508.5. CALCULO DE PILAS'
Altura de la pila : 17.400 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo

Nu	[m]	d-xyz	r-xyz
2	17.400	---	--B
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba		Tipo Car.		Dim.	Valor	ey[m] Val.arriba	ez[m] Val.abajo
Comp. Carga G1 :							
Nudo	2	Fuerza	x	[kN]	-5597.000		
		Fuerza	z	[kN]	168.000		
Barra	1	Fuerza	x	[kN/m]	-57.000		
Comp. Carga Q1 :							
Nudo	2	Fuerza	x	[kN]	753.000		
		Fuerza	y	[kN]	142.000		
Barra	1	Fuerza	y	[kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <8.P4-M2.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia.	1.000 * Carga permanente G1
No de elementos	6
Tolerancia desequi. fuerzas	0.058 [kN]
Tolerancia desequi. momentos	0.029 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1
	+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.
Fuerza en la armadura comprimida > 50% fuerza de comp. del hormigón.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	1.800	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-4.94	0.00	0.00	-0.077	-5.747	0.000
Máxima	0.00	9.39	67.22	0.000	0.000	0.793

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-5753.15	-228.13	-168.00	-10.38	-0.00	-1596.64
Máxima	-4926.65	-149.83	-168.00	0.00	3274.29	1741.88

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	EIy [kNm²]	EIz [kNm²]
Mínima	-5.1	-187.1	-0.371	-0.891	4.680E+6	7.721E+6
Máxima	0.0	75.0	0.249	0.357	9.122E+6	1.028E+7

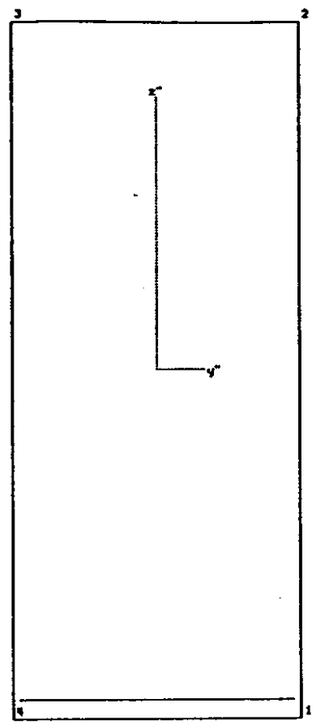
Programm: P Y R U S V.2.20 Bn:2019. 1
GIMPROSA Ingenieros Consultores 24.06.98
E-1508.5. CALCULO DE PILAS 17:33

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	17.40	FUSTE	381.7	1.52	14
	14.50	FUSTE	381.7	1.52	13
	11.60	FUSTE	381.7	1.52	14
	8.700	FUSTE	381.7	1.52	16
	5.800	FUSTE	381.7	1.52	18
	2.900	FUSTE	381.7	1.52	22
	0.000	FUSTE	381.7	1.52	26

(≤) : Armadura ≤ ρ_min = 0.40%
(≥) : Armadura ≥ ρ_max = 8.00%

Nstb. 1 : 15.0



Sección :"TRAV-PIL" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H300PIL"

Ancho = 74.00 cm Canto = 180.00 cm

Características mecánicas de la sección:
Area : Ax= 1.332 [m2]
Momentos de inercia : Iy= 0.359640 [m4] Iz= 0.060784 [m4]
Inercia a torsión : Ix= 0.180311 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.900000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.370	-0.164280	0.123
dch.	Iz	0.370	0.164280	-0.123
abajo	Iy	-0.900	-0.399600	0.300
arriba	Iy	0.900	0.399600	-0.300

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	1.00	-35.00	5.00	35.00	5.00

Programa F A G U S - 2 V.1.32
GIMPROSA Ingenieros Consultores 25.06.98

Total: 1.00 Cuantía de armadura: 0.008 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H300PIL")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	74.00 [cm]	176.00 [cm]	0.00
Vy	0.00 [cm2/m]	180.00 [cm]	70.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H300PIL"	312000.0	-153.000	-2.000	0.0	10.000	300.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Dimensionamiento : Viga "TRAV-PIL"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
				285.000		45.0

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-35.0	5.0	35.0	5.0	1.00	38.76	38.76

Cuantía arm. 0.29 [o/o] Suma 38.76

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-37.00	180.00	-1.678	-149.043	"H300PIL"
Hormigón-Max	37.00	0.00	10.334	0.000	"H300PIL"
Armadura-Max	35.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 154.85 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 25.15 cm Zona comprimida/Canto útil 0.14

Cálculo de Cimentación de Pilas	PILA Nº 1
PROYECTO : L.A.V. MADRID - ZARAGOZA	
ESTRUCTURA: E-1508.5	

CARACTERISTICAS DEL TERRENO

Tensión media admisible =	5.0	Kp/cm²
Coeficiente de rozamiento zapata-terreno =	0.58	

DIMENSIONES GEOMETRICAS (en metros)

Medida zapata según Y =	11.00
Medida zapata según Z =	8.20
Canto zapata =	2.50
Peso zapata(ton.)=	563.75

Número de fustes	2
Separacion de ejes fustes consecutivos	5.20
Diametro de los fustes	1.80
Altura de la pila	15.90
Vuelo de la zapata(a cara de fuste)	2.00

CUADRO DE CONTROL

Tension(kp/cm2) =	4.98	Vale
Seguridad deslizamiento		Verifica
Seguridad al vuelco		Verifica
A,cortante=		No necesita

CUADRO DE ARMADURAS (cm2/m)

	Calculadas	Minimas		A disponer
Ay,inf=	23.53	20.80	--->	23.53
Ay,sup=	12.60	20.80	--->	20.80
Az,inf=	46.93	20.80	--->	46.93
Az,sup=	2.52	20.80	--->	20.80

Hipótesis	ESFUERZOS EN CARA SUPERIOR ZAPATA (valores para el calculo de armaduras)						Coef. poderacion peso zap.	ESFUERZOS EN CARA INFERIOR DE ZAPATA					TENSION COBARICENTRICA	ESTABILIDAD FRENTE AL DESLIZAMIENTO		ESTABILIDAD FRENTE AL VUELCO			Armadura inferior dir. Y			Armadura superior dir. Y			Armadura inferior dir. Z			Cortante Comprobac. Vd<Vd2
	FX (Ton)	FY (Ton)	FZ (Ton)	MX(mT)	MY (mT)	MZ (mT)		FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)	Sigma(Kp/cm2)	Coef.Seguridad	Comp.	Coef.Seg. Y	Coef.Seg. Z	Comp.	Md (m.t/m)	As (cm2/m)	Comp.	Md (m.t/m)	As (cm2/m)	Comp.	Md (m.t/m)	As (cm2/m)	Comp.	
MFX(+)	-3412.75	-35.25	-227.93	0.00	1169.51	280.22	1.00	-3976.50	-35.25	-227.93	1739.33	192.10	4.98	10.80	Vale	113.85	9.37	Vale	247.46	23.53	Vale	133.61	12.60	Vale	486.65	46.93	Vale	Vale
MFX(-)	-1389.19	-35.25	-226.77	0.00	1151.05	280.22	0.90	-1906.57	-35.25	-226.77	1717.98	192.10	2.76	4.82	Vale	54.59	4.55	Vale	106.65	10.03	Vale	58.16	5.44	Vale	271.63	25.87	Vale	Vale

Cálculo de Cimentación de Pilas	PILA Nº 2,3 Y 4
PROYECTO : L.A.V. MADRID - ZARAGOZA	
ESTRUCTURA: E-1508.5	

CARACTERISTICAS DEL TERRENO

Tensión media admisible =	5.0	Kp/cm²
Coeficiente de rozamiento zapata-terreno =	0.58	

DIMENSIONES GEOMETRICAS (en metros)

Medida zapata según Y =	11.00
Medida zapata según Z =	7.00
Canto zapata =	2.50
Peso zapata(ton.)=	481.25

Número de fustes	2
Separacion de ejes fustes consecutivos	5.20
Diametro de los fustes	1.80
Altura de la pila	17.00
Vuelo de la zapata(a cara de fuste)	2.00

CUADRO DE CONTROL

Tension(kp/cm2) =	4.77	Vale
Seguridad deslizamiento		Verifica
Seguridad al vuelco		Verifica
A,cortante=		No necesita

CUADRO DE ARMADURAS (cm2/m)

	Calculadas	Minimas		A disponer
Ay,inf=	23.89	20.80	--->	23.89
Ay,sup=	12.86	20.80	--->	20.80
Az,inf=	31.03	20.80	--->	31.03
Az,sup=	2.57	20.80	--->	20.80

Hipótesis	ESFUERZOS EN CARA SUPERIOR ZAPATA (valores para el calculo de armaduras)						Coef. poderacion peso zap.	ESFUERZOS EN CARA INFERIOR DE ZAPATA					TENSION COBARICENTRICA	ESTABILIDAD FRENTE AL DESLIZAMIENTO		ESTABILIDAD FRENTE AL VUELCO			Armadura inferior dir. Y			Armadura superior dir. Y			Armadura inferior dir. Z			Cortante Comprobac. Vd<Vd2
	FX (Ton)	FY (Ton)	FZ (Ton)	MX(mT)	MY (mT)	MZ (mT)		FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)	Sigma(Kp/cm2)	Coef.Seguridad	Comp.	Coef.Seg. Y	Coef.Seg. Z	Comp.	Md (m.t/m)	As (cm2/m)	Comp.	Md (m.t/m)	As (cm2/m)	Comp.	Md (m.t/m)	As (cm2/m)	Comp.	
-2880.73	-49.42	-43.26	0.00	722.46	412.69	1.00	-3361.98	-49.42	-43.26	830.61	289.13	4.77	29.69	Vale	63.95	14.17	Vale	251.17	23.89	Vale	136.33	12.86	Vale	324.75	31.03	Vale	Vale
-1461.44	-49.42	-42.12	0.00	703.45	412.69	1.00	-1942.69	-49.42	-42.12	808.75	289.13	2.94	17.35	Vale	36.95	8.41	Vale	134.91	12.72	Vale	74.03	6.94	Vale	202.55	19.20	Vale	Vale
-2877.57	-50.15	-43.20	0.00	717.19	416.26	1.00	-3358.82	-50.15	-43.20	825.21	290.88	4.77	29.43	Vale	63.51	14.25	Vale	251.05	23.87	Vale	136.28	12.85	Vale	324.11	30.96	Vale	Vale
-1457.40	-50.15	-42.04	0.00	697.85	416.26	1.00	-1938.65	-50.15	-42.04	802.95	290.88	2.94	17.18	Vale	36.66	8.45	Vale	134.71	12.70	Vale	73.94	6.93	Vale	201.81	19.13	Vale	Vale
-2751.06	-31.43	-41.30	0.00	718.70	273.42	1.00	-3232.31	-31.43	-41.30	821.96	194.85	4.58	36.12	Vale	91.24	13.76	Vale	235.42	22.37	Vale	127.31	12.00	Vale	308.85	29.48	Vale	Vale
-1376.15	-31.43	-37.66	0.00	655.20	273.42	1.00	-1857.40	-31.43	-37.66	749.34	194.85	2.78	21.96	Vale	52.43	8.68	Vale	122.80	11.57	Vale	66.95	6.27	Vale	186.30	17.64	Vale	Vale

PUENTE E-1508.5

3.2.- Tablero izquierdo

Al tratarse de un tablero recto en planta y con un punto fijo en el estribo 1 las unicas acciones a considerar son:

Cargas Remuretes

Sobrecarga

Coacción

Viento

COACCIÓN

Se considera un rozamiento de 0,03 en aparatos tipo POT

P1 $F_c = 1069 \times 0,03 = 32,1$ Ton
P2 $F_c = 1121 \times 0,03 = 33,6$ Ton
P3 $F_c = 1128 \times 0,03 = 33,8$ Ton
P4 $F_c = 1082 \times 0,03 = 32,4$ Ton.

VIENTO

$f_w = 150\ (2 - 0,7\lambda)$ $\qquad \lambda = \frac{A_n}{A_{tot}} = 1,00$

$f_w = 200$ Kp/m²

$W = f_w \cdot A$ $\qquad A = (2,10 + 0,70 + 3,50 + 1,50) = 7,80$ m.

$W = 0,20 \times 7,80 = 1,6$ t/m.

La presion del viento sobre la fiesta es

$$q_w = 200 \text{ kg/m}^2 \times 1,80 = 0,36 \text{ t/m}.$$

Para el reparto se supone aplicada como carga puntual en coronación de pila con un valor de $P_w = q_w \cdot H_s/2$.

Las alturas de las pilas son:

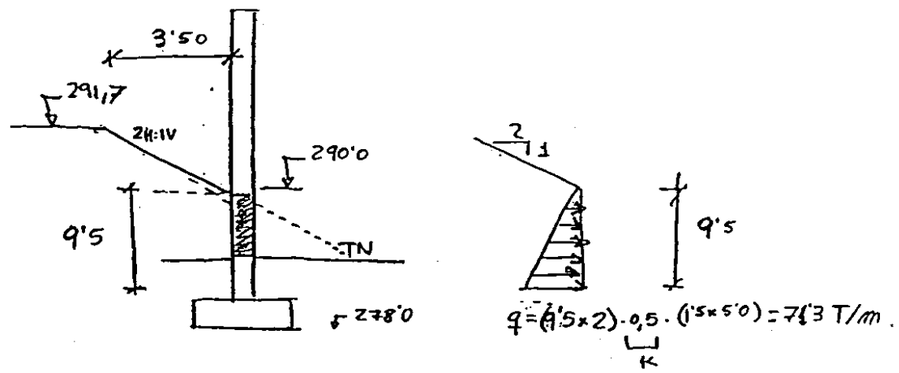
P1 $H_f = 16'2$ m
P2 $H_f = 17'0$ m
P3 $H_f = 16'9$ m
P4 $H_f = 17'8$ m.

Los estribos se consideran indeformables.

El resultado del calculo es el siguiente

Apoyo	Fuerza horiz.
E1	20'6 t.
P1	39'6 t.
P2	55'7 t.
P3	58'3 t.
P4	29'1 t.
E2	22'4 t.

Sobre la pila 1 actua ademas una carga de tierras procedente de tazid del ramal 17 de enlace de la autovia Sumport - Sgurb



IBM

Ordenador Personal

PROGRAMA PILATAB

REPARTO DE ACCIONES HORIZONTALES EN PUENTES

(C) Copyright J.Diaz del Valle, 1992

PROYECTO : XV

Referencia ..... : E-1508.S. TABLERO IZQUIERDO

Fecha ..... : 07-12-1998

DATOS GENERALES

TIPO DE ANALISIS (LINEAL=1, NO LINEAL=0) ..... = 1

NUMERO DE PILAS ..... = 6

NUMERO DE TRAMOS DEL TABLERO ..... = 5

NUMERO DE SECCIONES POR TRAMO..... = 5

MODULO DE ELASTICIDAD DEL TABLERO (Mp/m²) ..... Et = 3.5000E+06

MODULO DE ELASTICIDAD DE LAS PILAS (Mp/m²) ..... Ep = 3.0000E+06

COEFICIENTE DE FLUENCIA DE LAS PILAS ..... ϕ = 2.00

MODULO DEFORMACION NEOPRENO(CARGAS RAPIDAS) (Mp/m²) Gr = 160.00

MODULO DEFORMACION NEOPRENO (CARGAS LENTAS) (Mp/m²) Gl = 80.00

COEFICIENTE DE MAYORACION DE LAS CARGAS ..... ¥f = 1.00

TOLERANCIA DE CONVERGENCIA ..... = 1.0000E-04

CARACTERISTICAS DEL TABLERO

TRAMO N°	LONGITUD L (m)	ANCHO B (m)	INERCIA Iz (m4)	SECCION A (m2)
1	23.770	8.300	32.050	8.800
2	32.410	8.300	32.050	8.800
3	32.410	8.300	32.050	8.800
4	32.410	8.300	32.050	8.800
5	20.000	8.300	35.510	11.880

CARACTERISTICAS DE LAS PILAS

LAS PILAS ARRANCAN DE LOS NUDOS : 1 2 3 4 5 6

PILAS ACTIVAS LONGITUDINALMENTE : 1

PILAS ACTIVAS TRANSVERSALMENTE : 1 2 3 4 5 6

PROGRAMA PILATAB. . . 07-12-1998 .PAG

CARACTERISTICAS DE LA PILA N° 1

ALTURA DE LA PILA : H = 1.000 m.

I.long. Iy =¥1000.000 m4 I.trans. Ix =¥1000.000 m4

CARACTERISTICAS DE LA PILA N° 2

ALTURA DE LA PILA : H = 16.200 m.

I.long. Iy = 0.000 m4 I.trans. Ix = 15.710 m4

CARACTERISTICAS DE LA PILA N° 3

ALTURA DE LA PILA : H = 17.000 m.

I.long. Iy = 0.000 m4 I.trans. Ix = 15.710 m4

CARACTERISTICAS DE LA PILA N° 4

ALTURA DE LA PILA : H = 16.900 m.

I.long. Iy = 0.000 m4 I.trans. Ix = 15.710 m4

CARACTERISTICAS DE LA PILA N° 5

ALTURA DE LA PILA : H = 17.800 m.

I.long. Iy = 0.000 m4 I.trans. Ix = 15.710 m4

CARACTERISTICAS DE LA PILA N° 6

ALTURA DE LA PILA : H = 1.000 m.

I.long. Iy = 0.000 m4 I.trans. Ix =¥1000.000 m4

DIMENSIONES DE LOS APARATOS DE APOYO

(Si en una pila h=0 y/o A=0 implica apoyo directo)

PILA N°	ALTURA h DEL NEOPRENO (m)	SECCION A DEL NEOPRENO (m²)
1	0.000	0.000
2	0.000	0.000
3	0.000	0.000
4	0.000	0.000
5	0.000	0.000
6	0.000	0.000

NUDOS COACCIONADOS DEL TABLERO

NUDO N°	CONSTANTE Kx DE MUELLE (Mp/m.)	CONSTANTE Ky DE MUELLE (Mp/m.)

ACCIONES TRANSVERSALES AL TABLERO (F.CENTFRIFUGA)

ACCIONES TRANSVERSALES AL TABLERO (VIENTO)

CARGA UNIFORME REPARTIDA EN TODO EL TABLERO .... q = 1.600

NUDO N° 2 ... FUERZA = 2.90000E+00 , MOMENTO = 0.00000E+00

NUDO N° 3 ... FUERZA = 3.10000E+00 , MOMENTO = 0.00000E+00

NUDO N° 4 ... FUERZA = 3.00000E+00 , MOMENTO = 0.00000E+00

NUDO N° 5 ... FUERZA = 3.20000E+00 , MOMENTO = 0.00000E+00

ACCIONES TRANSVERSALES AL TABLERO (SISMO)

ACCIONES LONGITUDINALES (REOLOGICAS Y TERMICAS)

DEFORMACION DE RETRACCION+FLUENCIA+TEMPERATURA .. ϵ = 0.00100

ACCIONES LONGITUDINALES (ROZAMIENTO)

FUERZA DE ROZAMIENTO DE LOS APOYOS DESLIZANTES (Mp) = 131.90

ACCIONES LONGITUDINALES (FRENADO)

FUERZA DE FRENADO SOBRE EL TABLERO (Mp) ..... Ff = 211.50

ACCIONES LONGITUDINALES (SISMO)

COEFICIENTE SISMICO (SEGUN NORMA PDS1) ..... s = 0.000

PESO TOTAL DEL TABLERO + 0.6 x SOBRECARGA (Mp) ... W = 0.0

FUERZA SISMICA LONGITUDINAL (Mp) ..... Fx = 0.00

A) REPARTO DE ACCIONES HORIZONTALES TRANSVERSALES

DESPLAZAMIENTOS Y REACCIONES EN NUDOS DEL TABLERO

ACCION TRANSVERSAL : HIP II = ¥f x VIENTO

NUDO N°	FLECHA Dy (mm)	GIROx1000 (radianes)	REACCION Ry (Mp)	MUELLE Ky (Mp/m)
1	0.00	0.06	20.57	%9000000000.00
2	1.28	0.04	42.54	33256.28
3	2.04	0.01	58.75	28778.75
4	2.09	-0.01	61.31	29292.64
5	1.29	-0.05	32.29	25070.25
6	0.00	-0.07	22.35	%9000000000.00

ESFUERZOS Y DEFORMADA DEL TABLERO

ACCION TRANSVERSAL : HIP II = ¥f x VIENTO

TRAMO N°	X (m)	CORTANTE Qy (Mp)	MOMENTO Mz (Mpxm)	FLECHA Dy (mm)
1	0.00	20.57	-0.00	0.00
1	5.94	11.06	93.98	0.37
1	11.89	1.55	131.46	0.71
1	17.83	-7.96	112.43	1.01
1	23.77	-17.46	36.91	1.28
2	23.77	22.18	36.91	1.28
2	31.87	9.21	164.08	1.60
2	39.97	-3.75	186.21	1.84
2	48.08	-16.71	103.29	1.97
2	56.18	-29.68	-84.66	2.04
3	56.18	25.97	-84.66	2.04
3	64.28	13.00	73.22	2.13
3	72.38	0.04	126.05	2.17
3	80.49	-12.93	73.84	2.15
3	88.59	-25.89	-83.41	2.09
4	88.59	32.42	-83.41	2.09
4	96.69	19.46	126.75	2.04
4	104.80	6.49	231.87	1.92
4	112.90	-6.47	231.95	1.67
4	121.00	-19.44	126.99	1.29
5	121.00	9.65	126.99	1.29
5	126.00	1.65	155.24	1.01
5	131.00	-6.35	143.50	0.70
5	136.00	-14.35	91.75	0.36

5	141.00	-22.35	0.00	0.00

FUERZAS Y DESPLAZAMIENTOS EN CABEZAS DE PILA Y APOYOS DE NEOPRENO

ACCION TRANSVERAL : HIP II = ¥f x VIENTO

PILA N°	FUERZA Hy (Mp)	DESP.PILA (mm)	DESP.APOYO Dn (mm)	DESP.TOTAL Dy (mm)
1	20.57	0.00	0.00	0.00
2	42.54	1.28	0.00	1.28
3	58.75	2.04	0.00	2.04
4	61.31	2.09	0.00	2.09
5	32.29	1.29	0.00	1.29
6	22.35	0.00	0.00	0.00

REPARTO PESIMO DE FUERZAS HORIZONTALES TRANSVERSALES EN PILAS

PILA N°	HIP I (Mp)	HIP II (Mp)	HIP III (Mp)	HIP IV (Mp)	FUERZA MAX. Hy (Mp)
1	0.00	20.57	0.00	0.00	20.57
2	0.00	42.54	0.00	0.00	42.54
3	0.00	58.75	0.00	0.00	58.75
4	0.00	61.31	0.00	0.00	61.31
5	0.00	32.29	0.00	0.00	32.29
6	0.00	22.35	0.00	0.00	22.35

DESPLAZAMIENTOS TRANSVERSALES DE LOS APOYOS DE NEOPRENO

EN ESTADO DE SERVICIO (ACCIONES SIN MAYORAR)

PILA N°	HIP I (mm)	HIP II (mm)	HIP III (mm)	HIP IV (mm)	DESP.MAX. Dn (mm)
1	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00

PROGRAMA PILATAB. . . 07-12-1998 .PAG

B) REPARTO DE ACCIONES HORIZONTALES LONGITUDINALES

FUERZAS Hd Y DESPLAZAMIENTOS Dd POR DEFORM. REOLOGICAS Y TERMICAS

(Distancia del punto fijo al estribo izquierdo = 0.00)

PILA N°	FUERZA Hd (Mp)	DESP. Dd (mm)	VALORES ABSOLUTOS FUERZA Hd (Mp)	VALORES ABSOLUTOS DESP. Dd (mm)
1	0.00	0.00	0.00	0.00

FUERZAS Hr Y DESPLAZAMIENTOS Dr DEBIDOS AL ROZAMIENTO DE APOYOS

PILA N°	FUERZA Hr (Mp)	DESP. Dr (mm)	VALORES ACUMULADOS FUERZA Hd+Hr (Mp)	VALORES ACUMULADOS DESP.Dd+Dr (mm)
1	131.90	0.00	131.90	0.00

FUERZAS Hf Y DESPLAZAMIENTOS Df DEBIDOS AL FRENADO (SUPUESTO I)

PILA N°	FUERZA Hf (Mp)	DESP. Df (mm)	VALORES ACUMULADOS FUERZA #Hd+Hr+Hf	VALORES ACUMULADOS DESPLAZA. Dd+Dr+Df
1	211.50	0.00	343.40	0.00

FUERZAS Hf Y DESPLAZAMIENTOS Df DEBIDOS AL FRENADO (SUPUESTO II)

PILA N°	FUERZA Hf (Mp)	DESP. Df (mm)	VALORES ACUMULADOS FUERZA Hf (Mp)	VALORES ACUMULADOS DESP. Df (mm)
1	211.50	0.00	211.50	0.00

CARGAS EN CABEZA DE PILAS

PROYECTO: L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1508.5. TAB. IZDO

PILA 1

Cargas verticales (KN)

Nodo	PP	PP,rios	CM	PRET	GRAD	SC +	SC -
116	3594	0	1471	-117	-104	1595	-224
117	3595	0	2027	-117	-104	3295	-206
MZ(KNm)	2	0	834	0	0	2550	28
FX (KN)	7189	0	3498	-234	-207	4891	-430

Cargas horizontales transversales

Viento tablero (KN)	396	FY (KN)	396
Viento fuste (KN/m)	4	qY(KN/m)	4

Cargas horizontales longitudinales

Coacción (KN)	321	FZ (KN)	321

EN ESTADO LIMITE DE SERVICIO				EN ESTADO LIMITE ULTIMO			
HIPOTESIS DE AXIL MAXIMO		HIPOTESIS DE AXIL MINIMO		HIPOTESIS DE AXIL MAXIMO		HIPOTESIS DE AXIL MINIMO	
FXG (KN)	10687	FXG (KN)	10365	FXG (KN)	16031	FXG (KN)	9326
FXQ (KN)	4891	FXQ (KN)	-637	FXQ (KN)	7336	FXQ (KN)	-956
FYQ (KN)	396	FYQ (KN)	396	FYQ (KN)	595	FYQ (KN)	595
FZG (KN)	321	FZG (KN)	321	FZG (KN)	482	FZG (KN)	482
MZG (KNm)	836	MZG (KNm)	836	MZG (KNm)	1253	MZG (KNm)	752
MZQ (KNm)	2550	MZQ (KNm)	28	MZQ (KNm)	3825	MZQ (KNm)	42
qXG (KN/m)	211	qXG (KN/m)	211	qXG (KN/m)	316	qXG (KN/m)	190
qYQ (KN/m)	4	qYQ (KN/m)	4	qYQ (KN/m)	5	qYQ (KN/m)	5
qZG(KN/m)(en9.5m	0 a -713	qZG(KN/m)(en9.5m	0 a -713	qZG(KN/m)(en9.5m	0 a -1070	qZG(KN/m)(en9.5m	0 a -1070

PILA 3

Cargas verticales (KN)

Nodo	PP	PP,rios	CM	PRET	GRAD	SC +	SC -
120	3788	0	1529	-26	16	1648	-285
121	3788	0	2175	-26	16	3614	-254
MZ(KNm)	0	0	969	0	0	2950	45
FX (KN)	7576	0	3704	-52	31	5262	-539

Cargas horizontales transversales

Viento tablero (KN)	583	FY (KN)	583
Viento fuste (KN/m)	4	qY(KN/m)	4

Cargas horizontales longitudinales

Coacción (KN)	338	FZ (KN)	338

EN ESTADO LIMITE DE SERVICIO				EN ESTADO LIMITE ULTIMO			
HIPOTESIS DE AXIL MAXIMO		HIPOTESIS DE AXIL MINIMO		HIPOTESIS DE AXIL MAXIMO		HIPOTESIS DE AXIL MINIMO	
FXG (KN)	11280	FXG (KN)	11209	FXG (KN)	16920	FXG (KN)	10087
FXQ (KN)	5293	FXQ (KN)	-539	FXQ (KN)	7940	FXQ (KN)	-808
FYQ (KN)	583	FYQ (KN)	583	FYQ (KN)	875	FYQ (KN)	875
FZG (KN)	338	FZG (KN)	338	FZG (KN)	507	FZG (KN)	507
MZG (KNm)	969	MZG (KNm)	969	MZG (KNm)	1454	MZG (KNm)	872
MZQ (KNm)	2950	MZQ (KNm)	45	MZQ (KNm)	4425	MZQ (KNm)	68
qXG (KN/m)	211	qXG (KN/m)	211	qXG (KN/m)	316	qXG (KN/m)	190
qYQ (KN/m)	4	qYQ (KN/m)	4	qYQ (KN/m)	5	qYQ (KN/m)	5

PILA 2

Cargas verticales (KN)

Nodo	PP	PP,rios	CM	PRET	GRAD	SC +	SC -
118	3781	0	1502	-6	14	1651	-324
119	3781	0	2148	-6	14	3617	-291
MZ(KNm)	0	0	969	0	0	2950	49
FX (KN)	7562	0	3650	-12	28	5268	-615

Cargas horizontales transversales

Viento tablero (KN)	557	FY (KN)	557
Viento fuste (KN/m)	4	qY(KN/m)	4

Cargas horizontales longitudinales

Coacción (KN)	336	FZ (KN)	336

EN ESTADO LIMITE DE SERVICIO				EN ESTADO LIMITE ULTIMO			
HIPOTESIS DE AXIL MAXIMO		HIPOTESIS DE AXIL MINIMO		HIPOTESIS DE AXIL MAXIMO		HIPOTESIS DE AXIL MINIMO	
FXG (KN)	11212	FXG (KN)	11196	FXG (KN)	16818	FXG (KN)	10076
FXQ (KN)	5297	FXQ (KN)	-615	FXQ (KN)	7945	FXQ (KN)	-923
FYQ (KN)	557	FYQ (KN)	557	FYQ (KN)	835	FYQ (KN)	835
FZG (KN)	336	FZG (KN)	336	FZG (KN)	504	FZG (KN)	504
MZG (KNm)	969	MZG (KNm)	969	MZG (KNm)	1454	MZG (KNm)	872
MZQ (KNm)	2950	MZQ (KNm)	49	MZQ (KNm)	4424	MZQ (KNm)	74
qXG (KN/m)	211	qXG (KN/m)	211	qXG (KN/m)	316	qXG (KN/m)	190
qYQ (KN/m)	4	qYQ (KN/m)	4	qYQ (KN/m)	5	qYQ (KN/m)	5

PILA 4

Cargas verticales (KN)

Nodo	PP	PP,rios	CM	PRET	GRAD	SC +	SC -
122	3767	0	1381	-105	-123	1541	-250
123	3769	0	1898	-105	-123	3122	-231
MZ(KNm)	3	0	776	0	0	2371	28
FX (KN)	7536	0	3279	-210	-246	4663	-482

Cargas horizontales transversales

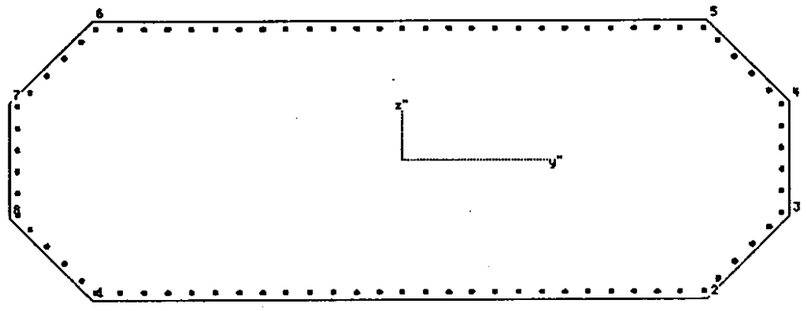
Viento tablero (KN)	291	FY (KN)	291
Viento fuste (KN/m)	4	qY(KN/m)	4

Cargas horizontales longitudinales

Coacción (KN)	324	FZ (KN)	324

EN ESTADO LIMITE DE SERVICIO				EN ESTADO LIMITE ULTIMO			
HIPOTESIS DE AXIL MAXIMO		HIPOTESIS DE AXIL MINIMO		HIPOTESIS DE AXIL MAXIMO		HIPOTESIS DE AXIL MINIMO	
FXG (KN)	10815	FXG (KN)	10526	FXG (KN)	16223	FXG (KN)	9471
FXQ (KN)	4663	FXQ (KN)	-727	FXQ (KN)	6994	FXQ (KN)	-1091
FYQ (KN)	291	FYQ (KN)	291	FYQ (KN)	436	FYQ (KN)	436
FZG (KN)	324	FZG (KN)	324	FZG (KN)	486	FZG (KN)	486
MZG (KNm)	779	MZG (KNm)	779	MZG (KNm)	1168	MZG (KNm)	701
MZQ (KNm)	2371	MZQ (KNm)	28	MZQ (KNm)	3556	MZQ (KNm)	41
qXG (KN/m)	211	qXG (KN/m)	211	qXG (KN/m)	316	qXG (KN/m)	190
qYQ (KN/m)	4	qYQ (KN/m)	4	qYQ (KN/m)	5	qYQ (KN/m)	5

Mstb. 1 : 40.0



Sección :"PILATIZ" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón =H300PIL

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	-197.00	-90.00	2	197.00	-90.00
3	250.00	-37.00	4	250.00	37.00
5	197.00	90.00	6	-197.00	90.00
7	-250.00	37.00	8	-250.00	-37.00

Características mecánicas de la sección:
Area : Ax= 8.438 [m2]
Momentos de inercia : Iy= 2.127 [m4] Iz= 15.709 [m4]
Inercia a torsión : Ix= 11.332 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-6.90E-18 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-2.500	-6.283	0.745
dch.	Iz	2.500	6.283	-0.745
abajo	Iy	-0.900	-2.364	0.280
arriba	Iy	0.900	2.364	-0.280

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	132.54	-195.00	-85.00	195.00	-85.00
2	AEH500	(2)	132.54	-195.00	85.00	195.00	85.00
3	AEH500	(2)	29.45	-245.00	-35.00	-245.00	35.00
4	AEH500	(2)	29.45	245.00	-35.00	245.00	35.00
5	AEH500	(2)	19.63	-204.00	-77.00	-237.00	-44.00
6	AEH500	(2)	19.63	-204.00	77.00	-237.00	44.00
7	AEH500	(2)	19.63	204.00	-77.00	237.00	-44.00
8	AEH500	(2)	19.63	204.00	77.00	237.00	44.00
	Total:		402.52	Cuantía de armadura: 0.477 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H300PIL"	310000.0	-153.000	-2.000	0.0	6.708	270.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Pila ''1U1'
****

Título : 'E-1508.5. TAB. IZDO.ELU.P1 1'
Altura de la pila : 16.200 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo
Nu [m] d-xyz r-xyz

Nu	[m]	d-xyz	r-xyz
3	16.200		
2	9.500		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
2	3-2	'PILATIZ'	SecFAGUS			1	1.000
1	2-1	'PILATIZ'	SecFAGUS			2	1.000

CARGAS :

Nu/Ba		Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :						
Nudo	3	Fuerza	x [kN]	-16030.500		
		Fuerza	z [kN]	481.500		
		Momento	z [kNm]	1253.250		
Barra	2	Fuerza	x [kN/m]	-316.425		
Barra	1	Fuerza	x [kN/m]	-316.425		
Barra	1	Fuerza trap.	z [kN/m]	-1070.000	0.000	
Comp. Carga Q1 :						
Nudo	3	Fuerza	x [kN]	-7335.870		
		Fuerza	y [kN]	594.600		
		Momento	z [kNm]	3824.595		
Barra	2	Fuerza	y [kN/m]	5.400		
Barra	1	Fuerza	y [kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <B.1U1.1>

PARAMETROS DE CALCULO:
Norma..... EH
Criterio de rotura..... Agotamiento de secciones o del sistema
Rotura de secciones..... Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada).... -2.000 [o/oo]
- Hormigón (flexión)..... -3.500 [o/oo]
- Acero ..... 10.00 [o/oo]
Coef. min. resist. (gamma_r)... 1.000
Coeficiente de fluencia..... 2.000
Carga contribuyente a fluencia. 1.000 * Carga permanente G1
No de elementos 6
Tolerancia desequi. fuerzas.... 0.281 [kN]
Tolerancia desequi. momentos... 0.154 [kNm]
Mayoración de cargas..... 1.000 * Carga permanente G1
+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
PILATIZ	5.000	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-6.98	0.00	-2.01	-1.310E-3	-1.898	0.000
Máxima	0.00	7.62	11.17	4.413E-4	0.578	0.819

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-28116.70	-675.67	-481.50	-5.84	-7572.59	5072.79
Máxima	-23896.38	-603.65	3425.67	0.00	4611.05	15608.50

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	Ely [kNm²]	Elz [kNm²]
Mínima	-6.6	-224.8	-0.489	-1.070	5.929E+5	1.773E+8
Máxima	0.0	24.0	0.092	0.114	1.673E+7	2.127E+8

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
2	16.20	PILATIZ	402.5	0.48	18
	12.85	PILATIZ	402.5	0.48	20
	9.500	PILATIZ	402.5	0.48	22
1	9.500	PILATIZ	402.5	0.48	23
	7.125	PILATIZ	402.5	0.48	25
	4.750	PILATIZ	402.5	0.48	26
	2.375	PILATIZ	402.5	0.48	25
	0.000	PILATIZ	402.5	0.48	32

(≤) : Armadura ≤ μ_min = 0.40%
(≥) : Armadura ≥ μ_max = 8.00%

ESFUERZOS (global)
<B.1U1.1> Carga: 1.00*G1 1.00*Q1

Coord-x	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
16.200	-23896.38	-603.65	-481.50	0.00	0.00	5072.79
12.850	-23896.38	-603.65	-481.50	-2.47	1759.77	7156.33
12.850	-24956.41	-621.74	-481.50	-2.47	1759.77	7156.32
9.500	-24956.41	-621.74	-481.50	-4.44	3493.30	9292.72
9.500	-25862.17	-637.20	-386.20	-4.44	3543.60	9295.22
7.125	-25862.17	-637.20	-386.20	-5.19	4510.46	10839.93
7.125	-26613.68	-650.02	249.11	-5.19	4611.05	10839.92
4.750	-26613.68	-650.02	249.11	-5.61	4027.19	12408.04
4.750	-27365.19	-662.85	1519.74	-5.61	4127.78	12408.03
2.375	-27365.19	-662.85	1519.74	-5.79	489.53	13998.09
2.375	-28116.70	-675.67	3425.67	-5.79	590.12	13998.09
0.000	-28116.70	-675.67	3425.67	-5.84	-7572.59	15608.50

Pila ''1U2'
****

Título : 'E-1508.5. TAB. IZDO.ELU.P1 2'
Altura de la pila : 16.200 [m]
Long. max. de barra: Altura pila / 6

NUDOS Nu	x Apoyo [m]	d-xyz	r-xyz
3	16.200		
2	9.500		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
2	3-2	'PILATIZ'	SecFAGUS			1	1.000
1	2-1	'PILATIZ'	SecFAGUS			2	1.000

CARGAS :

Nu/Ba		Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :						
Nudo	3	Fuerza	x [kN]	-9325.800		
		Fuerza	z [kN]	481.500		
		Momento	z [kNm]	751.950		
Barra	2	Fuerza	x [kN/m]	-189.855		
Barra	1	Fuerza	x [kN/m]	-189.855		
Barra	1	Fuerza trap.	z [kN/m]	-1070.000	0.000	
Comp. Carga Q1 :						
Nudo	3	Fuerza	x [kN]	955.575		
		Fuerza	y [kN]	594.600		
		Momento	z [kNm]	41.620		
Barra	2	Fuerza	y [kN/m]	5.400		
Barra	1	Fuerza	y [kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <B.1U2.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia	1.000 * Carga permanente G1
No de elementos	6
Tolerancia desequi. fuerzas	0.112 [kN]
Tolerancia desequi. momentos	0.111 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1 + 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
PILATIZ	5.000	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-3.29	0.00	-2.42	-1.541E-3	-1.722	0.000
Máxima	0.00	5.32	9.12	0.000E+0	0.672	0.511

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-11220.43	-675.67	-481.50	-5.43	-7763.22	788.51
Máxima	-8688.23	-603.65	3425.67	-0.00	4398.99	11182.84

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	Ely [kNm²]	Elz [kNm²]
Mínima	-5.4	-180.3	-0.392	-0.858	3.570E+6	1.031E+8
Máxima	0.0	102.2	0.319	0.487	1.518E+7	2.289E+8

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
2	16.20	PILATIZ	402.5	0.48	6
	12.85	PILATIZ	402.5	0.48	9
	9.500	PILATIZ	402.5	0.48	12
1	9.500	PILATIZ	402.5	0.48	12
	7.125	PILATIZ	402.5	0.48	15
	4.750	PILATIZ	402.5	0.48	15
	2.375	PILATIZ	402.5	0.48	12
	0.000	PILATIZ	402.5	0.48	26

(≤) : Armadura ≤ μ_min = 0.40%
(≥) : Armadura ≥ μ_max = 8.00%

ESFUERZOS (global)
<B.1U2.1> Carga: 1.00*G1 1.00*Q1

Coord-x	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
16.200	-8688.23	-603.65	-481.50	-0.00	0.00	788.51
12.850	-8688.23	-603.65	-481.50	-2.56	1661.36	2825.09
12.850	-9324.25	-621.74	-481.50	-2.56	1661.36	2825.07
9.500	-9324.25	-621.74	-481.50	-4.55	3314.79	4921.66
9.500	-9867.71	-637.20	-386.20	-4.55	3365.09	4924.15
7.125	-9867.71	-637.20	-386.20	-5.25	4298.40	6446.18
7.125	-10318.61	-650.03	249.11	-5.25	4398.99	6446.15
4.750	-10318.61	-650.03	249.11	-5.43	3807.50	7997.00
4.750	-10769.52	-662.85	1519.74	-5.42	3908.10	7996.98
2.375	-10769.52	-662.85	1519.74	-5.24	284.64	9576.11
2.375	-11220.43	-675.67	3425.67	-5.24	385.24	9576.09
0.000	-11220.43	-675.67	3425.67	-5.11	-7763.22	11182.84

Pila ''2U1'
****

Título : 'E-1508.5. TAB. IZDO.ELU.P2 1'
Altura de la pila : 17.000 [m]
Long. max. de barra: Altura pila / 6

NUDOS Nu	x Apoyo [m]	d-xyz	r-xyz
3	17.000		
2	9.969		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
2	3-2	'PILATIZ'	SecFAGUS			1	1.000
1	2-1	'PILATIZ'	SecFAGUS			2	1.000

CARGAS :

Nu/Ba		Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :						
Nudo	3	Fuerza	x [kN]	-16818.000		
		Fuerza	z [kN]	504.000		
		Momento	z [kNm]	1453.500		
Barra	2	Fuerza	x [kN/m]	-316.425		
Barra	1	Fuerza	x [kN/m]	-316.425		
Comp. Carga Q1 :						
Nudo	3	Fuerza	x [kN]	-7945.110		
		Fuerza	y [kN]	834.750		
		Momento	z [kNm]	4424.355		
Barra	2	Fuerza	y [kN/m]	5.400		
Barra	1	Fuerza	y [kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <B.2U1.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia.	1.000 * Carga permanente G1
No de elementos	6
Tolerancia desequi. fuerzas	0.297 [kN]
Tolerancia desequi. momentos	0.208 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1
	+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero		Distrib. de la armadura	Armadura fija[cm²]
PILATIZ	5.000	1.800	H300PIL	AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-7.89	0.00	0.00	-3.722E-3	-6.189	0.000
Máxima	0.00	11.66	70.30	3.087E-3	0.000	1.155

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-29748.02	-919.82	-504.00	-55.28	-0.00	5872.29
Máxima	-25319.30	-844.24	-504.00	-0.00	10452.91	21157.79

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	EIy [kNm²]	EIz [kNm²]
Mínima	-8.4	-282.3	-0.654	-1.344	2.074E+5	1.764E+8
Máxima	0.0	75.6	0.250	0.360	1.549E+7	2.061E+8

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
2	17.00	PILATIZ	402.5	0.48	20
	13.48	PILATIZ	402.5	0.48	22
	9.97	PILATIZ	402.5	0.48	26
1	9.97	PILATIZ	402.5	0.48	26
	7.477	PILATIZ	402.5	0.48	29
	4.985	PILATIZ	402.5	0.48	33
	2.492	PILATIZ	402.5	0.48	36
	0.000	PILATIZ	402.5	0.48	40

(≤) : Armadura ≤ μ_min = 0.40%
(≥) : Armadura ≥ μ_max = 8.00%

ESFUERZOS (global)
<B.2U1.1> Carga: 1.00*G1 1.00*Q1

Coord-x	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
17.000	-25319.30	-844.24	-504.00	0.00	-0.00	5872.29
13.485	-25319.30	-844.24	-504.00	-16.18	2314.82	8937.06
13.485	-26431.67	-863.23	-504.00	-16.18	2314.82	8937.05
9.969	-26431.67	-863.23	-504.00	-31.46	4604.68	12057.73
9.969	-27382.16	-879.45	-504.00	-31.46	4604.68	12060.49
7.477	-27382.16	-879.45	-504.00	-40.86	6183.04	14303.62
7.477	-28170.78	-892.91	-504.00	-40.86	6183.04	14303.62
4.985	-28170.78	-892.91	-504.00	-48.40	7699.88	16569.56
4.985	-28959.40	-906.36	-504.00	-48.40	7699.88	16569.56
2.492	-28959.40	-906.36	-504.00	-53.43	9131.79	18855.44
2.492	-29748.02	-919.82	-504.00	-53.43	9131.79	18855.44
0.000	-29748.02	-919.82	-504.00	-55.28	10452.91	21157.79

Pila ''2U2'
****

Título : 'E-1508.5. TAB. IZDO.ELU.P2 2'
Altura de la pila : 17.000 [m]
Long. max. de barra: Altura pila / 6

NUDOS Nu	x Apoyo [m]	d-xyz	r-xyz
3	17.000		
2	9.969		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
2	3-2	'PILATIZ'	SecFAGUS			1	1.000
1	2-1	'PILATIZ'	SecFAGUS			2	1.000

CARGAS :

Nu/Ba		Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :						
Nudo	3	Fuerza	x [kN]	-10075.800		
		Fuerza	z [kN]	504.000		
		Momento	z [kNm]	872.100		
Barra	2	Fuerza	x [kN/m]	-189.855		
Barra	1	Fuerza	x [kN/m]	-189.855		
Comp. Carga Q1 :						
Nudo	3	Fuerza	x [kN]	922.650		
		Fuerza	y [kN]	834.750		
		Momento	z [kNm]	74.025		
Barra	2	Fuerza	y [kN/m]	5.400		
Barra	1	Fuerza	y [kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <B.2U2.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia	1.000 * Carga permanente G1
No de elementos	6
Tolerancia desequi. fuerzas	0.121 [kN]
Tolerancia desequi. momentos	0.159 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1
	+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
PILATIZ	5.000	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-3.41	0.00	0.00	-0.008	-6.608	0.000
Máxima	0.00	11.35	77.78	0.000	0.000	0.974

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-12144.11	-919.83	-504.02	-61.93	-0.03	940.50
Máxima	-9486.86	-844.28	-504.00	-0.00	9377.10	16032.33

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	EIy [kNm²]	EIz [kNm²]
Mínima	-7.5	-238.7	-0.568	-1.136	1.542E+6	1.046E+8
Máxima	0.0	196.2	0.622	0.934	1.518E+7	1.960E+8

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
2	17.00	PILATIZ	402.5	0.48	7
	13.48	PILATIZ	402.5	0.48	10
	9.97	PILATIZ	402.5	0.48	14
1	9.97	PILATIZ	402.5	0.48	14
	7.477	PILATIZ	402.5	0.48	18
	4.985	PILATIZ	402.5	0.48	23
	2.492	PILATIZ	402.5	0.48	28
	0.000	PILATIZ	402.5	0.48	34

(≤) : Armadura ≤ μ_min = 0.40%
(≥) : Armadura ≥ μ_max = 8.00%

ESFUERZOS (global)
<B.2U2.1> Carga: 1.00*G1 1.00*Q1

Coord-x	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
17.000	-9486.86	-844.28	-504.02	-0.00	-0.03	940.50
13.485	-9486.86	-844.28	-504.02	-17.70	1989.58	3940.17
13.485	-10154.29	-863.26	-504.01	-17.70	1989.53	3940.05
9.969	-10154.29	-863.26	-504.01	-34.56	3977.87	7006.01
9.969	-10724.59	-879.49	-504.02	-34.56	3977.82	7008.68
7.477	-10724.59	-879.49	-504.02	-45.16	5374.98	9221.10
7.477	-11197.76	-892.93	-504.01	-45.15	5374.94	9221.01
4.985	-11197.76	-892.93	-504.01	-53.84	6749.92	11463.89
4.985	-11670.94	-906.38	-504.01	-53.83	6749.90	11463.83
2.492	-11670.94	-906.38	-504.01	-59.75	8089.23	13735.13
2.492	-12144.11	-919.83	-504.00	-59.72	8089.21	13735.10
0.000	-12144.11	-919.83	-504.00	-61.93	9377.10	16032.33

Pila ''3U1'
****

Título : 'E-1508.5. TAB. IZDO.ELU.P3 1'
Altura de la pila : 16.900 [m]
Long. max. de barra: Altura pila / 6

NUDOS Nu	x Apoyo [m]	d-xyz	r-xyz
3	16.900		
2	9.910		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
2	3-2	'PILATIZ'	SecFAGUS			1	1.000
1	2-1	'PILATIZ'	SecFAGUS			2	1.000

CARGAS :

Nu/Ba		Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :						
Nudo	3	Fuerza	x [kN]	-16920.000		
		Fuerza	z [kN]	507.000		
		Momento	z [kNm]	1453.500		
Barra	2	Fuerza	x [kN/m]	-316.425		
Barra	1	Fuerza	x [kN/m]	-316.425		
Comp. Carga Q1 :						
Nudo	3	Fuerza	x [kN]	-7940.025		
		Fuerza	y [kN]	874.650		
		Momento	z [kNm]	4425.233		
Barra	2	Fuerza	y [kN/m]	5.400		
Barra	1	Fuerza	y [kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <B.3U1.1>

PARAMETROS DE CALCULO:
Norma..... EH
Criterio de rotura..... Agotamiento de secciones o del sistema
Rotura de secciones..... Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada).... -2.000 [o/oo]
- Hormigón (flexión)..... -3.500 [o/oo]
- Acero ..... 10.00 [o/oo]
Coef. min. resist. (gamma_r)... 1.000
Coeficiente de fluencia..... 2.000
Carga contribuyente a fluencia. 1.000 * Carga permanente G1
No de elementos 6
Tolerancia desequi. fuerzas.... 0.298 [kN]
Tolerancia desequi. momentos... 0.214 [kNm]
Mayoración de cargas..... 1.000 * Carga permanente G1
+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
PILATIZ	5.000	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-7.87	0.00	0.00	-3.911E-3	-6.151	0.000
Máxima	0.00	11.81	69.47	2.771E-3	0.000	1.173

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-29815.62	-959.22	-507.00	-57.21	-0.00	5873.23
Máxima	-25412.94	-884.09	-507.00	-0.00	10436.94	21745.38

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	Ely [kNm²]	Elz [kNm²]
Mínima	-8.5	-284.0	-0.662	-1.352	2.466E+5	1.764E+8
Máxima	0.0	77.0	0.258	0.367	1.548E+7	2.066E+8

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
2	16.90	PILATIZ	402.5	0.48	20
	13.41	PILATIZ	402.5	0.48	22
	9.910	PILATIZ	402.5	0.48	26
1	9.910	PILATIZ	402.5	0.48	26
	7.433	PILATIZ	402.5	0.48	29
	4.955	PILATIZ	402.5	0.48	33
	2.478	PILATIZ	402.5	0.48	37
	0.000	PILATIZ	402.5	0.48	40

(≤) : Armadura ≤ μ_min = 0.40%
(≥) : Armadura ≥ μ_max = 8.00%

ESFUERZOS (global)
<B.3U1.1> Carga: 1.00*G1 1.00*Q1

Coord-x	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
16.900	-25412.94	-884.09	-507.00	0.00	-0.00	5873.23
13.405	-25412.94	-884.09	-507.00	-16.77	2310.35	9061.15
13.405	-26518.77	-902.96	-507.00	-16.77	2310.34	9061.15
9.910	-26518.77	-902.96	-507.00	-32.59	4595.78	12304.17
9.910	-27463.67	-919.09	-507.00	-32.59	4595.78	12306.89
7.433	-27463.67	-919.09	-507.00	-42.32	6171.35	14636.20
7.433	-28247.65	-932.46	-507.00	-42.32	6171.35	14636.20
4.955	-28247.65	-932.46	-507.00	-50.11	7685.94	16987.79
4.955	-29031.63	-945.84	-507.00	-50.11	7685.94	16987.78
2.478	-29031.63	-945.84	-507.00	-55.30	9116.35	19358.71
2.478	-29815.62	-959.22	-507.00	-55.30	9116.35	19358.70
0.000	-29815.62	-959.22	-507.00	-57.21	10436.94	21745.38

Pila ''3U2'
****

Título : 'E-1508.5. TAB. IZDO.ELU.P3 2'
Altura de la pila : 16.900 [m]
Long. max. de barra: Altura pila / 6

NUDOS Nu	x Apoyo [m]	d-xyz	r-xyz
3	16.900		
2	9.910		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
2	3-2	'PILATIZ'	SecFAGUS			1	1.000
1	2-1	'PILATIZ'	SecFAGUS			2	1.000

CARGAS :

Nu/Ba		Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :						
Nudo	3	Fuerza	x [kN]	-10087.000		
		Fuerza	z [kN]	507.000		
		Momento	z [kNm]	872.100		
Barra	2	Fuerza	x [kN/m]	-189.855		
Barra	1	Fuerza	x [kN/m]	-189.855		
Comp. Carga Q1 :						
Nudo	3	Fuerza	x [kN]	808.200		
		Fuerza	y [kN]	874.650		
		Momento	z [kNm]	68.220		
Barra	2	Fuerza	y [kN/m]	5.400		
Barra	1	Fuerza	y [kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <B.3U2.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia.	1.000 * Carga permanente G1
No de elementos	6
Tolerancia desequi. fuerzas	0.123 [kN]
Tolerancia desequi. momentos	0.165 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1
	+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
PILATIZ	5.000	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-3.39	0.00	0.00	-0.009	-6.579	0.000
Máxima	0.00	11.64	77.01	0.000	0.000	1.003

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-12252.18	-959.23	-507.02	-64.13	-0.03	934.75
Máxima	-9610.55	-884.13	-507.00	-0.00	9378.52	16612.68

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	Ely [kNm²]	Elz [kNm²]
Mínima	-7.6	-240.8	-0.579	-1.147	1.789E+6	1.043E+8
Máxima	0.0	199.6	0.639	0.950	1.519E+7	1.975E+8

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
2	16.90	PILATIZ	402.5	0.48	7
	13.41	PILATIZ	402.5	0.48	10
	9.910	PILATIZ	402.5	0.48	14
1	9.910	PILATIZ	402.5	0.48	14
	7.433	PILATIZ	402.5	0.48	18
	4.955	PILATIZ	402.5	0.48	23
	2.478	PILATIZ	402.5	0.48	29
	0.000	PILATIZ	402.5	0.48	35

(≤) : Armadura ≤ μ_min = 0.40%
(≥) : Armadura ≥ μ_max = 8.00%

ESFUERZOS (global)
<B.3U2.1> Carga: 1.00*G1 1.00*Q1

Coord-x	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
16.900	-9610.55	-884.13	-507.02	-0.00	-0.03	934.75
13.405	-9610.55	-884.13	-507.02	-18.36	1990.25	4057.42
13.405	-10274.05	-902.99	-507.02	-18.36	1990.18	4057.28
9.910	-10274.05	-902.99	-507.02	-35.82	3978.95	7245.43
9.910	-10840.99	-919.13	-507.02	-35.82	3978.90	7248.04
7.433	-10840.99	-919.13	-507.02	-46.79	5376.24	9546.57
7.433	-11311.39	-932.50	-507.02	-46.79	5376.19	9546.47
4.955	-11311.39	-932.50	-507.02	-55.78	6751.27	11874.94
4.955	-11781.78	-945.86	-507.01	-55.75	6751.24	11874.87
2.478	-11781.78	-945.86	-507.01	-61.88	8090.62	14231.17
2.478	-12252.18	-959.23	-507.00	-61.85	8090.60	14231.13
0.000	-12252.18	-959.23	-507.00	-64.13	9378.52	16612.68

Pila ''4U1'
****

Título : 'E-1508.5. TAB. IZDO.ELU.P4 1'
Altura de la pila : 17.800 [m]
Long. max. de barra: Altura pila / 6

NUDOS Nu	x Apoyo [m]	d-xyz	r-xyz
3	17.800		
2	10.438		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
2	3-2	'PILATIZ'	SecFAGUS			1	1.000
1	2-1	'PILATIZ'	SecFAGUS			2	1.000

CARGAS :

Nu/Ba		Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :						
Nudo	3	Fuerza	x [kN]	-16222.500		
		Fuerza	z [kN]	486.000		
		Momento	z [kNm]	1167.750		
Barra	2	Fuerza	x [kN/m]	-316.425		
Barra	1	Fuerza	x [kN/m]	-316.425		
Comp. Carga Q1 :						
Nudo	3	Fuerza	x [kN]	-6993.750		
		Fuerza	y [kN]	436.350		
		Momento	z [kNm]	3556.440		
Barra	2	Fuerza	y [kN/m]	5.400		
Barra	1	Fuerza	y [kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <B.4U1.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia	1.000 * Carga permanente G1
No de elementos	6
Tolerancia desequi. fuerzas	0.284 [kN]
Tolerancia desequi. momentos	0.133 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1 + 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
PILATIZ	5.000	1.800	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-7.98	0.00	0.00	-1.769E-3	-6.534	0.000
Máxima	0.00	8.38	77.53	4.557E-3	0.000	0.817

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-28435.75	-525.42	-486.00	-32.59	0.00	4718.09
Máxima	-23798.61	-446.29	-486.00	-0.00	10616.71	13555.29

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	Ely [kNm²]	Elz [kNm²]
Mínima	-7.3	-262.1	-0.556	-1.248	1.834E+4	1.772E+8
Máxima	0.0	60.1	0.159	0.286	1.549E+7	2.027E+8

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
2	17.80	PILATIZ	402.5	0.48	18
	14.12	PILATIZ	402.5	0.48	20
	10.44	PILATIZ	402.5	0.48	23
1	10.44	PILATIZ	402.5	0.48	24
	7.829	PILATIZ	402.5	0.48	27
	5.219	PILATIZ	402.5	0.48	30
	2.610	PILATIZ	402.5	0.48	33
	0.000	PILATIZ	402.5	0.48	36

(≤) : Armadura ≤ μ_min = 0.40%
(≥) : Armadura ≥ μ_max = 8.00%

ESFUERZOS (global)
<B.4U1.1> Carga: 1.00*G1 1.00*Q1

Coord-x	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
17.800	-23798.61	-446.29	-486.00	0.00	0.00	4718.09
14.119	-23798.61	-446.29	-486.00	-9.21	2353.04	6427.67
14.119	-24963.33	-466.17	-486.00	-9.21	2353.04	6427.67
10.438	-24963.33	-466.17	-486.00	-18.16	4682.27	8202.24
10.438	-25958.55	-483.15	-486.00	-18.16	4682.27	8205.27
7.829	-25958.55	-483.15	-486.00	-23.78	6287.29	9500.69
7.829	-26784.28	-497.24	-486.00	-23.78	6287.29	9500.69
5.219	-26784.28	-497.24	-486.00	-28.35	7828.24	10825.41
5.219	-27610.02	-511.33	-486.00	-28.35	7828.24	10825.41
2.610	-27610.02	-511.33	-486.00	-31.44	9280.43	12177.65
2.610	-28435.75	-525.42	-486.00	-31.44	9280.43	12177.65
0.000	-28435.75	-525.42	-486.00	-32.59	10616.71	13555.29

Pila ''4U2'
****

Título : 'E-1508.5. TAB. IZDO.ELU.P4 2'
Altura de la pila : 17.800 [m]
Long. max. de barra: Altura pila / 6

NUDOS Nu	x Apoyo [m]	d-xyz	r-xyz
3	17.800		
2	10.438		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
2	3-2	'PILATIZ'	SecFAGUS			1	1.000
1	2-1	'PILATIZ'	SecFAGUS			2	1.000

CARGAS :

Nu/Ba		Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :						
Nudo	3	Fuerza	x [kN]	-9471.000		
		Fuerza	z [kN]	486.000		
		Momento	z [kNm]	700.650		
Barra	2	Fuerza	x [kN/m]	-189.855		
Barra	1	Fuerza	x [kN/m]	-189.855		
Comp. Carga Q1 :						
Nudo	3	Fuerza	x [kN]	1090.703		
		Fuerza	y [kN]	436.350		
		Momento	z [kNm]	41.420		
Barra	2	Fuerza	y [kN/m]	5.400		
Barra	1	Fuerza	y [kN/m]	5.400		

D I M E N S I O N A M I E N T O (global) <B.4U2.1>

PARAMETROS DE CALCULO:
Norma..... EH
Criterio de rotura..... Agotamiento de secciones o del sistema
Rotura de secciones..... Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada).... -2.000 [o/oo]
- Hormigón (flexión)..... -3.500 [o/oo]
- Acero ..... 10.00 [o/oo]
Coef. min. resist. (gamma_r)... 1.000
Coeficiente de fluencia..... 2.000
Carga contribuyente a fluencia. 1.000 * Carga permanente G1
No de elementos 6
Tolerancia desequi. fuerzas.... 0.115 [kN]
Tolerancia desequi. momentos... 0.094 [kNm]
Mayoración de cargas..... 1.000 * Carga permanente G1
+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
PILATIZ	5.000	1.800	H30OPIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-3.53	0.00	0.00	-0.005	-6.810	0.000
Máxima	0.00	6.93	83.66	0.000	0.000	0.582

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-11512.00	-525.42	-486.00	-36.24	-0.00	735.97
Máxima	-8729.71	-446.29	-486.00	-0.00	9461.10	9428.54

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	EIy [kNm²]	EIz [kNm²]
Mínima	-6.0	-213.6	-0.443	-1.017	7.892E+5	1.031E+8
Máxima	0.0	160.9	0.421	0.766	1.514E+7	1.860E+8

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
2	17.80	PILATIZ	402.5	0.48	6
	14.12	PILATIZ	402.5	0.48	9
	10.44	PILATIZ	402.5	0.48	12
1	10.44	PILATIZ	402.5	0.48	13
	7.829	PILATIZ	402.5	0.48	16
	5.219	PILATIZ	402.5	0.48	20
	2.610	PILATIZ	402.5	0.48	24
	0.000	PILATIZ	402.5	0.48	29

(≤) : Armadura ≤ ρ_min = 0.40%
(≥) : Armadura ≥ ρ_max = 8.00%

ESFUERZOS (global)
<B.4U2.1> Carga: 1.00*G1 1.00*Q1

Coord-x	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
17.800	-8729.71	-446.29	-486.00	-0.00	-0.00	735.97
14.119	-8729.71	-446.29	-486.00	-10.04	2005.06	2396.83
14.119	-9428.54	-466.17	-486.00	-10.04	2005.06	2396.82
10.438	-9428.54	-466.17	-486.00	-19.83	4010.45	4130.53
10.438	-10025.68	-483.15	-486.00	-19.83	4010.44	4133.56
7.829	-10025.68	-483.15	-486.00	-26.09	5420.35	5406.00
7.829	-10521.12	-497.24	-486.00	-26.09	5420.34	5406.00
5.219	-10521.12	-497.24	-486.00	-31.29	6808.37	6713.44
5.219	-11016.56	-511.33	-486.00	-31.29	6808.36	6713.44
2.610	-11016.56	-511.33	-486.00	-34.89	8160.68	8054.74
2.610	-11512.00	-525.42	-486.00	-34.89	8160.68	8054.74
0.000	-11512.00	-525.42	-486.00	-36.24	9461.10	9428.54

GINPROSA

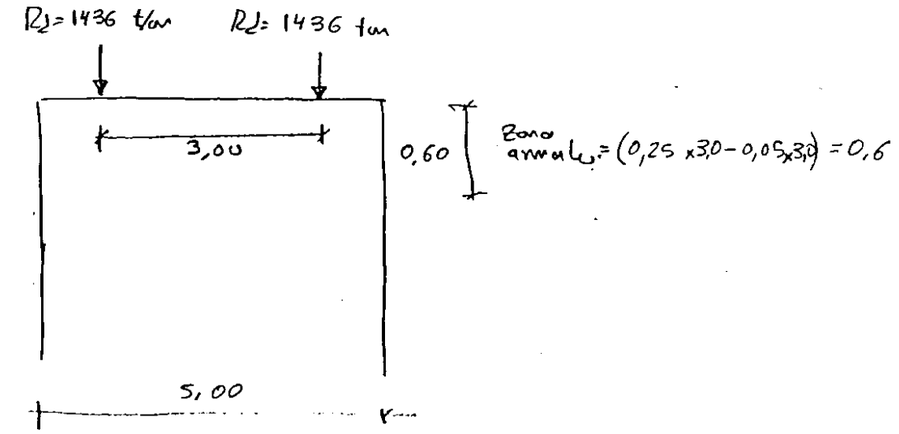
ASUNTO

E-1508.5 . TABLERO IZQUIERDO

ARMADURA SUPERION EN PILAS

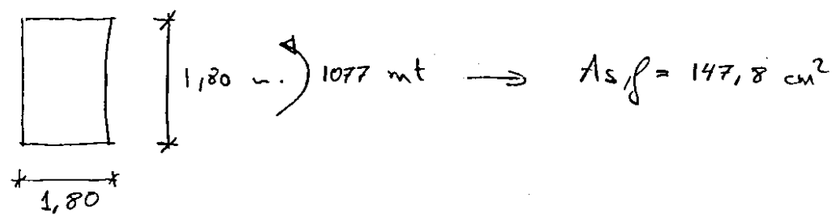
PAG. 1

Se calcula como una viga de gran canto



$l/h < 1 \rightarrow z = 0,6 \cdot l$ $\quad l = 3,00$ m. $\quad z = 1,80$ m.

$q_d = \frac{2 \times 1436}{3} = 957,3$ t/m $\quad M_2 = 957,3 \cdot 3^2/8 = 1077$ mt



$\longrightarrow \quad As, f = 147,8$ cm^2

Cálculo de Cimentacion de Pilas — PILA Nº 1

PROYECTO : L.A.V. MADRID - ZARAGOZA. Subtramo XV.
ESTRUCTURA: E-1506.5. Tablero Izquierdo.

CARACTERISTICAS DEL TERRENO

Tensión admisible =	5.0	Kp/cm²
Coeficiente de rozamiento zapata-terreno =	0.58	

DIMENSIONES GEOMETRICAS (en metros)

Medida fuste segun Y =	5.00
Medida fuste según Z =	1.80
Medida zapata según Y =	9.00
Medida zapata según Z =	7.00
Canto zapata =	2.50

Vale . Zapata tipo I
Vale . Zapata tipo I

ACCIONES SOBRE CARA SUPERIOR ZAPATA EN E.L.U.SERVICIO (signos del FAGUS).

Hipótesis	FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)	Coef. PP.
1	-1874.45	-45.05	228.26	-511.37	1036.00	1.00
2	-1289.51	-45.05	228.26	-515.69	779.43	1.00

ACCIONES SOBRE CARA SUPERIOR ZAPATA EN ESTADO LIMITE ULTIMO (signos del FAGUS).

Hipótesis	FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)	Coef. PP.
1	-2811.67	-67.57	342.57	-757.26	1560.85	1.50
2	-1122.04	-67.57	342.57	-776.32	1118.28	0.90

RESULTADOS

ACCIONES EN BASE DE ZAPATA SIN MAYORAR

FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)
-2266.20	-45.05	228.26	-1082.01	1148.62
-1683.26	-45.05	228.26	-1086.33	892.04

COMPROBACION TENSIONES SOBRE EL TERRENO

eY (m)	eZ (m)	Z (m)	Y (m)	σcob (Kp/cm²)	
0.51	0.48	6.05	7.99	4.70	Vale
0.53	0.65	5.71	7.94	3.71	Vale

COMPROBACION ESTABILIDAD (con esfuerzos E.L.U + peso zapata)

- Al deslizamiento

FYdesl.(Ton)	FZdesl.(Ton)	TOTALdesl.	TOTALres.	COEFICIENTE	
-67.57	342.57	349.17	1973.33	5.65	Vale
-67.57	342.57	349.17	856.32	2.45	Vale

- Al vuelco

MYvolc.(mT)	MZvolc.(mT)	MYres.(mT)	MZres.(mT)	COEF. Y	COEF. X	
-1613.68	1729.77	-11906.03	15310.33	7.38	8.85	Vale
-1632.74	1287.20	-5891.41	6643.68	3.61	5.16	Vale

ACCIONES EN BASE DE ZAPATA MAYORADAS (si el peso propio de la zapata)

FX (Ton)	MY (mT)	MZ (mT)	eY (m)	eZ (m)	Z (m)	Y (m)	σ calc. (T/m²)
-2811.67	-1613.68	1729.77	0.62	-0.57	5.85	7.77	61.84
-1122.04	-1632.74	1287.20	1.15	-1.46	4.09	6.71	40.91

CALCULO DE SECCIONES (con esfuerzos de diseño)

Calculo armadura flexión en Z		Calculo armadura flexión en Y		Calculo armadura cortante Y			Calculo armadura cortante Z		
MYd (mT/m)	Canto (m)	MZd (mT/m)	Canto (m)	VYXd (T)	Canto (m)	Ancho (m)	VZXd (T)	Canto (m)	Ancho (m)
254.67	2.50	233.82	2.50	335.47	1.21	4.25	765.24	2.11	7.45
168.51	2.50	154.71	2.50	221.96	1.21	4.25	506.32	2.11	7.45

- Armadura resultante.

AsY inf. (cm²/m)		AsZ inf. (cm²/m)		AsYXcte.(cm²)		AsZXcte.(cm²)	
22.12	Vale	24.12	Vale	0.00	Vale	0.00	Vale
14.55	Vale	15.87	Vale	0.00	Vale	0.00	Vale

VALORES MAXIMOS

AsYinf.(cm²/m)	AsYsup.(cm²/m)	AsZinf.(cm²/m)	AsZsup.(cm²/m)	AsYXcte.(cm²)	AsZXcte.(cm²)	As piel(cm²)
22.12	0.00	24.12	0.00	0.00	0.00	0.00

ARMADURAS MINIMAS

AsYinf.(cm²/m)	AsYsup.(cm²/m)	AsZinf.(cm²/m)	AsZsup.(cm²/m)	AsYXcte.(cm²)	AsZXcte (cm²)	As piel(cm²)
13.33	13.33	14.16	14.16	0.00	0.00	35.39

TOTAL ARMADURAS

AsYinf. (cm²/m)	AsYsup. (cm²/m)	AsZinf. (cm²/m)	AsZsup. (cm²/m)	AsYXcte. (cm²)	AsZXcte. (cm²)	As piel (cm²)
22.12	13.33	24.12	14.16	0.00	0.00	35.39

Cálculo de Cimentacion de Pilas — PILA Nº 2

PROYECTO : L.A.V. MADRID - ZARAGOZA. Subtramo XV.
ESTRUCTURA: E-1506.5. Tablero Izquierdo.

CARACTERISTICAS DEL TERRENO

Tensión admisible =	5.0	Kp/cm²
Coeficiente de rozamiento zapata-terreno =	0.58	

DIMENSIONES GEOMETRICAS (en metros)

Medida fuste segun Y =	5.00
Medida fuste según Z =	1.80
Medida zapata según Y =	9.00
Medida zapata según Z =	7.00
Canto zapata =	2.50

Vale . Zapata tipo I
Vale . Zapata tipo I

ACCIONES SOBRE CARA SUPERIOR ZAPATA EN E.L.U.SERVICIO (signos del FAGUS).

Hipótesis	FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)	Coef. PP.
1	-1983.20	-61.32	-33.60	646.89	1402.83	1.00
2	-1390.37	-61.32	-33.60	621.83	1106.77	1.00

ACCIONES SOBRE CARA SUPERIOR ZAPATA EN ESTADO LIMITE ULTIMO (signos del FAGUS).

Hipótesis	FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)	Coef. PP.
1	-2974.80	-91.98	-50.40	1045.29	2115.78	1.50
2	-1214.41	-91.98	-50.40	937.71	1603.23	0.90

RESULTADOS

ACCIONES EN BASE DE ZAPATA SIN MAYORAR

FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)
-2376.95	-61.32	-33.60	730.89	1556.14
-1784.12	-61.32	-33.60	705.83	1260.07

COMPROBACION TENSIONES SOBRE EL TERRENO

eY (m)	eZ (m)	Z (m)	Y (m)	σcob (Kp/cm²)	
0.65	-0.31	6.39	7.69	4.84	Vale
0.71	-0.40	6.21	7.59	3.79	Vale

COMPROBACION ESTABILIDAD (con esfuerzos E.L.U + peso zapata)

- Al deslizamiento

FYdesl.(Ton)	FZdesl.(Ton)	TOTALdesl.	TOTALres.	COEFICIENTE	
-91.98	-50.40	104.88	2067.95	19.72	Vale
-91.98	-50.40	104.89	909.90	8.68	Vale

- Al vuelco

MYvolc.(mT)	MZvolc.(mT)	MYres.(mT)	MZres.(mT)	COEF. Y	COEF. X	
1171.29	2345.73	12478.99	16044.42	10.65	6.84	Vale
1063.71	1833.19	6244.41	7059.54	5.87	3.85	Vale

ACCIONES EN BASE DE ZAPATA MAYORADAS (si el peso propio de la zapata)

FX (Ton)	MY (mT)	MZ (mT)	eY (m)	eZ (m)	Z (m)	Y (m)	σ calc. (T/m²)
-2974.80	1171.29	2345.73	0.79	0.39	6.21	7.42	64.51
-1214.41	1063.71	1833.19	1.51	0.88	5.25	5.98	38.69

CALCULO DE SECCIONES (con esfuerzos de diseño)

Calculo armadura flexión en Z		Calculo armadura flexión en Y		Calculo armadura cortante Y			Calculo armadura cortante Z		
MYd (mT/m)	Canto (m)	MZd (mT/m)	Canto (m)	VYXd (T)	Canto (m)	Ancho (m)	VZXd (T)	Canto (m)	Ancho (m)
265.67	2.50	243.92	2.50	349.98	1.21	4.25	798.29	2.11	7.45
159.34	2.50	146.29	2.50	209.89	1.21	4.25	478.78	2.11	7.45

- Armadura resultante

AsY inf. (cm²/m)		AsZ inf. (cm²/m)		AsYXcte.(cm²)		AsZXcte.(cm²)	
23.09	Vale	25.18	Vale	0.00	Vale	0.00	Vale
13.75	Vale	14.99	Vale	0.00	Vale	0.00	Vale

VALORES MAXIMOS

AsYinf.(cm²/m)	AsYsup.(cm²/m)	AsZinf.(cm²/m)	AsZsup.(cm²/m)	AsYXcte.(cm²)	AsZXcte.(cm²)	As piel(cm²)
23.09	0.00	25.18	0.00	0.00	0.00	0.00

ARMADURAS MINIMAS

AsYinf.(cm²/m)	AsYsup.(cm²/m)	AsZinf.(cm²/m)	AsZsup.(cm²/m)	AsYXcte.(cm²)	AsZXcte.(cm²)	As piel(cm²)
13.33	13.33	14.16	14.16	0.00	0.00	35.39

TOTAL ARMADURAS

AsYinf. (cm²/m)	AsYsup. (cm²/m)	AsZinf. (cm²/m)	AsZsup. (cm²/m)	AsYXcte. (cm²)	AsZXcte. (cm²)	As piel (cm²)
23.09	13.33	25.18	14.16	0.00	0.00	35.39

Cálculo de Cimentacion de Pilas — PILA Nº 3

PROYECTO : L.A.V. MADRID - ZARAGOZA. Subtramo XV.
ESTRUCTURA: E-1508.5. Tablero izquierdo.

CARACTERISTICAS DEL TERRENO

Tensión admisible =	5.0	Kp/cm²
Coeficiente de rozamiento zapata-terreno =	0.58	

DIMENSIONES GEOMETRICAS (en metros)

Medida fuste segun Y =	5.00
Medida fuste según Z =	1.80
Medida zapata según Y =	9.00
Medida zapata según Z =	7.00
Canto zapata =	2.50

Vale . Zapata tipo I
Vale . Zapata tipo I

ACCIONES SOBRE CARA SUPERIOR ZAPATA EN E.L.U.SERVICIO (signos del FAGUS).

Hipótesis	FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)	Coef. PP.
1	-1987.71	-63.95	-33.80	646.28	1441.88	1.00
2	-1397.34	-63.95	-33.80	621.66	1145.36	1.00

ACCIONES SOBRE CARA SUPERIOR ZAPATA EN ESTADO LIMITE ULTIMO (signos del FAGUS).

Hipótesis	FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)	Coef. PP.
1	-2961.56	-95.92	-50.70	1043.69	2174.54	1.50
2	-1225.22	-95.92	-50.70	937.85	1661.27	0.90

RESULTADOS

ACCIONES EN BASE DE ZAPATA SIN MAYORAR

FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)
-2361.46	-63.95	-33.80	730.78	1601.75
-1791.09	-63.95	-33.80	708.16	1305.23

COMPROBACION TENSIONES SOBRE EL TERRENO

eY (m)	eZ (m)	Z (m)	Y (m)	σcob (Kp/cm²)	
0.67	-0.31	6.39	7.85	4.87	Vale
0.73	-0.39	6.21	7.54	3.82	Vale

COMPROBACION ESTABILIDAD (con esfuerzos E.L.U + peso zapata)

- Al deslizamiento

FYdesl.(Ton)	FZdesl.(Ton)	TOTALdesl.	TOTALres.	COEFICIENTE	
-95.92	-50.70	108.50	2071.87	19.10	Vale
-95.92	-50.70	108.50	916.16	8.44	Vale

- Al vuelco

MYvolc.(mT)	MZvolc.(mT)	MYres.(mT)	MZres.(mT)	COEF. Y	COEF. X	
1170.44	2414.34	12502.65	16074.84	10.68	6.66	Vale
1064.60	1901.08	6268.83	7106.17	5.89	3.74	Vale

ACCIONES EN BASE DE ZAPATA MAYORADAS (si el peso propio de la zapata)

FX (Ton)	MY (mT)	MZ (mT)	eY (m)	eZ (m)	Z (m)	Y (m)	σ calc. (T/m²)
-2961.56	1170.44	2414.34	0.81	0.39	6.21	7.38	65.00
-1225.22	1064.60	1901.08	1.55	0.87	5.26	5.90	39.49

CALCULO DE SECCIONES (con esfuerzos de diseño)

Calculo armadura flexión en Z		Calculo armadura flexión en Y		Calculo armadura cortante Y			Calculo armadura cortante Z		
MYd (mT/m)	Canto (m)	MZd (mT/m)	Canto (m)	VYXd (T)	Canto (m)	Ancho (m)	VZXd (T)	Canto (m)	Ancho (m)
267.71	2.50	245.79	2.50	352.64	1.21	4.25	804.40	2.11	7.45
162.62	2.50	149.30	2.50	214.21	1.21	4.25	488.63	2.11	7.45

- Armadura resultante.

AsY inf. (cm²/m)		AsZ inf. (cm²/m)		AsYXcte.(cm²)		AsZXcte.(cm²)	
23.27	Vale	25.38	Vale	0.00	Vale	0.00	Vale
14.04	Vale	15.31	Vale	0.00	Vale	0.00	Vale

VALORES MAXIMOS

AsYinf.(cm²/m)	AsYsup.(cm²/m)	AsZinf.(cm²/m)	AsZsup.(cm²/m)	AsYXcte.(cm²)	AsZXcte.(cm²)	As piel(cm²)
23.27	0.00	25.38	0.00	0.00	0.00	0.00

ARMADURAS MINIMAS

AsYinf.(cm²/m)	AsYsup.(cm²/m)	AsZinf.(cm²/m)	AsZsup.(cm²/m)	AsYXcte.(cm²)	AsZXcte.(cm²)	As piel(cm²)
13.33	13.33	14.16	14.16	0.00	0.00	35.39

TOTAL ARMADURAS

AsYinf. (cm²/m)	AsYsup. (cm²/m)	AsZinf. (cm²/m)	AsZsup. (cm²/m)	AsYXcte. (cm²)	AsZXcte. (cm²)	As piel (cm²)
23.27	13.33	25.38	14.16	0.00	0.00	35.39

Cálculo de Cimentacion de Pilas — PILA Nº 4

PROYECTO : L.A.V. MADRID - ZARAGOZA. Subtramo XV.
ESTRUCTURA: E-1508.5. Tablero izquierdo.

CARACTERISTICAS DEL TERRENO

Tensión admisible =	5.0	Kp/cm²
Coeficiente de rozamiento zapata-terreno =	0.58	

DIMENSIONES GEOMETRICAS (en metros)

Medida fuste segun Y =	5.00
Medida fuste según Z =	1.80
Medida zapata según Y =	9.00
Medida zapata según Z =	7.00
Canto zapata =	2.50

Vale . Zapata tipo I
Vale . Zapata tipo I

ACCIONES SOBRE CARA SUPERIOR ZAPATA EN E.L.U.SERVICIO (signos del FAGUS).

Hipótesis	FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)	Coef. PP.
1	-1895.72	-35.03	-32.40	655.57	898.52	1.00
2	-1327.88	-35.03	-32.40	628.54	659.65	1.00

ACCIONES SOBRE CARA SUPERIOR ZAPATA EN ESTADO LIMITE ULTIMO (signos del FAGUS).

Hipótesis	FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)	Coef. PP.
1	-2843.58	-52.54	-48.60	1061.67	1355.53	1.50
2	-1151.20	-52.54	-48.60	946.11	942.85	0.90

RESULTADOS

ACCIONES EN BASE DE ZAPATA SIN MAYORAR

FX (Ton)	FY (Ton)	FZ (Ton)	MY (mT)	MZ (mT)
-2289.47	-35.03	-32.40	736.57	986.09
-1721.63	-35.03	-32.40	709.54	747.22

COMPROBACION TENSIONES SOBRE EL TERRENO

eY (m)	eZ (m)	Z (m)	Y (m)	σcob (Kp/cm²)	
0.43	-0.32	6.36	8.14	4.43	Vale
0.43	-0.41	6.18	8.13	3.43	Vale

COMPROBACION ESTABILIDAD (con esfuerzos E.L.U + peso zapata)

- Al deslizamiento

FYdesl.(Ton)	FZdesl.(Ton)	TOTALdesl.	TOTALres.	COEFICIENTE	
-52.54	-48.60	71.57	1991.84	27.83	Vale
-52.54	-48.60	71.57	873.23	12.20	Vale

- Al vuelco

MYvolc.(mT)	MZvolc.(mT)	MYres.(mT)	MZres.(mT)	COEF. Y	COEF. X	
1183.17	1486.88	12019.70	15453.90	10.16	10.39	Vale
1067.61	1074.21	6025.72	6775.09	5.64	6.31	Vale

ACCIONES EN BASE DE ZAPATA MAYORADAS (si el peso propio de la zapata)

FX (Ton)	MY (mT)	MZ (mT)	eY (m)	eZ (m)	Z (m)	Y (m)	σ calc. (T/m²)
-2843.58	1183.17	1486.88	0.52	0.42	6.17	7.95	57.96
-1151.20	1067.61	1074.21	0.93	0.93	5.15	7.13	31.36

CALCULO DE SECCIONES (con esfuerzos de diseño)

Calculo armadura flexión en Z		Calculo armadura flexión en Y		Calculo armadura cortante Y			Calculo armadura cortante Z		
MYd (mT/m)	Canto (m)	MZd (mT/m)	Canto (m)	VYXd (T)	Canto (m)	Ancho (m)	VZXd (T)	Canto (m)	Ancho (m)
238.71	2.50	219.16	2.50	314.44	1.21	4.25	717.27	2.11	7.45
129.17	2.50	118.59	2.50	170.15	1.21	4.25	388.13	2.11	7.45

- Armadura resultante.

AsY inf. (cm²/m)		AsZ inf. (cm²/m)		AsYXcte.(cm²)		AsZXcte.(cm²)	
20.71	Vale	22.59	Vale	0.00	Vale	0.00	Vale
11.12	Vale	12.13	Vale	0.00	Vale	0.00	Vale

VALORES MAXIMOS

AsYinf.(cm²/m)	AsYsup.(cm²/m)	AsZinf.(cm²/m)	AsZsup.(cm²/m)	AsYXcte.(cm²)	AsZXcte.(cm²)	As piel(cm²)
20.71	0.00	22.59	0.00	0.00	0.00	0.00

ARMADURAS MINIMAS

AsYinf.(cm²/m)	AsYsup.(cm²/m)	AsZinf.(cm²/m)	AsZsup.(cm²/m)	AsYXcte.(cm²)	AsZXcte.(cm²)	As piel(cm²)
13.33	13.33	14.16	14.16	0.00	0.00	35.39

TOTAL ARMADURAS

AsYinf. (cm²/m)	AsYsup. (cm²/m)	AsZinf. (cm²/m)	AsZsup. (cm²/m)	AsYXcte. (cm²)	AsZXcte. (cm²)	As piel (cm²)
20.71	13.33	22.59	14.16	0.00	0.00	35.39

PUENTE E-1508.5

4º CALCULO DE ESTRIBOS

ACCIONES SOBRE EL ENCEPADO

	TABLERO DERECHO		TABLERO IZQUIERDO		CARGADERO
ESFUERZOS	MIN	MAX	MIN	MAX	
	(Ton.)	(Ton.)	(Ton.)	(Ton.)	(Ton.)
VERTICALES	363	919	332	547	1301 PESO PROPIO
HORIZONTALES	194	537	152	339	358 EMPUJE DE TIERRAS

EMPUJE DE TIERRAS SOBRE EL CARGADERO

FX (Ton.)		MY (Tm.)
55.091	3.400	187.308
59.920	1.667	99.866
115.401	0.833	96.168
61.212	3.850	235.665
66.578	1.250	83.222
358.200		702.228
	e (m.) =	1.960

SOLICITACIONES CARACTERISTICAS A NIVEL INFERIOR DE ENCEPADO

HIPOTESIS	TABLERO DERECHO / TABLERO IZQUIERDO	MIN / MAX	TABLERO DERECHO / TABLERO IZQUIERDO	MAX / MIN	TABLERO DERECHO / TABLERO IZQUIERDO	MAX / MAX
FX	2211 Ton.		2552 Ton.		2767 Ton.	
FZ	891 Ton.		1047 Ton.		1234 Ton.	
MX	1611 Tm.		-1280 Tm.		85 Tm.	
MY	5125 Tm.		6598 Tm.		7900 Tm.	
MZ	2378 Tm.		-1666 Tm.		-96 Tm.	
	V (Ton.)	M (Tm.) H (Ton.)	V (Ton.)	M (Tm.) H (Ton.)	V (Ton.)	M (Tm.) H (Ton.)
PANTALLA - 1	254.44	589.82 85.71	407.55	1053.85 182.65	397.75	1135.66 174.12
PANTALLA - 2	274.90	637.25 99.58	393.22	1016.78 171.63	396.92	1133.29 174.85
PANTALLA - 3	295.37	684.68 113.45	378.88	979.71 160.62	396.09	1130.92 175.58
PANTALLA - 4	315.83	732.12 127.31	364.54	942.63 149.60	395.26	1128.55 176.31
PANTALLA - 5	336.29	779.55 141.18	350.21	905.56 138.58	394.43	1126.18 177.05
PANTALLA - 6	356.75	826.99 155.05	335.87	868.49 127.57	393.60	1123.81 177.78
PANTALLA - 7	377.22	874.42 168.92	321.53	831.42 116.55	392.77	1121.44 178.51

SOLICITACIONES CARACTERISTICAS A NIVEL INFERIOR DE PANTALLA

HIPOTESIS	DERECHO / IZQUIERDO	MIN / MAX	DERECHO / IZQUIERDO	MAX / MIN	DERECHO / IZQUIERDO	MAX / MAX
	V (Ton.)	M (Tm.)	V (Ton.)	M (Tm.)	V (Ton.)	M (Tm.)
PANTALLA - 1	602.44	2142.92	755.55	4363.43	745.75	4290.69
PANTALLA - 2	622.90	2441.63	741.22	4126.75	744.92	4301.58
PANTALLA - 3	643.37	2740.34	726.88	3890.07	744.09	4312.47
PANTALLA - 4	663.83	3039.05	712.54	3653.39	743.26	4323.36
PANTALLA - 5	684.29	3337.77	698.21	3416.70	742.43	4334.26
PANTALLA - 6	704.75	3636.48	683.87	3180.02	741.60	4345.15
PANTALLA - 7	725.22	3935.19	669.53	2943.34	740.77	4356.04

VERIFICACION DE SOLICITACIONES CARACTERISTICAS A NIVEL INFERIOR DE ENCEPADO

HIPOTESIS	TABLERO DERECHO / TABLERO IZQUIERDO	MIN / MAX	TABLERO DERECHO / TABLERO IZQUIERDO	MAX / MIN	TABLERO DERECHO / TABLERO IZQUIERDO	MAX / MAX
	MZ (Tm.)	MY (Tm.) MX (Tm.)	MZ (Tm.)	MY (Tm.) MX (Tm.)	MZ (Tm.)	MY (Tm.) MX (Tm.)
PANTALLA - 1	-3167.78	589.82 -1067.11	-5074.03	1053.85 -2273.97	-4951.94	1135.66 -2167.78
PANTALLA - 2	-2281.69	637.25 -826.51	-3263.69	1016.78 -1424.54	-3294.41	1133.29 -1451.26
PANTALLA - 3	-1225.77	684.68 -470.80	-1572.35	979.71 -666.56	-1643.76	1130.92 -728.67
PANTALLA - 4	0.00	732.12 0.00	0.00	942.63 0.00	0.00	1128.55 0.00
PANTALLA - 5	1395.60	779.55 585.90	1453.35	905.56 575.12	1636.87	1126.18 734.74
PANTALLA - 6	2961.05	826.99 1286.91	2787.71	868.49 1058.82	3266.85	1123.81 1475.56
PANTALLA - 7	4696.33	874.42 2103.01	4003.06	831.42 1451.08	4889.94	1121.44 2222.45
Σ =	2377.75	5124.83 1611.40	-1665.95	6598.43 -1280.05	-96.45	7899.83 85.05

SOLICITACIONES DE DISEÑO A NIVEL INFERIOR DE PANTALLA

HIPOTESIS	DERECHO / IZQUIERDO	MIN / MAX	DERECHO / IZQUIERDO	MAX / MIN	DERECHO / IZQUIERDO	MAX / MAX
	V (Ton.)	M (Tm.)	V (Ton.)	M (Tm.)	V (Ton.)	M (Tm.)
PANTALLA - 1	903.66	3214.37	1133.33	6545.14	1118.62	6436.03
PANTALLA - 2	934.35	3662.44	1111.82	6190.12	1117.37	6452.37
PANTALLA - 3	965.05	4110.51	1090.32	5835.10	1116.13	6468.71
PANTALLA - 4	995.74	4558.58	1068.81	5480.08	1114.88	6485.04
PANTALLA - 5	1026.44	5006.65	1047.31	5125.06	1113.64	6501.38
PANTALLA - 6	1057.13	5454.72	1025.80	4770.04	1112.39	6517.72
PANTALLA - 7	1087.82	5902.79	1004.30	4415.01	1111.15	6534.06

VIENTO TRANSVERSAL

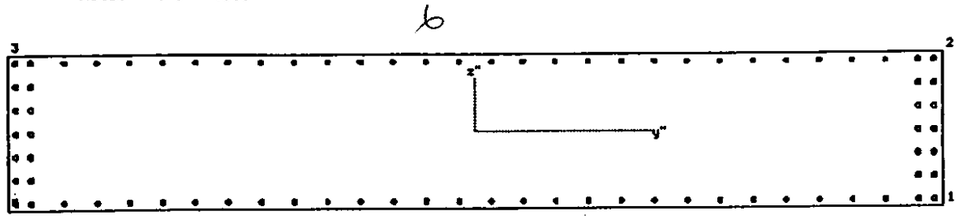
FY = 66.40 Ton.

Esfuerzos sobre Pantallas

M transv. d = 128.91 Tm.

0.5 x M transv. d = 64.46 Tm.

Mstb. 1 : 40.0



Sección :"PANTALLA" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H200PTE"

Ancho = 600.00 cm Canto = 100.00 cm

Características mecánicas de la sección:
Area : Ax= 6.000 [m2]
Momentos de inercia : Iy= 0.500000 [m4] Iz= 18.000 [m4]
Inercia a torsión : Ix= 1.790 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.500000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-3.000	-6.000	1.000
dch.	Iz	3.000	6.000	-1.000
abajo	Iy	-0.500	-0.999999	0.167
arriba	Iy	0.500	0.999999	-0.167

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	56.30	-295.00	5.00	-295.00	95.00
2	AEH500	(2)	56.30	-285.00	5.00	-285.00	95.00
3	AEH500	(2)	56.30	295.00	5.00	295.00	95.00
4	AEH500	(2)	56.30	285.00	5.00	285.00	95.00
5	AEH500	(2)	137.44	285.00	5.00	-285.00	5.00
6	AEH500	(2)	137.44	285.00	95.00	-285.00	95.00

Total: 500.08 Cuantía de armadura: 0.833 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H200PTE")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	600.00 [cm]	96.00 [cm]	0.00
Vy	0.00 [cm2/m]	100.00 [cm]	596.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H200PTE"	210000.0	-85.000	-2.000	0.0	10.000	300.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Dimensionamiento : Viga "PANTALLA"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
-1133.330				64.460	6545.140	45.0

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección 1.16
Factor necesario de minoración de la resistencia de la sección .. 1.00

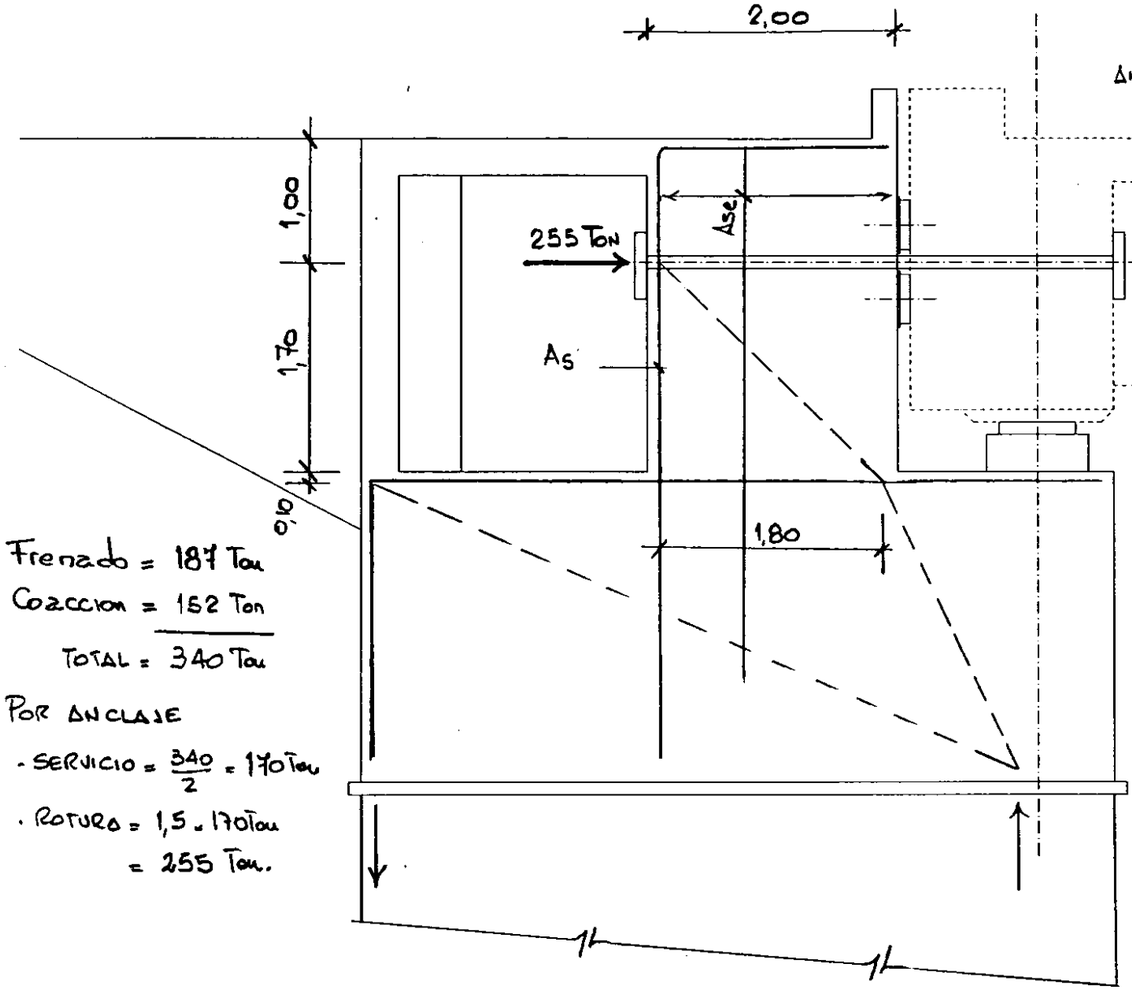
Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado (As-min)	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-295.0	5.0	-295.0	95.0	56.30	-	56.30
2 "AEH500"	-285.0	5.0	-285.0	95.0	56.30	-	56.30
3 "AEH500"	295.0	5.0	295.0	95.0	56.30	-	56.30
4 "AEH500"	285.0	5.0	285.0	95.0	56.30	-	56.30
5 "AEH500"	285.0	5.0	-285.0	5.0	137.44	-	137.44
6 "AEH500"	285.0	95.0	-285.0	95.0	137.44	-	137.44

Cuantía arm. 0.83 [o/o] Suma 500.08

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	300.00	100.00	-3.500	-85.000	"H200PTE"
Armadura-Min	295.00	95.00	-3.401	-4434.700	"AEH500"
Hormigón-Max	-300.00	0.00	5.223	0.000	"H200PTE"
Armadura-Max	-295.00	5.00	5.123	4434.700	"AEH500"

Fibra neutra zn 74.75 cm yn 52.20 cm Angulo -64.63



Frenado = 187 Tau
Cozccion = 152 Ton
TOTAL = 340 Tau

POR ANCLAJE

- SERVICIO = $\frac{340}{2}$ = 170 Tau
- ROTURA = 1,5 . 170 Tau
  = 255 Tau.

CALCULO DE As

1) $A_s = A_{sf} = \frac{255\,Tau \times 1,8\,m}{1,8\,m} \times \frac{1}{4,435\,T/cm^2} = 57,5\,cm^2$

$A_s = \frac{2}{3} A_{sv} \qquad A_{sv} = \frac{V_d}{f_{yd}\,cotg\,\theta}$

$A_{sv} = \frac{255\,Tau}{4,435\,T/cm^2 \times 0,7} = 82,1\,cm^2$

2) $A_s = \frac{2}{3} \cdot 82,1\,cm^2 = 54,8\,cm^2$

$\tau_d = \frac{V_d}{bd} = \frac{255000\,Kg}{190\,cm \times 180\,cm} = 7,46\,Kg/cm^2 < 0,17 f_c$

$0,17\,f_{ck} = 0,17 \cdot 250\,Kg/cm^2 = 42,5\,Kg/cm^2$

$A_s = 0,04 \frac{f_{cd}}{f_{yd}} bd = 0,04 \cdot \frac{167}{4435} \times 180\,cm \times 180\,cm$

3) $A_s = 51,4\,cm^2$

Se Adopta A_s = 2 CAPAS $\phi 25/0,15$

CALCULO DE Ase

$A_{sf} \geq \frac{2}{3} A_{sv}$

$A_{se} = 0,50\,A_{sf} = 0,50 \cdot 57,5\,cm^2$

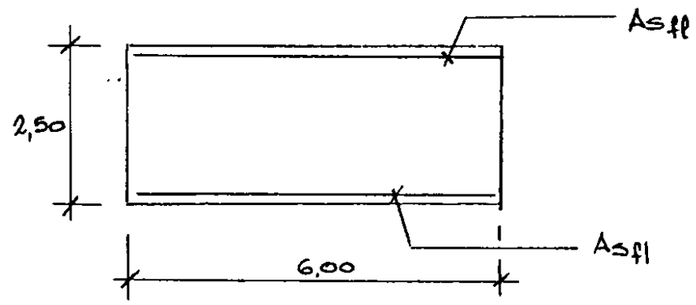
$A_{se} = 28,8\,cm^2$ 10 Morgoillas $\phi 16$

CALCULO DEL CARGADERO (100 × 600) ESTRIBO 1

- ARMADURA DE FLEXION

$$M = \frac{15\,T/m \times (4,15\,m)^2}{10} + \frac{24\,T\,(4,15\,m)}{6} + \frac{72\,T \times 4,15\,m}{6} + \frac{459\,T \cdot (4,15\,m)}{6} = 410\,Tm$$

$$M_d = 1,5 \cdot 410\,Tm = 615\,Tm$$



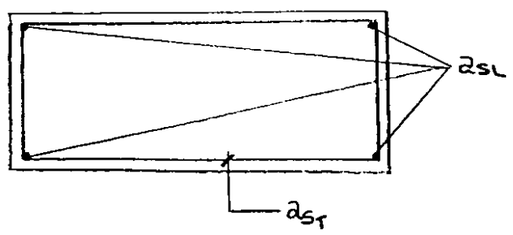
$$A_{sfl} = 57\,cm^2 \quad (9,5\,cm^2/m)$$

- ARMADURA DE TORSION

$$M_T = \frac{15,6\,T/m \times 1,96\,m \times 4,15\,m}{2} + 170\,T \cdot 2,75\,m = 565\,Tm.$$

$$a_{sl_T} = \frac{1,5 \times 565\,Tm}{2 \times 14,16\,m^2 \times 4,435\,T/cm^2} = 6,75\,cm^2/m$$

$$a_{st_T} = \frac{1,5 \times 565\,Tm}{2 \times 14,16\,m^2 \times 4,2\,T/cm^2} = 7,13\,cm^2/m.$$



Condicion de agotamiento por compresión

$$T_d = 1,5 \times 565\,Tm = 847,5\,Tm.$$

$$T_{u1} = 0,36\,f_{cd}\,A_e\,h_e = 0,36 \times 1667\,T/m^2 \times 14,16\,m^2 \times 0,41\,m$$

$$T_{u1} = 3484,1\,Tm$$

$T_d << T_{u1}$: Verifica.

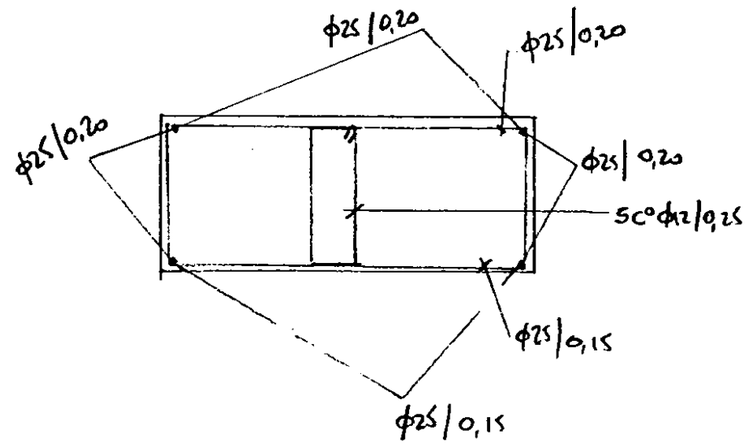
- ARMADURA DE CORTANTE

$$V = 15\,T/m \times \frac{4,15\,m}{2} + 24\,T + 72\,T + \frac{459\,T}{2} = 356,6\,Tm$$

$$V_d = 1,50 \times 356,6\,Tm = 535\,Tm$$

$$a_{s90^\circ} = 41,6\,cm^2/m = 5\,c^\circ\,\phi 12/0,25$$

- ARMADURA ADOPTADA



ACCIONES SOBRE EL ENCEPADO

	TABLERO DERECHO		TABLERO IZQUIERDO		CARGADERO	
ESFUERZOS	MIN (Ton.)	MAX (Ton.)	MIN (Ton.)	MAX (Ton.)	(Ton.)	
VERTICALES	298	893	314	513	1029	PESO PROPIO+TIERRAS
HORIZONTALES	8.9	26.8	9.4	15.4	322	EMPUJE DE TIERRAS

EMPUJE DE TIERRAS SOBRE EL CARGADERO

FX (Ton.)		MY (Tm.)
55.091	3.400	187.308
51.010	1.667	85.016
98.241	0.833	81.868
61.212	3.850	235.665
56.678	1.250	70.847
322.230		660.703
	e (m.) =	2.050

SOLICITACIONES CARACTERISTICAS A NIVEL INFERIOR DE ENCEPADO

HIPOTESIS	TABLERO DERECHO / TABLERO IZQUIERDO	MIN / MAX	TABLERO DERECHO / TABLERO IZQUIERDO	MAX / MIN	TABLERO DERECHO / TABLERO IZQUIERDO	MAX / MAX
FX		1840 Ton.		2236 Ton.		2435 Ton.
FZ		347 Ton.		358 Ton.		364 Ton.
MX		73 Tm.		-50 Tm.		-7 Tm.
MY		2067 Tm.		2754 Tm.		3099 Tm.
MZ		2419 Tm.		-1682 Tm.		-229 Tm.
	V (Ton.)	M (Tm.) H (Ton.)	V (Ton.)	M (Tm.) H (Ton.)	V (Ton.)	M (Tm.) H (Ton.)
PANTALLA - 1	223.67	251.21 55.27	430.48	530.05 61.47	413.76	526.45 60.97
PANTALLA - 2	256.90	288.52 56.26	407.38	501.60 60.78	410.62	522.45 60.88
PANTALLA - 3	290.12	325.84 57.26	384.28	473.16 60.09	407.47	518.45 60.78
PANTALLA - 4	323.35	363.15 58.26	361.18	444.72 59.39	404.33	514.45 60.69
PANTALLA - 5	356.57	400.47 59.26	338.08	416.28 58.70	401.18	510.45 60.59
PANTALLA - 6	389.80	437.79 60.25	314.99	387.84 58.01	398.04	506.45 60.50

SOLICITACIONES CARACTERISTICAS A NIVEL INFERIOR DE PANTALLA

HIPOTESIS	DERECHO / IZQUIERDO	MIN / MAX	DERECHO / IZQUIERDO	MAX / MIN	DERECHO / IZQUIERDO	MAX / MAX
	V (Ton.)	M (Tm.)	V (Ton.)	M (Tm.)	V (Ton.)	M (Tm.)
PANTALLA - 1	506.61	1347.73	713.42	1749.66	696.70	1736.12
PANTALLA - 2	539.83	1404.82	690.32	1707.47	693.56	1730.25
PANTALLA - 3	573.06	1461.91	667.22	1665.28	690.41	1724.37
PANTALLA - 4	606.28	1519.00	644.12	1623.09	687.27	1718.50
PANTALLA - 5	639.51	1576.09	621.02	1580.90	684.12	1712.63
PANTALLA - 6	672.73	1633.18	597.92	1538.71	680.98	1706.75

VERIFICACION DE SOLICITACIONES CARACTERISTICAS A NIVEL INFERIOR DE ENCEPADO

HIPOTESIS	TABLERO DERECHO / TABLERO IZQUIERDO	MIN / MAX	TABLERO DERECHO / TABLERO IZQUIERDO	MAX / MIN	TABLERO DERECHO / TABLERO IZQUIERDO	MAX / MAX
	MZ (Tm.)	MY (Tm.) MX (Tm.)	MZ (Tm.)	MY (Tm.) MX (Tm.)	MZ (Tm.)	MY (Tm.) MX (Tm.)
PANTALLA - 1	-2326.18	251.21 -574.79	-4477.02	530.05 -639.31	-4303.14	526.45 -634.10
PANTALLA - 2	-1603.03	288.52 -351.09	-2542.07	501.60 -379.26	-2562.26	522.45 -379.87
PANTALLA - 3	-603.45	325.84 -119.10	-799.31	473.16 -124.98	-847.54	518.45 -126.43
PANTALLA - 4	672.56	363.15 121.18	751.26	444.72 123.54	841.00	514.45 126.23
PANTALLA - 5	2225.01	400.47 369.75	2109.65	416.28 366.29	2503.38	510.45 378.10
PANTALLA - 6	4053.89	437.79 626.62	3275.84	387.84 603.28	4139.60	506.45 629.19
Σ =	2418.80	2066.98 72.56	-1681.65	2753.64 -50.45	-228.95	3098.71 -6.87

SOLICITACIONES DE DISEÑO A NIVEL INFERIOR DE PANTALLA

HIPOTESIS	DERECHO / IZQUIERDO	MIN / MAX	DERECHO / IZQUIERDO	MAX / MIN	DERECHO / IZQUIERDO	MAX / MAX
	V (Ton.)	M (Tm.)	V (Ton.)	M (Tm.)	V (Ton.)	M (Tm.)
PANTALLA - 1	759.91	2021.59	1070.13	2624.49	1045.05	2604.18
PANTALLA - 2	809.75	2107.23	1035.48	2561.20	1040.33	2595.37
PANTALLA - 3	859.59	2192.87	1000.83	2497.92	1035.62	2586.56
PANTALLA - 4	909.43	2278.50	966.18	2434.63	1030.90	2577.75
PANTALLA - 5	959.26	2364.14	931.53	2371.35	1026.18	2568.94
PANTALLA - 6	1009.10	2449.78	896.88	2308.06	1021.46	2560.13

VIENTO TRANSVERSAL

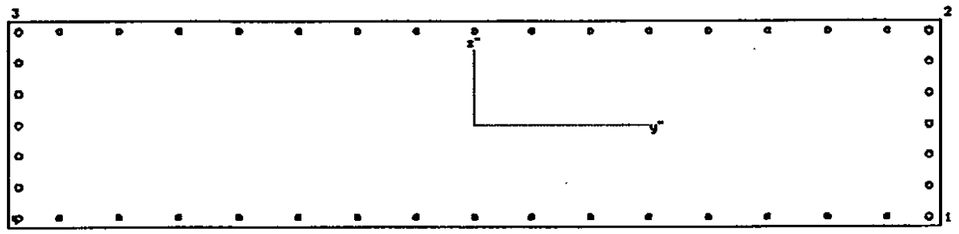
FY = 70.50 Ton.

Esfuerzos sobre Pantallas

M transv. d = 174.84 Tm.

0.5 x M transv. d = 87.42 Tm.

Mstb. 1 : 30.0



Sección :"PANTA-4" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H200PTE"

Ancho = 450.00 cm Canto = 100.00 cm

Características mecánicas de la sección:
Area : Ax= 4.500 [m2]
Momentos de inercia : Iy= 0.375000 [m4] Iz= 7.594 [m4]
Inercia a torsión : Ix= 1.290 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.500000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-2.250	-3.375	0.750
dch.	Iz	2.250	3.375	-0.750
abajo	Iy	-0.500	-0.749999	0.167
arriba	Iy	0.500	0.749999	-0.167

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	56.30	-220.00	5.00	-220.00	95.00
2	AEH500	(2)	56.30	220.00	5.00	220.00	95.00
3	AEH500	(2)	73.63	200.00	5.00	-200.00	5.00
4	AEH500	(2)	73.63	200.00	95.00	-200.00	95.00
	Total:		259.86	Cuantía de armadura: 0.577 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H200PTE")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	450.00 [cm]	96.00 [cm]	0.00
Vy	0.00 [cm2/m]	100.00 [cm]	446.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H200PTE"	210000.0	-85.000	-2.000	0.0	10.000	300.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Dimensionamiento : Viga "PANTA-4"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
-1070.130				87.420	2624.490	45.0

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección 1.35
Factor necesario de minoración de la resistencia de la sección .. 1.00

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado (As-min)	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-220.0	5.0	-220.0	95.0	56.30	-	56.30
2 "AEH500"	220.0	5.0	220.0	95.0	56.30	-	56.30
3 "AEH500"	200.0	5.0	-200.0	5.0	73.63	-	73.63
4 "AEH500"	200.0	95.0	-200.0	95.0	73.63	-	73.63
				Cuantía arm. 0.58 [o/o]		Suma	259.86

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	225.00	100.00	-3.500	-85.000	"H200PTE"
Armadura-Min	220.00	95.00	-3.377	-4434.700	"AEH500"
Hormigón-Max	-225.00	0.00	3.595	0.000	"H200PTE"
Armadura-Max	-220.00	5.00	3.472	4434.700	"AEH500"

Fibra neutra zn 51.77 cm yn 2.06 cm Angulo -49.30

PUENTE E-1508.5

5º PROYECTO DE PRUEBA DE CARGA

PUENTE E-1508.5

5.1.- Tablero derecho

PRUEBA DE CARGA

OBJETO DE LA PRUEBA

El objeto de la prueba es comprobar la respuesta estructural, frente a situaciones de carga estática, de manera tal que confrontando la respuesta real con la teórica, determinar la fiabilidad del comportamiento en servicio del puente.

Esta prueba de carga se realizará antes de la colocación del balasto, carriles, etc., mediante el empleo de camiones cargados con arena, y servirá para obtener una recepción provisional de la obra. Para la recepción definitiva de la estructura será necesario realizar otra prueba de carga con locomotoras, una vez colocada la infraestructura ferroviaria, que no es objeto del presente documento.

CARGA DE PRUEBA

La prueba se realizará empleando camiones, el la disposición que se adjunta a continuación, de tres ejes separados 3.825 y 1.36 m. con cargas por eje de 7.6, 13.7 y 13.7 T.

APARATOS DE MEDIDA Y MEDICIONES

Para la realización de las mediciones se colocarán flexímetros en el centro del vano (medidas f1) y apoyos (medidas f2). Los valores de los desplazamientos que se adjuntan son los descensos relativos esperados entre los puntos de los vanos y los fijos de los apoyos. Estos valores deben ser del orden de la magnitud del valor f1-f2 medido en obra.

La apreciación mínima de cualquiera de los flexímetros será del orden del 3% de los valores máximos esperados de las magnitudes a medir.

El rango de los aparatos deberá ser como mínimo superior en un 50% a los esperados de dicha magnitud.

Las medidas se realizarán inmediatamente antes de la carga, inmediatamente después de su colocación y a los quince minutos de haberla retirado.

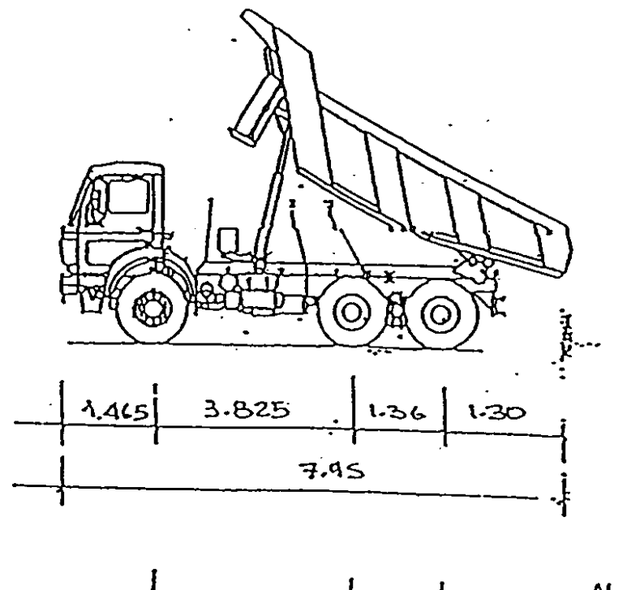
Durante la realización de la prueba se deberá anotar las condiciones climatológicas existentes a lo largo de la misma.

ANALISIS

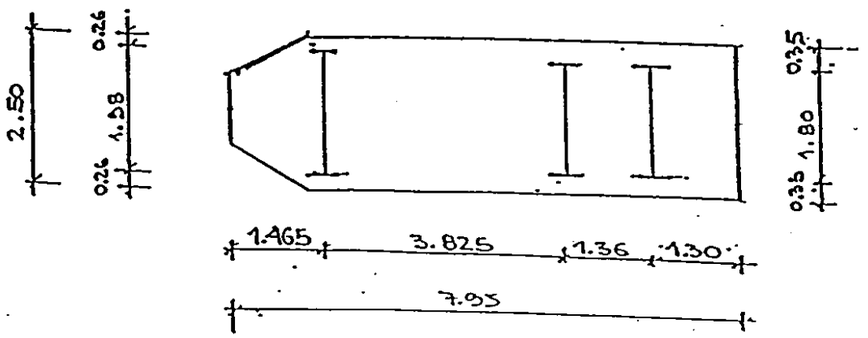
Para obtener las solicitaciones y desplazamientos verticales en los puntos a medir se procesó la estructura mediante el programa COSMOS/M. El modelo es el mismo usado en el cálculo del tablero. Los esfuerzos que se consiguen son del orden del 30 % de los obtenidos en la realización de una prueba de carga con locomotoras y la infraestructura ferroviaria colocada.

DEFINICION TREN DE CARGAS

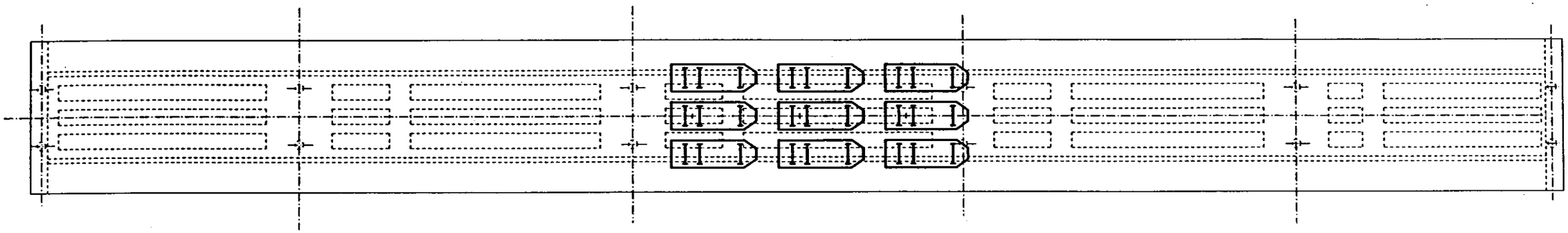
CAMION VOLQUETE DE 35 Ton.



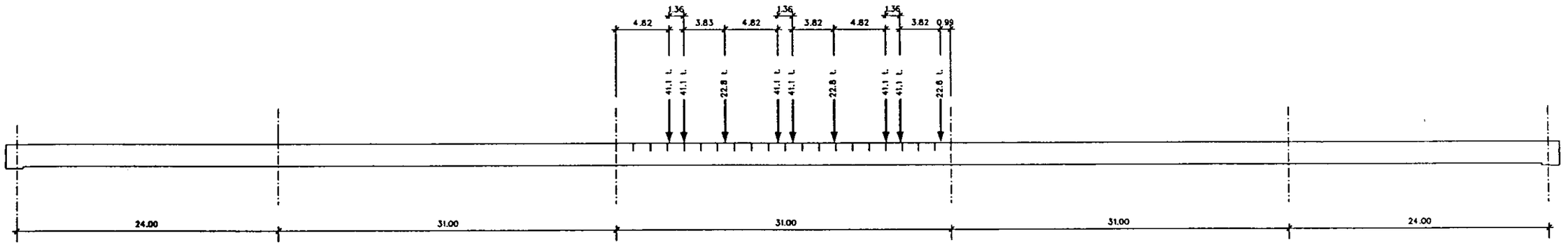
ALZADO



PLANTA



SITUACION EN PLANTA DE CAMIONES EN PRUEBA DE CARGA

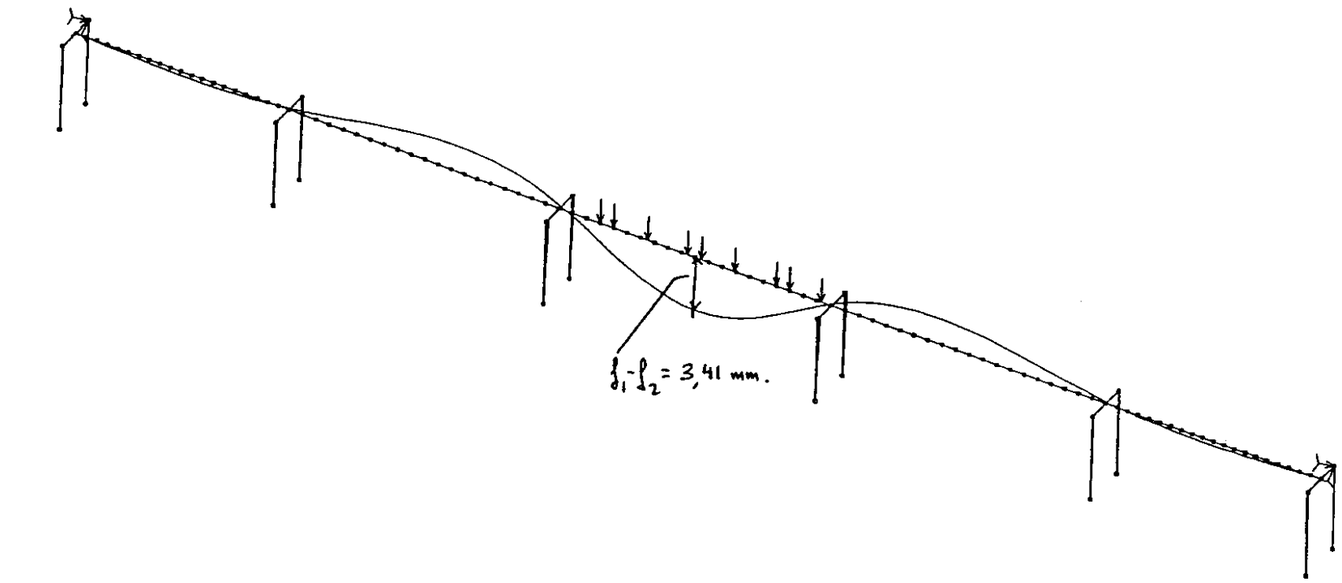


SITUACION EN ALZADO DE EJES DE CAMIONES

E-1508.5

DESPLAZAMIENTO VERTICAL DE NODOS (mm.)

Node	UZ	Node	UZ	Node	UZ
1	0.00	42	0.02	83	0.07
2	0.00	43	0.46	84	0.14
3	0.04	44	0.93	85	0.19
4	0.08	45	1.41	86	0.23
5	0.12	46	1.87	87	0.27
6	0.16	47	2.30	88	0.29
7	0.19	48	2.67	89	0.31
8	0.22	49	2.98	90	0.32
9	0.25	50	3.21	91	0.32
10	0.27	51	3.36	92	0.31
11	0.29	52	3.41	93	0.30
12	0.31	53	3.36	94	0.28
13	0.31	54	3.22	95	0.25
14	0.31	55	2.99	96	0.23
15	0.31	56	2.68	97	0.19
16	0.29	57	2.31	98	0.16
17	0.27	58	1.88	99	0.12
18	0.23	59	1.42	100	0.08
19	0.19	60	0.93	101	0.04
20	0.14	61	0.46	102	0.00
21	0.07	62	0.03	103	0.00
22	0.00	63	-0.35	104	0.00
23	-0.12	64	-0.66	105	0.00
24	-0.24	65	-0.91	106	0.00
25	-0.38	66	-1.11	107	0.02
26	-0.53	67	-1.24	108	0.02
27	-0.67	68	-1.33	109	0.03
28	-0.82	69	-1.38	110	0.03
29	-0.96	70	-1.38	111	0.00
30	-1.08	71	-1.35	112	0.00
31	-1.19	72	-1.29	113	0.00
32	-1.28	73	-1.20	114	0.00
33	-1.34	74	-1.09	115	0.00
34	-1.37	75	-0.96	116	0.00
35	-1.37	76	-0.83	117	0.00
36	-1.32	77	-0.68	118	0.00
37	-1.24	78	-0.53	119	0.00
38	-1.10	79	-0.39	120	0.00
39	-0.91	80	-0.25	121	0.00
40	-0.66	81	-0.12	122	0.00
41	-0.35	82	0.00	123	0.00



E - 1508.5

PRUEBA DE CARGA DINAMICA

El objeto de la prueba de carga dinámica es el de obtener el valor de los principales parámetros dinámicos de cálculo que presenta la estructura. Es el caso de las frecuencias propias de vibración libre.

La valoración del período o frecuencia de vibración vertical correspondiente al modo fundamental, tiene especial repercusión en el coeficiente de amplificación dinámico al paso de la sobrecarga, utilizado en el cálculo.

Para la obtención de estos parámetros es necesaria la excitación dinámica de la estructura. Esto se obtiene mediante el paso de un camión, a distintas velocidades, sobre un obstáculo colocado en el tablero. Las características del mismo serán las de un tablón de forma redondeada de 50cm por 300cm con un espesor de 6 cm.

Se utilizará un solo vehículo pudiendo ser un camión de 2 o 3 ejes con un peso total suficiente para provocar la respuesta de la estructura con la debida amplitud.

El ensayo consistirá en efectuar algunas pasadas a muy baja velocidad, e ir incrementando la velocidad en escalones de 10 km/h.

La instrumentación a disponer consistirá en anillos extensométricos, para la medida de flechas, para registrar los desplazamientos de cada vano y en dos acelerómetros piezoeléctricos, para la medida de vibraciones, colocados en una de los centros de vanos del puente, de manera de determinar las frecuencias principales de vibración vertical, que deberán coincidir con los valores calculados a continuación.

PUENTE E-1508.5

```
**********************************************************************
**********************************************************************
**                                  **
**                                  **
** CCCC  OOOO  SSSS  M   M  OOOO  SSSS   / M   M **
** C   O O S     MM MM O O S     / MM MM **
** C   O O SSSS  M M M M O O SSSS / M M M M **
** C   O O     S M   M O O     S / M   M **
** CCCC  OOOO  SSSS  M   M  OOOO  SSSS/  M   M **
**                                  **
**                                  **
**              VERSION: 2.00               **
**             DISTRIBUTED BY:              **
**    STRUCTURAL RESEARCH AND ANALYSIS CORPORATION    **
**          12121 WILSHIRE BLVD. SUITE 700          **
**         LOS ANGELES,  CALIFORNIA  90025          **
**           TEL. NO.  (310) 207-2800               **
**          COPYRIGHT 1988  S. R. A. C.             **
**                                  **
**********************************************************************
**********************************************************************
Problem name: COEF-2
Date     : 09/11/1998   Time:  18:18:22
Title    :                                          |
Subtitle :

 CONTROL INFORMATION
  NUMBER OF LOAD CASES ..... (NLCASE) =      1
  SOLUTION MODE ..... (MODEX) =      2
    EQ. 0, STATIC ANALYSIS
    EQ. 1, BUCKLING ANALYSIS
    EQ. 2, DYNAMIC ANALYSIS
  THERMAL LOADING FLAG ..... (ITHERM) =      0
    EQ. 0, NO THERMAL EFFECTS CONSIDERED
    EQ. 1, ADD TEMPERATURE EFFECT
  GRAVITY LOADING FLAG ..... (IGRAV) =      0
    EQ. 0, NO GRAVITY LOADING CONSIDERED
    EQ. 1, ADD GRAVITY LOADING EFFECT
  CENTRIFUGAL LOADING FLAG ..... (ICNTRF) =      0
    EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
    EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
  IN-PLANE STIFFENING FLAG ..... (INPLN) =      0
    EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
    EQ. 1, IN-PLANE EFFECTS CONSIDERED
  SOFT SPRING ADDITION FLAG ..... (ISOFT) =      0
    EQ. 0, NO SOFT SPRING OPTION
    EQ. 1, SOFT SPRING ADDED

  SAVE DECOMPOSED STIFFNESS MATRIX FLAG ... (ISAVK) =      0
    EQ. 0, DO NOT SAVE DECOMPOSED K
    EQ. 1, SAVE DECOMPOSED K
  FORM STIFFNESS MATRIX FLAG ..... (IFORMK) =      0
    EQ. 0, FORM STIFFNESS MATRIX
    EQ. 1, USE EXISTING DECOMPOSED STIFFNESS MATRIX

  SPIN SOFTENING FLAG ..... (ISPIN) =      0
    EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
    EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
  INERTIA RELIEF FLAG ..... (IFORMK) =      0
    EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
    EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
  RIGID CONNECTIONS FLAG ..... (IRIGID) =      0
    EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS & SHELLS
    EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS & SHELLS


 TOTAL SYSTEM DATA
  NUMBER OF EQUATIONS ..... (NEQ) =    586
  NUMBER OF MATRIX ELEMENTS ..... (NWK) =   5434
  MAXIMUM HALF BANDWIDTH ..... (MK ) =     12
  MEAN HALF BANDWIDTH ..... (MM ) =      9
  NUMBER OF ELEMENTS. ..... (NUME) =    100
  NUMBER OF NODAL POINTS. ..... (NUMNP)=    102
  ADJUSTED BLOCK SIZE ..... (MTBLK)=   5435
  EXTRA MEMORY AVAILABLE (in 8-byte words) . . (XMTBLK)=  4732189
  NUMBER OF STIFFNESS BLOCKS. ..... (NBLK) =      1


 MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE =  .585788E+10 (   495)
 MINIMUM DIAGONAL STIFFNESS MATRIX VALUE =  .122545E+08 (   584)
1

 ----------------------------------------------------
 |      MASS MOMENT INFORMATION                     |
 |--------------------------------------------------|
 |MASS    .485600E+03 |VOLUME  .190431E+04 |WEIGHT  .000000E+00 |
 |--------------------------------------------------|
 | MASS MOMENT OF INERTIA W.R.T. C.G.               |
 |--------------------------------------------------|
 |IX      .000000E+00 |IY      .798175E+06 |IZ      .798175E+06 |
 |--------------------------------------------------|
 | MASS PRODUCT OF INERTIA W.R.T. C.G.              |
 |--------------------------------------------------|
 |PXY     .000000E+00 |PXZ     .000000E+00 |PYZ     .000000E+00 |
 |--------------------------------------------------|
 | RADII OF GYRATION W.R.T. C.G.                    |
 |--------------------------------------------------|
 |RX      .000000E+00 |RY      .405424E+02 |RZ      .405424E+02 |
 |--------------------------------------------------|
 | CENTER OF GRAVITY                                |
 |--------------------------------------------------|
 |CGx     .705001E+02 |CGy     .000000E+00 |CGz     .000000E+00 |
 |--------------------------------------------------|

 Note: In the above table, WEIGHT is computed based on the user
       defined acceleration for the first active Load Case


 SOLUTION PARAMETERS
  NUMBER OF EIGENVALUES. ..... (NFR)=      2
  MASS TYPE: 1-LUMPED,2-CONSISTENT. . . . (MASS)=      1
  MODE SHAPE PRINT FLAG. ..... (MPRNT)=      1
  INTERMEDIATE SOLUTION PRINT FLAG . . . .(IFPR)=      0
  STURM SEQUENCE CHECK FLAG. ..... (IFSS)=      0
  MAXIMUM NUMBER OF ITERATIONS ..... (ITMAX)=     16
  FREQUENCY SHIFT FLAG ..... (IFRSH)=      0
  FREQUENCY SHIFT. ..... (FRSH)= .0000000E+00
  CONVERGENCE TOLERANCE. ..... (RTOL)= .1000000E-04
  COMPOSITE MODAL DAMPING CALC. FLAG . . .(IMDC)=      0
  MODAL ACCELERATION FLAG. ..... (IMAM)=      0


 SUBSPACE ITERATION

  ITERATION NUMBER   1

  ITERATION NUMBER   2

  ITERATION NUMBER   3

  ITERATION NUMBER   4

  ITERATION NUMBER   5

  ITERATION NUMBER   6

  ITERATION NUMBER   7

  ITERATION NUMBER   8

  ITERATION NUMBER   9

  ITERATION NUMBER   10


 CONVERGENCE REACHED FOR RTOL  .1000E-04


 FREQUENCY ANALYSIS
       by
 SUBSPACE ALGORITHM


   FREQUENCY     FREQUENCY     FREQUENCY     PERIOD
    NUMBER       (RAD/SEC)   (CYCLES/SEC)  (SECONDS)

      1       .2691419E+02  .4283526E+01  .2334526E+00
      2       .3416490E+02  .5437513E+01  .1839076E+00


 MODE SHAPE NO.  1

   NODE  X-DISPLACEMENT  Y-DISPLACEMENT  Z-DISPLACEMENT  X - ROTATION
 Y - ROTATION   Z - ROTATION

     1  .0000000E+00   .0000000E+00   .0000000E+00   .0000000E+00   .0000000E+00
 .0000000E+00
     2  .0000000E+00   .0000000E+00   .0000000E+00   .0000000E+00   .3512808E-02
 .0000000E+00
     3  .0000000E+00  -.4027515E-18  -.4202479E-02   .0000000E+00   .3480580E-02 -
 .6523196E-18
     4  .0000000E+00  -.1520149E-17  -.8324578E-02   .0000000E+00   .3378340E-02 -
 .1191094E-17
     5  .0000000E+00  -.3216048E-17  -.1228388E-01   .0000000E+00   .3209566E-02 -
 .1616549E-17
     6  .0000000E+00  -.5354759E-17  -.1600185E-01   .0000000E+00   .2976579E-02 -
 .1929236E-17
     7  .0000000E+00  -.7801504E-17  -.1940326E-01   .0000000E+00   .2682565E-02 -
 .2130148E-17
     8  .0000000E+00  -.1042301E-16  -.2241719E-01   .0000000E+00   .2331513E-02 -
 .2220812E-17
     9  .0000000E+00  -.1308820E-16  -.2497796E-01   .0000000E+00   .1928134E-02 -
 .2203342E-17
    10  .0000000E+00  -.1566887E-16  -.2702592E-01   .0000000E+00   .1477766E-02 -
 .2080467E-17
    11  .0000000E+00  -.1804049E-16  -.2850815E-01   .0000000E+00   .9862683E-03 -
 .1855523E-17
    12  .0000000E+00  -.2008287E-16  -.2937901E-01   .0000000E+00   .4598959E-03 -
 .1532421E-17
    13  .0000000E+00  -.2168081E-16  -.2960056E-01   .0000000E+00  -.9483029E-04 -
 .1115583E-17
    14  .0000000E+00  -.2272471E-16  -.2914274E-01   .0000000E+00  -.6712662E-03 -
 .6098559E-18
    15  .0000000E+00  -.2311097E-16  -.2798348E-01   .0000000E+00  -.1262795E-02 -
 .2039005E-19
    16  .0000000E+00  -.2274228E-16  -.2610857E-01   .0000000E+00  -.1862981E-02
 .6474954E-18
    17  .0000000E+00  -.2152774E-16  -.2351130E-01   .0000000E+00  -.2465731E-02
 .1388483E-17
    18  .0000000E+00  -.1938273E-16  -.2019202E-01   .0000000E+00  -.3065456E-02
 .2197436E-17
    19  .0000000E+00  -.1622861E-16  -.1615739E-01   .0000000E+00  -.3657231E-02
 .3069607E-17
    20  .0000000E+00  -.1199204E-16  -.1141948E-01   .0000000E+00  -.4236965E-02
 .4000867E-17
```

21	.0000000E+00	-.6604252E-17	-.6014889E-02	.0000000E+00	-.4768083E-02
	.4987816E-17				
22	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	-.5254003E-02
	.6027969E-17				
23	.1194319E-30	.1030539E-16	.8561834E-02	.0000000E+00	-.5754745E-02
	.7201366E-17				
24	.2535734E-30	.2211527E-16	.1773481E-01	.0000000E+00	-.6041091E-02
	.7970303E-17				
25	.4043606E-30	.3480916E-16	.2717101E-01	.0000000E+00	-.6093445E-02
	.8344069E-17				
26	.5443459E-30	.4778532E-16	.3650014E-01	.0000000E+00	-.5905116E-02
	.8337389E-17				
27	.6697892E-30	.6046918E-16	.4536050E-01	.0000000E+00	-.5491558E-02
	.7970909E-17				
28	.7773396E-30	.7232321E-16	.5341786E-01	.0000000E+00	-.4872646E-02
	.7271684E-17				
29	.8641241E-30	.8285662E-16	.6037199E-01	.0000000E+00	-.4072359E-02
	.6272906E-17				
30	.9278242E-30	.9163450E-16	.6596274E-01	.0000000E+00	-.3118316E-02
	.5013355E-17				
31	.9667380E-30	.9828583E-16	.6997519E-01	.0000000E+00	-.2041193E-02
	.3536645E-17				
32	.9798261E-30	.1025104E-15	.7224389E-01	.0000000E+00	-.8739862E-03
	.1890236E-17				
33	.9667388E-30	.1040838E-15	.7265584E-01	.0000000E+00	.3487789E-03
	.1243060E-18				
34	.9278257E-30	.1028607E-15	.7115214E-01	.0000000E+00	.1591927E-02
-	.1709520E-17				
35	.8641261E-30	.9877592E-16	.6772836E-01	.0000000E+00	.2820549E-02
-	.3559539E-17				
36	.7773420E-30	.9184378E-16	.6243337E-01	.0000000E+00	.4000927E-02
-	.5375359E-17				
37	.6697917E-30	.8215459E-16	.5536675E-01	.0000000E+00	.5101464E-02
-	.7109363E-17				
38	.5443482E-30	.6986949E-16	.4667486E-01	.0000000E+00	.6093563E-02
-	.8718081E-17				
39	.4043627E-30	.5521290E-16	.3654553E-01	.0000000E+00	.6952454E-02
-	.1016354E-16				
40	.2535745E-30	.3846299E-16	.2520150E-01	.0000000E+00	.7657936E-02
-	.1141449E-16				
41	.1194325E-30	.1994098E-16	.1291911E-01	.0000000E+00	.8162768E-02
-	.1244668E-16				
42	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.8479882E-02
-	.1324332E-16				
43	-.3862862E-11	-.2092671E-16	-.1326324E-01	.0000000E+00	.8593259E-02
-	.1367883E-16				
44	-.7970200E-11	-.4215957E-16	-.2651068E-01	.0000000E+00	.8458354E-02
-	.1364056E-16				
45	-.1210372E-10	-.6297703E-16	-.3934128E-01	.0000000E+00	.8055084E-02
-	.1314660E-16				
46	-.1526245E-10	-.8269266E-16	-.5135574E-01	.0000000E+00	.7408485E-02
-	.1222414E-16				
47	-.1721728E-10	-.1006692E-15	-.6219323E-01	.0000000E+00	.6540573E-02
-	.1090954E-16				
48	-.1785493E-10	-.1163333E-15	-.7153142E-01	.0000000E+00	.5478910E-02
-	.9248569E-17				
49	-.1718735E-10	-.1291888E-15	-.7909452E-01	.0000000E+00	.4255968E-02
-	.7295390E-17				
50	-.1534846E-10	-.1388297E-15	-.8466047E-01	.0000000E+00	.2908300E-02
-	.5111259E-17				
51	-.1257836E-10	-.1449490E-15	-.8806635E-01	.0000000E+00	.1475672E-02
-	.2763077E-17				
52	-.9196827E-11	-.1473470E-15	-.8921280E-01	.0000000E+00	.4014810E-09
-	.3216323E-18				
53	-.5569052E-11	-.1459355E-15	-.8806636E-01	.0000000E+00	-.1475671E-02
	.2140132E-17				
54	-.2066920E-11	-.1407399E-15	-.8466047E-01	.0000000E+00	-.2908299E-02
	.4549031E-17				
55	.9698767E-12	-.1318978E-15	-.7909452E-01	.0000000E+00	-.4255967E-02
	.6833568E-17				
56	.3268716E-11	-.1196553E-15	-.7153142E-01	.0000000E+00	-.5478910E-02
	.8925704E-17				
57	.4651603E-11	-.1043599E-15	-.6219323E-01	.0000000E+00	-.6540573E-02
	.1076271E-16				
58	.5052135E-11	-.8645151E-16	-.5135571E-01	.0000000E+00	-.7408487E-02
	.1228870E-16				
59	.4520452E-11	-.6645027E-16	-.3934128E-01	.0000000E+00	-.8055085E-02
	.1345607E-16				
60	.3215488E-11	-.4494269E-16	-.2651068E-01	.0000000E+00	-.8458354E-02
	.1422670E-16				
61	.1623638E-11	-.2256739E-16	-.1326328E-01	.0000000E+00	-.8593260E-02
	.1457180E-16				
62	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	-.8479884E-02
	.1447202E-16				
63	.5023142E-12	.2209217E-16	.1291915E-01	.0000000E+00	-.8162769E-02
	.1397782E-16				
64	.1065469E-11	.4316081E-16	.2520150E-01	.0000000E+00	-.7657937E-02
	.1315379E-16				
65	.1696511E-11	.6270815E-16	.3654554E-01	.0000000E+00	-.6952456E-02
	.1201864E-16				
66	.2279861E-11	.8027196E-16	.4667485E-01	.0000000E+00	-.6093567E-02
	.1059972E-16				
67	.2799928E-11	.9543905E-16	.5536676E-01	.0000000E+00	-.5101465E-02
	.8932667E-17				
68	.3243353E-11	.1078577E-15	.6243339E-01	.0000000E+00	-.4000925E-02
	.7061275E-17				
69	.3599249E-11	.1172496E-15	.6772838E-01	.0000000E+00	-.2820550E-02
	.5036220E-17				
70	.3859278E-11	.1234195E-15	.7115216E-01	.0000000E+00	-.1591927E-02
	.2913579E-17				
71	.4017592E-11	.1262623E-15	.7265585E-01	.0000000E+00	-.3487815E-03
	.7533458E-18				
72	.4070742E-11	.1257676E-15	.7224390E-01	.0000000E+00	.8739869E-03
-	.1382287E-17				
73	.4017592E-11	.1220224E-15	.6997519E-01	.0000000E+00	.2041197E-02
-	.3430510E-17				
74	.3859278E-11	.1152101E-15	.6596275E-01	.0000000E+00	.3118318E-02
-	.5329577E-17				
75	.3599249E-11	.1056083E-15	.6037199E-01	.0000000E+00	.4072360E-02
-	.7020401E-17				
76	.3243353E-11	.9358292E-16	.5341788E-01	.0000000E+00	.4872646E-02
-	.8447951E-17				
77	.2799928E-11	.7958128E-16	.4536050E-01	.0000000E+00	.5491560E-02
-	.9562617E-17				
78	.2279861E-11	.6412270E-16	.3650011E-01	.0000000E+00	.5905117E-02
-	.1032125E-16				
79	.1696511E-11	.4778785E-16	.2717102E-01	.0000000E+00	.6093446E-02
-	.1068806E-16				
80	.1065469E-11	.3120657E-16	.1773479E-01	.0000000E+00	.6041091E-02
-	.1063516E-16				
81	.5023142E-12	.1504623E-16	.8561855E-02	.0000000E+00	.5754745E-02
-	.1014219E-16				
82	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.5254002E-02
-	.9195916E-17				
83	.0000000E+00	-.1048212E-16	-.6014869E-02	.0000000E+00	.4768083E-02
-	.8268484E-17				
84	.0000000E+00	-.1983096E-16	-.1141948E-01	.0000000E+00	.4236961E-02
-	.7307537E-17				
85	.0000000E+00	-.2800843E-16	-.1615737E-01	.0000000E+00	.3657230E-02
-	.6317121E-17				
86	.0000000E+00	-.3498256E-16	-.2019202E-01	.0000000E+00	.3065452E-02
-	.5302958E-17				
87	.0000000E+00	-.4072897E-16	-.2351129E-01	.0000000E+00	.2465728E-02
-	.4272341E-17				
88	.0000000E+00	-.4523307E-16	-.2610854E-01	.0000000E+00	.1862980E-02
-	.3234012E-17				
89	.0000000E+00	-.4849148E-16	-.2798346E-01	.0000000E+00	.1262792E-02
-	.2197898E-17				
90	.0000000E+00	-.5051325E-16	-.2914271E-01	.0000000E+00	.6712655E-03
-	.1174844E-17				
91	.0000000E+00	-.5132090E-16	-.2960053E-01	.0000000E+00	.9482772E-04
-	.1762765E-18				
92	.0000000E+00	-.5095083E-16	-.2937899E-01	.0000000E+00	-.4598965E-03
	.7860242E-18				
93	.0000000E+00	-.4945367E-16	-.2850813E-01	.0000000E+00	-.9862672E-03
	.1700247E-17				
94	.0000000E+00	-.4689412E-16	-.2702590E-01	.0000000E+00	-.1477763E-02
	.2554791E-17				
95	.0000000E+00	-.4335047E-16	-.2497793E-01	.0000000E+00	-.1928135E-02
	.3338531E-17				
96	.0000000E+00	-.3891412E-16	-.2241716E-01	.0000000E+00	-.2331513E-02
	.4041022E-17				
97	.0000000E+00	-.3368834E-16	-.1940324E-01	.0000000E+00	-.2682563E-02
	.4652769E-17				
98	.0000000E+00	-.2778716E-16	-.1600184E-01	.0000000E+00	-.2976576E-02
	.5165381E-17				
99	.0000000E+00	-.2133395E-16	-.1228389E-01	.0000000E+00	-.3209562E-02
	.5571758E-17				
100	.0000000E+00	-.1445965E-16	-.8324549E-02	.0000000E+00	-.3378337E-02
	.5866226E-17				
101	.0000000E+00	-.7301374E-17	-.4202464E-02	.0000000E+00	-.3480576E-02
	.6044641E-17				
102	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	-.3512805E-02
	.6104420E-17				

MODE SHAPE NO. 2

NODE	X-DISPLACEMENT	Y-DISPLACEMENT	Z-DISPLACEMENT	X - ROTATION	Y - ROTATION	Z - ROTATION
1	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
2	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.6657157E-02	.0000000E+00
3	.0000000E+00	-.1661250E-16	-.7960919E-02	.0000000E+00	.6587984E-02	-.2690702E-16
4	.0000000E+00	-.6270451E-16	-.1574950E-01	.0000000E+00	.6369008E-02	-.4913319E-16
5	.0000000E+00	-.1326635E-15	-.2319013E-01	.0000000E+00	.6009007E-02	-.6668780E-16
6	.0000000E+00	-.2208956E-15	-.3011754E-01	.0000000E+00	.5515049E-02	-.7959332E-16
7	.0000000E+00	-.3218441E-15	-.3637653E-01	.0000000E+00	.4896811E-02	-.8789040E-16
8	.0000000E+00	-.4300141E-15	-.4182500E-01	.0000000E+00	.4166361E-02	-.9164146E-16
9	.0000000E+00	-.5399998E-15	-.4633659E-01	.0000000E+00	.3337896E-02	-.9093297E-16
10	.0000000E+00	-.6465141E-15	-.4980314E-01	.0000000E+00	.2427417E-02	-.8587646E-16
11	.0000000E+00	-.7444187E-15	-.5213657E-01	.0000000E+00	.1452378E-02	-.7660840E-16
12	.0000000E+00	-.8287536E-15	-.5327043E-01	.0000000E+00	.4312818E-03	-.6328876E-16
13	.0000000E+00	-.8947634E-15	-.5316088E-01	.0000000E+00	-.6167386E-03	-.4609846E-16
14	.0000000E+00	-.9379209E-15	-.5178721E-01	.0000000E+00	-.1672364E-02	-.2523575E-16
15	.0000000E+00	-.9539446E-15	-.4915178E-01	.0000000E+00	-.2716544E-02	-.9113932E-18
16	.0000000E+00	-.9388107E-15	-.4527942E-01	.0000000E+00	-.3730954E-02	.2665693E-16
17	.0000000E+00	-.8887574E-15	-.4021626E-01	.0000000E+00	-.4698457E-02	.5725159E-16
18	.0000000E+00	-.8002804E-15	-.3402809E-01	.0000000E+00	-.5603532E-02	.9066230E-16
19	.0000000E+00	-.6701193E-15	-.2679814E-01	.0000000E+00	-.6432701E-02	.1266947E-15
20	.0000000E+00	-.4952320E-15	-.1862438E-01	.0000000E+00	-.7174924E-02	.1651797E-15
21	.0000000E+00	-.2727627E-15	-.9640039E-02	.0000000E+00	-.7783444E-02	.2059781E-15
22	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	-.8267934E-02	.2489880E-15

23	.2114909E-29	.4257269E-15	.1316364E-01	.0000000E+00	-.8658985E-02
.2975334E-15					
24	.4490297E-29	.9137310E-15	.2666943E-01	.0000000E+00	-.8707986E-02
.3293895E-15					
25	.7160449E-29	.1438409E-14	.3996661E-01	.0000000E+00	-.8389882E-02
.3449372E-15					
26	.9639318E-29	.1974922E-14	.5250075E-01	.0000000E+00	-.7728595E-02
.3447801E-15					
27	.1186068E-28	.2499550E-14	.6376664E-01	.0000000E+00	-.6760299E-02
.3297648E-15					
28	.1376519E-28	.2990089E-14	.7332254E-01	.0000000E+00	-.5530474E-02
.3010013E-15					
29	.1530197E-28	.3426254E-14	.8080369E-01	.0000000E+00	-.4092746E-02
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30	.1642998E-28	.3790052E-14	.8593379E-01	.0000000E+00	-.2507401E-02
.2079071E-15					
31	.1711907E-28	.4066115E-14	.8853407E-01	.0000000E+00	-.8396726E-03
.1469589E-15					
32	.1735084E-28	.4241980E-14	.8852947E-01	.0000000E+00	.8421968E-03
.7895644E-16					
33	.1711908E-28	.4308300E-14	.8595175E-01	.0000000E+00	.2468944E-02
.5961557E-17					
34	.1643001E-28	.4258978E-14	.8093949E-01	.0000000E+00	.3972315E-02
-.6990336E-16					
35	.1530201E-28	.4091215E-14	.7373503E-01	.0000000E+00	.5287030E-02
-.1465116E-15					
36	.1376523E-28	.3805479E-14	.6467843E-01	.0000000E+00	.6352578E-02
-.2217896E-15					
37	.1186072E-28	.3405369E-14	.5419876E-01	.0000000E+00	.7114817E-02
-.2937763E-15					
38	.9639359E-29	.2897399E-14	.4280324E-01	.0000000E+00	.7527246E-02
-.3606807E-15					
39	.7160485E-29	.2290694E-14	.3106464E-01	.0000000E+00	.7551921E-02
-.4209370E-15					
40	.4490316E-29	.1596594E-14	.1960754E-01	.0000000E+00	.7159944E-02
-.4732561E-15					
41	.2114920E-29	.8282175E-15	.9060100E-02	.0000000E+00	.6379795E-02
-.5166360E-15					
42	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.5243362E-02
-.5503832E-15					
43	-.6812844E-10	-.8702266E-15	-.7113833E-02	.0000000E+00	.3951157E-02
-.5691440E-15					
44	-.1443682E-09	-.1754114E-14	-.1224231E-01	.0000000E+00	.2683632E-02
-.5681011E-15					
45	-.2294844E-09	-.2621497E-14	-.1543225E-01	.0000000E+00	.1452634E-02
-.5480047E-15					
46	-.3076825E-09	-.3443668E-14	-.1681129E-01	.0000000E+00	.3490094E-03
-.5099831E-15					
47	-.3766988E-09	-.4193963E-14	-.1658651E-01	.0000000E+00	-.6146316E-03
-.4555464E-15					
48	-.4346159E-09	-.4848364E-14	-.1498501E-01	.0000000E+00	-.1425227E-02
-.3865962E-15					
49	-.4799212E-09	-.5386076E-14	-.1225376E-01	.0000000E+00	-.2070422E-02
-.3053854E-15					
50	-.5115451E-09	-.5790040E-14	-.8657655E-02	.0000000E+00	-.2539569E-02
-.2144626E-15					
51	-.5288734E-09	-.6047332E-14	-.4476293E-02	.0000000E+00	-.2824483E-02
-.1166133E-15					
52	-.5317404E-09	-.6149486E-14	.3999815E-06	.0000000E+00	-.2920031E-02
-.1478641E-16					
53	-.5204015E-09	-.6092685E-14	.4477075E-02	.0000000E+00	-.2824460E-02
.8797757E-16					
54	-.4954923E-09	-.5877849E-14	.8658383E-02	.0000000E+00	-.2539524E-02
.1886264E-15					
55	-.4579753E-09	-.5510578E-14	.1225441E-01	.0000000E+00	-.2070359E-02
.2841763E-15					
56	-.4090846E-09	-.5001005E-14	.1498554E-01	.0000000E+00	-.1425151E-02
.3717866E-15					
57	-.3502668E-09	-.4363496E-14	.1658692E-01	.0000000E+00	-.6145493E-03
.4488362E-15					
58	-.2831289E-09	-.3616274E-14	.1681158E-01	.0000000E+00	.3490925E-03
.5129886E-15					
59	-.2093914E-09	-.2780925E-14	.1543242E-01	.0000000E+00	.1452704E-02
.5622523E-15					
60	-.1308484E-09	-.1881809E-14	.1224238E-01	.0000000E+00	.2683683E-02
.5950313E-15					
61	-.6149728E-10	-.9454691E-15	.7113858E-02	.0000000E+00	.3951177E-02
.6101192E-15					
62	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.5243351E-02
.6067047E-15					
63	.3057892E-11	.9267695E-15	-.9060080E-02	.0000000E+00	.6379753E-02
.5867422E-15					
64	.6404349E-11	.1811667E-14	-.1960740E-01	.0000000E+00	.7159874E-02
.5527798E-15					
65	.9994089E-11	.2633559E-14	-.3106439E-01	.0000000E+00	.7551834E-02
.5056044E-15					
66	.1311299E-10	.3372809E-14	-.4280281E-01	.0000000E+00	.7527154E-02
.4463686E-15					
67	.1567669E-10	.4011845E-14	-.5419822E-01	.0000000E+00	.7114727E-02
.3765739E-15					
68	.1766286E-10	.4535689E-14	-.6467778E-01	.0000000E+00	.6352496E-02
.2980676E-15					
69	.1910123E-10	.4932459E-14	-.7373425E-01	.0000000E+00	.5286969E-02
.2129889E-15					
70	.2005368E-10	.5193782E-14	-.8093863E-01	.0000000E+00	.3972277E-02
.1237062E-15					
71	.2058946E-10	.5315086E-14	-.8595084E-01	.0000000E+00	.2468935E-02
.3275485E-16					
72	.2076149E-10	.5295818E-14	-.8852857E-01	.0000000E+00	.8422114E-03
-.5723539E-16					
73	.2058946E-10	.5139526E-14	-.8853322E-01	.0000000E+00	-.8396362E-03
-.1436075E-15					
74	.2005368E-10	.4853855E-14	-.8593302E-01	.0000000E+00	-.2507338E-02
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75	.1910123E-10	.4450419E-14	-.8080302E-01	.0000000E+00	-.4092665E-02
-.2951550E-15					
76	.1766286E-10	.3944592E-14	-.7332204E-01	.0000000E+00	-.5530379E-02
-.3554974E-15					
77	.1567669E-10	.3355181E-14	-.6376626E-01	.0000000E+00	-.6760205E-02
-.4026730E-15					
78	.1311299E-10	.2704051E-14	-.5250048E-01	.0000000E+00	-.7728509E-02
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79	.9994089E-11	.2015671E-14	-.3996652E-01	.0000000E+00	-.8389810E-02
-.4505179E-15					
80	.6404349E-11	.1316590E-14	-.2666939E-01	.0000000E+00	-.8707943E-02
-.4484865E-15					
81	.3057892E-11	.6349532E-15	-.1316369E-01	.0000000E+00	-.8658977E-02
-.4278939E-15					
82	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	-.8267968E-02
-.3881782E-15					
83	.0000000E+00	-.4425722E-15	.9640070E-02	.0000000E+00	-.7783513E-02
-.3491910E-15					
84	.0000000E+00	-.8374775E-15	.1862456E-01	.0000000E+00	-.7175017E-02
-.3087507E-15					
85	.0000000E+00	-.1183062E-14	.2679841E-01	.0000000E+00	-.6432815E-02
-.2670292E-15					
86	.0000000E+00	-.1477933E-14	.3402853E-01	.0000000E+00	-.5603653E-02
-.2242700E-15					
87	.0000000E+00	-.1721020E-14	.4021683E-01	.0000000E+00	-.4698583E-02
-.1807830E-15					
88	.0000000E+00	-.1911669E-14	.4528013E-01	.0000000E+00	-.3731078E-02
-.1369405E-15					
89	.0000000E+00	-.2049704E-14	.4915265E-01	.0000000E+00	-.2716651E-02
-.9316502E-16					
90	.0000000E+00	-.2135477E-14	.5178819E-01	.0000000E+00	-.1672456E-02
-.4991814E-16					
91	.0000000E+00	-.2169913E-14	.5316196E-01	.0000000E+00	-.6168037E-03
-.7686586E-17					
92	.0000000E+00	-.2154531E-14	.5327157E-01	.0000000E+00	.4312411E-03
.3302787E-16					
93	.0000000E+00	-.2091455E-14	.5213775E-01	.0000000E+00	.1452365E-02
.7172202E-16					
94	.0000000E+00	-.1983405E-14	.4980433E-01	.0000000E+00	.2427433E-02
.1079015E-15					
95	.0000000E+00	-.1833685E-14	.4633770E-01	.0000000E+00	.3337951E-02
.1410921E-15					
96	.0000000E+00	-.1646156E-14	.4182603E-01	.0000000E+00	.4166444E-02
.1708487E-15					
97	.0000000E+00	-.1425185E-14	.3637747E-01	.0000000E+00	.4896919E-02
.1967663E-15					
98	.0000000E+00	-.1175597E-14	.3011834E-01	.0000000E+00	.5515181E-02
.2184874E-15					
99	.0000000E+00	-.9026165E-15	.2319078E-01	.0000000E+00	.6009158E-02
.2357089E-15					
100	.0000000E+00	-.6117900E-15	.1574989E-01	.0000000E+00	.6369177E-02
.2481891E-15					
101	.0000000E+00	-.3089277E-15	.7961113E-02	.0000000E+00	.6588161E-02
.2557512E-15					
102	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.6657337E-02
.2582850E-15					

SOLUTION TIME LOG (sec)

INPUT PHASE	1
ASSEMBLAGE OF THE STIFFNESS MATRIX	0
ASSEMBLAGE OF THE MASS MATRIX	0
DECOMPOSITION OF THE STIFFNESS MATRIX	0
EIGENVALUE SOLUTION	0
OUTPUT PHASE	0
TOTAL SOLUTION TIME	1

PUENTE E-1508.5

5.2.- Tablero izquierdo

PRUEBA DE CARGA

OBJETO DE LA PRUEBA

El objeto de la prueba es comprobar la respuesta estructural, frente a situaciones de carga estática, de manera tal que confrontando la respuesta real con la teórica, determinar la fiabilidad del comportamiento en servicio del puente.

Esta prueba de carga se realizará antes de la colocación del balasto, carriles, etc., mediante el empleo de camiones cargados con arena, y servirá para obtener una recepción provisional de la obra. Para la recepción definitiva de la estructura será necesario realizar otra prueba de carga con locomotoras, una vez colocada la infraestructura ferroviaria, que no es objeto del presente documento.

CARGA DE PRUEBA

La prueba se realizará empleando camiones, el la disposición que se adjunta a continuación, de tres ejes separados 3.825 y 1.36 m. con cargas por eje de 7.6, 13.7 y 13.7 T.

APARATOS DE MEDIDA Y MEDICIONES

Para la realización de las mediciones se colocarán flexímetros en el centro del vano (medidas f1) y apoyos (medidas f2). Los valores de los desplazamientos que se adjuntan son los descensos relativos esperados entre los puntos de los vanos y los fijos de los apoyos. Estos valores deben ser del orden de la magnitud del valor f1-f2 medido en obra.

La apreciación mínima de cualquiera de los flexímetros será del orden del 3% de los valores máximos esperados de las magnitudes a medir.

El rango de los aparatos deberá ser como mínimo superior en un 50% a los esperados de dicha magnitud.

Las medidas se realizarán inmediatamente antes de la carga, inmediatamente después de su colocación y a los quince minutos de haberla retirado.

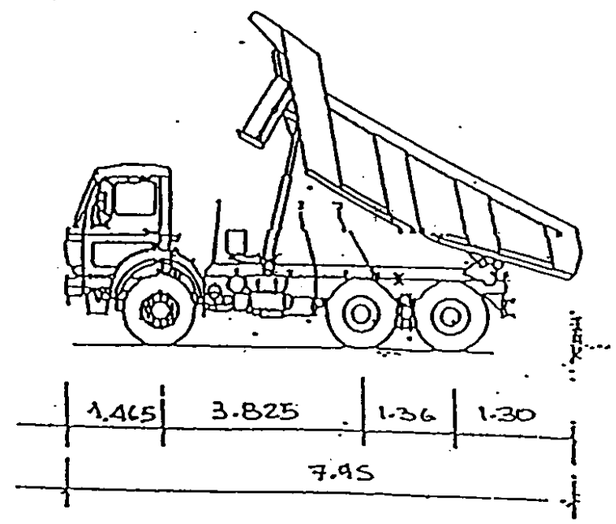
Durante la realización de la prueba se deberá anotar las condiciones climatológicas existentes a lo largo de la misma.

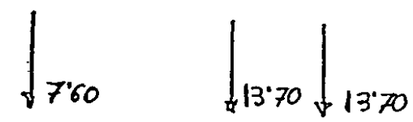
ANALISIS

Para obtener las solicitaciones y desplazamientos verticales en los puntos a medir se procesó la estructura mediante el programa COSMOS/M. El modelo es el mismo usado en el cálculo del tablero. Los esfuerzos que se consiguen son del orden del 30 % de los obtenidos en la realización de una prueba de carga con locomotoras y la infraestructura ferroviaria colocada.

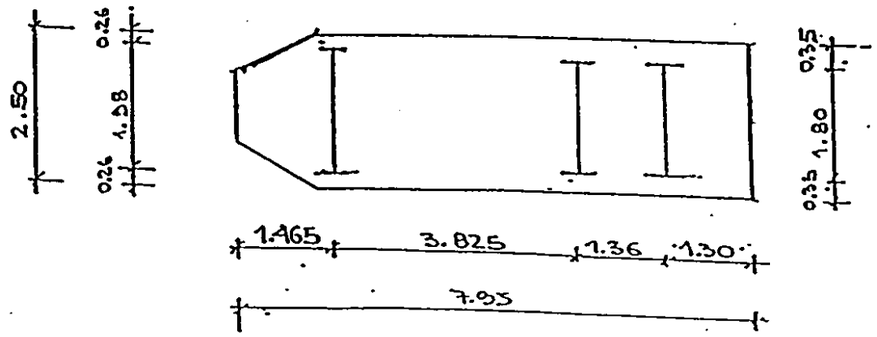
DEFINICION TREN DE CARGAS

CAMION VOLQUETE DE 35 Ton.



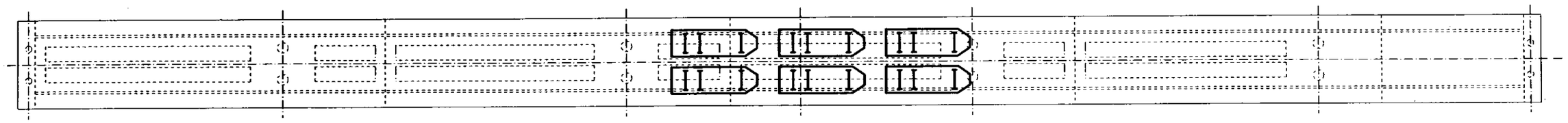


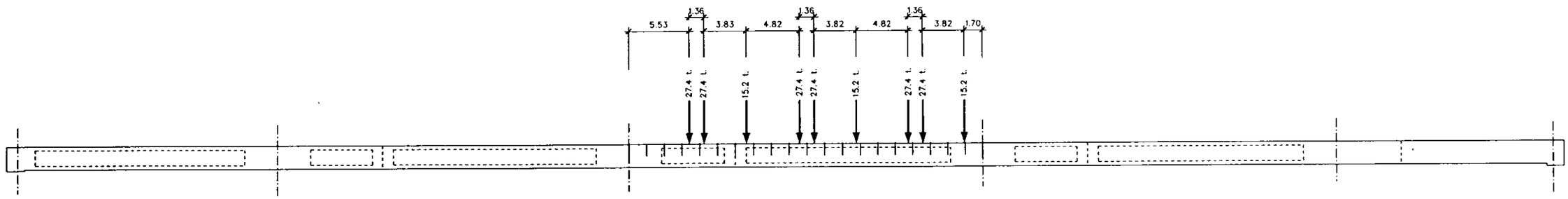
ALZADO



PLANTA

SITUACION EN PLANTA DE CAMIONES EN PRUEBA DE CARGA

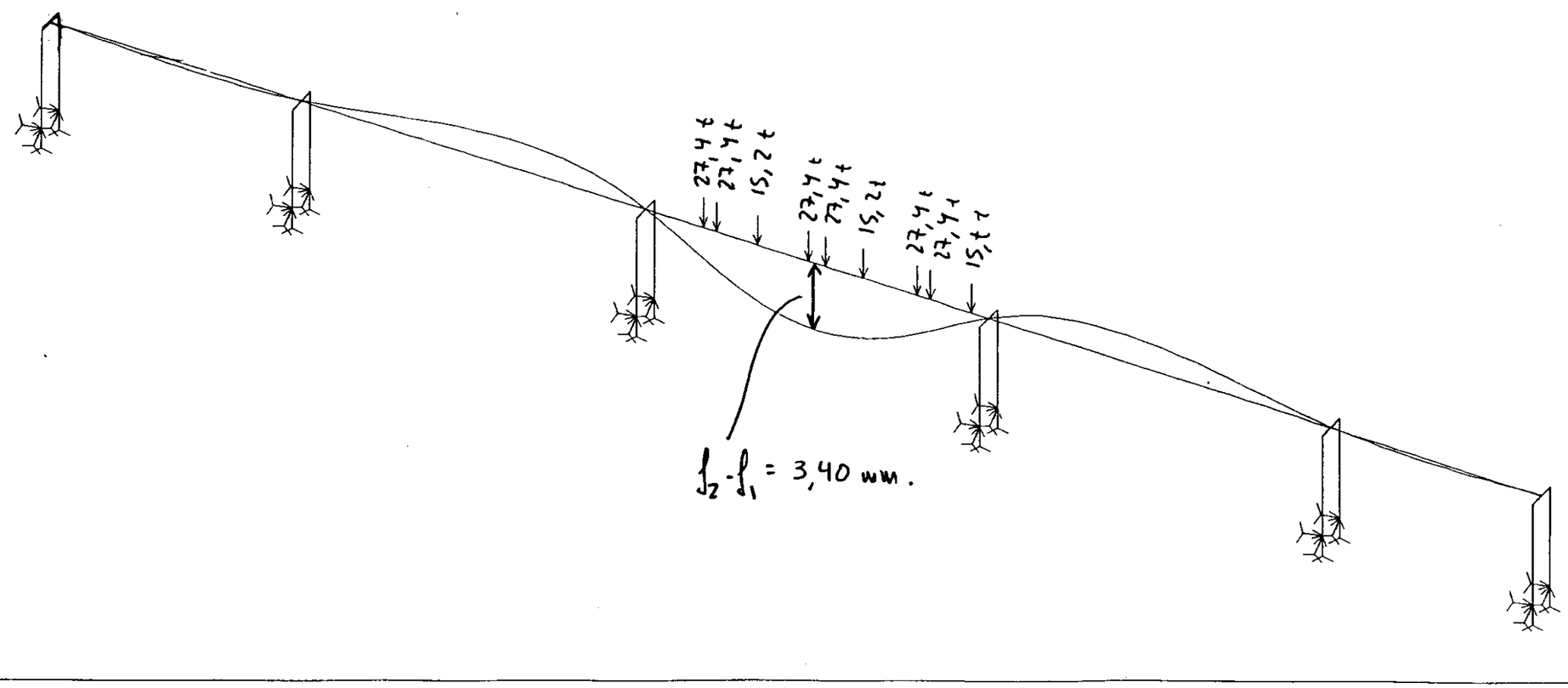




SITUACION EN ALZADO DE CAMIONES EN PRUEBA DE CARGA

GeoStar 2.0 (64K Version): COMPLETA - [Main]

Lin DEF Lc=28



Load case 28

Node	UX	UY	UZ	RX	RY	RZ
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
5	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
6	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
7	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
8	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
9	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
10	0.0000	0.0000	-0.0003	0.0000	0.0000	0.0000
11	0.0000	0.0000	-0.0003	0.0000	0.0000	0.0000
12	0.0000	0.0000	-0.0003	0.0000	0.0000	0.0000
13	0.0000	0.0000	-0.0003	0.0000	0.0000	0.0000
14	0.0000	0.0000	-0.0003	0.0000	0.0000	0.0000
15	0.0000	0.0000	-0.0003	0.0000	0.0000	0.0000
16	0.0000	0.0000	-0.0003	0.0000	0.0000	0.0000
17	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
18	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
19	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
20	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
21	0.0000	0.0000	-0.0001	0.0000	-0.0001	0.0000
22	0.0000	0.0000	0.0000	0.0000	-0.0001	0.0000
23	0.0000	0.0000	0.0001	0.0000	-0.0001	0.0000
24	0.0000	0.0000	0.0002	0.0000	-0.0001	0.0000
25	0.0000	0.0000	0.0004	0.0000	-0.0001	0.0000
26	0.0000	0.0000	0.0005	0.0000	-0.0001	0.0000
27	0.0000	0.0000	0.0007	0.0000	-0.0001	0.0000
28	0.0000	0.0000	0.0008	0.0000	-0.0001	0.0000
29	0.0000	0.0000	0.0009	0.0000	-0.0001	0.0000
30	0.0000	0.0000	0.0011	0.0000	-0.0001	0.0000
31	0.0000	0.0000	0.0012	0.0000	-0.0001	0.0000
32	0.0000	0.0000	0.0013	0.0000	0.0000	0.0000
33	0.0000	0.0000	0.0013	0.0000	0.0000	0.0000
34	0.0000	0.0000	0.0014	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0014	0.0000	0.0000	0.0000
36	0.0000	0.0000	0.0013	0.0000	0.0000	0.0000
37	0.0000	0.0000	0.0012	0.0000	0.0001	0.0000
38	0.0000	0.0000	0.0011	0.0000	0.0001	0.0000
39	0.0000	0.0000	0.0009	0.0000	0.0001	0.0000
40	0.0000	0.0000	0.0007	0.0000	0.0002	0.0000
41	0.0000	0.0000	0.0004	0.0000	0.0002	0.0000
42	0.0000	0.0000	0.0000	0.0001	0.0002	0.0000
43	0.0000	0.0000	-0.0004	0.0001	0.0003	0.0000
44	0.0000	0.0000	-0.0009	0.0001	0.0003	0.0000
45	0.0000	0.0000	-0.0014	0.0001	0.0003	0.0000
46	0.0000	0.0000	-0.0019	0.0001	0.0003	0.0000
47	0.0000	0.0000	-0.0023	0.0001	0.0002	0.0000
48	0.0000	0.0000	-0.0027	0.0001	0.0002	0.0000
49	0.0000	0.0000	-0.0030	0.0000	0.0002	0.0000
50	0.0000	0.0000	-0.0032	0.0000	0.0001	0.0000
51	0.0000	0.0000	-0.0034	0.0000	0.0001	0.0000
52	0.0000	0.0000	-0.0034	0.0000	0.0000	0.0000
53	0.0000	0.0000	-0.0034	0.0000	-0.0001	0.0000
54	0.0000	0.0000	-0.0032	0.0000	-0.0001	0.0000
55	0.0000	0.0000	-0.0030	0.0000	-0.0002	0.0000
56	0.0000	0.0000	-0.0027	-0.0001	-0.0002	0.0000
57	0.0000	0.0000	-0.0023	-0.0001	-0.0002	0.0000
58	0.0000	0.0000	-0.0019	-0.0001	-0.0003	0.0000
59	0.0000	0.0000	-0.0014	-0.0001	-0.0003	0.0000
60	0.0000	0.0000	-0.0009	-0.0001	-0.0003	0.0000
61	0.0000	0.0000	-0.0005	-0.0001	-0.0003	0.0000
62	0.0000	0.0000	0.0000	-0.0001	-0.0002	0.0000
63	0.0000	0.0000	0.0004	-0.0001	-0.0002	0.0000
64	0.0000	0.0000	0.0007	0.0000	-0.0002	0.0000
65	0.0000	0.0000	0.0009	0.0000	-0.0001	0.0000
66	0.0000	0.0000	0.0011	0.0000	-0.0001	0.0000
67	0.0000	0.0000	0.0012	0.0000	-0.0001	0.0000
68	0.0000	0.0000	0.0013	0.0000	0.0000	0.0000
69	0.0000	0.0000	0.0014	0.0000	0.0000	0.0000
70	0.0000	0.0000	0.0014	0.0000	0.0000	0.0000
71	0.0000	0.0000	0.0013	0.0000	0.0000	0.0000
72	0.0000	0.0000	0.0012	0.0000	0.0000	0.0000
73	0.0000	0.0000	0.0012	0.0000	0.0001	0.0000
74	0.0000	0.0000	0.0010	0.0000	0.0001	0.0000
75	0.0000	0.0000	0.0009	0.0000	0.0001	0.0000
76	0.0000	0.0000	0.0008	0.0000	0.0001	0.0000
77	0.0000	0.0000	0.0006	0.0000	0.0001	0.0000
78	0.0000	0.0000	0.0005	0.0000	0.0001	0.0000
79	0.0000	0.0000	0.0004	0.0000	0.0001	0.0000
80	0.0000	0.0000	0.0002	0.0000	0.0001	0.0000
81	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000
82	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000
83	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
84	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
85	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
86	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
87	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
88	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
89	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
90	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
91	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
92	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
93	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
94	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
95	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
96	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000
97	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
98	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
99	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
100	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000

PRUEBA DE CARGA DINAMICA

El objeto de la prueba de carga dinámica es el de obtener el valor de los principales parámetros dinámicos de cálculo que presenta la estructura. Es el caso de las frecuencias propias de vibración libre.

La valoración del período o frecuencia de vibración vertical correspondiente al modo fundamental, tiene especial repercusión en el coeficiente de amplificación dinámico al paso de la sobrecarga, utilizado en el cálculo.

Para la obtención de estos parámetros es necesaria la excitación dinámica de la estructura. Esto se obtiene mediante el paso de un camión, a distintas velocidades, sobre un obstáculo colocado en el tablero. Las características del mismo serán las de un tablón de forma redondeada de 50cm por 300cm con un espesor de 6 cm.

Se utilizará un solo vehículo pudiendo ser un camión de 2 o 3 ejes con un peso total suficiente para provocar la respuesta de la estructura con la debida amplitud.

El ensayo consistirá en efectuar algunas pasadas a muy baja velocidad, e ir incrementando la velocidad en escalones de 10 km/h.

La instrumentación a disponer consistirá en anillos extensométricos, para la medida de flechas, para registrar los desplazamientos de cada vano y en dos acelerómetros piezoeléctricos, para la medida de vibraciones, colocados en una de los centros de vanos del puente, de manera de determinar las frecuencias principales de vibración vertical, que deberán coincidir con los valores calculados a continuación.

```
**********************************************************************
**********************************************************************
**                                  **
**                                  **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS   / M    M **
** C    O  O  S     MM  MM  O  O  S      / MM  MM **
** C    O  O  SSSS  M MM M  O  O  SSSS  / M MM M **
** C    O  O     S  M    M  O  O     S / M    M **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS/   M    M **
**                                  **
**                                  **
**              VERSION: 2.00               **
**             DISTRIBUTED BY:                **
**    STRUCTURAL RESEARCH AND ANALYSIS CORPORATION     **
**          12121 WILSHIRE BLVD. SUITE 700          **
**        LOS ANGELES,  CALIFORNIA  90025          **
**          TEL. NO.  (310) 207-2800             **
**          COPYRIGHT 1988  S. R. A. C.           **
**                                  **
**********************************************************************
**********************************************************************
Problem name: PCARGA
Date     : 12/11/1998   Time:  17:25:16
Title    :                                                    |
Subtitle :
```

```
CONTROL INFORMATION
 NUMBER OF LOAD CASES ..... (NLCASE) =      1
 SOLUTION MODE ..... (MODEX) =      2
   EQ. 0, STATIC ANALYSIS
   EQ. 1, BUCKLING ANALYSIS
   EQ. 2, DYNAMIC ANALYSIS
 THERMAL LOADING FLAG ..... (ITHERM) =      0
   EQ. 0, NO THERMAL EFFECTS CONSIDERED
   EQ. 1, ADD TEMPERATURE EFFECT
 GRAVITY LOADING FLAG ..... (IGRAV) =      0
   EQ. 0, NO GRAVITY LOADING CONSIDERED
   EQ. 1, ADD GRAVITY LOADING EFFECT
 CENTRIFUGAL LOADING FLAG ..... (ICNTRF) =      0
   EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
   EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
 IN-PLANE STIFFENING FLAG ..... (INPLN) =      0
   EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
   EQ. 1, IN-PLANE EFFECTS CONSIDERED
 SOFT SPRING ADDITION FLAG ..... (ISOFT) =      0
   EQ. 0, NO SOFT SPRING OPTION
   EQ. 1, SOFT SPRING ADDED

 SAVE DECOMPOSED STIFFNESS MATRIX FLAG ... (ISAVK) =      0
   EQ. 0, DO NOT SAVE DECOMPOSED K
   EQ. 1, SAVE DECOMPOSED K
 FORM STIFFNESS MATRIX FLAG ..... (IFORMK) =      0
   EQ. 0, FORM STIFFNESS MATRIX
   EQ. 1, USE EXISTING DECOMPOSED STIFFNESS MATRIX

 SPIN SOFTENING FLAG ..... (ISPIN) =      0
   EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
   EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
 INERTIA RELIEF FLAG ..... (IFORMK) =      0
   EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
   EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
 RIGID CONNECTIONS FLAG ..... (IRIGID) =      0
   EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS & SHELLS
   EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS & SHELLS
```

```
TOTAL SYSTEM DATA
 NUMBER OF EQUATIONS ..... (NEQ) =     694
 NUMBER OF MATRIX ELEMENTS ..... (NWK) =    7159
 MAXIMUM HALF BANDWIDTH ..... (MK ) =      32
 MEAN HALF BANDWIDTH ..... (MM ) =      10
 NUMBER OF ELEMENTS. ..... (NUME) =     124
 NUMBER OF NODAL POINTS. ..... (NUMNP)=     126
 ADJUSTED BLOCK SIZE ..... (MTBLK)=    7160
 EXTRA MEMORY AVAILABLE (in 8-byte words) . . .(XMTBLK)=  4467808
 NUMBER OF STIFFNESS BLOCKS. ..... (NBLK) =       1


 MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE =  .251273E+11 (    560)
 MINIMUM DIAGONAL STIFFNESS MATRIX VALUE =  .145833E+02 (      3)
1

 ---------------------------------------------------------------
 |       MASS MOMENT INFORMATION                               |
 |-------------------------------------------------------------|
 |MASS    .345269E+03 |VOLUME  .205553E+05 |WEIGHT  .000000E+00 |
 |-------------------------------------------------------------|
 | MASS MOMENT OF INERTIA W.R.T. C.G.                          |
 |-------------------------------------------------------------|
 |IX      .370957E+05 |IY      .562474E+06 |IZ      .608585E+06 |
 |-------------------------------------------------------------|
 | MASS PRODUCT OF INERTIA W.R.T. C.G.                         |
 |-------------------------------------------------------------|
 |PXY    -.134496E+06 |PXZ     .000000E+00 |PYZ     .000000E+00 |
 |-------------------------------------------------------------|
 | RADII OF GYRATION W.R.T. C.G.                               |
 |-------------------------------------------------------------|
 |RX      .103653E+02 |RY      .403620E+02 |RZ      .419838E+02 |
 |-------------------------------------------------------------|
 | CENTER OF GRAVITY                                           |
 |-------------------------------------------------------------|
 |CGx     .227043E+04 |CGy     .885536E+04 |CGz     .000000E+00 |
 |-------------------------------------------------------------|
 | PRINCIPAL MASS MOMENT OF INERTIA                            |
 |-------------------------------------------------------------|
 |P1      .608585E+06 |P2      .594903E+06 |P3      .466649E+04 |
 |-------------------------------------------------------------|
 | PRINCIPAL RADII OF GYRATION                                 |
 |-------------------------------------------------------------|
 |R1      .419838E+02 |R2      .415092E+02 |R3      .367635E+01 |
 |-------------------------------------------------------------|
 | PRINCIPAL AXES (DIRECTION COSINES IN ROWS W.R.T C.G)        |
 |-------------------------------------------------------------|
 |N_11    .324312E+00 |N_12    .945950E+00 |N_13    .000000E+00 |
 |-------------------------------------------------------------|
 |N_21    .234399E+00 |N_22    .972140E+00 |N_23    .000000E+00 |
 |-------------------------------------------------------------|
 |N_31    .000000E+00 |N_32    .000000E+00 |N_33    .935471E-01 |
 ---------------------------------------------------------------

 Note: In the above table, WEIGHT is computed based on the user
       defined acceleration for the first active Load Case


SOLUTION PARAMETERS
 NUMBER OF EIGENVALUES. ..... (NFR)=      2
 MASS TYPE: 1-LUMPED,2-CONSISTENT. . . . (MASS)=      1
```

MODE SHAPE PRINT FLAG. . . . . (MPRNT)= 1
INTERMEDIATE SOLUTION PRINT FLAG . . . .(IPR)= 0
STURM SEQUENCE CHECK FLAG. . . . . .(IFSS)= 0
MAXIMUM NUMBER OF ITERATIONS . . . . . (ITMAX)= 16
FREQUENCY SHIFT FLAG . . . . . (IFRSH)= 0
FREQUENCY SHIFT. . . . . .(FRSH)= .0000000E+00
CONVERGENCE TOLERANCE. . . . . .(RTOL)= .1000000E-04
COMPOSITE MODAL DAMPING CALC. FLAG . . .(IMDC)= 0
MODAL ACCELERATION FLAG. . . . . .(IMAM)= 0

SUBSPACE ITERATION

ITERATION NUMBER 1

ITERATION NUMBER 2

ITERATION NUMBER 3

ITERATION NUMBER 4

ITERATION NUMBER 5

ITERATION NUMBER 6

ITERATION NUMBER 7

CONVERGENCE REACHED FOR RTOL .1000E-04

FREQUENCY ANALYSIS
by
SUBSPACE ALGORITHM

FREQUENCY NUMBER	FREQUENCY (RAD/SEC)	FREQUENCY (CYCLES/SEC)	PERIOD (SECONDS)
1	.2692215E+02	.4284794E+01	.2333835E+00
2	.3501020E+02	.5572046E+01	.1794673E+00

MODE SHAPE NO. 1

NODE	X-DISPLACEMENT	Y-DISPLACEMENT	Z-DISPLACEMENT	X - ROTATION	Y - ROTATION	Z - ROTATION
1	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
2	.8135342E-08	-.1990127E-08	-.1065802E-03	.9102171E-03	.3720529E-02	-.5576808E-08
3	.6360475E-08	-.7719132E-08	-.4643525E-02	.9021059E-03	.3687064E-02	-.4514537E-08
4	.4811532E-08	-.1225672E-07	-.9099687E-02	.8765324E-03	.3582187E-02	-.3531722E-08
5	.3528295E-08	-.1570229E-07	-.1338124E-01	.8342764E-03	.3409011E-02	-.2630409E-08
6	.2487480E-08	-.1815474E-07	-.1741104E-01	.7757909E-03	.3169497E-02	-.1809624E-08
7	.1664486E-08	-.1970764E-07	-.2111228E-01	.7017536E-03	.2866174E-02	-.1070012E-08
8	.1040202E-08	-.2045275E-07	-.2440202E-01	.6130319E-03	.2503250E-02	-.4116889E-09
9	.5895550E-09	-.2048486E-07	-.2721540E-01	.5105786E-03	.2084289E-02	.1655684E-09
10	.2899842E-09	-.1989903E-07	-.2948227E-01	.3958247E-03	.1614818E-02	.6589513E-09
11	.1175999E-09	-.1879130E-07	-.3114821E-01	.2698506E-03	.1099036E-02	.1067419E-08
12	.4841188E-10	-.1725996E-07	-.3215691E-01	.1340544E-03	.5437280E-03	.1395051E-08
13	.5945633E-10	-.1539651E-07	-.3246487E-01	-.1026567E-04	-.4624737E-04	.1640209E-08
14	.1276187E-09	-.1330106E-07	-.3203340E-01	-.1613217E-03	-.6639918E-03	.1799524E-08
15	.2291835E-09	-.1107106E-07	-.3083060E-01	-.3178242E-03	-.1304665E-02	.1869371E-08
16	.3377449E-09	-.8809238E-08	-.2883568E-01	-.4783139E-03	-.1960969E-02	.1859188E-08
17	.4312420E-09	-.6607479E-08	-.2603036E-01	-.6415165E-03	-.2628307E-02	.1764369E-08
18	.4857663E-09	-.4561576E-08	-.2240156E-01	-.8063310E-03	-.3302002E-02	.1586148E-08
19	.4778213E-09	-.2773504E-08	-.1795074E-01	-.9712894E-03	-.3976523E-02	.1320326E-08
20	.3822282E-09	-.1344466E-08	-.1267040E-01	-.1135658E-02	-.4649367E-02	.9612560E-09
21	.2362818E-09	-.3913571E-09	-.6594455E-02	-.1291288E-02	-.5285758E-02	.5246607E-09
22	.1400683E-11	-.1852422E-11	.2431777E-03	-.1438618E-02	-.5888005E-02	.3797701E-11
23	.1280233E-11	-.3604128E-11	.1066728E-01	-.1602661E-02	-.6558979E-02	-.5400596E-11
24	-.6920561E-12	-.1307334E-10	.2198324E-01	-.1700739E-02	-.6959787E-02	-.6605455E-11
25	-.3170143E-11	-.2476047E-10	.3372891E-01	-.1728674E-02	-.7073651E-02	-.8215607E-11
26	-.6392417E-11	-.3935153E-10	.4541833E-01	-.1685087E-02	-.6894941E-02	-.1030033E-10
27	-.9302838E-11	-.5244983E-10	.5657975E-01	-.1574500E-02	-.6442149E-02	-.5628451E-11
28	-.1190215E-10	-.6407291E-10	.6677213E-01	-.1402578E-02	-.5739400E-02	-.9169933E-11
29	-.1603829E-10	-.8171465E-10	.7560348E-01	-.1176607E-02	-.4815549E-02	-.1328666E-10
30	-.1808690E-10	-.9049909E-10	.8273319E-01	-.9049125E-03	-.3703794E-02	.2595342E-11
31	-.1361638E-10	-.7236328E-10	.8787724E-01	-.5963256E-03	-.2441503E-02	.2078637E-10
32	-.7166759E-11	-.4575112E-10	.9081728E-01	-.2604166E-03	-.1069006E-02	.1292250E-10
33	-.5688162E-11	-.3913132E-10	.9140427E-01	.9260398E-04	.3730512E-03	-.4676235E-11
34	-.9281322E-11	-.5293130E-10	.8955867E-01	.4515469E-03	.1839825E-02	-.1296759E-10
35	-.9815730E-11	-.5389443E-10	.8527364E-01	.8060759E-03	.3290136E-02	.1149056E-10
36	-.7621176E-11	-.4340160E-10	.7861288E-01	.1146761E-02	.4682355E-02	.1744429E-11
37	-.9215519E-11	-.4814056E-10	.6970488E-01	.1463912E-02	.5978308E-02	-.7855886E-11
38	-.1450318E-10	-.6775731E-10	.5873983E-01	.1749021E-02	.7143181E-02	-.1715099E-10
39	-.1293509E-10	-.5917473E-10	.4595834E-01	.1994149E-02	.8147241E-02	.2645969E-10
40	-.5182761E-11	-.2512131E-10	.3165806E-01	.2194120E-02	.8965096E-02	.1680591E-10
41	-.1027604E-11	-.6047477E-11	.1618438E-01	.2337250E-02	.9550365E-02	7501924E-11
42	.4026385E-13	.1639787E-12	-.7630632E-04	.2425568E-02	.9911431E-02	4195625E-12
43	.1474633E-10	.6184824E-10	-.1674734E-01	.2453106E-02	.1002437E-01	.7363520E-10
44	.5348362E-10	.2221086E-09	-.3335687E-01	.2407851E-02	.9839960E-02	.1271780E-09
45	.1097314E-09	.4542177E-09	-.4939789E-01	.2286256E-02	.9343264E-02	.1650079E-09
46	.1776134E-09	.7337783E-09	-.6437079E-01	.2095392E-02	.8563207E-02	.1876164E-09
47	.2453075E-09	.1011762E-08	-.7782600E-01	.1841899E-02	.7526291E-02	.1619046E-09
48	.3011533E-09	.1241280E-08	-.8936609E-01	.1533429E-02	.6265287E-02	.1266576E-09
49	.3475063E-09	.1432074E-08	-.9863566E-01	.1179888E-02	.4821183E-02	.1141788E-09
50	.3882001E-09	.1599438E-08	-.1053739E+00	.7920729E-03	.3236963E-02	.9735331E-10
51	.4207658E-09	.1733198E-08	-.1093850E+00	.3818505E-03	.1560966E-02	.7197228E-10
52	.4308907E-09	.1774711E-08	-.1105584E+00	-.3818808E-04	-.1569641E-03	-.1944011E-10
53	.4185258E-09	.1723972E-08	-.1088675E+00	-.4561353E-03	-.1864504E-02	-.4464300E-10
54	.3971561E-09	.1636043E-08	-.1043723E+00	-.8590378E-03	-.3510501E-02	-.6621798E-10
55	.3686773E-09	.1518693E-08	-.9721757E-01	-.1234661E-02	-.5044905E-02	-.8160026E-10
56	.3136891E-09	.1293592E-08	-.8762635E-01	-.1570711E-02	-.6420968E-02	-.2002966E-09
57	.2376391E-09	.9810287E-09	-.7590605E-01	-.1857721E-02	-.7594184E-02	-.1949796E-09
58	.1658250E-09	.6855382E-09	-.6242449E-01	-.2085894E-02	-.8526713E-02	-.1783960E-09
59	.1027616E-09	.4256375E-09	-.4761110E-01	-.2247294E-02	-.9186090E-02	-.1496219E-09
60	.4985489E-10	.2075586E-09	-.3193941E-01	-.2335418E-02	-.9546595E-02	-.1229926E-09
61	1322325E-10	.5577186E-10	-.1592858E-01	-.2345205E-02	-.9586654E-02	-.6801560E-10
62	.5504266E-13	.2401867E-12	-.1147186E-03	-.2280671E-02	-.9322557E-02	-.2063079E-12
63	.5108306E-11	.2275536E-10	.1504377E-01	-.2159102E-02	-.8825160E-02	.2676616E-10
64	.2418727E-10	.1027125E-09	.2921889E-01	-.1992054E-02	-.8141195E-02	.7402329E-10
65	.6093367E-10	.2550242E-09	.4209155E-01	-.1777867E-02	-.7264872E-02	.1186784E-09
66	.1046051E-09	.4358506E-09	.5337929E-01	-.1528645E-02	-.6246424E-02	.1091312E-09
67	.1426271E-09	.5933650E-09	.6286465E-01	-.1250113E-02	-.5108077E-02	.8922859E-10
68	.1825055E-09	.7578734E-09	.7037163E-01	-.9491008E-03	-.3876688E-02	.1188314E-09
69	.2208105E-09	.9160148E-09	.7576699E-01	-.6328691E-03	-.2584384E-02	.8083635E-10
70	.2433385E-09	.1009303E-08	.7897913E-01	-.3100290E-03	-.1265048E-02	.3677126E-10
71	.2481510E-09	.1029787E-08	.7999304E-01	.1054053E-04	.4500110E-04	-.1127814E-10
72	.2474551E-09	.1027407E-08	.7885495E-01	.3194276E-03	.1308705E-02	.7556857E-11
73	.2406759E-09	.9997794E-09	.7567412E-01	.6080416E-03	.2488267E-02	-.4229893E-10
74	.2270084E-09	.9437624E-09	.7062007E-01	.8670023E-03	.3547886E-02	-.2933812E-10
75	.2077303E-09	.8643415E-09	.6392368E-01	.1088355E-02	.4452793E-02	-.7027768E-10
76	.1806173E-09	.7527582E-09	.5586256E-01	.1264133E-02	.5172112E-02	-.7115253E-10
77	.1486065E-09	.6206656E-09	.4678165E-01	.1387496E-02	.5676657E-02	-.9441161E-10
78	.1105429E-09	.4636023E-09	.3705626E-01	.1452578E-02	.5942800E-02	-.1027375E-09
79	.7209197E-10	.3047693E-09	.2709966E-01	.1454593E-02	.5950952E-02	-.9642659E-10
80	.3645843E-10	.1576391E-09	.1735407E-01	.1389794E-02	.5686009E-02	-.9054899E-10
81	.8814899E-11	.4305098E-10	.8268252E-02	.1261555E-02	.5162323E-02	-.5217348E-10
82	-.1033253E-11	.1417217E-11	.2593426E-03	.1074037E-02	.4396136E-02	.2127607E-11

83	-.1704371E-09	.1525823E-09	-.3981033E-02	.9397780E-03	3845998E-02	.2044976E-09
84	-.2877734E-09	.5178949E-09	-.7663941E-02	.8076398E-03	.3306081E-02	.4426119E-09
85	-.3551453E-09	.1086544E-08	-.1079302E-01	.6785341E-03	.2778221E-02	.6241906E-09
86	-.3900570E-09	.1786224E-08	-.1338588E-01	.5527696E-03	.2262860E-02	.7122562E-09
87	-.4071358E-09	.2560306E-08	-.1545732E-01	.4303425E-03	.1761375E-02	.7758391E-09
88	-.4036575E-09	.3422868E-08	-.1701887E-01	.3115851E-03	.1276885E-02	.8958715E-09
89	-.3863746E-09	.4337975E-08	-.1809212E-01	.1976515E-03	.8102424E-03	.8822930E-09
90	-.3782720E-09	.5214657E-08	-.1869488E-01	.8900688E-04	.3649191E-03	.8185277E-09
91	-.3802059E-09	.6056211E-08	-.1885122E-01	-.1431631E-04	-.5672159E-04	.8098447E-09
92	-.3973824E-09	.6832927E-08	-.1858609E-01	-.1111125E-03	-.4531663E-03	.6828336E-09
93	-.4509313E-09	.7460385E-08	-.1792797E-01	-.2007471E-03	-.8206652E-03	.5043261E-09
94	-.5431910E-09	.7932990E-08	-.1690795E-01	-.2831360E-03	-.1156967E-02	.3634373E-09
95	-.6815909E-09	.8217209E-08	-.1555673E-01	-.3572042E-03	-.1460444E-02	.1158122E-09
96	-.8844451E-09	.8238891E-08	-.1391233E-01	-.4224726E-03	-.1728156E-02	-.1768578E-09
97	-.1158347E-08	.7969794E-08	-.1201249E-01	-.4786404E-03	-.1958190E-02	-.4835331E-09
98	-.1509931E-08	.7383816E-08	-.9893935E-02	-.5252783E-03	-.2149098E-02	-.8286222E-09
99	-.1952584E-08	.6430935E-08	-.7601383E-02	-.5617884E-03	-.2299098E-02	-.1240223E-08
100	-.2494976E-08	.5065899E-08	-.5175988E-02	-.5880905E-03	-.2407111E-02	-.1677413E-08
101	-.3146596E-08	.3253889E-08	-.2659626E-02	-.6039431E-03	-.2472308E-02	-.2158095E-08
102	-.3917789E-08	.9547657E-09	-.1009086E-03	-.6091789E-03	-.2494067E-02	-.2684547E-08
103	.1627348E-07	-.3978305E-08	-.1045962E-03	.9103313E-03	.3720501E-02	-.5589733E-08
104	.0000000E+00	.0000000E+00	-.1046953E-03	.9101026E-03	.3720557E-02	-.5586185E-08
105	.0000000E+00	.0000000E+00	.2427020E-03	-.1438884E-02	-.5887939E-02	-.9962168E-13
106	.0000000E+00	.0000000E+00	.2431390E-03	-.1438352E-02	-.5888069E-02	-.3699282E-11
107	.0000000E+00	.0000000E+00	-.7981089E-04	.2425655E-02	.9911409E-02	-.2096905E-12
108	.0000000E+00	.0000000E+00	-.7988144E-04	.2425480E-02	.9911451E-02	-.2099521E-12
109	.0000000E+00	.0000000E+00	-.1282579E-03	-.2280531E-02	-.9322590E-02	.9977725E-13
110	.0000000E+00	.0000000E+00	-.1282030E-03	-.2280811E-02	-.9322521E-02	.1069964E-12
111	.0000000E+00	.0000000E+00	.2591206E-03	.1073753E-02	.4396205E-02	-.2403981E-11
112	.0000000E+00	.0000000E+00	.2589818E-03	.1074320E-02	.4396066E-02	.2763743E-12
113	.0000000E+00	.0000000E+00	-.1006075E-03	-.6090689E-03	-.2494094E-02	-.2690493E-08
114	-.7840311E-08	.1912409E-08	-.1003885E-03	-.6092887E-03	-.2494040E-02	-.2693222E-08
115	.0000000E+00	.0000000E+00	.0000000E+00	-.4551651E-03	-.1860248E-02	-.5589733E-08
116	.0000000E+00	.0000000E+00	.0000000E+00	-.4550513E-03	-.1860278E-02	-.5586185E-08
117	.0000000E+00	.0000000E+00	.0000000E+00	.7194418E-03	.2943970E-02	-.9962168E-13
118	.0000000E+00	.0000000E+00	.0000000E+00	.7191761E-03	.2944035E-02	-.3699282E-11
119	.0000000E+00	.0000000E+00	.0000000E+00	-.1212827E-02	-.4955704E-02	-.2096905E-12
120	.0000000E+00	.0000000E+00	.0000000E+00	-.1212740E-02	-.4955726E-02	-.2099521E-12
121	.0000000E+00	.0000000E+00	.0000000E+00	.1140265E-02	.4661295E-02	.9977725E-13
122	.0000000E+00	.0000000E+00	.0000000E+00	.1140405E-02	.4661261E-02	.1069964E-12
123	.0000000E+00	.0000000E+00	.0000000E+00	-.5368767E-03	-.2198102E-02	-.2403981E-11
124	.0000000E+00	.0000000E+00	.0000000E+00	-.5371598E-03	-.2198033E-02	.2763743E-12
125	.0000000E+00	.0000000E+00	.0000000E+00	.3045345E-03	.1247047E-02	-.2690493E-08
126	.0000000E+00	.0000000E+00	.0000000E+00	.3046441E-03	.1247019E-02	-.2693222E-08

MODE SHAPE NO. 2

NODE	X-DISPLACEMENT	Y-DISPLACEMENT	Z-DISPLACEMENT	X - ROTATION	Y - ROTATION	Z - ROTATION
1	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
2	.1499060E-07	-.3667182E-08	-.2211118E-03	.1671427E-02	.6832076E-02	-.1027616E-07
3	.1172187E-07	-.1422790E-07	-.8549071E-02	.1654513E-02	.6762516E-02	-.8324449E-08
4	.8868031E-08	-.2259868E-07	-.1670842E-01	.1601422E-02	.6545012E-02	-.6517222E-08
5	.6502521E-08	-.2896043E-07	-.2450746E-01	.1514104E-02	.6187382E-02	-.4858435E-08
6	.4582935E-08	-.3349354E-07	-.3178802E-01	.1394024E-02	.5695833E-02	-.3346502E-08
7	.3064333E-08	-.3636890E-07	-.3839610E-01	.1243300E-02	.5078535E-02	-.1983037E-08
8	.1911870E-08	-.3775427E-07	-.4417202E-01	.1064613E-02	.4347779E-02	-.7681983E-09
9	.1079637E-08	-.3782324E-07	-.4899436E-01	.8609677E-03	.3515205E-02	.2980274E-09
10	.5262398E-09	-.3675033E-07	-.5273979E-01	.6364546E-03	.2596883E-02	.1210003E-08
11	.2077201E-09	-.3471240E-07	-.5531980E-01	.3945811E-03	.1606708E-02	.1965489E-08
12	.7992673E-10	-.3189047E-07	-.5665223E-01	.1395361E-03	.5638609E-03	.2572175E-08
13	.1005486E-09	-.2845322E-07	-.5668476E-01	-.1246484E-03	-.5159974E-03	.3026607E-08
14	.2269179E-09	-.2458554E-07	-.5538394E-01	-.3930368E-03	-.1613440E-02	.3322446E-08
15	.4153111E-09	-.2046726E-07	-.5273527E-01	-.6616248E-03	-.2712903E-02	.3453500E-08
16	.6169294E-09	-.1628828E-07	-.4875434E-01	-.9262123E-03	-.3794931E-02	.3435809E-08
17	.7908436E-09	-.1221920E-07	-.4346706E-01	-.1183061E-02	-.4845221E-02	.3261305E-08
18	.8926836E-09	-.8437895E-08	-.3691647E-01	-.1428844E-02	-.5849883E-02	.2931559E-08
19	.8789415E-09	-.5133279E-08	-.2917771E-01	-.1659931E-02	-.6794769E-02	.2440338E-08
20	.7036664E-09	-.2490112E-08	-.2031541E-01	-.1874019E-02	-.7671230E-02	.1780398E-08
21	.4355702E-09	-.7248668E-09	-.1045982E-01	-.2060253E-02	-.8432980E-02	.9725200E-09
22	.2487096E-11	-.3351187E-11	.2675440E-03	-.2220011E-02	-.9086206E-02	.7149472E-11
23	-.1862771E-10	.2267117E-10	.1600188E-01	-.2370067E-02	-.9699840E-02	.1776310E-10
24	-.3828385E-10	.6818615E-10	.3239450E-01	-.2414179E-02	-.9880124E-02	.3004744E-10
25	-.5786151E-10	.1291765E-09	.4870957E-01	-.2347673E-02	-.9607897E-02	.3635610E-10
26	-.7380758E-10	.1949529E-09	.6420841E-01	-.2176586E-02	-.8907859E-02	.3690313E-10
27	-.8429770E-10	.2693696E-09	.7821493E-01	-.1911946E-02	-.7824623E-02	.4930910E-10
28	-.9051320E-10	.3447545E-09	.9013184E-01	-.1567124E-02	-.6415163E-02	.3846153E-10
29	-.9731065E-10	.3984383E-09	.9947113E-01	-.1158833E-02	-.4746069E-02	.2325695E-10
30	-.9917581E-10	.4507206E-09	.1058622E+00	-.7057919E-03	-.2892226E-02	.3881579E-10
31	-.8980587E-10	.5258371E-09	.1090630E+00	-.2275360E-03	-.9354967E-03	.5385134E-10
32	-.7699929E-10	.5911613E-09	.1089731E+00	.2554447E-03	.1038395E-02	.2811815E-10
33	-.7089139E-10	.6047296E-09	.1056324E+00	.7220460E-03	.2944608E-02	-.9831264E-11
34	-.7114474E-10	.5682401E-09	.9923243E-01	.1150475E-02	.4695219E-02	-.3365122E-10
35	-.6796401E-10	.5228258E-09	.9009621E-01	.1520896E-02	.6210622E-02	-.2033140E-10
36	-.6098304E-10	.4713825E-09	.7868294E-01	.1815568E-02	.7415058E-02	-.3849148E-10
37	-.5552039E-10	.3943958E-09	.6556683E-01	.2017921E-02	.8241840E-02	-.5121655E-10
38	-.4989632E-10	.3014035E-09	.5142700E-01	.2113960E-02	.8633719E-02	-.5747959E-10
39	-.4233827E-10	.2031479E-09	.3702510E-01	.2091939E-02	.8544255E-02	-.6113651E-10
40	-.3202809E-10	.1056841E-09	.2320333E-01	.1943199E-02	.7938413E-02	-.5119347E-10
41	-.1933927E-10	.3285293E-10	.1079909E-01	.1674915E-02	.6843549E-02	-.3073174E-10
42	-.5776396E-12	-.1747124E-11	.6087764E-03	.1294186E-02	.5288554E-02	-.3753781E-11
43	-.1478783E-09	-.5651452E-09	-.6752242E-02	.8728668E-03	.3564979E-02	-.6801131E-09
44	-.5071773E-09	-.1991875E-08	-.1132659E-01	.4778669E-03	.1951070E-02	-.1102647E-08
45	-.9923533E-09	-.3928634E-08	-.1331284E-01	.1141580E-03	.4651740E-03	-.1330327E-08
46	-.1529150E-08	-.6080372E-08	-.1299851E-01	-.1969110E-03	-.8053860E-03	-.1378633E-08
47	-.2060397E-08	-.8209861E-08	-.1075109E-01	-.4524710E-03	-.1850386E-02	-.1304930E-08
48	-.2533698E-08	-.1010987E-07	-.6952752E-02	-.6505509E-03	-.2660534E-02	-.1091158E-08
49	-.2899559E-08	-.1158062E-07	-.2007684E-02	-.7893232E-03	-.3227752E-02	-.7680756E-09
50	-.3128531E-08	-.1249917E-07	.3679660E-02	-.8680288E-03	-.3549205E-02	-.3955359E-09
51	-.3209360E-08	-.1281962E-07	.9697504E-02	-.8867974E-03	-.3625466E-02	-.1385075E-10
52	-.3144192E-08	-.1255146E-07	.1564235E-01	-.8468735E-03	-.3461882E-02	.3490706E-09
53	-.2948042E-08	-.1175506E-07	.2112015E-01	-.7506476E-03	-.3068578E-02	.6524104E-09
54	-.2646996E-08	-.1053727E-07	.2576008E-01	-.6018221E-03	-.2460102E-02	.8824536E-09
55	-.2271829E-08	-.9023503E-08	.2921825E-01	-.4049450E-03	-.1655060E-02	.1027847E-08
56	-.1839335E-08	-.7289653E-08	.3118491E-01	-.1656158E-03	-.6748833E-03	.1164753E-08
57	-.1386615E-08	-.5470912E-08	.3138716E-01	.1111174E-03	.4556576E-03	.1134846E-08
58	-.9596898E-09	-.3762514E-08	.2959499E-01	.4186366E-03	.1712136E-02	.1026257E-08
59	-.5874653E-09	-.2281721E-08	.2561872E-01	.7510256E-03	.3070351E-02	.8473223E-09
60	-.2837196E-09	-.1086429E-08	.1930519E-01	.1102732E-02	.4508888E-02	.6650381E-09
61	-.7741421E-10	-.2817179E-09	.1059172E-01	.1453259E-02	.5940675E-02	.3504315E-09
62	-.3766626E-12	-.1840799E-11	-.4903015E-03	.1798853E-02	.7352740E-02	-.1148482E-11
63	-.8285978E-10	-.4481798E-09	-.1380835E-01	.2087619E-02	.8530606E-02	-.5316086E-09
64	-.3293166E-09	-.1576348E-08	-.2870389E-01	.2261340E-02	.9239658E-02	-.8708811E-09
65	-.6777550E-09	-.3135543E-08	-.4436983E-01	.2313851E-02	.9454125E-02	-.1079319E-08
66	-.1082161E-08	-.4917266E-08	-.5997066E-01	.2244348E-02	.9170164E-02	-.1152189E-08
67	-.1491783E-08	-.6707454E-08	-.7471005E-01	.2063131E-02	.8429215E-02	-.1093994E-08
68	-.1871515E-08	-.8356077E-08	-.8787220E-01	.1783291E-02	.7284320E-02	-.9799056E-09
69	-.2183269E-08	-.9711540E-08	-.9882861E-01	.1420243E-02	.5800808E-02	-.7246805E-09
70	-.2389568E-08	-.1061499E-07	-.1070785E+00	.9924419E-03	.4052406E-02	-.4118558E-09
71	-.2474191E-08	-.1099846E-07	-.1122472E+00	.5198647E-03	.2120837E-02	-.7035992E-10
72	-.2452806E-08	-.1092512E-07	-.1141014E+00	.2419062E-04	.9274578E-04	.1619747E-09
73	-.2330056E-08	-.1041331E-07	-.1125548E+00	-.4734587E-03	-.1941202E-02	.4816705E-09
74	-.2118598E-08	-.9517091E-08	-.1076719E+00	-.9501872E-03	-.3891848E-02	.6467476E-09
75	-.1839317E-08	-.8318779E-08	-.9966699E-01	-.1385435E-02	-.5670986E-02	.8603578E-09
76	-.1509064E-08	-.6893099E-08	-.8888593E-01	-.1758604E-02	-.7197789E-02	.9334986E-09
77	-.1157230E-08	-.5357366E-08	-.7582901E-01	-.2051472E-02	-.8395168E-02	.9963805E-09
78	-.8023692E-09	-.3792879E-08	-.6109684E-01	-.2248040E-02	-.9198645E-02	.9689283E-09
79	-.4780396E-09	-.2339740E-08	-.4539133E-01	-.2335078E-02	-.9554069E-02	.8537968E-09
80	-.2160499E-09	-.1134083E-08	-.2949458E-01	-.2302063E-02	-.9419156E-02	.6588710E-09
81	-.4384390E-10	-.3075204E-09	-.1423466E-01	-.2148738E-02	-.8793133E-02	.3680764E-09
82	.2832300E-11	-.7417327E-11	-.4093737E-03	-.1881395E-02	-.7700682E-02	-.9054815E-11
83	.5105576E-09	-.7083154E-09	.7087344E-02	-.1677640E-02	-.6865608E-02	-.1073989E-08

84	.7772641E-09	-.2393659E-08	.1372403E-01	-.1470070E-02	-.6017352E-02	-.2035475E-08
85	.8420128E-09	-.4890791E-08	.1947503E-01	-.1260407E-02	-.5159953E-02	-.2751518E-08
86	.7673517E-09	-.7934523E-08	.2434118E-01	-.1049591E-02	-.4295952E-02	-.3162103E-08
87	.6130713E-09	-.1128788E-07	.2832043E-01	-.8381572E-03	-.3429897E-02	-.3386135E-08
88	.4092145E-09	-.1483647E-07	.3140636E-01	-.6273460E-03	-.2569847E-02	-.3576419E-08
89	.1909921E-09	-.1839620E-07	.3361465E-01	-.4199300E-03	-.1720271E-02	-.3406422E-08
90	.2891552E-10	-.2168756E-07	.3495614E-01	-.2175103E-03	-.8906158E-03	-.3037258E-08
91	-.5111764E-10	-.2462404E-07	.3545702E-01	-.2095222E-04	-.8854783E-04	-.2684554E-08
92	-.2550336E-10	-.2707458E-07	.3514887E-01	.1666610E-03	.6798375E-03	-.2036625E-08
93	.1610369E-09	-.2881701E-07	.3407236E-01	.3433290E-03	.1404094E-02	-.1241068E-08
94	.5206939E-09	-.2980683E-07	.3227720E-01	.5081249E-03	.2076688E-02	-.4963669E-09
95	.1070989E-08	-.2996393E-07	.2981572E-01	.6581910E-03	.2691481E-02	.4651053E-09
96	.1845547E-08	-.2914756E-07	.2675677E-01	.7919097E-03	.3239854E-02	.1497830E-08
97	.2848584E-08	-.2733007E-07	.2317196E-01	.9080726E-03	.3715472E-02	.2517681E-08
98	.4081968E-08	-.2450537E-07	.1913352E-01	.1005278E-02	.4113249E-02	.3556614E-08
99	.5557895E-08	-.2063975E-07	.1473114E-01	.1081849E-02	.4427709E-02	.4656818E-08
100	.7270736E-08	-.1571833E-07	.1004962E-01	.1137275E-02	.4655184E-02	.5719743E-08
101	.9218844E-08	-.9760167E-08	.5176528E-02	.1170797E-02	.4792908E-02	.6773244E-08
102	.1139865E-07	-.2785725E-08	.2134670E-03	.1181908E-02	.4838942E-02	.7816189E-08
103	.2998635E-07	-.7330698E-08	-.2174711E-03	.1671665E-02	.6832017E-02	-.1029990E-07
104	.0000000E+00	.0000000E+00	-.2175910E-03	.1671189E-02	.6832133E-02	-.1029339E-07
105	.0000000E+00	.0000000E+00	.2669666E-03	-.2220303E-02	-.9086134E-02	-.3652713E-12
106	.0000000E+00	.0000000E+00	.2675699E-03	-.2219719E-02	-.9086277E-02	-.6786345E-11
107	.0000000E+00	.0000000E+00	.6061020E-03	.1293524E-02	.5288716E-02	.1731558E-11
108	.0000000E+00	.0000000E+00	.6062135E-03	.1294849E-02	.5288391E-02	.2023110E-11
109	.0000000E+00	.0000000E+00	-.4788568E-03	.1799376E-02	.7352612E-02	.6440326E-12
110	.0000000E+00	.0000000E+00	-.4791272E-03	.1798329E-02	.7352868E-02	.5009207E-12
111	.0000000E+00	.0000000E+00	-.4090522E-03	-.1880947E-02	-.7700791E-02	.9039452E-11
112	.0000000E+00	.0000000E+00	-.4087753E-03	-.1881841E-02	-.7700572E-02	.1536323E-13
113	.0000000E+00	.0000000E+00	.2128495E-03	.1181676E-02	.4838998E-02	.7826946E-08
114	.2281107E-07	-.5571950E-08	.2124515E-03	.1182141E-02	.4838885E-02	.7833020E-08
115	.0000000E+00	.0000000E+00	.0000000E+00	-.8358312E-03	-.3416004E-02	-.1029990E-07
116	.0000000E+00	.0000000E+00	.0000000E+00	-.8355946E-03	-.3416067E-02	-.1029339E-07
117	.0000000E+00	.0000000E+00	.0000000E+00	.1110152E-02	.4543067E-02	-.3652713E-12
118	.0000000E+00	.0000000E+00	.0000000E+00	.1109859E-02	.4543138E-02	-.6786345E-11
119	.0000000E+00	.0000000E+00	.0000000E+00	-.6467620E-03	-.2644358E-02	.1731558E-11
120	.0000000E+00	.0000000E+00	.0000000E+00	-.6474244E-03	-.2644196E-02	.2023110E-11
121	.0000000E+00	.0000000E+00	.0000000E+00	-.8996881E-03	-.3676306E-02	.6440326E-12
122	.0000000E+00	.0000000E+00	.0000000E+00	-.8991647E-03	-.3676434E-02	.5009207E-12
123	.0000000E+00	.0000000E+00	.0000000E+00	.9404737E-03	.3850395E-02	.9039452E-11
124	.0000000E+00	.0000000E+00	.0000000E+00	.9409205E-03	.3850286E-02	.1536323E-13
125	.0000000E+00	.0000000E+00	.0000000E+00	-.5908378E-03	-.2419499E-02	.7826946E-08
126	.0000000E+00	.0000000E+00	.0000000E+00	-.5910695E-03	-.2419439E-02	.7833020E-08

SOLUTION TIME LOG (sec)

INPUT PHASE	2
ASSEMBLAGE OF THE STIFFNESS MATRIX	0
ASSEMBLAGE OF THE MASS MATRIX	1
DECOMPOSITION OF THE STIFFNESS MATRIX	0
EIGENVALUE SOLUTION	0
OUTPUT PHASE	1
TOTAL SOLUTION TIME	4

Bajo las pilas 3 del Viaducto E-1508.5, tableros izquierdo y derecho, pasa una tubería de gas, dado que en Proyecto no esta previsto su desvío, se ha optado por profundizar las zapatas 2.40 metros, de forma que su cara superior quede por debajo de dicha tubería, para la ejecución de esta solución será necesario apear la citada tubería mientras se realizan las zapatas.

Debido al incremento de longitud de las pilas 3, se produce una disminución de su rigidez, por lo que el reparto de los esfuerzos transversales de viento, se modifican, produciéndose una disminución en las pilas tres y un aumento en las restantes.

Se ha calculado la estructura con la nueva rigidez de la pila, para los esfuerzos transversales de viento, manteniéndose los esfuerzos verticales y longitudinales de Proyecto.

Con los datos obtenidos se han comprobado los fustes y las zapatas de cada una de las pilas, siendo todo valido, excepto las zapatas de las pilas 1 que están semienterradas, esto es debido no solo al nuevo reparto de cargas, sino a que en el proyecto solo se ha considerado el empuje de las tierras pero no el peso que gravita sobre la zapata.

Las nuevas zapatas 1 son las siguientes

Tablero Izquierdo - 11 x 8 x 2.5 metros con armaduras inferiores en ambas direcciones de 6 ϕ 32 por metro

Tablero derecho - 14 x 8.5 x 2.5 metros con armaduras inferiores en ambas direcciones de 6 ϕ 32 por metro

El resto de dimensiones y armaduras se mantiene iguales a las de proyecto

Alcobendas 24 de noviembre de 1999

Fdo. Manuel Torres Gutierrez

L.A.V. Madrid - Barcelona

Subtramo XV

Puente E-1508.5: <u>Tablero Izquierdo</u>

Modificación de la altura de la pila-3

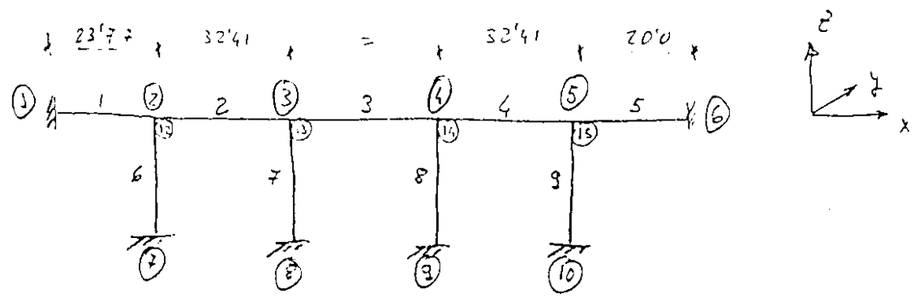
(ΔH = 2'40 m)

1.- Introducción

La nueva altura de la pila-3 es de 19'23 m, debido al descenso de 2'40 m de la posición de su cimentación con relación a la del Proyecto. Esto produce un cambio en el reparto sobre las pilas, del empuje del viento actuante sobre el Tablero, al variar la rigidez de esta pila nº 3.

En tanto que, las cargas verticales en cabeza de pila no se ven afectadas por esta modificación.

1.1.- Modelo para el reparto del viento



Se consideran las mismas características mecánicas adoptadas en proyecto

Barras 1 a 5 (tablero): $A = 8'8\ m^2$; $I_z = 32'05\ m^4$

$I_y = 4'21\ m^4$; $I_x = 5'45\ m^4$

Barras 6 a 9 (Pilas): $A = 8'43\ m^2$; $I_z = 15'71\ m^4$

$I_y = 2'12\ m^4$; $I_x = 7'7\ m^4$

$E = 3'5 \cdot 10^7\ t/m^2$

$\nu = 0'2$

- Dimensiones geométricas

Vano	Luz (m)	Pila	Altura (m)
1	23'72	1	16'20
2	32'41	2	17'60
3	32'41	3	19'30
4	32'41	4	17'80
5	20'0		

- Coacciones: Nudos 1 y 6 $u_x = u_y = u_z = \theta_x = 0$

Nudos 2, 3, 4 y 5 $u_x = u_y = u_z = \theta_x = \theta_y = \theta_z = 0$

- Empuje del viento: Sobre las barras del tablero (barras 1 a 5)

$P = 116$ t/ml.

- Con estos datos, se calcula la estructura, obteniendo las esfuerzos y reacciones que aparecen en los listados. Con estos esfuerzos junto a los verticales debidos a sobrecargas tomados del Proyecto, se comprueban los fustes y zapatas de cada una de las pilas.

2.- Cálculo de los fustes

2.1.- Esfuerzos

Llamando Hx = Esfuerzos longitudinales; Hy = Esfuerzos del viento, Mx = Mom. produc.por Hy y My = Mom. Produc. Por Hx, por fuste, los esfuerzos en coronación serán:

	Reacc. Máxima en E.L.S.				Reacc. Minima en E.L.S.				Altura
Pila	N (t)	Hx (t)	Hy (t)	Mx(viento)	N (t)	Hx (t)	Hy (t)	Mx(viento)	Pila (m)
1	1557.8	32.1	41.2	18.5	399.5	32.1	41.2	18.5	16.2
2	1650.9	33.6	59.9	15.1	504.6	33.6	59.9	15.1	17.0
3	1657.3	33.8	48.5	17.9	504.6	33.8	48.5	17.9	19.2
4	1547.8	32.4	37.2	27.6	399.5	32.4	37.2	27.6	17.7

En arranques:

	Reacc. Máxima en E.L.S.					Reacc. Minima en E.L.S.				
Pila	N (t)	Hx (t)	Hy (t)	My (mt)	Mx (viento)	N (t)	Hx (t)	Hy (t)	My (mt)	Mx (viento)
1	1899	32.1	47.0	1592.5	696.2	740.9	32.1	47.0	1592.5	696.2
2	2009	33.6	66.0	571.2	1055.2	862.9	33.6	66.0	571.2	1055.2
3	2062	33.8	55.4	649.0	979.7	909.2	33.8	55.4	649.0	979.7
4	1921	32.4	43.6	573.5	687.2	772.5	32.4	43.6	573.5	687.2

	Reacc. Máxima en E.L.U					Reacc. Minima en E.L.U.				
Pila	N (t)	Hx (t)	Hy (t)	My (mt)	Mx (viento)	N (t)	Hx (t)	Hy (t)	My (mt)	Mx (viento)
1	2849	48.2	70.5	2388.8	1044.3	1111.4	48.2	70.5	2388.8	1044.3
2	3014	50.4	99.0	856.8	1582.8	1294.3	50.4	99.0	856.8	1582.8
3	3093	50.7	83.1	973.4	1469.5	1363.9	50.7	83.1	973.4	1469.5
4	2881	48.6	65.4	860.2	1030.8	1158.8	48.6	65.4	860.2	1030.8

2.2.- Excentricidad adicional de pandeo

El radio de giro de la sección es

$A = 8'42\ m^2$

$I = 2'117\ m^4$ $\Rightarrow$ $i = \sqrt{\frac{I}{A}} = 0'50$

$l_o = 2l$

$\lambda = \frac{l_o}{i}$ ($\lambda_{max} = \frac{2 \cdot 12'2}{0'5} = 76'8 > 35$)

La excentricidad adicional será

$e_{ax} = \left(0'85 + \frac{f_{yd}}{12000}\right) \frac{1 + 20 \cdot e_{ox}}{1 + 10 \cdot e_{ox}} \cdot \frac{l_o^2}{i} \cdot 10^{-4}$

con $f_{yd} = \frac{511'5}{1'15} = 4'434\ t/m^2$; $h = 1'80\ m$.

$e_{ax} = 1'22 \frac{1'8 + 20 e_{ox}}{1'8 + 10 e_{ox}} \cdot \frac{l_o^2}{0'5} \cdot 10^{-4} = 21'4 \frac{1'8 + 20 e_{ox}}{1'8 + 10 e_{ox}} \cdot l_o^2 \cdot 10^{-4}$

$e_{Tx} = e_{ox} + e_{ax}$

2.3.- Esfuerzos totales en arranques

Teniendo en cuenta la excentricidad de segundo orden, los esfuerzos totales serán:

	Reacc. Máxima en E.L.U					Reacc. Mínima en E.L.U.				
Pila	N (t)	My (t)	eox (m)	eax (m)	etx (m)	N (t)	My (t)	eox (m)	eax (m)	etx (m)
1	2849	2388.8	0.839	0.117	0.955	1111.4	2388.8	2.149	0.123	2.273
2	3014	856.8	0.284	0.114	0.398	1294.3	856.8	0.662	0.126	0.788
3	3093	973.4	0.315	0.147	0.462	1363.9	973.4	0.714	0.162	0.876
4	2881	860.2	0.299	0.124	0.423	1158.8	860.2	0.742	0.138	0.880

	Reacc. Máxima en E.L.U.			Reacc. Mínima en E.L.U.		
Pila	N (t)	etx (m)	ety (m)	N (t)	etx (m)	ety (m)
1	2849	0.96	0.37	1111.4	2.273	0.94
2	3014	0.40	0.53	1294.3	0.788	1.22
3	3093	0.46	0.48	1363.9	0.876	1.08
4	2881	0.42	0.36	1158.8	0.880	0.89

2.4.- Curvas equirresistentes de la sección

Mediante programa se determinan las curvas equirresistentes de la sección, para un hormigón H-300, acero AEH-500S, con control normal, y disponiendo como armadura la que aparece en los planos: 82 Φ 25

2.5.- Comprobación frente a la rotura por flexión

Comparando los valores anteriores con las curvas equirresistentes de la sección, se puede concluir que la seguridad es mas que suficiente.

3.- Cálculo de la cimentación de las pilas

Ancho de los fustes = 5 m.

Canto de los fustes = 1.8 m.

3.1.- Dimensiones de las zapatas

Pila	Longitud (m)	Ancho (m)	Canto (m)	Peso Propio	Peso Tierras
1	11	8.8	2.5	605.0	1742.4
2	9	7	2.5	393.8	63
3	9	7	2.5	393.8	63
4	9	7	2.5	393.8	63

3.2.- Esfuerzos en cara superior de zapata

Pila	N(t)	Hx(t)	Hy(viento)	My	Mx (viento)
1	3642	32.1	47.0	1592.5	696.2
2	2072	33.6	66.0	571.2	1055.2
3	2125	33.8	55.4	649.0	979.7
4	1984	32.4	43.6	573.5	687.2

3.3.- Esfuerzos en cara inferior de zapata

Pila	N(t)	Hx(t)	Hy(viento)	My	Mx (viento)	ex (m)	ey(m)
1	4246.6	32.1	47.0	1672.8	813.8	0.394	0.192
2	2465.9	33.6	66.0	655.2	1220.3	0.266	0.495
3	2518.7	33.8	55.4	733.5	1118.2	0.291	0.444
4	2377.6	32.4	43.6	654.5	796.2	0.275	0.335

3.4.- Tension cobaricentrica, flectores y armaduras

Para un hormigón fck = 250 γ_c = 1.5

y acero fyk = 5100 γ_s = 1.15

γ_f = 1.6

Pila	σ_{cob} (t/m^2)	M_1 (mt/m)	M_2 (mt/m)	A_{1_1} (cm^2/m)	A_{1_2} (cm^2/m)	A_{2_1} (cm^2/m)	A_{2_2} (cm^2/m)
1	49.92	310.4	307.1	47.7	0.0	47.2	0.0
2	47.59	170.3	156.3	29.9	0.0	28.1	0.0
3	48.38	173.5	159.3	30.3	0.0	28.5	0.0
4	44.25	156.5	143.7	28.1	0.0	26.3	0.0

Armadura A1 en direcc. Longitudinal del puente

Armadura A2 en direcc. Transversal del puente

4.- Listados de ordenador

Pilas estructura Izquierda E-1508.5

COORDENADAS

Nudo	Abcisa	Ordenada
1	1.970	-0.900
2	2.500	-0.370
3	2.500	0.370
4	1.970	0.900
5	-1.970	0.900
6	-2.500	0.370
7	-2.500	-0.370
8	-1.900	-0.900

Perimetro = 12.34
AREA = 8.420
Xg = 0.005
Yg = 0.002
Ix = 2.117274
Iy = 15.624560

log

```
/input,reales,log
/input,nodos,log
/input,elemento,log
eplot
/VIEW, 1 ,1,1,1
/ANG, 1
/REP
/input,viento,log

FINISH
/POST1
PRRSOL,
```

reales

```
/prep7
et, 1, beam4, , , , , , , 1,
  R,    1 ,  8.8 , 32.05, 4.21 ,  2. ,  8.3 ,
RMORE,  0 ,  6.06
  R,    2 ,  8.43 , 15.71, 2.12,  1.8 ,  5,
RMORE,  0 ,  7.7 ,     0 ,     0 , ,
mp, EX, 1, 3500000, , , ,
mp, alpx, 1, .00001, , , ,
mp, dens, 1, 0, , , ,
mp, gxy, 1, 1480000, , , ,
```

nodos

```
 N,    1 ,
 N,    2 , 23.77
 N,    3 , 56.18
 N,    4 , 88.59
 N,    5 , 121
 N,    6 , 141
 N,    7 , 23.77,,-16.2
 N,    8 , 56.18,,-17
 N,    9 , 88.59,,-19.3
 N,   10 , 121,,-17.8
ngen,2,10,2,5,1
   cp,1,ux,2,12
   cplgen,1,uy,uz,rotx,rotz
   cp,6,ux,3,13
   cplgen,6,uy,uz,rotx,rotz
   cp,11,ux,4,14
   cplgen,11,uy,uz,rotx,rotz
   cp,16,ux,5,15
   cplgen,16,uy,uz,rotx,rotz
```

elemento

```
C***      BARRAS LONGITUDINALES
!
!
TYPE,1
MAT, 1
REAL, 1
EN,         1 ,      1 ,       2
EN,         2 ,      2 ,       3
EN,         3 ,      3 ,       4
EN,         4 ,      4 ,       5
EN,         5 ,      5 ,       6
!
! Pilas
!
real,2
EN,         6, 7, 12
engen,      1, 4, 1, 6
```

viento

```
finish
/SOLU
D,    1 , Ux,,,,,uy,uz,rotx
D,    6 , Ux,,,,,uy,uz,rotx
D,    7, all
D,    8, all
D,    9, all
D,    10, all
esel,s,elem,,1,5,1
sfbeam,all,2,pres,1.6,1.6
esel,all
solve
```

T REACTION SOLUTIONS PER NODE

*** POST1 TOTAL REACTION SOLUTION LISTING *****

AD STEP= 1 SUBSTEP= 1
IME= 1.0000 LOAD CASE= 0

E FOLLOWING X,Y,Z SOLUTIONS ARE IN GLOBAL COORDINATES

ODE	FX	FY	FZ	MX	MY	MZ
1	.00000	19.247	.00000	-35.026		
6	.00000	19.589	.00000	-44.109		
7	.00000	41.177	.00000	-648.61	.00000	24.217
8	.00000	59.883	.00000	-1002.9	.00000	10.677
9	.00000	48.459	.00000	-917.36	.00000	-2.3373
10	.00000	37.245	.00000	-635.32	.00000	-32.439

AL VALUES

E	.00000	225.60	.00000	-3283.3	.00000	.11766

PRINT DOF NODAL SOLUTION PER NODE

***** POST1 NODAL DEGREE OF FREEDOM LISTING *****

LOAD STEP= 1 SUBSTEP= 1
TIME= 1.0000 LOAD CASE= 0

THE FOLLOWING DEGREE OF FREEDOM RESULTS ARE IN GLOBAL COORDINATES

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
1	.00000	.00000	.00000	.00000	.00000	-.50971E-04
2	.00000	-.10172E-02	.00000	.92829E-04	.00000	-.34426E-04
3	.00000	-.17438E-02	.00000	.15269E-03	.00000	-.15927E-04
4	.00000	-.20513E-02	.00000	.15786E-03	.00000	.39583E-05
5	.00000	-.11938E-02	.00000	.93360E-04	.00000	.50668E-04
6	.00000	.00000	.00000	.00000	.00000	.66575E-04
7	.00000	.00000	.00000	.00000	.00000	.00000
8	.00000	.00000	.00000	.00000	.00000	.00000
9	.00000	.00000	.00000	.00000	.00000	.00000
10	.00000	.00000	.00000	.00000	.00000	.00000
12	.00000	-.10172E-02	.00000	.92829E-04	.00000	-.34426E-04
13	.00000	-.17438E-02	.00000	.15269E-03	.00000	-.15927E-04
14	.00000	-.20513E-02	.00000	.15786E-03	.00000	.39583E-05
15	.00000	-.11938E-02	.00000	.93360E-04	.00000	.50668E-04

AXIMUM ABSOLUTE VALUES

ODE	0	4	0	4	0	6
ALUE	.00000	-.20513E-02	.00000	.15786E-03	.00000	.66575E-04



T ELEMENT TABLE ITEMS PER ELEMENT

*** POST1 ELEMENT TABLE LISTING *****

STAT ELEM	CURRENT NX1	CURRENT QY1	CURRENT QZ1	CURRENT MX1	CURRENT MY1	CURRENT MZ1
1	.00000	-19.247	.00000	35.026	.00000	.12790E-12
2	.00000	-22.392	.00000	16.566	.00000	-18.728
3	.00000	-30.419	.00000	1.4295	.00000	-144.01
4	.00000	-27.022	.00000	-16.465	.00000	3.8875
5	.00000	-12.411	.00000	-44.109	.00000	71.777
6	.00000	-41.177	.00000	-24.217	.00000	-695.61
7	.00000	-59.883	.00000	-10.677	.00000	-1002.9
8	.00000	-48.459	.00000	2.3373	.00000	-917.36
9	.00000	-37.245	.00000	32.439	.00000	-635.32

NUM VALUES

	1	7	1	5	1	7
E	.00000	-59.883	.00000	-44.109	.00000	-1002.9

NUM VALUES

	1	5	1	1	1	5
E	.00000	-12.411	.00000	35.026	.00000	71.777

PRINT ELEMENT TABLE ITEMS PER ELEMENT

***** POST1 ELEMENT TABLE LISTING *****

STAT ELEM	CURRENT NX2	CURRENT QY2	CURRENT QZ2	CURRENT MX2	CURRENT MY2	CURRENT MZ2
1	.00000	18.785	.00000	35.026	.00000	5.4891
2	.00000	29.464	.00000	16.566	.00000	-133.33
3	.00000	21.437	.00000	1.4295	.00000	1.5502
4	.00000	24.834	.00000	-16.465	.00000	39.338
5	.00000	19.589	.00000	-44.109	.00000	.71054E-13
6	.00000	-41.177	.00000	-24.217	.00000	18.460
7	.00000	-59.883	.00000	-10.677	.00000	15.136
8	.00000	-48.459	.00000	2.3373	.00000	17.894
9	.00000	-37.245	.00000	32.439	.00000	27.644

MINIMUM VALUES

ELEM	1	7	1	5	1	2
VALUE	.00000	-59.883	.00000	-44.109	.00000	-133.33

MAXIMUM VALUES

ELEM	1	2	1	1	1	4
VALUE	.00000	29.464	.00000	35.026	.00000	39.338

11-11-1999 11:35:48

SECCION Nº = 1

PUNTOS DE HORMIGON = 494
PUNTOS DE ACERO = 82
RESIST.CALC.HORMIGON = 200 Kg/cm2
RESIST.CALC.ACERO = 4435 Kg/cm2
NUMERO DE HIPOTESIS = 11
BETA SUPERIOR = 90.0
BETA INFERIOR = 0.0
INCREMENTO DE BETA = 15.0

Nu(t)	Ex(cm)	Ey(cm)
1099.9	-2.1	208.5
1099.6	317.7	171.9
1099.3	437.1	129.1
1099.3	488.4	92.1
1099.7	512.4	59.5
1101.1	524.1	28.9
1100.0	528.4	-0.3

Nu(t)	Ex(cm)	Ey(cm)
1300.0	-1.8	187.0
1300.8	279.9	153.1
1299.3	389.2	113.7
1300.2	436.8	80.2
1299.9	458.4	51.3
1299.6	469.1	25.1
1300.3	472.5	-0.1

Nu(t)	Ex(cm)	Ey(cm)
1500.3	-1.5	170.5
1500.7	252.1	139.2
1500.3	353.2	102.1
1500.1	398.1	71.6
1500.5	417.9	45.3
1500.1	427.6	21.8
1501.5	430.5	-0.3

Nu(t)	Ex(cm)	Ey(cm)
1699.9	-1.4	157.9
1699.3	230.0	128.3
1700.7	325.2	93.0
1699.6	367.2	64.8
1698.5	386.6	40.6
1700.5	395.3	19.3
1699.4	398.3	-0.2

Nu(t)	Ex(cm)	Ey(cm)
1900.3	-1.2	147.4
1898.5	212.6	119.6
1899.0	302.9	85.7
1898.4	342.7	58.8
1900.4	360.3	36.5
1899.0	369.5	17.3
1898.5	372.3	-0.2

Nu(t)	Ex(cm)	Ey(cm)
2099.5	-1.1	138.7
2099.5	197.9	112.3
2100.1	284.0	79.6
2098.0	321.9	54.3
2099.3	338.7	33.2
2099.9	347.1	15.7
2098.2	350.5	-0.1

Nu(t)	Ex(cm)	Ey(cm)
2298.9	-1.0	131.4
2298.0	185.3	106.2
2301.2	267.9	74.4
2299.4	304.3	50.1
2298.3	320.4	30.5
2301.7	328.1	14.3
2298.0	331.4	-0.2

Nu(t)	Ex(cm)	Ey(cm)
2499.6	-0.9	125.1
2498.2	174.6	100.8
2497.8	254.4	70.0
2501.7	289.2	46.5
2501.4	304.3	28.1
2500.1	311.8	13.1
2502.2	314.5	-0.2

Nu(t)	Ex(cm)	Ey(cm)
2700.9	-0.9	119.4
2700.8	164.9	96.2
2701.5	242.0	66.1
2700.9	275.8	43.6
2699.4	290.5	26.1
2699.1	297.5	12.2
2701.9	300.0	-0.1

Nu(t)	Ex(cm)	Ey(cm)
2902.5	-0.8	114.3
2898.7	156.6	92.1
2902.1	231.3	62.6
2898.4	264.3	40.9
2900.6	278.0	24.3
2900.7	284.6	11.3
2899.4	287.2	-0.2

Nu(t)	Ex(cm)	Ey(cm)
3102.1	-0.7	109.7
3098.5	148.9	88.4
3098.8	221.8	59.5
3099.6	253.7	38.4
3098.2	267.0	22.8

3099.2	273.2	10.5
3100.0	275.6	-0.2

L.A.V. Madrid - Barcelona

Subtramo XV

Puente E-1508.5: Tablero Derecho

Modificación de la altura de la pila 3

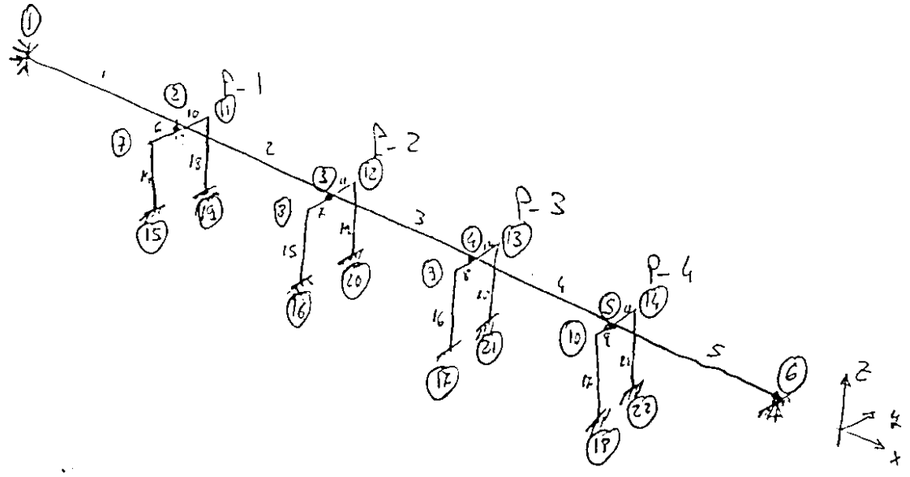
($\Delta H = 2'40$ m).

1.- Introducción

El incremento de la altura de la pila 3 en 2'40m. produce un cambio en el reparto del empuje del viento, al variar la rigidez de dicha pila.

Por el contrario, las cargas verticales en cabeza de pila no se ven afectadas por este cambio.

1.1.- Modelo para el reparto del viento



Se consideran las mismas características mecánicas adoptadas en proyecto

Barra 1 a 5 (tablero): $A = 12'89\ m^2$
$I_z = 120'5\ m^4$
$I_y = 5'2184\ m^4$
$I_x = 9'64\ m^4$

Barras 6 a 13 (Horizontales): $A = 1000$
$I_y = I_z = 1000 ; I_x = 0$

Barras 14 a 21 (Pilas): $A = 2'54\ m^2$
$I_y = 0'515\ m^4$
$I_z = 0'515\ m^4$
$I_x = 0$

$E = 3'5 \cdot 10^7\ t/m^2$

$\nu = 0'2$

- Dimensiones geométricas:

Vano	Luz (m)	Pila	Altura (m)
1	24	1	16'3
2	31	2	17'1
3	31	3	19'3
4	31	4	17'8
5	24		

- Separación entre fustes $s = 5'20$ $(\pm 2'60)$
- Coacciones: Nudos 1 y 6 $U_x = U_y = U_z = \theta_x = 0$
Nudos 15 a 22 $U_x = U_y = U_z = \theta_x = \theta_y = \theta_z = 0$
- Empuje del viento:
Sobre las barras del tablero (barras 1 a 5)
$p = 1'5\ t/ml$

Con estos datos, se calcula la estructura, resultando los esfuerzos y reacciones que aparecen en los listados de ordenador. Con estos esfuerzos, junto a los verticales y longitudinales de proyecto, se comprueban las pilas.

2.- Cálculo de los fustes

2.1.- Esfuerzos

Llamando Hx = Esfuerzos longitudinales; Hy = Esfuerzos del viento, Mx = Mom. produc.por Hy y My = Mom. Produc. Por Hx, por fuste, los esfuerzos en coronación serán:

	Reacc. Máxima en E.L.S.				Reacc. Minima en E.L.S.				Altura	Incr. Axil
Pila	N (t)	Hx (t)	Hy (t)	Mx(viento)	N (t)	Hx (t)	Hy (t)	Mx(viento)	Pila (m)	Por viento
1	1282.2	20.5	11.6	103.0	559.8	16.8	11.6	103.0	16.3	38.2
2	1398	21.5	18.6	172.6	560.0	16.8	18.6	172.6	17.1	64.0
3	1385.9	21.7	13.6	141.1	570.1	17.1	13.6	141.1	19.3	52.9
4	1298.7	20.8	9.5	91.6	543.3	16.3	9.5	91.6	17.8	33.7

En arranques:

	Reacc. Máxima en E.L.S.					Reacc. Minima en E.L.S.				
Pila	N (t)	Hx (t)	Hy (t)	My (mt)	Mx (viento)	N (t)	Hx (t)	Hy (t)	My (mt)	Mx (viento)
1	1388	20.5	17.5	865.8	133.9	665.8	16.8	17.5	805.9	133.9
2	1509	21.5	24.8	368.2	198.1	671.2	16.8	24.8	287.3	198.1
3	1511	21.7	20.5	419.5	188.4	695.6	17.1	20.5	330.1	188.4
4	1414	20.8	15.9	370.2	134.5	659.0	16.3	15.9	290.1	134.5

	Reacc. Máxima en E.L.U					Reacc. Minima en E.L.U.				
Pila	N (t)	Hx (t)	Hy (t)	My (mt)	Mx (viento)	N (t)	Hx (t)	Hy (t)	My (mt)	Mx (viento)
1	2082	30.7	26.2	1298.7	200.9	998.6	25.2	26.2	1208.9	200.9
2	2264	32.3	37.1	552.3	297.1	1006.7	25.2	37.1	430.9	297.1
3	2267	32.6	30.8	629.2	282.6	1043.3	25.7	30.8	495.1	282.6
4	2122	31.2	23.9	555.4	201.8	988.5	24.4	23.9	435.2	201.8

2.2- Excentricidad adicional de pandeo

El radio de giro de la sección es

$$A = 2'68\ m^2 \qquad I = 0'575\ m^4 \qquad i = \sqrt{\frac{I}{A}} = 0'463$$

$$L_o = 27$$

$$\lambda = \frac{L_o}{i} \qquad \left(\lambda_{max} = \frac{2 \cdot 191^3}{0'463} = 83 > 35\right)$$

La excentricidad

$$e_a = \left(0'85 + \frac{f_{yd}}{12000}\right) \frac{h + 20 \cdot e_o}{h + 10 \cdot e_o} \cdot \frac{L_o^2}{i} \cdot 10^{-4}$$

$$f_{yd} = \frac{5100}{1'15} = 4434\ Kg/cm^2 \qquad , \qquad h = 1'80\ m$$

$$e_a = 1'22\ \frac{1'8 + 20 \cdot e_o}{1'8 + 10 \cdot e_o} \cdot \frac{L_o^2}{0'463} \cdot 10^{-4} = 2'63\ \frac{1'8 + 20 e_o}{1'8 + 10 e_o} \cdot L_c^2 \cdot 10^{-4}$$

$$e_T = e_o + e_a$$

2.3.- Esfuerzos totales en arranques

Teniendo en cuenta la excentricidad de segundo orden, los esfuerzos totales serán:

	Reacc. Máxima en E.L.U					Reacc. Mínima en E.L.U.				
Pila	N (t)	M (t)	eo (m)	ea (m)	et (m)	N (t)	M (t)	eo (m)	ea (m)	et (m)
1	2082	1314.2	0.631	0.124	0.755	998.6	1225.5	1.227	0.131	1.358
2	2264	627.2	0.277	0.124	0.401	1006.7	523.4	0.520	0.134	0.654
3	2267	689.7	0.304	0.160	0.464	1043.3	570.1	0.546	0.172	0.718
4	2122	590.9	0.279	0.134	0.412	988.5	479.7	0.485	0.144	0.629

con M =raiz(Mx^2+My^2)

2.4.- Curvas equirresistentes de la sección

Mediante programa se determinan las curvas equirresistentes de la sección, para un hormigón H-300, acero AEH-500S, con control normal, y disponiendo como armadura la que aparece en los planos: 48 Φ 32

2.5.- Comprobación frente a la rotura por flexión

Comparando los valores anteriores con las curvas equirresistentes de la sección, se puede concluir que la seguridad es mas que suficiente.

3.- Cálculo de la cimentación de las pilas

Separación entre fustes = 5.2 m.

Diametro de los fustes = 1.8 m.

3.1.- Dimensiones de las zapatas

Pila	Longitud (m)	Ancho (m)	Canto (m)	Peso Propio	Peso tierras
1	14	8.5	2.5	743.8	1904
2	11	7	2.5	481.3	77
3	11	7	2.5	481.3	77
4	11	7	2.5	481.3	77

3.2.- Esfuerzos en cara superior de zapata

Pila	N(t)	Hx(t)	Hy(viento)	My	Mx (viento)
1	4603.9	40.9	34.9	1731.6	466.4
2	2890.3	43.1	49.5	736.4	729.0
3	2916.9	43.5	41.1	838.9	651.9
4	2761.4	41.6	31.8	740.5	444.3

3.3.- Esfuerzos en cara inferior de zapata

Pila	N(t)	Hx(t)	Hy(viento)	My	Mx (viento)	ex (m)	ey(m)
1	5347.7	40.9	34.9	1833.9	553.8	0.343	0.104
2	3371.6	43.1	49.5	844.1	852.8	0.250	0.253
3	3398.2	43.5	41.1	947.6	754.7	0.279	0.222
4	3242.7	41.6	31.8	844.5	523.8	0.260	0.162

3.4.- Tension cobaricentrica, flectores y armaduras

Para un hormigón fck = 250 γ_c = 1.5

y acero fyk = 5100 γ_s = 1.15

γ_f = 1.6

Pila	σ_{cob} (t/m^2)	M_1 (mt/m)	M_2' (mt/m)	M_2'' (mt/m)	A_{s1} (cm^2/m)	A_{s2} (cm^2/m)	A_{s1} (cm^2/m)	A_{s2} (cm^2/m)
1	49.62	284.1	308.2	-273.2	43.6	0.0	47.4	min.
2	49.43	177.8	111.3	-35.6	30.8	0.0	21.4	min.
3	49.97	180.1	112.6	-36.1	31.1	0.0	21.6	min.
4	46.87	167.3	104.7	-33.5	29.5	0.0	20.3	min.

Armadura A1 en direcc. Longitudinal del puente

Armadura A2 en direcc. Transversal del puente

log

```
/input,reales,log
/input,nodos,log
/input,elemento,log
eplot
/VIEW, 1 ,1,1,1
/ANG, 1
/REP
/input,viento,log

FINISH
/POST1
PRRSOL,
```

4. Listado de ordenador

reales

```
/prep7
et, 1, beam4, , , , , , , 1,
  R,    1 ,  12.89 , 120.5 ,5.2184 ,  2. ,  14. ,
RMORE,  0 ,  9.64
  R,    2 ,  1000 ,1000 ,1000 ,  1 ,  1 ,
RMORE,  0 ,   0 ,     0 ,     0 , ,
  R,    3 ,  2.54 , 0.515 ,0.515 ,  1.8 ,  1.8 ,
RMORE,  0 ,  0.0 ,     0 ,     0 , ,
mp, EX, 1, 3500000, , , ,
mp, alpx, 1, .00001, , , ,
mp, dens, 1, 0, , , ,
mp, gxy, 1, 1480000, , , ,
```

nodos

```
N,    1 ,
N,    2 , 24
N,    3 , 55
N,    4 , 86
N,    5 , 117
N,    6 , 141
N,    7 , 24,-2.6
N,    8 , 55,-2.6
N,    9 , 86,-2.6
N,   10 , 117,-2.6
N,   11 , 24,2.6
N,   12 , 55,2.6
N,   13 , 86,2.6
N,   14 , 117,2.6
N,    15 , 24,-2.6,-18.3
N,    16 , 55,-2.6,-19.1
N,    17 , 86,-2.6,-21.3
N,   18 , 117,-2.6,-19.8
N,   19 , 24,2.6,-18.3
N,   20 , 55,2.6,-19.1
N,   21 , 86,2.6,-21.3
N,   22 , 117,2.6,-19.8
```

elemento

```
C***      BARRAS LONGITUDINALES
!
!
TYPE,1
MAT, 1
REAL, 1
EN,         1 ,      1 ,       2
EN,         2 ,      2 ,       3
EN,         3 ,      3 ,       4
EN,         4 ,      4 ,       5
EN,         5 ,      5 ,       6
!
!Barras transversales
!
REAL, 2
EN,         6 ,      2 ,       7
engen,      1, 4, 1, 6
EN,         10 ,       2 ,      11
engen,      1, 4, 1, 10
!
! Pilas
!
real,3
EN,         14, 7, 15
engen,      1, 4, 1, 14
EN,         18, 11, 19
engen,      1, 4, 1, 18
```

viento

```
finish
/SOLU
D,    1 , Ux,,,,,uy,uz,rotx
D,    6 , Ux,,,,,uy,uz,rotx
D,    15, all
D,    16, all
D,    17, all
D,    18, all
D,    19, all
D,    20, all
D,    21, all
D,    22, all
esel,s,elem,,1,5,1
sfbeam,all,2,pres,1.5,1.5
esel,all
solve
```

: ELEMENT TABLE ITEMS PER ELEMENT

** POST1 ELEMENT TABLE LISTING *****

TAT	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT
LEM	NX1	QY1	QZ1	MX1	MY1	MZ1
1	.12784E-10	-50.004	.30374E-14	17.955	-.49304E-31	-.19895E-12
2	-.72875E-11	-37.167	-.15176E-13	10.430	-.15615E-12	739.88
3	-.63417E-11	-27.854	.90823E-13	-1.9122	-.10323E-11	1160.7
4	-.64336E-11	-8.6265	-.13798E-12	-9.1430	.20682E-11	1311.6
5	.13130E-10	18.840	.72304E-13	-17.147	-.17353E-11	884.17
6	-11.582	1.2076	38.165	11.049	3.7625	14.105
7	-18.594	.42417	64.002	4.0505	6.1709	5.2932
8	-13.636	-.27241	52.878	-2.9009	3.6154	-4.0589
9	-9.5165	-.98065	33.686	-9.7076	4.0018	-12.973
10	11.582	1.2076	-38.165	11.049	-3.7625	14.105
11	18.594	.42417	-64.002	4.0505	-6.1709	5.2932
12	13.636	-.27241	-52.878	-2.9009	-3.6154	-4.0589
13	9.5165	-.98065	-33.686	-9.7076	-4.0018	-12.973
14	-38.165	11.582	1.2076	-10.965	-11.049	102.99
15	-64.002	18.594	.42417	-4.1954	-4.0505	172.58
16	-52.878	13.636	-.27241	3.3507	2.9009	141.10
17	-33.686	9.5165	-.98065	10.423	9.7076	91.584
1	38.165	11.582	-1.2076	-10.965	11.049	102.99
19	64.002	18.594	-.42417	-4.1954	4.0505	172.58
2	52.878	13.636	.27241	3.3507	-2.9009	141.10
21	33.686	9.5165	.98065	10.423	-9.7076	91.584

IUM VALUES

15	1	11	5	14	13
-64.002	-50.004	-64.002	-17.147	-11.049	-12.973

IMUM VALUES

19	5	7	1	18	4
64.002	18.840	64.002	17.955	11.049	1311.6

RINT ELEMENT TABLE ITEMS PER ELEMENT

***** POST1 ELEMENT TABLE LISTING *****

STAT	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT
ELEM	NX2	QY2	QZ2	MX2	MY2	MZ2
1	.12784E-10	-14.004	.30374E-14	17.955	.72898E-13	768.09
2	-.72875E-11	9.3333	-.15176E-13	10.430	-.62660E-12	1171.3
3	-.63417E-11	18.646	.90823E-13	-1.9122	.17832E-11	1303.4
4	-.64336E-11	37.873	-.13798E-12	-9.1430	-.22092E-11	858.22
5	.13130E-10	54.840	.72304E-13	-17.147	.11833E-29	.45475E-12
6	-11.582	1.2076	38.165	11.049	102.99	10.965
7	-18.594	.42417	64.002	4.0505	172.58	4.1954
8	-13.636	-.27241	52.878	-2.9009	141.10	-3.3507
9	-9.5165	-.98065	33.686	-9.7076	91.584	-10.423
10	11.582	1.2076	-38.165	11.049	-102.99	10.965
11	18.594	.42417	-64.002	4.0505	-172.58	4.1954
12	13.636	-.27241	-52.878	-2.9009	-141.10	-3.3507
13	9.5165	-.98065	-33.686	-9.7076	-91.584	-10.423
14	-38.165	11.582	1.2076	-10.965	11.051	-108.95
15	-64.002	18.594	.42417	-4.1954	4.0512	-182.57
16	-52.878	13.636	-.27241	3.3507	-2.9014	-149.35
17	-33.686	9.5165	-.98065	10.423	-9.7092	-96.843
18	38.165	11.582	-1.2076	-10.965	-11.051	-108.95
19	64.002	18.594	-.42417	-4.1954	-4.0512	-182.57
20	52.878	13.636	.27241	3.3507	2.9014	-149.35
21	33.686	9.5165	.98065	10.423	9.7092	-96.843

MUM VALUES

EM	15	1	11	5	11	15
LUE	-64.002	-14.004	-64.002	-17.147	-172.58	-182.57

MINIMUM VALUES

EM	19	5	7	1	7	3
LUE	64.002	54.840	64.002	17.955	172.58	1303.4

NT REACTION SOLUTIONS PER NODE

*** POST1 TOTAL REACTION SOLUTION LISTING *****

AD STEP= 1 SUBSTEP= 1
IME= 1.0000 LOAD CASE= 0

E FOLLOWING X,Y,Z SOLUTIONS ARE IN GLOBAL COORDINATES

NODE	FX	FY	FZ	MX	MY	MZ
1	-.127845-10	50.004	-.30374E-14	-17.955		
6	.13130E-10	54.840	.72304E-13	-17.147		
15	1.2076	11.582	38.165	-108.95	11.051	10.965
16	.42417	18.594	64.002	-182.57	4.0512	4.1954
17	-.27241	13.636	52.878	-149.35	-2.9014	-3.3507
18	-.98065	9.5165	33.686	-96.843	-9.7092	-10.423
19	-1.2076	11.582	-33.165	-108.95	-11.051	10.965
20	-.42417	18.594	-64.002	-182.57	-4.0512	4.1954
21	.27241	13.636	-52.878	-149.35	2.9014	-3.3507
22	.98065	9.5165	-33.686	-96.843	9.7092	-10.423

AL VALUES
E .34950E-12 211.50 .17131E-10 -1110.5 .40856E-13 2.7725

11-10-1999 17:37:25

SECCION Nº = 1

PUNTOS DE HORMIGON = 316
PUNTOS DE ACERO = 48
RESIST.CALC.HORMIGON = 200 Kg/cm2
RESIST.CALC.ACERO = 4435 Kg/cm2
NUMERO DE HIPOTESIS = 14
BETA SUPERIOR = 90.0
BETA INFERIOR = 0.0
INCREMENTO DE BETA = 15.0

Nu(t)	Ex(cm)	Ey(cm)
1000.6	-0.0	158.8
999.1	41.6	152.6
999.2	78.6	137.1
1000.0	112.2	112.2
1000.0	137.0	78.6
1000.3	152.5	41.6
1001.0	158.9	-0.0

Nu(t)	Ex(cm)	Ey(cm)
1100.4	-0.0	146.6
1099.9	38.3	140.6
1099.4	72.5	126.4
1099.4	103.6	103.6
1099.1	126.4	72.5
1099.4	140.7	38.4
1100.0	146.7	-0.0

Nu(t)	Ex(cm)	Ey(cm)
1199.1	-0.0	136.4
1200.7	35.5	130.4
1200.7	67.2	117.1
1199.8	96.2	96.2
1201.0	117.1	67.2
1199.2	130.6	35.6
1199.7	136.4	-0.0

Nu(t)	Ex(cm)	Ey(cm)
1300.5	-0.0	127.2
1300.1	33.2	121.8
1301.2	62.7	109.3
1300.0	89.8	89.8
1301.2	109.3	62.8
1299.8	121.8	33.1
1299.5	127.3	-0.0

Nu(t)	Ex(cm)	Ey(cm)
1400.1	-0.0	119.2
1400.7	30.9	114.0
1400.9	58.8	102.3
1400.2	84.2	84.3
1401.1	102.3	58.8

1399.7	114.1	30.9
1400.1	119.2	-0.0

Nu(t)	Ex(cm)	Ey(cm)
1498.7	-0.0	112.2
1499.9	29.0	107.2
1500.8	55.5	96.1
1500.4	79.1	79.1
1500.8	96.1	55.5
1499.0	107.3	29.1
1500.3	112.2	-0.0

Nu(t)	Ex(cm)	Ey(cm)
1601.2	-0.0	105.7
1601.3	27.3	101.0
1599.8	52.3	90.7
1600.3	74.7	74.7
1599.7	90.7	52.3
1601.0	101.0	27.4
1600.6	105.8	-0.0

Nu(t)	Ex(cm)	Ey(cm)
1701.1	-0.0	99.9
1699.2	25.8	95.6
1701.0	49.4	85.6
1701.2	70.5	70.5
1701.2	85.6	49.4
1698.8	95.6	25.8
1699.7	100.1	-0.0

Nu(t)	Ex(cm)	Ey(cm)
1801.8	-0.0	94.6
1799.7	24.4	90.5
1800.4	46.8	81.1
1800.7	66.8	66.8
1800.3	81.0	46.9
1800.6	90.5	24.4
1799.0	94.8	-0.0

Nu(t)	Ex(cm)	Ey(cm)
1898.8	-0.0	89.9
1899.9	23.1	85.9
1901.3	44.4	76.8
1901.1	63.3	63.4
1901.4	76.8	44.5
1901.1	85.8	23.1
1898.2	90.0	-0.0

Nu(t)	Ex(cm)	Ey(cm)
2001.7	-0.0	85.3
2000.0	21.8	81.5
1998.7	42.3	73.0
1999.2	60.2	60.3
1998.6	73.0	42.3

2001.6	81.5	21.8
1998.5	85.5	-0.0

Nu(t)	Ex(cm)	Ey(cm)
2100.2	-0.0	81.2
2099.9	20.7	77.5
2099.9	40.2	69.3
2098.4	57.3	57.3
2102.0	69.2	40.2
2098.5	77.6	20.7
2101.9	81.2	-0.0

Nu(t)	Ex(cm)	Ey(cm)
2200.3	-0.0	77.1
2198.7	19.6	73.8
2202.0	38.2	65.8
2201.5	54.4	54.5
2199.9	65.8	38.3
2201.6	73.7	19.6
2200.5	77.2	-0.0

Nu(t)	Ex(cm)	Ey(cm)
2300.2	-0.0	73.4
2300.0	18.6	70.0
2298.4	36.4	62.5
2300.2	51.8	51.8
2298.5	62.5	36.4
2301.1	70.0	18.6
2300.1	73.5	-0.0

4.2.5 Puente E-1518.3

PUENTE 1518.3

INDICE

1º DEFINICION GEOMETRICA

2º CALCULO DEL TABLERO

3º CALCULO DE PILAS

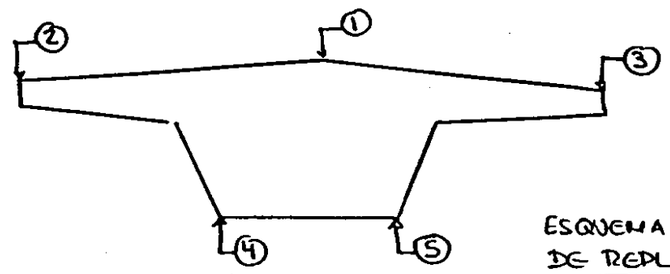
4º CALCULO DE ESTRIBOS

5º PROYECTO DE PRUEBA DE CARGA

PUENTE 1518.3

1º DEFINICION GEOMETRICA

```
NOMBRE del EJE : T0051
TRAMO donde se situa la estructura: 10
CASO en que se encuentra la estructura(0-1-2)
0  .... La seccion de la carretera tiene calzada unica
1  .... La estructura se sitúa en la calzada DERECHA
2  .... La estructura se sitúa en la calzada IZQUIERDA
CASO= 0
NUMERO de VANOS del tablero:  3
PK Estribo nº1 :        821.968
PK Pila  nº  1 :        839.569
PK Pila  nº  2 :        857.176
PK Estribo nº2 :        874.776
Distancia eje REP.PLANTA al de la ESTRUCTURA:          .000
ESPESOR del pavimento (en metros):                     .000
NUMERO puntos DE REPLANTEO:  5
PUNTO nº..  1 X=           .000 Y=          -.238
PUNTO nº..  2 X=         -4.750 Y=          -.143
PUNTO nº..  3 X=          4.750 Y=          -.143
PUNTO nº..  4 X=         -1.750 Y=          1.512
PUNTO nº..  5 X=          1.750 Y=          1.512
NUMERO de puntos que acompañan a los bordes:  0
VANO nº..   1 NUMERO de secciones NORMALES: 21
VANO nº..   2 NUMERO de secciones NORMALES: 21
VANO nº..   3 NUMERO de secciones NORMALES: 21
NUMERO de secciones ESVIADAS a calcular:  0
TIPO de tablero (1-2-3-4):  1
VANO..  1 PUNTO..  1  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  2  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  3  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  4  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  5  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  1  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  2  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  3  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  4  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  5  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  1  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  2  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  3  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  4  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  5  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  1  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  2  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  3  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  4  Variac. HORIZONTAL tipo:  1
VANO..  2 PUNTO..  5  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  1  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  2  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  3  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  4  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  5  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  1  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  2  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  3  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  4  Variac. HORIZONTAL tipo:  1
VANO..  3 PUNTO..  5  Variac. HORIZONTAL tipo:  1
```



ESQUEMA DE PUNTOS DE REPLANTEO

VAN-SEC-PUNTO	P.K.	AZ(g)	X	Y	Z
1 1 1	821.968	270.176	681606.025	4606650.897	240.584
1 1 2	821.968	270.176	681610.263	4606653.042	240.489
1 1 3	821.968	270.176	681601.786	4606648.752	240.489
1 1 4	821.968	270.176	681607.586	4606651.687	238.834
1 1 5	821.968	270.176	681604.463	4606650.107	238.834
1 2 1	822.848	270.157	681606.422	4606650.112	240.605
1 2 2	822.848	270.157	681610.660	4606652.258	240.510
1 2 3	822.848	270.157	681602.184	4606647.966	240.510
1 2 4	822.848	270.157	681607.983	4606650.903	238.855
1 2 5	822.848	270.157	681604.861	4606649.321	238.855
1 3 1	823.728	270.137	681606.820	4606649.327	240.626
1 3 2	823.728	270.137	681611.057	4606651.474	240.531
1 3 3	823.728	270.137	681602.583	4606647.180	240.531
1 3 4	823.728	270.137	681608.381	4606650.118	238.876
1 3 5	823.728	270.137	681605.259	4606648.536	238.876
1 4 1	824.608	270.117	681607.218	4606648.542	240.646
1 4 2	824.608	270.117	681611.454	4606650.691	240.551
1 4 3	824.608	270.117	681602.981	4606646.393	240.551
1 4 4	824.608	270.117	681608.778	4606649.334	238.896
1 4 5	824.608	270.117	681605.657	4606647.750	238.896
1 5 1	825.488	270.097	681607.616	4606647.757	240.667
1 5 2	825.488	270.097	681611.851	4606649.907	240.572
1 5 3	825.488	270.097	681603.380	4606645.607	240.572
1 5 4	825.488	270.097	681609.176	4606648.549	238.917
1 5 5	825.488	270.097	681606.055	4606646.965	238.917
1 6 1	826.368	270.077	681608.014	4606646.972	240.687
1 6 2	826.368	270.077	681612.249	4606649.124	240.592
1 6 3	826.368	270.077	681603.779	4606644.821	240.592
1 6 4	826.368	270.077	681609.575	4606647.765	238.937
1 6 5	826.368	270.077	681606.454	4606646.180	238.937
1 7 1	827.248	270.057	681608.413	4606646.188	240.708
1 7 2	827.248	270.057	681612.647	4606648.341	240.613
1 7 3	827.248	270.057	681604.179	4606644.035	240.613
1 7 4	827.248	270.057	681609.973	4606646.981	238.958
1 7 5	827.248	270.057	681606.853	4606645.395	238.958
1 8 1	828.128	270.037	681608.812	4606645.404	240.728
1 8 2	828.128	270.037	681613.046	4606647.558	240.633
1 8 3	828.128	270.037	681604.579	4606643.249	240.633
1 8 4	828.128	270.037	681610.372	4606646.197	238.978
1 8 5	828.128	270.037	681607.252	4606644.610	238.978
1 9 1	829.008	270.016	681609.211	4606644.619	240.748
1 9 2	829.008	270.016	681613.444	4606646.775	240.653
1 9 3	829.008	270.016	681604.978	4606642.464	240.653
1 9 4	829.008	270.016	681610.771	4606645.413	238.998
1 9 5	829.008	270.016	681607.652	4606643.825	238.998
1 10 1	829.888	269.996	681609.611	4606643.835	240.768
1 10 2	829.888	269.996	681613.843	4606645.992	240.673
1 10 3	829.888	269.996	681605.379	4606641.678	240.673
1 10 4	829.888	269.996	681611.170	4606644.630	239.018
1 10 5	829.888	269.996	681608.052	4606643.040	239.018
1 11 1	830.769	269.975	681610.010	4606643.051	240.788
1 11 2	830.769	269.975	681614.242	4606645.209	240.693
1 11 3	830.769	269.975	681605.779	4606640.893	240.693
1 11 4	830.769	269.975	681611.569	4606643.846	239.038
1 11 5	830.769	269.975	681608.451	4606642.256	239.038
1 12 1	831.649	269.955	681610.410	4606642.267	240.809
1 12 2	831.649	269.955	681614.641	4606644.427	240.714
1 12 3	831.649	269.955	681606.180	4606640.108	240.714
1 12 4	831.649	269.955	681611.969	4606643.063	239.059
1 12 5	831.649	269.955	681608.852	4606641.471	239.059
1 13 1	832.529	269.934	681610.811	4606641.483	240.829
1 13 2	832.529	269.934	681615.041	4606643.644	240.734
1 13 3	832.529	269.934	681606.581	4606639.322	240.734
1 13 4	832.529	269.934	681612.369	4606642.279	239.079
1 13 5	832.529	269.934	681609.252	4606640.687	239.079
1 14 1	833.409	269.913	681611.211	4606640.700	240.848
1 14 2	833.409	269.913	681615.440	4606642.862	240.753
1 14 3	833.409	269.913	681606.982	4606638.537	240.753
1 14 4	833.409	269.913	681612.769	4606641.496	239.098
1 14 5	833.409	269.913	681609.653	4606639.903	239.098

1	15	1	834.289	269.892	681611.612	4606639.916	240.868
1	15	2	834.289	269.892	681615.840	4606642.080	240.773
1	15	3	834.289	269.892	681607.383	4606637.752	240.773
1	15	4	834.289	269.892	681613.170	4606640.713	239.118
1	15	5	834.289	269.892	681610.054	4606639.119	239.118
1	16	1	835.169	269.871	681612.013	4606639.133	240.888
1	16	2	835.169	269.871	681616.241	4606641.298	240.793
1	16	3	835.169	269.871	681607.785	4606636.968	240.793
1	16	4	835.169	269.871	681613.570	4606639.930	239.138
1	16	5	835.169	269.871	681610.455	4606638.335	239.138
1	17	1	836.049	269.850	681612.414	4606638.349	240.908
1	17	2	836.049	269.850	681616.641	4606640.516	240.813
1	17	3	836.049	269.850	681608.187	4606636.183	240.813
1	17	4	836.049	269.850	681613.971	4606639.148	239.158
1	17	5	836.049	269.850	681610.857	4606637.551	239.158
1	18	1	836.929	269.828	681612.816	4606637.566	240.928
1	18	2	836.929	269.828	681617.042	4606639.734	240.833
1	18	3	836.929	269.828	681608.589	4606635.399	240.833
1	18	4	836.929	269.828	681614.373	4606638.365	239.178
1	18	5	836.929	269.828	681611.258	4606636.768	239.178
1	19	1	837.809	269.807	681613.217	4606636.783	240.947
1	19	2	837.809	269.807	681617.443	4606638.953	240.852
1	19	3	837.809	269.807	681608.992	4606634.614	240.852
1	19	4	837.809	269.807	681614.774	4606637.583	239.197
1	19	5	837.809	269.807	681611.661	4606635.984	239.197
1	20	1	838.689	269.786	681613.619	4606636.001	240.967
1	20	2	838.689	269.786	681617.844	4606638.171	240.872
1	20	3	838.689	269.786	681609.394	4606633.830	240.872
1	20	4	838.689	269.786	681615.176	4606636.800	239.217
1	20	5	838.689	269.786	681612.063	4606635.201	239.217
1	21	1	839.569	269.764	681614.022	4606635.218	240.986
1	21	2	839.569	269.764	681618.246	4606637.390	240.891
1	21	3	839.569	269.764	681609.797	4606633.046	240.891
1	21	4	839.569	269.764	681615.578	4606636.018	239.236
1	21	5	839.569	269.764	681612.465	4606634.418	239.236
2	1	1	839.569	269.764	681614.022	4606635.218	240.986
2	1	2	839.569	269.764	681618.246	4606637.390	240.891
2	1	3	839.569	269.764	681609.797	4606633.046	240.891
2	1	4	839.569	269.764	681615.578	4606636.018	239.236
2	1	5	839.569	269.764	681612.465	4606634.418	239.236
2	2	1	840.449	269.742	681614.424	4606634.435	241.006
2	2	2	840.449	269.742	681618.648	4606636.609	240.911
2	2	3	840.449	269.742	681610.201	4606632.261	240.911
2	2	4	840.449	269.742	681615.980	4606635.236	239.256
2	2	5	840.449	269.742	681612.868	4606633.634	239.256
2	3	1	841.330	269.720	681614.827	4606633.652	241.025
2	3	2	841.330	269.720	681619.050	4606635.827	240.930
2	3	3	841.330	269.720	681610.605	4606631.477	240.930
2	3	4	841.330	269.720	681616.383	4606634.454	239.275
2	3	5	841.330	269.720	681613.272	4606632.851	239.275
2	4	1	842.210	269.698	681615.231	4606632.870	241.045
2	4	2	842.210	269.698	681619.453	4606635.046	240.950
2	4	3	842.210	269.698	681611.009	4606630.693	240.950
2	4	4	842.210	269.698	681616.786	4606633.672	239.295
2	4	5	842.210	269.698	681613.675	4606632.068	239.295
2	5	1	843.090	269.676	681615.634	4606632.087	241.064
2	5	2	843.090	269.676	681619.855	4606634.265	240.969
2	5	3	843.090	269.676	681611.413	4606629.909	240.969
2	5	4	843.090	269.676	681617.189	4606632.890	239.314
2	5	5	843.090	269.676	681614.079	4606631.285	239.314
2	6	1	843.971	269.654	681616.038	4606631.305	241.083
2	6	2	843.971	269.654	681620.258	4606633.484	240.988
2	6	3	843.971	269.654	681611.817	4606629.126	240.988
2	6	4	843.971	269.654	681617.593	4606632.108	239.333
2	6	5	843.971	269.654	681614.483	4606630.502	239.333
2	7	1	844.851	269.632	681616.442	4606630.523	241.102
2	7	2	844.851	269.632	681620.662	4606632.704	241.007
2	7	3	844.851	269.632	681612.222	4606628.342	241.007
2	7	4	844.851	269.632	681617.997	4606631.326	239.352
2	7	5	844.851	269.632	681614.887	4606629.719	239.352
2	8	1	845.731	269.610	681616.846	4606629.741	241.121
2	8	2	845.731	269.610	681621.065	4606631.923	241.026
2	8	3	845.731	269.610	681612.627	4606627.558	241.026
2	8	4	845.731	269.610	681618.401	4606630.545	239.371
2	8	5	845.731	269.610	681615.292	4606628.937	239.371
2	9	1	846.612	269.587	681617.245	4606628.969	241.140
2	9	2	846.612	269.587	681621.464	4606631.153	241.045
2	9	3	846.612	269.587	681613.027	4606626.785	241.045
2	9	4	846.612	269.587	681618.799	4606629.773	239.390
2	9	5	846.612	269.587	681615.691	4606628.164	239.390
2	10	1	847.492	269.565	681617.650	4606628.188	241.159
2	10	2	847.492	269.565	681621.867	4606630.373	241.064
2	10	3	847.492	269.565	681613.432	4606626.002	241.064
2	10	4	847.492	269.565	681619.204	4606628.993	239.409
2	10	5	847.492	269.565	681616.096	4606627.383	239.409
2	11	1	848.372	269.542	681618.055	4606627.406	241.178
2	11	2	848.372	269.542	681622.272	4606629.592	241.083
2	11	3	848.372	269.542	681613.839	4606625.219	241.083
2	11	4	848.372	269.542	681619.609	4606628.211	239.428
2	11	5	848.372	269.542	681616.502	4606626.600	239.428
2	12	1	849.253	269.520	681618.461	4606626.624	241.197
2	12	2	849.253	269.520	681622.677	4606628.812	241.102
2	12	3	849.253	269.520	681614.245	4606624.435	241.102
2	12	4	849.253	269.520	681620.014	4606627.430	239.447
2	12	5	849.253	269.520	681616.908	4606625.818	239.447
2	13	1	850.133	269.498	681618.866	4606625.843	241.216
2	13	2	850.133	269.498	681623.081	4606628.033	241.121
2	13	3	850.133	269.498	681614.651	4606623.653	241.121
2	13	4	850.133	269.498	681620.419	4606626.650	239.466
2	13	5	850.133	269.498	681617.313	4606625.036	239.466
2	14	1	851.014	269.475	681619.272	4606625.062	241.235
2	14	2	851.014	269.475	681623.487	4606627.253	241.140
2	14	3	851.014	269.475	681615.058	4606622.870	241.140
2	14	4	851.014	269.475	681620.825	4606625.869	239.485
2	14	5	851.014	269.475	681617.720	4606624.254	239.485
2	15	1	851.894	269.453	681619.678	4606624.281	241.253
2	15	2	851.894	269.453	681623.892	4606626.474	241.158
2	15	3	851.894	269.453	681615.465	4606622.088	241.158
2	15	4	851.894	269.453	681621.231	4606625.089	239.503
2	15	5	851.894	269.453	681618.126	4606623.473	239.503
2	16	1	852.774	269.430	681620.085	4606623.500	241.272
2	16	2	852.774	269.430	681624.298	4606625.694	241.177
2	16	3	852.774	269.430	681615.872	4606621.306	241.177
2	16	4	852.774	269.430	681621.637	4606624.308	239.522
2	16	5	852.774	269.430	681618.533	4606622.691	239.522
2	17	1	853.655	269.408	681620.492	4606622.719	241.290
2	17	2	853.655	269.408	681624.704	4606624.914	241.195
2	17	3	853.655	269.408	681616.280	4606620.523	241.195
2	17	4	853.655	269.408	681622.044	4606623.528	239.540
2	17	5	853.655	269.408	681618.940	4606621.910	239.540
2	18	1	854.535	269.386	681620.899	4606621.939	241.309
2	18	2	854.535	269.386	681625.110	4606624.136	241.214
2	18	3	854.535	269.386	681616.688	4606619.742	241.214
2	18	4	854.535	269.386	681622.450	4606622.748	239.559
2	18	5	854.535	269.386	681619.347	4606621.129	239.559
2	19	1	855.415	269.363	681621.307	4606621.158	241.327
2	19	2	855.415	269.363	681625.517	4606623.357	241.232
2	19	3	855.415	269.363	681617.096	4606618.959	241.232
2	19	4	855.415	269.363	681622.858	4606621.968	239.577
2	19	5	855.415	269.363	681619.755	4606620.348	239.577
2	20	1	856.296	269.341	681621.714	4606620.378	241.346
2	20	2	856.296	269.341	681625.924	4606622.578	241.251
2	20	3	856.296	269.341	681617.504	4606618.178	241.251
2	20	4	856.296	269.341	681623.265	4606621.189	239.596
2	20	5	856.296	269.341	681620.163	4606619.568	239.596
2	21	1	857.176	269.318	681622.122	4606619.598	241.364
2	21	2	857.176	269.318	681626.331	4606621.799	241.269
2	21	3	857.176	269.318	681617.913	4606617.396	241.269
2	21	4	857.176	269.318	681623.673	4606620.409	239.614
2	21	5	857.176	269.318	681620.571	4606618.786	239.614
3	1	1	857.176	269.318	681622.122	4606619.598	241.364
3	1	2	857.176	269.318	681626.331	4606621.799	241.269

3	1	3	857.176	269.318	681617.913	4606617.396	241.269
3	1	4	857.176	269.318	681623.673	4606620.409	239.614
3	1	5	857.176	269.318	681620.571	4606618.786	239.614
3	2	1	858.056	269.296	681622.530	4606618.818	241.382
3	2	2	858.056	269.296	681626.738	4606621.021	241.287
3	2	3	858.056	269.296	681618.322	4606616.615	241.287
3	2	4	858.056	269.296	681624.080	4606619.630	239.632
3	2	5	858.056	269.296	681620.979	4606618.007	239.632
3	3	1	858.936	269.273	681622.939	4606618.038	241.400
3	3	2	858.936	269.273	681627.146	4606620.243	241.305
3	3	3	858.936	269.273	681618.731	4606615.833	241.305
3	3	4	858.936	269.273	681624.489	4606618.850	239.650
3	3	5	858.936	269.273	681621.388	4606617.226	239.650
3	4	1	859.816	269.251	681623.347	4606617.259	241.418
3	4	2	859.816	269.251	681627.554	4606619.465	241.323
3	4	3	859.816	269.251	681619.140	4606615.053	241.323
3	4	4	859.816	269.251	681624.897	4606618.072	239.668
3	4	5	859.816	269.251	681621.797	4606616.446	239.668
3	5	1	860.696	269.229	681623.756	4606616.480	241.436
3	5	2	860.696	269.229	681627.961	4606618.688	241.341
3	5	3	860.696	269.229	681619.550	4606614.272	241.341
3	5	4	860.696	269.229	681625.305	4606617.293	239.686
3	5	5	860.696	269.229	681622.206	4606615.667	239.686
3	6	1	861.576	269.206	681624.165	4606615.701	241.454
3	6	2	861.576	269.206	681628.370	4606617.910	241.359
3	6	3	861.576	269.206	681619.959	4606613.492	241.359
3	6	4	861.576	269.206	681625.714	4606616.515	239.704
3	6	5	861.576	269.206	681622.615	4606614.887	239.704
3	7	1	862.456	269.184	681624.574	4606614.921	241.472
3	7	2	862.456	269.184	681628.779	4606617.132	241.377
3	7	3	862.456	269.184	681620.370	4606612.711	241.377
3	7	4	862.456	269.184	681626.123	4606615.736	239.722
3	7	5	862.456	269.184	681623.025	4606614.107	239.722
3	8	1	863.336	269.161	681624.984	4606614.143	241.490
3	8	2	863.336	269.161	681629.187	4606616.355	241.395
3	8	3	863.336	269.161	681620.780	4606611.931	241.395
3	8	4	863.336	269.161	681626.532	4606614.958	239.740
3	8	5	863.336	269.161	681623.435	4606613.328	239.740
3	9	1	864.216	269.139	681625.394	4606613.365	241.508
3	9	2	864.216	269.139	681629.596	4606615.578	241.413
3	9	3	864.216	269.139	681621.191	4606611.151	241.413
3	9	4	864.216	269.139	681626.942	4606614.180	239.758
3	9	5	864.216	269.139	681623.845	4606612.549	239.758
3	10	1	865.096	269.117	681625.804	4606612.585	241.525
3	10	2	865.096	269.117	681630.006	4606614.800	241.430
3	10	3	865.096	269.117	681621.602	4606610.370	241.430
3	10	4	865.096	269.117	681627.352	4606613.401	239.775
3	10	5	865.096	269.117	681624.256	4606611.769	239.775
3	11	1	865.976	269.094	681626.215	4606611.807	241.543
3	11	2	865.976	269.094	681630.416	4606614.024	241.448
3	11	3	865.976	269.094	681622.013	4606609.591	241.448
3	11	4	865.976	269.094	681627.762	4606612.624	239.793
3	11	5	865.976	269.094	681624.667	4606610.991	239.793
3	12	1	866.856	269.072	681626.625	4606611.029	241.561
3	12	2	866.856	269.072	681630.826	4606613.247	241.466
3	12	3	866.856	269.072	681622.425	4606608.811	241.466
3	12	4	866.856	269.072	681628.173	4606611.846	239.811
3	12	5	866.856	269.072	681625.078	4606610.212	239.811
3	13	1	867.736	269.049	681627.037	4606610.250	241.578
3	13	2	867.736	269.049	681631.236	4606612.470	241.483
3	13	3	867.736	269.049	681622.837	4606608.031	241.483
3	13	4	867.736	269.049	681628.584	4606611.068	239.828
3	13	5	867.736	269.049	681625.489	4606609.433	239.828
3	14	1	868.616	269.027	681627.448	4606609.473	241.596
3	14	2	868.616	269.027	681631.647	4606611.694	241.501
3	14	3	868.616	269.027	681623.249	4606607.252	241.501
3	14	4	868.616	269.027	681628.995	4606610.291	239.846
3	14	5	868.616	269.027	681625.901	4606608.654	239.846
3	15	1	869.496	269.005	681627.859	4606608.695	241.613
3	15	2	869.496	269.005	681632.057	4606610.918	241.518
3	15	3	869.496	269.005	681623.661	4606606.473	241.518
3	15	4	869.496	269.005	681629.406	4606609.514	239.863
3	15	5	869.496	269.005	681626.312	4606607.876	239.863
3	16	1	870.376	268.982	681628.271	4606607.918	241.630
3	16	2	870.376	268.982	681632.468	4606610.142	241.535
3	16	3	870.376	268.982	681624.073	4606605.694	241.535
3	16	4	870.376	268.982	681629.817	4606608.737	239.880
3	16	5	870.376	268.982	681626.724	4606607.099	239.880
3	17	1	871.256	268.960	681628.683	4606607.140	241.648
3	17	2	871.256	268.960	681632.880	4606609.365	241.553
3	17	3	871.256	268.960	681624.487	4606604.914	241.553
3	17	4	871.256	268.960	681630.229	4606607.959	239.898
3	17	5	871.256	268.960	681627.137	4606606.320	239.898
3	18	1	872.136	268.937	681629.096	4606606.362	241.665
3	18	2	872.136	268.937	681633.291	4606608.589	241.570
3	18	3	872.136	268.937	681624.900	4606604.136	241.570
3	18	4	872.136	268.937	681630.641	4606607.183	239.915
3	18	5	872.136	268.937	681627.550	4606605.542	239.915
3	19	1	873.016	268.915	681629.508	4606605.586	241.682
3	19	2	873.016	268.915	681633.703	4606607.814	241.587
3	19	3	873.016	268.915	681625.313	4606603.357	241.587
3	19	4	873.016	268.915	681631.054	4606606.407	239.932
3	19	5	873.016	268.915	681627.963	4606604.765	239.932
3	20	1	873.896	268.893	681629.921	4606604.808	241.699
3	20	2	873.896	268.893	681634.116	4606607.038	241.604
3	20	3	873.896	268.893	681625.727	4606602.578	241.604
3	20	4	873.896	268.893	681631.467	4606605.629	239.949
3	20	5	873.896	268.893	681628.376	4606603.986	239.949
3	21	1	874.776	268.870	681630.334	4606604.031	241.716
3	21	2	874.776	268.870	681634.528	4606606.262	241.621
3	21	3	874.776	268.870	681626.141	4606601.800	241.621
3	21	4	874.776	268.870	681631.879	4606604.853	239.966
3	21	5	874.776	268.870	681628.790	4606603.209	239.966

PUENTE 1518.3

2º CALCULO DEL TABLERO

GINPROSA

ASUNTO
CARGAS ACTUANTES
E-1518.3

1) Peso propio $\gamma = 2{,}5$ t/m³

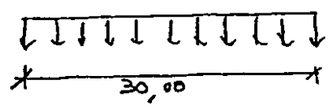
2) Carga muerta

Traviesas + carriles	—	0,52+0,12 = 0,64 t/m.
Balasto	—	5,40 x0,70x1,60 = 6,05 t/m.
Cables Catenaria	—	0,30 x 2 = 0,60 t/m.
Barreras	—	0,75x2 = 1,50 t/m.
TOTAL CARGA MUERTA	—	8,8 t/m.

3) Cargas en pasos: 0,5 t/m² x 1,75 x2 = 1,75 t/m.

4) TREN TIPO B (IPF-75)

Se supone una carga de 10 t/m aplicada como si fuese una sobrecarga de uso y las 2 t/m de exceso de peso propio a la vagona se aplican como un tren de cargas puntuales.

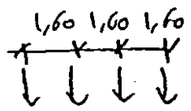


11 cargas puntuales $P = \frac{2 \times 30}{11} = 5{,}5$ ton

5) TREN TIPO LH71

Carga uniforme de 8 t/m.

4 cargas puntuales de 12,2 ton.



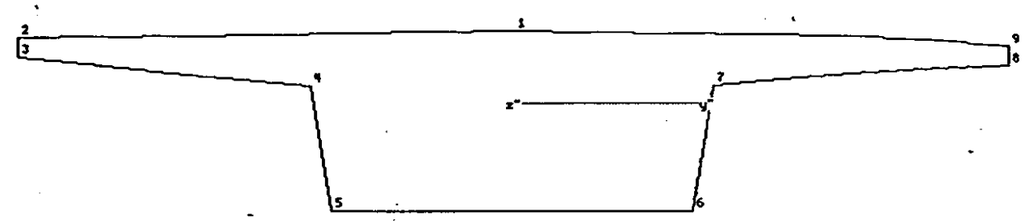
6) TREN SW/0

Sobrecarga 13,3 t/m.

7) TREN SW/2

Sobrecarga 15,0 t/m.

Mstb. 1 : 60.0



Sección :"APOYO" Armadura :""
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			

Características mecánicas de la sección:
Area : Ax= 8.485 [m2]
Momentos de inercia : Iy= 2.215 [m4] Iz= 28.448 [m4]
Inercia a torsión : Ix= 11.458 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.723786 [m]

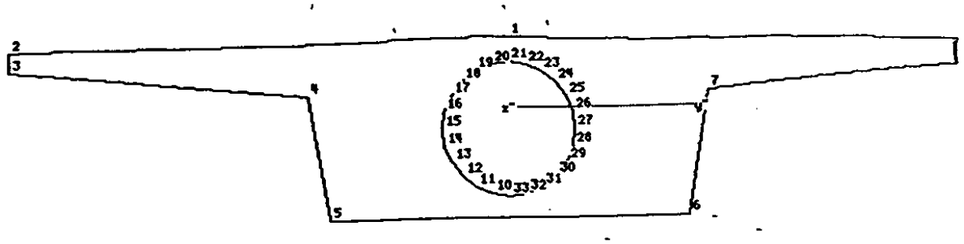
	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.989	0.706
dch.	Iz	4.750	5.989	-0.706
abajo	Iy	-1.026	-2.158	0.361
arriba	Iy	0.724	3.060	-0.254

Armadura: ningúna
Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H400"	380000.0	-226.600	-2.000	0.0	8.170	400.000

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Mstb. 1 : 60.0



Sección :"VANO" Armadura :""
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			
Puntos aligeramiento: 10				-16.82	-152.78
11	-32.50	-146.29	12	-45.96	-135.96
13	-56.29	-122.50	14	-62.78	-106.82
15	-65.00	-90.00	16	-62.78	-73.18
17	-56.29	-57.50	18	-45.96	-44.04
19	-32.50	-33.71	20	-16.82	-27.21
21	0.00	-25.00	22	16.82	-27.21
23	32.50	-33.71	24	45.96	-44.04
25	56.29	-57.50	26	62.78	-73.18
27	65.00	-90.00	28	62.78	-106.82
29	56.29	-122.50	30	45.96	-135.96
31	32.50	-146.29	32	16.82	-152.78
33	0.00	-155.00			

Características mecánicas de la sección:
Area : Ax= 7.173 [m2]
Momentos de inercia : Iy= 2.029 [m4] Iz= 28.311 [m4]
Inercia a torsión : Ix= 8.188 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.691547 [m]

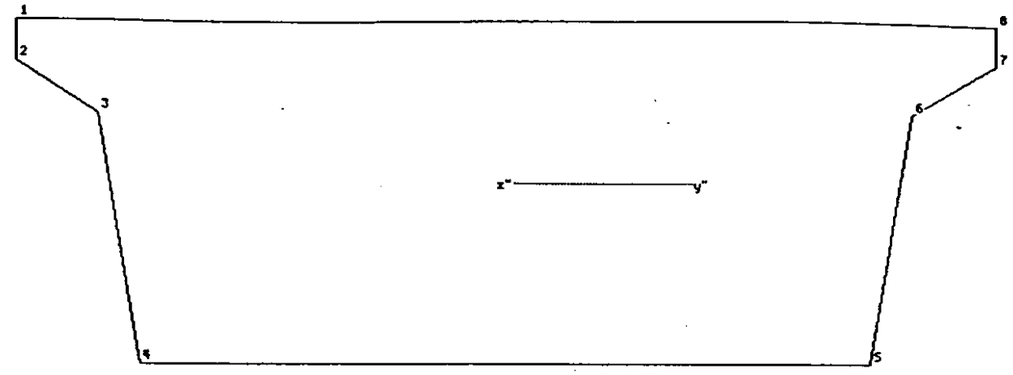
	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.960	0.831
dch.	Iz	4.750	5.960	-0.831
abajo	Iy	-1.058	-1.917	0.409
arriba	Iy	0.692	2.935	-0.267

Armadura: ningúna
Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H400"	380000.0	-226.600	-2.000	0.0	8.170	400.000

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)

Mstb. 1 : 30.0



Sección :"RIOSTRA" Armadura :""
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	-235.00	0.00	2	-235.00	-20.00
3	-195.00	-45.00	4	-175.00	-165.00
5	175.00	-165.00	6	195.00	-45.00
7	235.00	-20.00	8	235.00	0.00

Características mecánicas de la sección:
Area : Ax= 6.455 [m2]
Momentos de inercia : Iy= 1.500 [m4] Iz= 8.481 [m4]
Inercia a torsión : Ix= 6.631 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.782836 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-2.350	-3.609	0.559
dch.	Iz	2.350	3.609	-0.559
abajo	Iy	-0.867	-1.730	0.297
arriba	Iy	0.783	1.916	-0.268

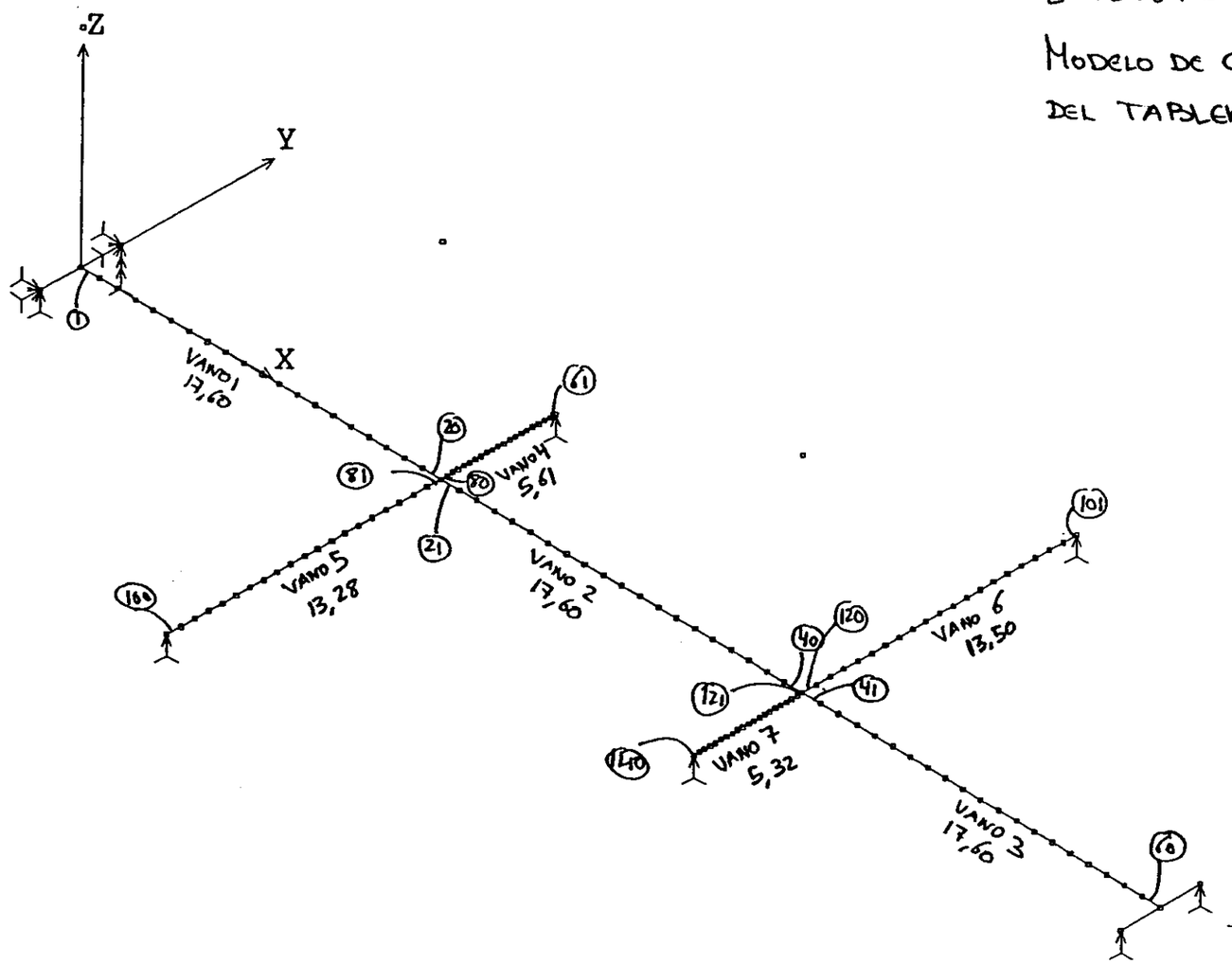
Armadura: ningúna
Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H400"	380000.0	-226.600	-2.000	0.0	8.170	400.000

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

GeoStar 2.0 (64K Version)

MP CLR
1
2



E-1518.3

MODELO DE CALCULO DEL TABLERO

GINPROSA

ASUNTO
E-1518.3
COEFICIENTE DE IMPACTO

PAG. 1

PASA VIRGINARIE :

$\gamma = 2,5 \text{ t/m}^3$

Carga viaria = 8,8 t/m.

Se adopta un peso específico ficticio para la viga principal y las traviesas

Viga $\gamma' = 2,5 + \frac{8,8}{\text{área}} = 3,72 \text{ t/m}^3 \rightarrow \gamma_{VIM} = 0,372$

Traviesa $\gamma' = 2,5 \text{ t/m}^3$ $\rightarrow \gamma_{VIM} = 0,750$

De acuerdo con el calculo por elementos finitos realizado el mayor periodo es :

$T = 0,20 \text{ seg.}$ $n = 4,92 \text{ Hz}$.

Esta frecuencia esta comprendida en los limites marcados por el EC-2.

$n_{min} = 80/L \rightarrow n_{min} = 4,54 \text{ Hz}$.

$n_{max} = 94,76 \times L^{-0,748} \rightarrow n_{max} = 11,09 \text{ Hz}$.

El coeficiente de impacto según la IPF-75 es:

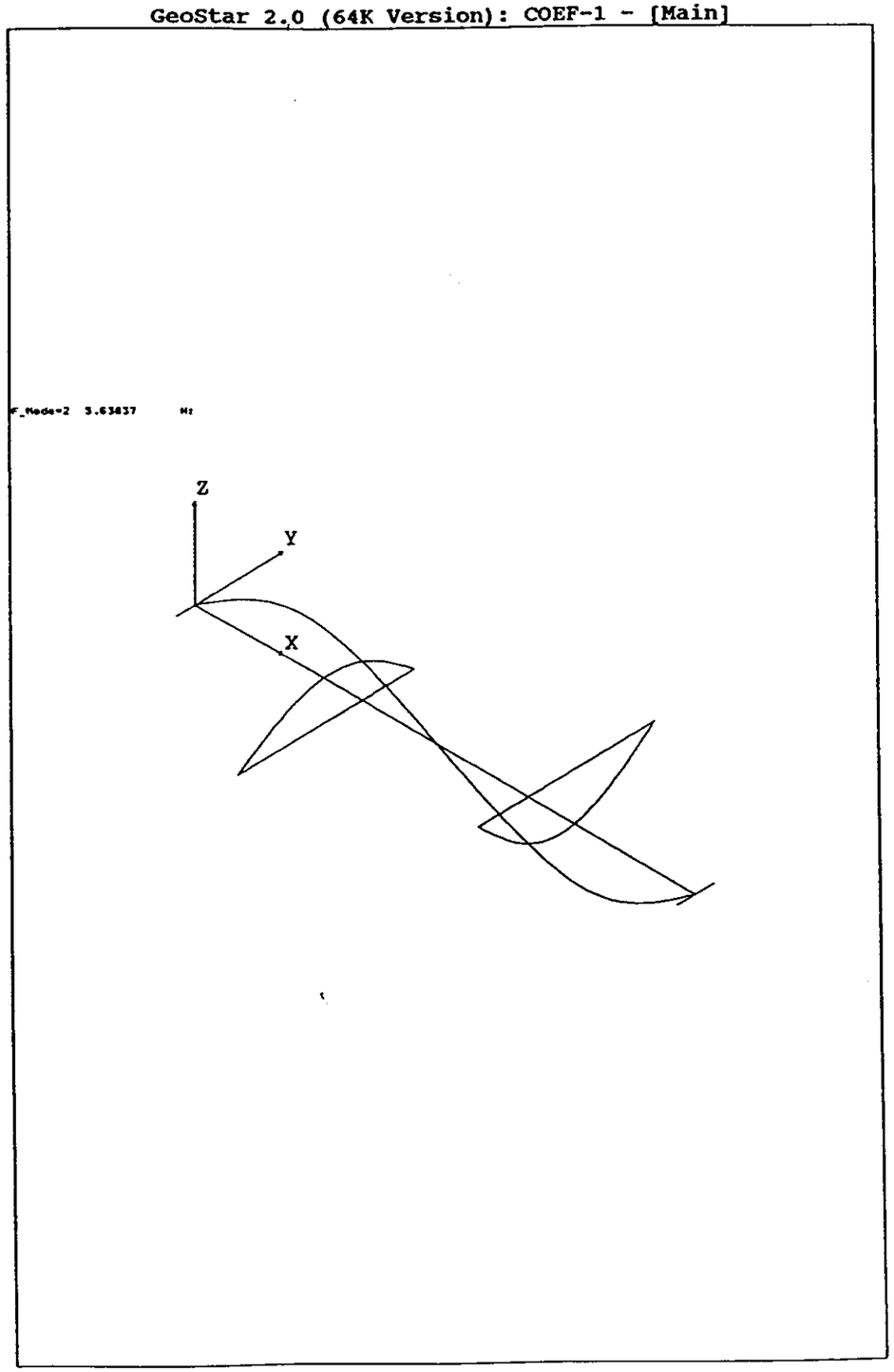
$$\mu = \frac{V \cdot T}{2L} = \frac{55,5 \cdot 0,20}{2 \cdot 17,60} \rightarrow \underline{I = 1,26}$$

El coeficiente según el EC-2 es:

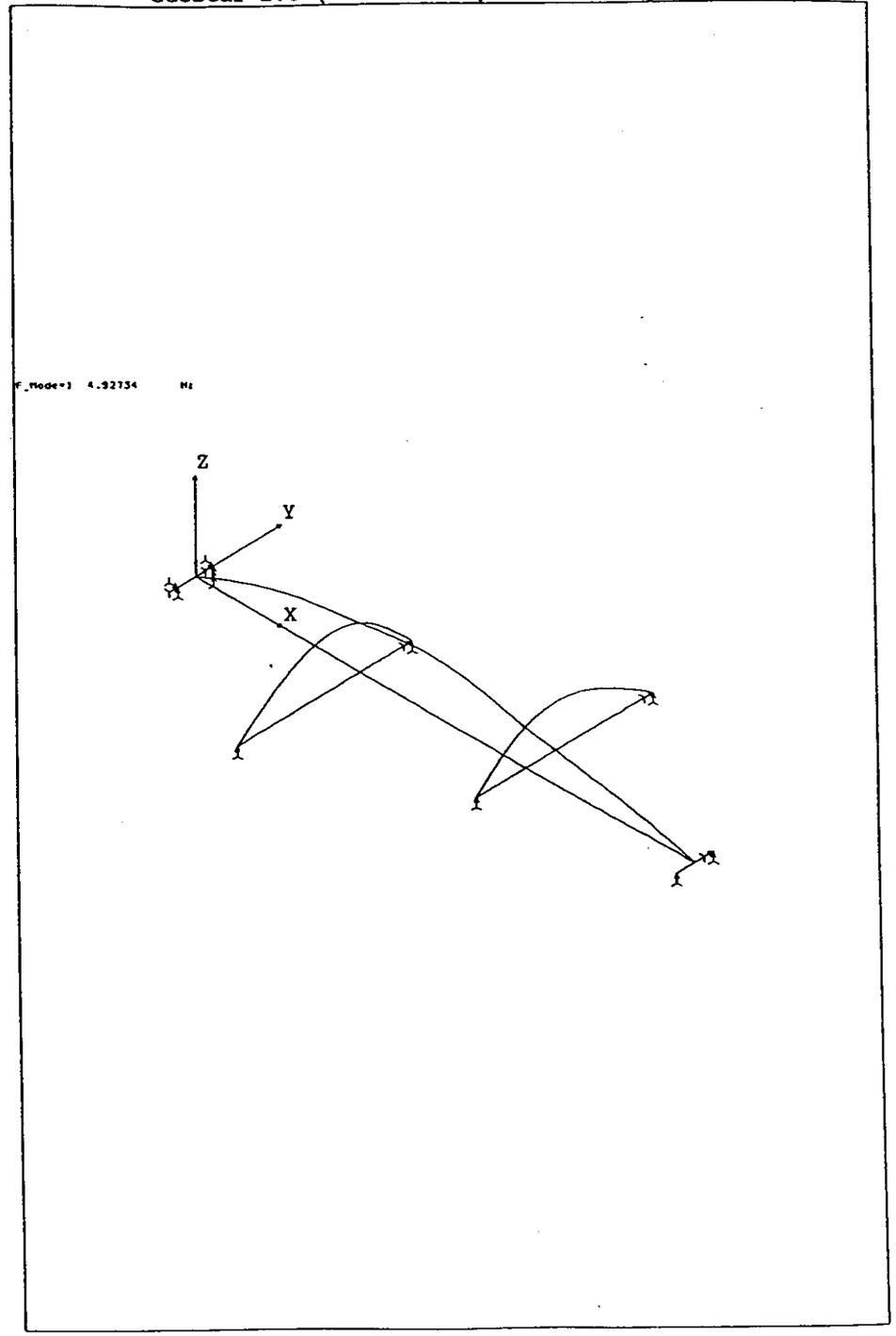
$$\phi_2 = \frac{1,44}{\sqrt{L_\phi} - 0,2} + 0,82 \qquad L_\phi = 1,3 \cdot 17,60 = 22,88 \text{ m}.$$

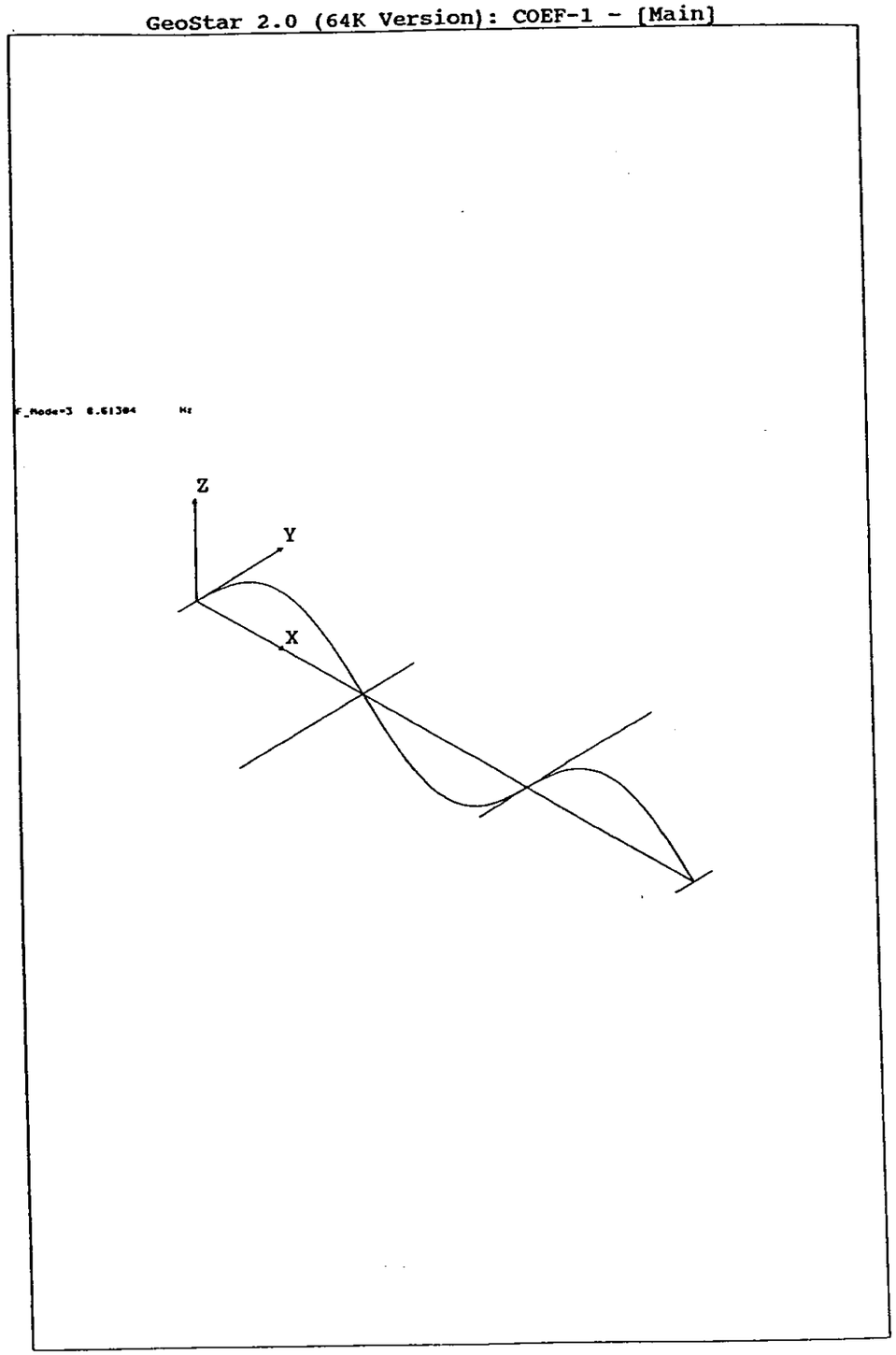
$$\underline{\phi_2 = 1,13}$$

GeoStar 2.0 (64K Version): COEF-1 - [Main]



GeoStar 2.0 (64K Version): COEF-1 - [Main]




GeoStar 2.0 (64K Version): COEF-1 - [Main]
F_Mode=3 8.61304 Hz
Z
Y
X

```
**************************************************
**********
**************************************************
**********
**                                  **
**                                  **
** CCCC  OOOO  SSSS  M   M  OOOO  SSSS   /M   M **
** C   O O S     MM MM O O S     / MM  MM **
** C   O O SSSS  M M M M O O SSSS / M M M M **
** C   O O     S M M M O O     S/  M M M M **
** CCCC  OOOO  SSSS  M   M  OOOO  SSSS/  M   M **
**                                  **
**                                  **
**              VERSION: 2.00              **
**            DISTRIBUTED BY:              **
**     STRUCTURAL RESEARCH AND ANALYSIS
CORPORATION     **
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**          TEL. NO.  (310) 207-2800          **
**          COPYRIGHT 1988  S. R. A. C.          **
**                                  **
**************************************************
**********
**************************************************
**********
Problem name: COEF-1
Date     : 07/24/1998    Time:  13:05:27
Title    :                                        |
Subtitle :


Element group data
------------------
Element group number=  1
Element name:
BEAM3D  Three dimensional Elastic Beam elements
Type of beam element = ..............  0
  EQ. 0 ; Symmetric beam element
  EQ. 1 ; Unsymmetric beam element
  EQ. 2 ; Symmetric tapered beam element


Real constant data
------------------
Real constant set   1
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                        =  7.1730
 Moment of Inertia about element Y-axis =  28.311
 Moment of Inertia about element Z-axis =  2.0290
 Depth of beam (y-axis)      =  1.7500
 Width of beam (z-axis)      =  9.5000
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  2.3600
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle           =  .00000
 Torsion const for max shear stress  =  1.0000
Real constant set   2
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                        =  8.4850
 Moment of Inertia about element Y-axis =  28.448
 Moment of Inertia about element Z-axis =  2.2150
 Depth of beam (y-axis)      =  1.7500
 Width of beam (z-axis)      =  9.5000
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  2.3600
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle           =  .00000
 Torsion const for max shear stress  =  1.0000
Real constant set   3
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                        =  6.4550
 Moment of Inertia about element Y-axis =  8.4810
 Moment of Inertia about element Z-axis =  1.5000
 Depth of beam (y-axis)      =  1.6500
 Width of beam (z-axis)      =  4.7000
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  3.7000
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  5.0000
 Temp. difference in the element z-axis =  .00000
 Orientation angle           =  .00000
 Torsion const for max shear stress  =  1.0000
Real constant set   4
Associated with :
BEAM3D  Three dimensional Elastic Beam elements
 Area                        =  100.00
 Moment of Inertia about element Y-axis =  100.00
 Moment of Inertia about element Z-axis =  100.00
 Depth of beam (y-axis)      =  .00000
 Width of beam (z-axis)      =  .00000
 End release code (I-node) [000000]  =  0
 End release code (J-node) [000000]  =  0
 Moment of inertia about element x-axis =  100.00
 Shear factor in the element y-axis  =  .00000
 Shear factor in the element z-axis  =  .00000
 Temp. difference in the element y-axis =  .00000
 Temp. difference in the element z-axis =  .00000
 Orientation angle           =  .00000
 Torsion const for max shear stress  =  .00000


Material propery data
---------------------
Material property set   1
                          Value       Temp curve no.
 EX   : X Elastic Modulus          .38000E+07     0
 NUXY : Poisson Ratio              .20000         0
 ALPX : X thermal expansion        .10000E-04     0
 DENS : Mass Density               .37200         0
Material property set   2
                          Value       Temp curve no.
 EX   : X Elastic Modulus          .38000E+07     0
 NUXY : Poisson Ratio              .20000         0
 DENS : Mass Density               .25000         0
Material property set   3
                          Value       Temp curve no.
 EX   : X Elastic Modulus          .38000E+07     0
 NUXY : Poisson Ratio              .20000         0


Nodal input data
----------------
   NODE  BOUNDARY CONDITION CODES        NODAL POINT
COORDINATES
        (0 = FREE ; 1 = FIXED)  ------------------------
      X  Y  Z  XX  YY  ZZ        X          Y          Z
   1  0  0  0  0   0   0     .00000     .00000     .00000
   2  0  0  0  0   0   0     .88000     .00000     .00000
   3  0  0  0  0   0   0    1.7600      .00000     .00000
   4  0  0  0  0   0   0    2.6400      .00000     .00000
   5  0  0  0  0   0   0    3.5200      .00000     .00000
   6  0  0  0  0   0   0    4.4000      .00000     .00000
   7  0  0  0  0   0   0    5.2800      .00000     .00000
   8  0  0  0  0   0   0    6.1600      .00000     .00000
   9  0  0  0  0   0   0    7.0400      .00000     .00000
  10  0  0  0  0   0   0    7.9200      .00000     .00000
  11  0  0  0  0   0   0    8.8000      .00000     .00000
  12  0  0  0  0   0   0    9.6800      .00000     .00000
  13  0  0  0  0   0   0    10.560      .00000     .00000
  14  0  0  0  0   0   0    11.440      .00000     .00000
  15  0  0  0  0   0   0    12.320      .00000     .00000
  16  0  0  0  0   0   0    13.200      .00000     .00000
  17  0  0  0  0   0   0    14.080      .00000     .00000
  18  0  0  0  0   0   0    14.960      .00000     .00000
  19  0  0  0  0   0   0    15.840      .00000     .00000
  20  0  0  0  0   0   0    16.720      .00000     .00000
  21  0  0  0  0   0   0    17.600      .00000     .00000
  22  1  1  1  1   1   1     .00000     .00000     10.000
  24  0  0  0  0   0   0    18.480      .00000     .00000
  25  0  0  0  0   0   0    19.360      .00000     .00000
  26  0  0  0  0   0   0    20.240      .00000     .00000
  27  0  0  0  0   0   0    21.120      .00000     .00000
  28  0  0  0  0   0   0    22.000      .00000     .00000
  29  0  0  0  0   0   0    22.880      .00000     .00000
  30  0  0  0  0   0   0    23.760      .00000     .00000
  31  0  0  0  0   0   0    24.640      .00000     .00000
  32  0  0  0  0   0   0    25.520      .00000     .00000
  33  0  0  0  0   0   0    26.400      .00000     .00000
  34  0  0  0  0   0   0    27.280      .00000     .00000
  35  0  0  0  0   0   0    28.160      .00000     .00000
  36  0  0  0  0   0   0    29.040      .00000     .00000
  37  0  0  0  0   0   0    29.920      .00000     .00000
  38  0  0  0  0   0   0    30.800      .00000     .00000
  39  0  0  0  0   0   0    31.680      .00000     .00000
  40  0  0  0  0   0   0    32.560      .00000     .00000
  41  0  0  0  0   0   0    33.440      .00000     .00000
  42  0  0  0  0   0   0    34.320      .00000     .00000
  43  0  0  0  0   0   0    35.200      .00000     .00000
  46  0  0  0  0   0   0    36.080      .00000     .00000
  47  0  0  0  0   0   0    36.960      .00000     .00000
  48  0  0  0  0   0   0    37.840      .00000     .00000
  49  0  0  0  0   0   0    38.720      .00000     .00000
  50  0  0  0  0   0   0    39.600      .00000     .00000
  51  0  0  0  0   0   0    40.480      .00000     .00000
  52  0  0  0  0   0   0    41.360      .00000     .00000
  53  0  0  0  0   0   0    42.240      .00000     .00000
  54  0  0  0  0   0   0    43.120      .00000     .00000
  55  0  0  0  0   0   0    44.000      .00000     .00000
  56  0  0  0  0   0   0    44.880      .00000     .00000
  57  0  0  0  0   0   0    45.760      .00000     .00000
  58  0  0  0  0   0   0    46.640      .00000     .00000
  59  0  0  0  0   0   0    47.520      .00000     .00000
  60  0  0  0  0   0   0    48.400      .00000     .00000
  61  0  0  0  0   0   0    49.280      .00000     .00000
  62  0  0  0  0   0   0    50.160      .00000     .00000
  63  0  0  0  0   0   0    51.040      .00000     .00000
  64  0  0  0  0   0   0    51.920      .00000     .00000
  65  0  0  0  0   0   0    52.800      .00000     .00000
  67  0  1  1  0   0   0    17.600     5.6100      .00000
  68  0  0  0  0   0   0    17.600     5.3295      .00000
  69  0  0  0  0   0   0    17.600     5.0490      .00000
  70  0  0  0  0   0   0    17.600     4.7685      .00000
  71  0  0  0  0   0   0    17.600     4.4880      .00000
  72  0  0  0  0   0   0    17.600     4.2075      .00000
  73  0  0  0  0   0   0    17.600     3.9270      .00000
  74  0  0  0  0   0   0    17.600     3.6465      .00000
  75  0  0  0  0   0   0    17.600     3.3660      .00000
  76  0  0  0  0   0   0    17.600     3.0855      .00000
  77  0  0  0  0   0   0    17.600     2.8050      .00000
  78  0  0  0  0   0   0    17.600     2.5245      .00000
  79  0  0  0  0   0   0    17.600     2.2440      .00000
  80  0  0  0  0   0   0    17.600     1.9635      .00000
  81  0  0  0  0   0   0    17.600     1.6830      .00000
  82  0  0  0  0   0   0    17.600     1.4025      .00000
  83  0  0  0  0   0   0    17.600     1.1220      .00000
  84  0  0  0  0   0   0    17.600     .84150      .00000
  85  0  0  0  0   0   0    17.600     .56100      .00000
  86  0  0  0  0   0   0    17.600     .28050      .00000
  88  1  1  1  1   1   1    17.600     .00000     10.000
  90  0  0  0  0   0   0    17.600     -.66400     .00000
  91  0  0  0  0   0   0    17.600     -1.3280     .00000
  92  0  0  0  0   0   0    17.600     -1.9920     .00000
  93  0  0  0  0   0   0    17.600     -2.6560     .00000
  94  0  0  0  0   0   0    17.600     -3.3200     .00000
  95  0  0  0  0   0   0    17.600     -3.9840     .00000
  96  0  0  0  0   0   0    17.600     -4.6480     .00000
  97  0  0  0  0   0   0    17.600     -5.3120     .00000
  98  0  0  0  0   0   0    17.600     -5.9760     .00000
  99  0  0  0  0   0   0    17.600     -6.6400     .00000
 100  0  0  0  0   0   0    17.600     -7.3040     .00000
 101  0  0  0  0   0   0    17.600     -7.9680     .00000
 102  0  0  0  0   0   0    17.600     -8.6320     .00000
 103  0  0  0  0   0   0    17.600     -9.2960     .00000
 104  0  0  0  0   0   0    17.600     -9.9600     .00000
 105  0  0  0  0   0   0    17.600     -10.624     .00000
 106  0  0  0  0   0   0    17.600     -11.288     .00000
 107  0  0  0  0   0   0    17.600     -11.952     .00000
 108  0  0  0  0   0   0    17.600     -12.616     .00000
 109  0  0  1  0   0   0    17.600     -13.280     .00000
 111  0  1  1  0   0   0    35.200     13.490      .00000
 112  0  0  0  0   0   0    35.200     12.815      .00000
 113  0  0  0  0   0   0    35.200     12.141      .00000
 114  0  0  0  0   0   0    35.200     11.467      .00000
 115  0  0  0  0   0   0    35.200     10.792      .00000
 116  0  0  0  0   0   0    35.200     10.117      .00000
 117  0  0  0  0   0   0    35.200     9.4430      .00000
 118  0  0  0  0   0   0    35.200     8.7685      .00000
 119  0  0  0  0   0   0    35.200     8.0940      .00000
 120  0  0  0  0   0   0    35.200     7.4195      .00000
 121  0  0  0  0   0   0    35.200     6.7450      .00000
 122  0  0  0  0   0   0    35.200     6.0705      .00000
 123  0  0  0  0   0   0    35.200     5.3960      .00000
 124  0  0  0  0   0   0    35.200     4.7215      .00000
 125  0  0  0  0   0   0    35.200     4.0470      .00000
 126  0  0  0  0   0   0    35.200     3.3725      .00000
 127  0  0  0  0   0   0    35.200     2.6980      .00000
 128  0  0  0  0   0   0    35.200     2.0235      .00000
 129  0  0  0  0   0   0    35.200     1.3490      .00000
 130  0  0  0  0   0   0    35.200     .67450      .00000
 132  1  1  1  1   1   1    35.200     .00000     10.000
 134  0  0  0  0   0   0    35.200     -.26600     .00000
 135  0  0  0  0   0   0    35.200     -.53200     .00000
 136  0  0  0  0   0   0    35.200     -.79800     .00000
 137  0  0  0  0   0   0    35.200     -1.0640     .00000
 138  0  0  0  0   0   0    35.200     -1.3300     .00000
 139  0  0  0  0   0   0    35.200     -1.5960     .00000
 140  0  0  0  0   0   0    35.200     -1.8620     .00000
```

141	0	0	0	0	0	0	35.200	-2.1280	.00000
142	0	0	0	0	0	0	35.200	-2.3940	.00000
143	0	0	0	0	0	0	35.200	-2.6600	.00000
144	0	0	0	0	0	0	35.200	-2.9260	.00000
145	0	0	0	0	0	0	35.200	-3.1920	.00000
146	0	0	0	0	0	0	35.200	-3.4580	.00000
147	0	0	0	0	0	0	35.200	-3.7240	.00000
148	0	0	0	0	0	0	35.200	-3.9900	.00000
149	0	0	0	0	0	0	35.200	-4.2560	.00000
150	0	0	0	0	0	0	35.200	-4.5220	.00000
151	0	0	0	0	0	0	35.200	-4.7880	.00000
152	0	0	0	0	0	0	35.200	-5.0540	.00000
153	0	0	1	0	0	0	35.200	-5.3200	.00000
154	1	1	1	0	0	1	.00000	1.9500	.00000
155	0	1	1	0	0	0	52.800	1.9500	.00000
156	1	1	1	0	0	0	.00000	-1.9500	.00000
157	0	0	1	0	0	0	52.800	-1.9500	.00000

Element input data

ELEM EGRP MP REAL ECS NODE 1 NODE 2 NODE 3 NODE 4 NODE 5 NODE 6
NODE 7 NODE 8 NODE 9 NODE10 NODE11 NODE12
NODE13 NODE14 NODE15 NODE16 NODE17 NODE18
NODE19 NODE20

1	1	1	2	-1	1	2	22
2	1	1	2	-1	2	3	22
3	1	1	1	-1	3	4	22
4	1	1	1	-1	4	5	22
5	1	1	1	-1	5	6	22
6	1	1	1	-1	6	7	22
7	1	1	1	-1	7	8	22
8	1	1	1	-1	8	9	22
9	1	1	1	-1	9	10	22
10	1	1	1	-1	10	11	22
11	1	1	1	-1	11	12	22
12	1	1	1	-1	12	13	22
13	1	1	1	-1	13	14	22
14	1	1	1	-1	14	15	22
15	1	1	1	-1	15	16	22
16	1	1	1	-1	16	17	22
17	1	1	1	-1	17	18	22
18	1	1	1	-1	18	19	22
19	1	1	2	-1	19	20	22
20	1	1	2	-1	20	21	22
21	1	1	2	-1	21	24	22
22	1	1	2	-1	24	25	22
23	1	1	1	-1	25	26	22
24	1	1	1	-1	26	27	22
25	1	1	1	-1	27	28	22
26	1	1	1	-1	28	29	22
27	1	1	1	-1	29	30	22
28	1	1	1	-1	30	31	22
29	1	1	1	-1	31	32	22
30	1	1	1	-1	32	33	22
31	1	1	1	-1	33	34	22
32	1	1	1	-1	34	35	22
33	1	1	1	-1	35	36	22
34	1	1	1	-1	36	37	22
35	1	1	1	-1	37	38	22
36	1	1	1	-1	38	39	22
37	1	1	1	-1	39	40	22
38	1	1	1	-1	40	41	22
39	1	1	2	-1	41	42	22
40	1	1	2	-1	42	43	22
41	1	1	2	-1	43	46	22
42	1	1	2	-1	46	47	22
43	1	1	1	-1	47	48	22
44	1	1	1	-1	48	49	22
45	1	1	1	-1	49	50	22
46	1	1	1	-1	50	51	22
47	1	1	1	-1	51	52	22
48	1	1	1	-1	52	53	22
49	1	1	1	-1	53	54	22
50	1	1	1	-1	54	55	22
51	1	1	1	-1	55	56	22
52	1	1	1	-1	56	57	22
53	1	1	1	-1	57	58	22
54	1	1	1	-1	58	59	22
55	1	1	1	-1	59	60	22
56	1	1	1	-1	60	61	22
57	1	1	1	-1	61	62	22
58	1	1	1	-1	62	63	22
59	1	1	2	-1	63	64	22
60	1	1	2	-1	64	65	22
61	1	2	3	-1	67	68	88
62	1	2	3	-1	68	69	88
63	1	2	3	-1	69	70	88
64	1	2	3	-1	70	71	88
65	1	2	3	-1	71	72	88
66	1	2	3	-1	72	73	88
67	1	2	3	-1	73	74	88
68	1	2	3	-1	74	75	88
69	1	2	3	-1	75	76	88
70	1	2	3	-1	76	77	88
71	1	2	3	-1	77	78	88
72	1	2	3	-1	78	79	88
73	1	2	3	-1	79	80	88
74	1	2	3	-1	80	81	88
75	1	2	3	-1	81	82	88
76	1	2	3	-1	82	83	88
77	1	2	3	-1	83	84	88
78	1	2	3	-1	84	85	88
79	1	2	3	-1	85	86	88
80	1	2	3	-1	86	21	88
81	1	2	3	-1	21	90	88
82	1	2	3	-1	90	91	88
83	1	2	3	-1	91	92	88
84	1	2	3	-1	92	93	88
85	1	2	3	-1	93	94	88
86	1	2	3	-1	94	95	88
87	1	2	3	-1	95	96	88
88	1	2	3	-1	96	97	88
89	1	2	3	-1	97	98	88
90	1	2	3	-1	98	99	88
91	1	2	3	-1	99	100	88
92	1	2	3	-1	100	101	88
93	1	2	3	-1	101	102	88
94	1	2	3	-1	102	103	88
95	1	2	3	-1	103	104	88
96	1	2	3	-1	104	105	88
97	1	2	3	-1	105	106	88
98	1	2	3	-1	106	107	88
99	1	2	3	-1	107	108	88
100	1	2	3	-1	108	109	88
101	1	2	3	-1	111	112	132
102	1	2	3	-1	112	113	132
103	1	2	3	-1	113	114	132
104	1	2	3	-1	114	115	132
105	1	2	3	-1	115	116	132
106	1	2	3	-1	116	117	132
107	1	2	3	-1	117	118	132
108	1	2	3	-1	118	119	132
109	1	2	3	-1	119	120	132
110	1	2	3	-1	120	121	132
111	1	2	3	-1	121	122	132
112	1	2	3	-1	122	123	132
113	1	2	3	-1	123	124	132
114	1	2	3	-1	124	125	132
115	1	2	3	-1	125	126	132
116	1	2	3	-1	126	127	132
117	1	2	3	-1	127	128	132
118	1	2	3	-1	128	129	132
119	1	2	3	-1	129	130	132
120	1	2	3	-1	130	43	132
121	1	2	3	-1	43	134	132
122	1	2	3	-1	134	135	132
123	1	2	3	-1	135	136	132
124	1	2	3	-1	136	137	132
125	1	2	3	-1	137	138	132
126	1	2	3	-1	138	139	132
127	1	2	3	-1	139	140	132
128	1	2	3	-1	140	141	132
129	1	2	3	-1	141	142	132
130	1	2	3	-1	142	143	132
131	1	2	3	-1	143	144	132
132	1	2	3	-1	144	145	132
133	1	2	3	-1	145	146	132
134	1	2	3	-1	146	147	132
135	1	2	3	-1	147	148	132
136	1	2	3	-1	148	149	132
137	1	2	3	-1	149	150	132
138	1	2	3	-1	150	151	132
139	1	2	3	-1	151	152	132
140	1	2	3	-1	152	153	132
141	1	3	4	-1	156	1	22
142	1	3	4	-1	1	154	22
143	1	3	4	-1	157	65	64
144	1	3	4	-1	65	155	64

CONTROL INFORMATION
NUMBER OF LOAD CASES .....(NLCASE) = 1
SOLUTION MODE .....(MODEX) = 2
EQ. 0, STATIC ANALYSIS
EQ. 1, BUCKLING ANALYSIS
EQ. 2, DYNAMIC ANALYSIS
THERMAL LOADING FLAG .....(ITHERM) = 0
EQ. 0, NO THERMAL EFFECTS CONSIDERED
EQ. 1, ADD TEMPERATURE EFFECT
GRAVITY LOADING FLAG .....(IGRAV) = 0
EQ. 0, NO GRAVITY LOADING CONSIDERED
EQ. 1, ADD GRAVITY LOADING EFFECT
CENTRIFUGAL LOADING FLAG .....(ICNTRF) = 0
EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
IN-PLANE STIFFENING FLAG .....(INPLN) = 0
EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
EQ. 1, IN-PLANE EFFECTS CONSIDERED
SOFT SPRING ADDITION FLAG .....(ISOFT) = 0
EQ. 0, NO SOFT SPRING OPTION
EQ. 1, SOFT SPRING ADDED

SAVE DECOMPOSED STIFFNESS MATRIX FLAG ...(ISAVK) = 0
EQ. 0, DO NOT SAVE DECOMPOSED K
EQ. 1, SAVE DECOMPOSED K
FORM STIFFNESS MATRIX FLAG .....(IFORMK) = 0
EQ. 0, FORM STIFFNESS MATRIX
EQ. 1, USE EXISTING DECOMPOSED STIFFNESS MATRIX

SPIN SOFTENING FLAG .....(ISPIN) = 0
EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
INERTIA RELIEF FLAG .....(IFORMK) = 0
EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
RIGID CONNECTIONS FLAG .....(IRIGID) = 0
EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS & SHELLS
EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS & SHELLS

TOTAL SYSTEM DATA
NUMBER OF EQUATIONS .....(NEQ) = 854
NUMBER OF MATRIX ELEMENTS .....(NWK) = 15981
MAXIMUM HALF BANDWIDTH .....(MK) = 45
MEAN HALF BANDWIDTH .....(MM) = 18
NUMBER OF ELEMENTS.....(NUME) = 144
NUMBER OF NODAL POINTS.....(NUMNP)= 148
ADJUSTED BLOCK SIZE .....(MTBLK)= 15982
EXTRA MEMORY AVAILABLE (in 8-byte words) ..(XMTBLK)= 4500970
NUMBER OF STIFFNESS BLOCKS..... (NBLK) = 1

MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE = .410959E+11 (436)
MINIMUM DIAGONAL STIFFNESS MATRIX VALUE = .849240E+07 (115)
1

MASS MOMENT INFORMATION

|MASS .206882E+03 |VOLUME .141594E+04 |WEIGHT .000000E+00 |

MASS MOMENT OF INERTIA W.R.T. C.G.

|IX .275436E+04 |IY .388223E+05 |IZ .415765E+05 |

MASS PRODUCT OF INERTIA W.R.T. C.G.

|PXY .211999E+04 |PXZ .000000E+00 |PYZ .000000E+00 |

RADII OF GYRATION W.R.T. C.G.

|RX .364880E+01 |RY .136987E+02 |RZ .141763E+02 |

CENTER OF GRAVITY

|CGx .263945E+02 |CGy .342879E-01 |CGz .000000E+00 |

PRINCIPAL MASS MOMENT OF INERTIA

|P1 .415765E+05 |P2 .389465E+05 |P3 .263018E+04 |

PRINCIPAL RADII OF GYRATION

|R1 .141763E+02 |R2 .137206E+02 |R3 .356559E+01 |

| PRINCIPAL AXES (DIRECTION COSINES IN ROWS W.R.T C.G) |

IN_11	.792430E+00	IN_12 -.609962E+00	IN_13 .000000E+00
IN_21	.584783E-01	IN_22 -.998289E+00	IN_23 .000000E+00
IN_31	.000000E+00	IN_32 .000000E+00	IN_33 -.755405E+00

Note: In the above table, WEIGHT is computed based on the user defined acceleration for the first active Load Case

SOLUTION PARAMETERS

NUMBER OF EIGENVALUES.....(NFR)= 10
MASS TYPE: 1-LUMPED,2-CONSISTENT....(MASS)= 1
MODE SHAPE PRINT FLAG.....(MPRNT)= 1
INTERMEDIATE SOLUTION PRINT FLAG....(IFPR)= 0
STURM SEQUENCE CHECK FLAG.....(IFSS)= 0
MAXIMUM NUMBER OF ITERATIONS.....(ITMAX)= 16
FREQUENCY SHIFT FLAG.....(IFRSH)= 0
FREQUENCY SHIFT.....(FRSH)= .0000000E+00
CONVERGENCE TOLERANCE.....(RTOL)= .1000000E-04
COMPOSITE MODAL DAMPING CALC. FLAG..(IMDC)= 0
MODAL ACCELERATION FLAG.....(IMAM)= 0

SUBSPACE ITERATION

ITERATION NUMBER 1
ITERATION NUMBER 2
ITERATION NUMBER 3
ITERATION NUMBER 4
ITERATION NUMBER 5
ITERATION NUMBER 6
ITERATION NUMBER 7
ITERATION NUMBER 8
ITERATION NUMBER 9
ITERATION NUMBER 10
ITERATION NUMBER 11
ITERATION NUMBER 12
ITERATION NUMBER 13
ITERATION NUMBER 14

CONVERGENCE REACHED FOR RTOL .1000E-04

FREQUENCY ANALYSIS
by
SUBSPACE ALGORITHM

FREQUENCY NUMBER	FREQUENCY (RAD/SEC)	FREQUENCY (CYCLES/SEC)	PERIOD (SECONDS)
1	.3095941E+02	.4927344E+01	.2029491E+00
2	.3542694E+02	.5638372E+01	.1773562E+00
3	.5411735E+02	.8613043E+01	.1161030E+00
4	.6631871E+02	.1055495E+02	.9474227E-01
5	.8012926E+02	.1275297E+02	.7841312E-01
6	.8527177E+02	.1357142E+02	.7368424E-01
7	.9595016E+02	.1527094E+02	.6548385E-01
8	.1210412E+03	.1926430E+02	.5190948E-01
9	.1602951E+03	.2551175E+02	.3919763E-01
10	.1687245E+03	.2685334E+02	.3723932E-01

GINPROSA

ASUNTO

VERIFICACIÓN DEL PRETENSADO

Se realizarán las siguientes comprobaciones:

a) Durante las fases constructivas

Combinacion: $PP + \begin{pmatrix} 0,9 \\ 1,1 \end{pmatrix} Pret + Sc,constructiv.$

Condiciones $\sigma_{max} = f_{ck}/1,60 = 2500\ t/m^2$

$\sigma_{min} = f_{ctk} = -244\ t/m^2$

b) En las fases finales:

Combinacion frecuente:

$$PP + CM + \begin{pmatrix} 0,9 \\ 1,1 \end{pmatrix} Pret + 0,60\ SC + 0,5\ \sigma_{sc}$$

Condicion: $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = 0$

Combinacion rara:

$$PP + CM + \begin{pmatrix} 0,9 \\ 1,1 \end{pmatrix} x\ Pret + SC + 0,6\ \sigma_{sc}.$$

Condicione $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = f_{ctk}$

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GIMPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-1.LIS

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 3

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=1
Parametros del tramo:
S0= 0.000 S1= 7.300 S2= 0.000 S3= 7.300 S4= 3.000 SR= 0.000
H1= 0.700 H2= 1.400 H3= 1.400 H4= 0.550

Tipo de cableado(1-2-3-4) para tramo nº2 TIPO=3
Parametros del tramo:
S1= 3.000 S2= 5.800 S3= 0.000 S4= 5.800 S5= 3.000
H1= 0.550 H2= 1.300 H3= 1.300 H5= 0.550

Tipo de cableado(1-2-3-4) para tramo nº3 TIPO=2
Parametros del tramo:
S0= 0.000 S1= 7.300 S2= 0.000 S3= 7.300 S4= 3.000 SR= 0.000
H1= 0.700 H2= 1.400 H3= 1.400 H4= 0.550

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...1
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1
Anclaje desde el que se tesa primero..(1=IZDO.)(2=DCHO.)...1

Fuerza de tesado inicial P0(ton)= 2040.0
Fuerza de tesado final P1(ton)= 1904.0
Area del cable (cm2)=134.399994
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=10

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	7.300000	-0.013136	0.191781	0.700000
2	7.300000	14.600000	-0.011305	0.165049	0.797573
3	14.600000	17.600000	0.027508	-0.968285	9.070906
4	17.600000	20.600000	0.028409	-1.000000	9.349998
5	20.600000	26.400002	-0.01469%	0.775862	-8.941376
6	26.400002	32.200001	-0.01469%	0.775862	-8.941382
7	32.200001	35.200001	0.028409	-2.000000	35.750000
8	35.200001	38.200001	0.027508	-1.936570	34.633629
9	38.200001	45.500000	-0.011305	1.028727	-22.003544
10	45.500000	52.799999	-0.013136	1.195346	-25.794125

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	7.300000	0.000000	0.189480
2	7.300000	14.600000	0.189480	0.353054
3	14.600000	17.600000	0.353054	0.516628
4	17.600000	20.600000	0.516628	0.685460
5	20.600000	26.400002	0.685460	0.854292
6	26.400002	32.200001	0.854292	1.023124
7	32.200001	35.200001	1.023124	1.191956
8	35.200001	38.200001	1.191956	1.355530
9	38.200001	45.500000	1.355530	1.519104
10	45.500000	52.799999	1.519104	1.708584

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	7.300000	1.708583	1.519103
2	7.300000	14.600000	1.519103	1.355529
3	14.600000	17.600000	1.355529	1.191956
4	17.600000	20.600000	1.191956	1.023124
5	20.600000	26.400002	1.023124	0.854292
6	26.400002	32.200001	0.854292	0.685460
7	32.200001	35.200001	0.685460	0.516628
8	35.200001	38.200001	0.516628	0.353054
9	38.200001	45.500000	0.353054	0.189480
10	45.500000	52.799999	0.189480	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por izda. a_izda= 5.000(mm.)
Penetracion por retesado por izda. retesado _izda= 1.355(mm.)
Penetracion de cuñas ficticia por izda. a_ficticia_izda= 6.355(mm.)

Alcance de penetracion de cuñas+retesado por izda. x= 11.560(m.) perdidas= 7.149%

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 1.355(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 6.355(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 41.240(m.) perdidas= 7.149%

Punto de interseccion de curvas de perdidas x= 26.400(m.) perdidas= 19.157%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	7.300000	15.3	10.6	1727.1	1824.6
2	7.300000	11.559662	10.6	8.2	1824.6	1872.9
3	11.559662	14.600000	8.2	9.9	1872.9	1838.4
4	14.600000	17.600000	9.9	13.3	1838.4	1768.8
5	17.600000	20.600000	13.3	16.7	1768.8	1700.0
6	20.600000	26.400002	16.7	20.2	1700.0	1627.9
7	26.400002	32.200001	20.2	16.7	1627.9	1700.0
8	32.200001	35.200001	16.7	13.3	1700.0	1768.8
9	35.200001	38.200001	13.3	9.9	1768.8	1838.4
10	38.200001	41.240337	9.9	8.2	1838.4	1872.9
11	41.240337	45.500000	8.2	10.6	1872.9	1824.6
12	45.500000	52.799999	10.6	15.3	1824.6	1727.1

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-2.LIS

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...1
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1
Anclaje desde el que se tesa primero..(1=IZDO.)(2=DCHO.)...1

Fuerza de tesado inicial P0(ton)= 5740.0
Fuerza de tesado final P1(ton)= 5380.0
Area del cable (cm2)=378.000000
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=2

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	5.610000	0.000000	0.119430	0.800000
2	5.610000	18.889999	0.000000	-0.050450	1.753030

TRAZADO EN PLANTA:
El trazado el planta es recto.

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	5.610000	0.000000	0.000000
2	5.610000	18.889999	0.169274	0.169274

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	5.610000	0.169274	0.169274
2	5.610000	18.889999	0.000000	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por izda. a_izda= 5.000(mm.)
Penetracion por retesado por izda. retesado _izda= 2.496(mm.)
Penetracion de cuñas ficticia por izda. a_ficticia_izda= 7.496(mm.)

Alcance de penetracion de cuñas+retesado por izda. x= 18.890(m.) perdidas= 6.079%

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 343.997
Alargamiento por la dcha.(mm.)= 39.226
ALARGAMIENTO TOTAL(mm.)= 383.223

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	q1	q2
1	0.000000	7.300000	42.979	47.934
2	7.300000	11.559662	41.253	41.763
3	11.559662	14.600000	41.763	39.923
4	14.600000	17.600000	-97.146	-97.315
5	17.600000	20.600000	-100.502	-92.527
6	20.600000	26.400002	47.859	47.842
7	26.400002	32.200001	47.842	47.859
8	32.200001	35.200001	-92.527	-100.502
9	35.200001	38.200001	-97.315	-97.146
10	38.200001	41.240337	39.923	41.763
11	41.240337	45.500000	41.763	41.253
12	45.500000	52.799999	47.934	42.979

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion		Componente Vertical	Componente Longitudinal
x=	0.000	-325.289	1696.150
x=	52.800	-325.289	-1696.150

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 2.383(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 7.383(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 0.000(m.) perdidas= 6.177%

Punto de interseccion de curvas de perdidas x= 13.490(m.) perdidas= 0.000%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	13.490000	11.9	10.2	5055.5	5152.3
2	13.490000	15.253754	12.7	12.9	5009.4	4996.7
3	15.253754	18.809999	12.9	13.4	4996.7	4971.0

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 147.066
Alargamiento por la dcha.(mm.)= 4.660
ALARGAMIENTO TOTAL(mm.)= 151.726

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	q1	q2
1	0.000000	13.490000	0.000	0.000
2	13.490000	15.253754	0.000	0.000
3	15.253754	18.809999	0.000	0.000

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion		Componente Vertical	Componente Longitudinal
x=	0.000	-250.799	5049.302
x=	13.490	881.537	-175.790
x=	18.810	-621.147	-4932.086

CÁLCULO DE TENSIONES EN PUENTES CONSTRUIDOS POR FASES

Fase nº: 0 PUENTE EN VACIO

PROYECTO: L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1518.3

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	1460	0
2	Σ pp(i) + 1.1 x Σ pret(i)	2051	-225
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	1417	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	2008	-187

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= preforzado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Preforzado			Peso Propio			Preforzado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t.)	M (mt.)	V (mt.)	N (t.)	M (mt.)	V (mt.)	N (t.)	M (mt.)	V (mt.)	N (t.)	M (mt.)	V (mt.)	N (t.)	M (mt.)	V (mt.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	0.0	0.0	0.0	7.2	0.0	0.0	-25.4	0.0	0.0	147.8	1727.0	39.7	-321.8	194.9	166.6	238.2	203.6	194.9	166.6	238.2	203.6
1	2	0.0	0.0	0.0	0.0	6.0	6.4	0.0	-22.4	-25.4	0.0	121.8	129.1	1727.0	-225.9	-281.8	156.6	221.0	182.5	262.6	156.5	218.2	184.5	279.8
1	3	0.0	0.0	0.0	0.0	11.2	5.5	0.0	-44.7	-25.4	0.0	227.2	110.4	1727.0	-456.3	-241.9	154.2	312.4	171.3	408.2	158.0	306.6	175.1	402.4
1	4	0.0	0.0	0.0	0.0	15.7	4.7	0.0	-67.1	-25.4	0.0	317.5	94.7	1727.0	-707.0	-202.0	108.1	383.1	108.1	505.0	113.5	374.9	113.5	496.8
1	5	0.0	0.0	0.0	0.0	19.5	3.9	0.0	-89.5	-25.4	0.0	393.8	78.9	1727.0	-967.2	-162.1	85.0	418.5	74.1	557.1	91.6	408.3	80.7	547.0
1	6	0.0	0.0	0.0	0.0	22.5	3.0	0.0	-111.8	-25.4	0.0	456.3	63.1	1727.0	-992.3	-122.2	68.0	444.6	48.5	596.4	75.6	432.9	56.2	584.6
1	7	0.0	0.1	0.0	0.0	24.8	2.2	0.0	-134.2	-25.4	0.0	505.0	47.3	1727.0	-1062.2	-82.2	57.0	461.5	31.4	622.6	65.4	448.6	39.8	609.7
1	8	0.0	0.1	0.0	0.0	26.3	1.3	0.0	-156.6	-25.4	0.0	539.6	31.5	1727.0	-1137.1	-42.3	51.9	469.2	22.6	636.1	60.9	455.5	31.6	622.3
1	9	0.0	0.1	0.0	0.0	27.1	0.5	0.0	-178.9	-25.4	0.0	560.4	15.8	1727.0	-1156.7	-2.4	53.0	467.6	22.4	636.5	62.2	453.4	31.6	622.3
1	10	0.0	0.1	0.0	0.0	27.2	-0.3	0.0	-201.3	-25.4	0.0	567.4	0.0	1825.0	-1211.3	35.3	50.9	501.9	19.3	679.2	60.2	487.7	28.6	665.0
1	11	0.0	0.1	0.0	0.0	26.5	-1.2	0.0	-223.7	-25.4	0.0	560.4	-15.8	1825.0	-1164.1	71.3	63.0	483.3	34.6	655.7	72.1	469.5	43.7	641.9
1	12	0.0	0.1	0.0	0.0	25.2	-2.0	0.0	-246.0	-25.4	0.0	539.5	-31.6	1825.0	-1085.3	107.7	80.1	457.2	57.8	621.4	86.6	444.1	65.6	608.3
1	13	0.0	0.1	0.0	0.0	23.0	-2.8	0.0	-268.4	-25.4	0.0	504.8	-47.4	1825.0	-974.7	144.0	102.1	423.4	86.6	576.0	110.0	411.4	94.5	564.0
1	14	0.0	0.0	0.0	0.0	20.2	-3.7	0.0	-290.8	-25.4	0.0	456.1	-63.2	1825.0	-832.1	180.3	129.3	381.8	123.5	519.5	136.2	371.3	130.4	509.0
1	15	0.0	0.0	0.0	0.0	16.6	-4.5	0.0	-313.1	-25.4	0.0	393.5	-78.9	1873.0	-677.9	222.0	161.3	348.0	167.3	471.0	166.9	339.4	172.9	462.4
1	16	0.0	0.0	0.0	0.0	12.2	-5.3	0.0	-335.5	-25.4	0.0	317.1	-94.7	1873.0	-466.1	259.3	200.1	288.4	220.6	389.3	204.3	282.0	224.8	382.9
1	17	0.0	0.0	0.0	0.0	7.2	-6.2	0.0	-357.9	-25.4	0.0	226.8	-110.5	1873.0	-221.6	296.6	244.3	228.7	281.5	296.1	246.8	217.0	263.9	292.3
1	18	0.0	0.0	0.0	0.0	1.4	-7.0	0.0	-380.2	-25.4	0.0	122.7	-126.3	1873.0	46.4	301.5	291.0	149.2	346.4	196.5	291.5	148.5	346.9	195.8
1	19	0.0	0.0	0.0	0.0	-5.2	-7.9	0.0	-402.6	-25.4	0.0	4.6	-142.1	1838.0	252.2	167.5	309.5	109.7	377.9	134.7	307.7	112.5	376.1	137.4
1	20	0.0	0.0	0.0	0.0	-12.5	-8.7	0.0	-425.0	-25.4	0.0	-128.6	-160.7	1838.0	436.8	98.5	289.5	68.9	363.5	78.0	285.3	75.1	359.3	76.2
1	21	0.0	0.0	0.0	0.0	-20.5	-9.5	0.0	-447.3	-25.4	0.0	-278.3	-179.4	1838.0	484.3	9.4	253.6	122.2	330.7	118.5	246.7	132.4	323.9	126.7
2	1	0.0	0.0	0.0	0.0	-20.5	8.2	0.0	-447.3	4.9	0.0	-278.3	159.7	1769.0	472.3	5.6	235.6	119.6	306.1	117.5	226.9	129.1	301.4	127.0
2	2	0.0	0.0	0.0	0.0	-13.6	7.4	0.0	-443.1	4.9	0.0	-146.0	141.0	1769.0	436.2	-62.9	268.8	72.5	339.1	73.5	264.3	78.8	334.7	79.9
2	3	0.0	0.0	0.0	0.0	-7.5	6.6	0.0	-438.8	4.9	0.0	-30.1	122.4	1769.0	326.4	-171.2	311.8	64.3	383.3	99.6	309.2	66.2	380.8	103.5
2	4	0.0	0.0	0.0	0.0	-2.1	5.7	0.0	-434.5	4.9	0.0	70.7	106.6	1769.0	80.2	-259.7	270.6	147.4	325.4	186.4	269.9	148.5	324.7	189.4
2	5	0.0	0.0	0.0	0.0	2.6	4.9	0.0	-430.2	4.9	0.0	157.5	90.8	1700.0	-153.3	-268.6	220.0	203.1	256.9	266.5	220.8	201.8	257.8	265.2
2	6	0.0	0.0	0.0	0.0	6.5	4.0	0.0	-426.0	4.9	0.0	230.5	75.0	1700.0	-361.3	-214.2	181.1	262.7	203.9	347.8	183.3	259.3	206.1	344.4
2	7	0.0	0.0	0.0	0.0	9.7	3.2	0.0	-421.7	4.9	0.0	289.5	59.2	1700.0	-530.4	-170.3	149.3	311.3	160.6	414.1	152.6	306.3	163.9	409.0
2	8	0.0	0.0	0.0	0.0	12.2	2.4	0.0	-417.4	4.9	0.0	334.7	43.5	1700.0	-660.9	-126.3	124.7	349.0	127.1	465.4	128.9	342.7	131.3	459.1
2	9	0.0	0.0	0.0	0.0	13.9	1.5	0.0	-413.1	4.9	0.0	366.0	27.7	1700.0	-752.7	-82.4	107.3	375.8	103.4	501.8	112.0	368.6	108.1	494.6
2	10	0.0	0.0	0.0	0.0	14.9	0.7	0.0	-408.9	4.9	0.0	383.4	11.9	1700.0	-805.9	-38.4	96.9	391.7	89.4	523.3	101.9	384.8	94.4	515.5
2	11	0.0	0.0	0.0	0.0	15.1	-0.1	0.0	-404.6	4.9	0.0	386.9	-3.9	1700.0	-820.3	5.5	93.6	396.7	85.2	529.7	98.8	388.8	90.3	521.8
2	12	0.0	0.0	0.0	0.0	14.6	-1.0	0.0	-400.3	4.9	0.0	376.6	-19.7	1628.0	-753.1	47.6	101.7	361.4	95.8	485.5	106.7	353.8	100.8	477.8
2	13	0.0	0.0	0.0	0.0	13.4	-1.8	0.0	-396.1	4.9	0.0	352.3	-35.5	1628.0	-692.7	89.7	111.9	345.8	110.2	463.5	116.5	338.8	114.7	456.5
2	14	0.0	0.0	0.0	0.0	11.4	-2.6	0.0	-391.8	4.9	0.0	314.2	-51.2	1628.0	-595.2	131.9	128.8	319.8	133.7	427.4	132.7	313.9	137.6	421.4
2	15	0.0	0.0	0.0	0.0	8.7	-3.5	0.0	-387.5	4.9	0.0	262.1	-67.0	1628.0	-460.7	174.0	152.3	283.8	166.4	377.3	155.3	278.3	169.3	372.8
2	16	0.0	0.0	0.0	0.0	5.3	-4.3	0.0	-383.2	4.9	0.0	196.2	-82.8	1628.0	-289.0	216.1	182.5	237.6	208.2	313.2	184.3	234.9	210.0	310.4
2	17	0.0	0.0	0.0	0.0	1.1	-5.2	0.0	-379.0	4.9	0.0	116.4	-98.6	1628.0	-80.5	258.2	219.2	181.3	259.1	235.1	219.6	180.7	259.5	234.5
2	18	0.0	0.0	0.0	0.0	-3.8	-6.0	0.0	-374.7	4.9	0.0	22.7	-114.4	1628.0	157.0	271.9	260.1	118.6	316.2	147.7	258.9	120.6	314.9	149.6
2	19	0.0	0.0	0.0	0.0	-9.4	-6.8	0.0	-370.4	4.9	0.0	-84.8	-130.1	1700.0	344.8	175.6	290.1	95.6	361.8	107.0	286.9	100.5	357.8	111.9
2	20	0.0	0.0	0.0	0.0	-15.8	-7.7	0.0	-366.1	4.9	0.0	-207.6	-146.8	1700.0	516.4	90.6	272.0	57.5	347.9	47.3	266.7	65.4	342.6	55.2
2	21	0.0	0.0	0.0	0.0	-22.9	-8.5	0.0	-361.9	4.9	0.0	-346.7	-167.5	1700.0	556.6	5.6	238.0	107.9	316.8	93.5	230.3	119.3	309.1	104.9
3	1	0.0	0.0	0.0	0.0	-22.9	9.7	0.0	-361.9	20.6	0.0	-346.7	183.3	1769.0	570.5	-15.0	242.1	110.3	321.1	99.1	234.6	120.9	313.6	109.7
3	2	0.0	0.0	0.0	0.0	-14.7	8.8	0.0	-343.8	20.6	0.0	-193.7	164.6	1769.0	519.6	-100.6	277.1	60.6	352.8	54.1	272.3	67.5	348.0	61.0
3	3	0.0	0.0	0.0	0.0	-7.3	8.0	0.0	-325.7	20.6	0.0	-57.0	145.9	1769.0	393.4	-186.2	323.1	66.9	399.2	75.2	320.6	70.8	396.7	79.0
3	4	0.0	0.0	0.0	0.0	-0.7	7.2	0.0	-307.6	20.6	0.0	64.5	130.2	1769.0	135.2	-271.9	285.4	124.8	343.9	160.0	285.1	125.1	343.7	160.4
3	5	0.0	0.0	0.0	0.0	5.2	6.3	0.0	-289.5	20.6	0.0	172.1	114.4	1838.0	-135.8	-307.9	247.6	204.6	289.6	270.0	249.4	201.8	291.4	267.3
3	6	0.0	0.0	0.0	0.0	10.4	5.5	0.0	-271.4	20.6	0.0	265.8	98.6	1838.0	-380.8	-260.2	204.4	270.7	229.7	361.7	208.0	265.3	233.3	356.3
3	7	0.0	0.0	0.0	0.0	14.9	4.6	0.0	-253.3	20.6	0.0	345.6	82.8	1838.0	-593.7	-223.6	166.4	329.1	177.2	442.3	171.4	321.3	182.2	434.6
3	8	0.0	0.0	0.0	0.0	18.6	3.8	0.0	-235.2	20.6	0.0	411.6	67.0	1838.0	-774.4	-187.0	133.4	379.5	131.9	511.6	139.8	369.8	138.3	501.9
3	9	0.0	0.0	0.0	0.0	21.6	3.0	0.0	-217.1	20.6	0.0	463.6	51.3	1873.0	-943.2	-153.0	103.8	436.1	91.8	586.8	111.2	424.8	99.1	575.5
3	10	0.0	0.1	0.0	0.0	23.8	2.1	0.0	-199.0	20.6	0.0	501.9	35.5	1873.0	-1061.4	-115.7	80.6	471.7	60.5	634.7	88.7	459.2	68.6	622.2
3	11	0.0	0.1	0.0	0.0	25.4	1.3	0.0	-180.9	20.6	0.0	526.2	19.7	1873.0	-1146.9	-78.5	62.7	499.1	36.8	671.1	71.3	485.9	45.4	657.8
3	12	0.0	0.1	0.0	0.0	26.1	0.5	0.0	-162.8	20.6	0.0	536.6	3.9	1873.0	-1199.8	-41.2	50.0	518.6	20.5	696.0	58.9	504.9	29.4	682.4
3	13	0.0	0.1	0.0	0.0	26.2	-0.4	0.0	-144.7	20.6	0.0	533.1	-11.9	1873.0	-1218.7	-2.9	43.0	529.3	12.2	708.7	51.9	515.6	21.1	695.0
3	14	0.0	0.1	0.0	0.0	25.5	-1.2	0.0	-126.7	20.6	0.0	515.7	-27.6	1825.0	-1168.7	39.7	46.4	508.8	17.7	681.7	55.1	495.5	26.3	668.4
3	15	0.0	0.0	0.0	0.0	24.0	-2.0	0.0	-108.6	20.6	0.0	484.3	-43.4	1825.0	-1115.6	81.9	52.0	500.2	26.9	667.6	60.2	487.7	35.1	655.0
3	16	0.0	0.0	0.0	0.0	21.9	-2.9	0.0	-90.5	20.6	0.0	439.2	-59.2	1824.0	-1024.5	124.1	64.4	480.8	45.5	638.6	71.9	469.4	53.0	627.2
3	17	0.0	0.0	0.0	0.0	19.0	-3.7	0.0	-72.4	20.6	0.0	380.1	-75.0	1824.0	-896.8	166.3	83.5	451.7	73.2	596.2	89.9	441.8	79.7	586.3
3	18	0.0	0.0	0.0	0.0	15.3	-4.6	0.0	-54.3	20.6	0.0	307.2	-90.8	1824.0	-731.9	208.4	109.2	412.3	110.2	539.6	114.4	404.3	115.4	531.6
3	19	0.0	0.0	0.0	0.0	11.0	-5.4	0.0	-36.2	20.6	0.0	220.4	-106.5	1824.0	-530.0	250.6	141.5	362.8	156.2	469.0	145.2	357.1	160.0	463.2
3	20	0.0	0.0	0.0	0.0	5.8	-6.2	0.0	-18.1	20.6	0.0	118.4	-125.2	1824.0	-232.5	292.8	168.6	244.4	197.2	311.8	170.6	241.5	199.2	308.9
3	21	0.0	0.0	0.0	0.0	0.0	-7.1	0.0	0.0	20.6	0.0	0.0	-143.9	1824.0	43.6	334.9	212.3	179.6	259.5	219.5	212.3	179.6	259.5	219.5
4	1	0.0	0.0	0.0	0.0	0.0	13.3	4982.0	-89.7	-616.2	0.0	0.0	419.4	4982.0	-89.7	-641.9	652.5	741.3	797.6	906.1	652.5	741.3	797.6	906.1
4	2	0.0	0.0	0.0	0.0	3.7	13.3	4982.0	-262.5	-616.2	0.0	117.0	414.9	4982.0	-269.7	-641.9	629.1	767.4	755.3	952.9	631.0	765.2	757.3	950.8
4	3	0.0	0.0	0.0	0.0	7.5	13.3	4982.0	-435.4	-616.2	0.0	232.8	410.4	4982.0	-449.8	-641.9	605.0	794.1	712.4	1000.6	608.9	789.8	716.3	996.2
4	4	0.0	0.0	0.0	0.0	11.2	13.3	4982.0	-608.2	-616.2	0.0	347.3	405.9	4982.0	-629.8	-641.9	580.2	821.6	668.9	1048.9	586.0	815.1	674.7	1042.4

4	5	0.0	0.0	0.0	0.0	15.0	13.3	4982.0	-781.1	-616.2	0.0	460.5	401.3	4982.0	-809.9	-641.9	554.7	849.9	624.6	1098.0	562.5	841.3	632.4	1069.4
4	6	0.0	0.1	0.0	0.0	16.7	13.3	4982.0	-953.9	-616.2	0.0	572.5	396.8	4982.0	-989.9	-641.9	528.6	878.9	579.8	1147.8	538.4	868.1	589.5	1137.0
4	7	0.0	0.1	0.0	0.0	22.4	13.3	4982.0	-1127.0	-616.2	0.0	683.2	392.3	4982.0	-1170.2	-641.9	501.7	908.7	534.1	1196.5	513.4	895.7	545.8	1185.5
4	8	0.0	0.1	0.0	0.0	26.2	13.3	4982.0	-1300.0	-616.2	0.0	792.6	387.8	4982.0	-1350.4	-641.9	474.2	939.3	487.8	1249.9	487.9	924.1	501.4	1234.8
4	9	0.0	0.1	0.0	0.0	29.9	13.3	4982.0	-1472.0	-616.2	0.0	900.7	383.2	4982.0	-1529.6	-641.9	446.5	970.0	441.4	1301.4	462.1	952.7	457.8	1284.1
4	10	0.0	0.1	0.0	0.0	33.6	13.3	4982.0	-1645.0	-616.2	0.0	1007.1	378.7	4982.0	-1709.8	-641.9	417.4	1002.3	393.5	1354.5	435.0	982.8	411.1	1335.1
4	11	0.0	0.1	0.0	0.0	37.4	13.3	5001.0	-1825.0	-618.5	0.0	1113.1	374.2	5001.0	-1897.8	-644.2	387.5	1041.1	344.7	1415.6	407.0	1019.5	364.2	1394.0
4	12	0.0	0.1	0.0	0.0	41.1	13.3	5001.0	-1998.0	-618.5	0.0	1217.1	369.7	5001.0	-2077.2	-644.2	357.2	1074.8	295.6	1470.1	378.6	1051.0	317.8	1446.3
4	13	0.0	0.1	0.0	0.0	44.9	13.3	5001.0	-2172.0	-618.5	0.0	1320.1	365.1	5001.0	-2258.4	-644.2	325.9	1109.5	245.4	1525.8	349.3	1083.6	268.7	1499.9
4	14	0.0	0.1	0.0	0.0	48.6	13.3	5001.0	-2345.0	-618.5	0.0	1422.1	360.6	5001.0	-2438.6	-644.2	294.5	1144.3	195.2	1581.5	319.8	1116.2	220.5	1553.4
4	15	0.0	0.2	0.0	0.0	52.3	13.3	5001.0	-2519.0	-618.5	0.0	1523.2	356.1	5001.0	-2619.8	-644.2	262.1	1180.3	143.9	1638.4	289.4	1150.0	171.2	1606.1
4	16	0.0	0.2	0.0	0.0	56.1	13.3	5001.0	-2692.0	-618.5	0.0	1622.2	351.6	5001.0	-2799.9	-644.2	229.2	1216.8	92.3	1695.8	256.5	1184.3	121.5	1663.3
4	17	0.0	0.2	0.0	0.0	59.8	13.3	5001.0	-2866.0	-618.5	0.0	1720.2	347.0	5001.0	-2981.1	-644.2	195.3	1254.4	39.4	1754.4	226.5	1219.8	70.6	1719.8
4	18	0.0	0.2	0.0	0.0	63.6	13.3	5001.0	-3039.0	-618.5	0.0	1817.2	342.5	5001.0	-3161.3	-644.2	161.3	1292.1	-13.3	1813.8	194.5	1255.4	19.8	1776.2
4	19	0.0	0.2	0.0	0.0	67.3	13.3	5001.0	-3213.0	-618.5	0.0	1912.2	338.0	5001.0	-3342.5	-644.2	125.9	1331.5	-67.7	1873.3	160.9	1292.6	-32.6	1834.4
4	20	0.0	0.2	0.0	0.0	71.0	13.3	5001.0	-3386.0	-618.5	0.0	2006.2	333.4	5001.0	-3522.7	-644.2	90.3	1371.0	-122.0	1933.6	127.3	1329.9	-85.0	1892.5
4	21	0.0	0.2	0.0	0.0	74.8	13.3	5001.0	-3560.0	-618.6	0.0	2099.2	328.9	5001.0	-3703.9	-644.3	53.8	1411.5	-177.5	1995.1	92.8	1368.3	-138.5	1951.9
5	1	0.0	0.2	0.0	0.0	58.7	-4.4	5150.0	-2860.0	208.3	0.0	1556.2	-10.2	5150.0	-2972.7	216.8	135.6	1364.6	-14.8	1868.2	166.2	1330.6	15.8	1834.2
5	2	0.0	0.2	0.0	0.0	55.8	-4.4	5150.0	-2721.0	208.4	0.0	1548.2	-20.9	5150.0	-2828.0	216.9	198.3	1295.0	63.8	1781.9	227.3	1262.7	92.0	1749.6
5	3	0.0	0.2	0.0	0.0	52.8	-4.4	5150.0	-2583.0	208.4	0.0	1530.2	-31.6	5150.0	-2684.4	216.9	256.2	1230.6	135.9	1700.9	283.8	1200.1	163.5	1670.3
5	4	0.0	0.2	0.0	0.0	49.9	-4.4	5150.0	-2445.0	208.4	0.0	1506.2	-42.3	5150.0	-2540.8	216.9	311.1	1169.7	205.8	1623.3	337.1	1140.8	231.8	1594.5
5	5	0.0	0.1	0.0	0.0	47.0	-4.4	5150.0	-2306.0	208.4	0.0	1474.1	-53.0	5150.0	-2396.1	216.9	362.3	1112.9	272.0	1549.8	386.8	1085.7	296.5	1522.6
5	6	0.0	0.1	0.0	0.0	44.0	-4.4	5150.0	-2168.0	208.3	0.0	1435.1	-63.7	5150.0	-2252.5	216.8	409.4	1060.7	334.1	1480.9	432.3	1035.2	357.0	1455.5
5	7	0.0	0.1	0.0	0.0	41.1	-4.4	5150.0	-2030.0	208.3	0.0	1389.1	-74.5	5150.0	-2108.9	216.8	452.8	1012.5	392.5	1416.1	474.2	988.7	413.9	1392.3
5	8	0.0	0.1	0.0	0.0	38.2	-4.4	5150.0	-1891.0	208.3	0.0	1336.1	-85.2	5150.0	-1964.2	216.8	493.8	967.8	447.8	1354.7	512.9	945.8	467.7	1332.7
5	9	0.0	0.1	0.0	0.0	35.2	-4.4	5150.0	-1753.0	208.3	0.0	1276.1	-95.9	5150.0	-1820.6	216.8	529.1	927.8	498.8	1298.8	547.5	907.4	517.2	1277.6
5	10	0.0	0.1	0.0	0.0	32.3	-4.4	5149.0	-1615.0	208.3	0.0	1209.1	-106.6	5149.0	-1677.8	216.8	561.4	891.6	546.1	1245.2	578.3	872.9	562.9	1226.5
5	11	0.0	0.1	0.0	0.0	29.4	-4.4	5149.0	-1476.0	208.3	0.0	1135.1	-117.3	5149.0	-1532.3	216.8	590.7	859.1	590.5	1196.8	606.0	842.1	605.8	1179.0
5	12	0.0	0.1	0.0	0.0	26.4	-4.4	5149.0	-1338.0	208.3	0.0	1053.1	-128.0	5149.0	-1386.7	216.8	615.3	831.7	630.1	1152.0	629.1	816.5	643.9	1136.7
5	13	0.0	0.1	0.0	0.0	23.5	-4.4	5149.0	-1200.0	208.3	0.0	964.8	-138.7	5149.0	-1245.1	216.8	636.7	808.0	666.4	1111.7	648.9	794.5	678.7	1098.1
5	14	0.0	0.1	0.0	0.0	20.6	-4.4	5149.0	-1061.0	208.3	0.0	869.1	-149.5	5149.0	-1100.4	216.8	654.7	788.1	699.5	1075.8	665.4	776.2	710.2	1063.1
5	15	0.0	0.1	0.0	0.0	17.6	-4.4	5149.0	-922.9	208.3	0.0	766.3	-160.2	5149.0	-956.7	216.8	668.5	772.7	728.3	1043.0	677.7	762.5	737.5	1032.8
5	16	0.0	0.1	0.0	0.0	14.7	-4.4	5149.0	-784.5	208.3	0.0	656.4	-170.9	5149.0	-812.7	216.8	678.8	761.3	753.6	1014.9	686.4	752.8	761.2	1006.4
5	17	0.0	0.1	0.0	0.0	11.7	-4.4	5149.0	-646.2	208.3	0.0	539.4	-181.6	5149.0	-668.7	216.8	685.3	754.1	775.1	991.0	691.4	747.3	781.3	984.2
5	18	0.0	0.0	0.0	0.0	8.8	-4.4	5149.0	-507.9	208.3	0.0	415.1	-192.3	5149.0	-524.8	216.8	688.1	751.0	792.9	971.3	692.7	745.9	797.5	966.2
5	19	0.0	0.0	0.0	0.0	5.9	-4.4	5149.0	-369.5	208.3	0.0	283.9	-203.0	5149.0	-380.8	216.8	687.3	751.9	807.1	955.5	690.3	748.5	810.2	952.1
5	20	0.0	0.0	0.0	0.0	2.9	-4.4	5149.0	-231.2	208.3	0.0	145.5	-213.8	5149.0	-236.8	216.8	682.6	757.0	817.5	944.0	684.2	755.3	819.0	942.3
5	21	0.0	0.0	0.0	0.0	0.0	-4.4	5149.0	-92.8	208.3	0.0	0.0	-224.5	5149.0	-92.8	216.8	674.3	766.3	824.2	936.5	674.3	766.3	824.2	936.5
6	1	0.0	0.0	0.0	0.0	0.0	4.3	5056.0	-91.0	-203.2	0.0	0.0	221.7	5056.0	-91.0	-211.8	662.2	752.3	809.4	919.5	662.2	752.3	809.4	919.5
6	2	0.0	0.0	0.0	0.0	2.9	4.3	5056.0	-228.1	-203.2	0.0	145.8	210.8	5056.0	-233.9	-211.8	671.2	742.4	803.5	926.1	672.7	740.7	805.0	924.4
6	3	0.0	0.0	0.0	0.0	5.8	4.3	5056.0	-365.2	-203.2	0.0	284.3	199.9	5056.0	-376.7	-211.8	676.4	736.6	793.8	936.9	679.4	733.3	796.8	933.5
6	4	0.0	0.0	0.0	0.0	8.6	4.3	5056.0	-502.2	-203.2	0.0	415.5	189.0	5056.0	-519.5	-211.8	677.8	735.0	780.3	951.8	682.3	730.0	784.8	946.8
6	5	0.0	0.1	0.0	0.0	11.5	4.3	5056.0	-639.3	-203.2	0.0	539.4	178.1	5056.0	-662.4	-211.8	675.3	737.8	762.9	971.1	681.3	731.1	768.9	964.4
6	6	0.0	0.1	0.0	0.0	14.4	4.3	5056.0	-776.4	-203.2	0.0	655.9	167.2	5056.0	-805.2	-211.8	669.0	744.8	741.7	994.6	676.5	736.5	749.2	986.3
6	7	0.0	0.1	0.0	0.0	17.3	4.3	5056.0	-913.5	-203.2	0.0	765.0	156.4	5056.0	-948.1	-211.8	658.9	756.1	716.7	1022.4	667.9	746.1	725.7	1012.4
6	8	0.0	0.1	0.0	0.0	20.2	4.3	5056.0	-1051.0	-203.2	0.0	866.8	145.5	5056.0	-1091.4	-211.8	644.8	771.7	687.6	1054.7	655.3	760.1	698.1	1043.0
6	9	0.0	0.1	0.0	0.0	23.0	4.3	5056.0	-1188.0	-203.2	0.0	961.3	134.6	5056.0	-1234.1	-211.8	627.0	791.4	655.0	1090.9	639.0	778.1	667.0	1077.6
6	10	0.0	0.1	0.0	0.0	25.9	4.3	5056.0	-1325.0	-203.2	0.0	1048.1	123.7	5056.0	-1376.9	-211.8	605.3	815.5	616.4	1131.5	618.8	800.5	631.9	1116.6
6	11	0.0	0.1	0.0	0.0	28.8	4.3	5056.0	-1462.0	-203.2	0.0	1128.1	112.8	5056.0	-1519.7	-211.8	580.0	843.6	578.2	1176.1	595.0	826.9	593.2	1159.5
6	12	0.0	0.1	0.0	0.0	31.7	4.3	5056.0	-1599.0	-203.2	0.0	1200.1	101.9	5056.0	-1662.4	-211.8	550.6	876.3	533.9	1225.3	567.1	858.0	550.4	1207.0
6	13	0.0	0.1	0.0	0.0	34.5	4.3	5056.0	-1736.0	-203.2	0.0	1266.1	91.1	5056.0	-1805.2	-211.8	518.0	912.4	486.4	1278.0	536.0	892.4	504.4	1256.0
6	14	0.0	0.1	0.0	0.0	37.4	4.3	5056.0	-1873.0	-203.2	0.0	1323.1	80.2	5056.0	-1948.0	-211.8	480.7	953.8	434.3	1335.9	500.3	932.1	453.8	1314.2
6	15	0.0	0.1	0.0	0.0	40.3	4.3	5056.0	-2010.0	-203.2	0.0	1374.1	69.3	5056.0	-2090.8	-211.8	440.3	996.6	379.0	1397.3	461.4	975.3	400.0	1373.9
6	16	0.0	0.1	0.0	0.0	43.2	4.3	5056.0	-2147.0	-203.2	0.0	1417.1	58.4	5056.0	-2233.5	-211.8	395.8	1048.1	319.6	1463.2	418.3	1023.1	342.1	1438.3
6	17	0.0	0.1	0.0	0.0	46.1	4.3	5056.0	-2284.0	-203.2	0.0	1452.1	47.5	5056.0	-2376.3	-211.8	347.0	1102.2	255.9	1533.9	371.1	1075.6	279.9	1507.2
6	18	0.0	0.1	0.0	0.0	48.9	4.3	5056.0	-2421.0	-203.2	0.0	1481.1	36.6	5056.0	-2519.1	-211.8	295.2	1159.8	189.2	1608.8	320.7	1131.5	214.7	1579.6
6	19	0.0	0.2	0.0	0.0	51.8	4.3	5056.0	-2559.0	-203.2	0.0	1502.2	25.7	5056.0	-2662.8	-211.8	238.7	1222.5	117.7	1687.3	265.7	1192.5	144.7	1657.3
6	20	0.0	0.2	0.0	0.0	54.7	4.3	5056.0	-2696.0	-203.2	0.0	1516.2	14.9	5056.0	-2805.6	-211.8	179.0	1288.8	43.1	1770.1	207.5	1257.1	71.6	1738.5
6	21	0.0	0.2	0.0	0.0	57.6	4.3	5056.0	-2833.0	-202.1	0.0	1522.2	4.0	5056.0	-2948.4	-210.7	115.1	1359.6	-35.7	1857.5	145.1	1326.3	-5.7	1824.2
7	1	0.0	0.2	0.0	0.0	73.9	-13.9	5009.0	-3618.0	665.8	0.0	2073.2	-346.8	5009.0	-3765.6	693.6	12.4	1459.8	-225.0	2050.8	50.9	1417.1	-186.5	2008.1
7	2	0.0	0.2	0.0	0.0	70.2	-13.9	5009.0	-3441.0	662.1	0.0	1980.2	-351.1	5009.0	-3581.2	689.9	50.4	1417.6	-167.8	1987.3	87.0	1377.9	-131.2	1946.6
7	3	0.0	0.2	0.0	0.0	66.5	-13.9	5009.0	-3265.0	663.1	0.0	1886.2	-355.4	5009.0	-3397.9	690.9	87.4	1376.5	-111.7	1925.8	122.1	1336.1	-77.8	1886.5
7	4	0.0	0.2	0.0	0.0	62.8	-13.9	5009.0	-3088.0	663.1	0.0	1791.2	-359.7	5009.0	-3213.5	690.9	124.4	1335.5	-55.4	1862.6	157.2	1299.1	-22.7	1826.2
7	5	0.0	0.2	0.0	0.0	59.1	-13.9	5009.0	-2912.0	663.1	0.0	1695.2	-363.9	5009.0	-3030.1	690.9	160.4	1295.5	-0.3	1801.4	191.2	1261.3	30.5	1767.2
7	6	0.0	0.2	0.0	0.0	55.4	-13.9	5009.0	-2736.0	663.1	0.0	1598.2	-368.2	5009.0	-2846.7	690.9	195.9	1256.1	54.3	1740.8	224.8	1224.1	83.2	1708.7
7	7	0.0	0.1	0.0	0.0	51.7	-13.9	5009.0	-2559.0	663.1	0.0	1499.1	-372.5	5009.0	-2662.3	690.9	230.8	1217.4	108.4	1680.7	257.8	1187.5	135.4	1650.8
7	8	0.0	0.1	0.0	0.0	48.0	-13.9	5009.0	-2383.0	663.1	0.0	1400.1	-376.8	5009.0	-2479.8	690.9	265.2	1179.2	161.9	1621.3	290.2	1151.4	187.0	1593.5
7	9	0.0	0.1	0.0	0.0	44.3	-13.9	4997.0	-2201.0	661.5	0.0	1299.1	-381.1	4997.0	-2289.6	689.3	299.7	1137.4	215.8	1557.2	322.8	1111.7	238.9	1531.5
7	10	0.0	0.1	0.0	0.0	40.6	-13.9	4997.0	-2025.0	661.5	0.0	1197.1	-385.4	4997.0	-2106.2	689.3	332.6	1100.9	267.8	1499.5	353.8	1077.4	289.0	1476.0
7	11	0.0	0.1	0.0	0.0	36.9	-13.9	4997.0	-1849.0	661.5	0.0	1094.1	-389.7	4997.0	-1922.8	689.3	364.9	1065.0	319.3	1442.3	384.2	1043.6	338.5	1421.0
7	12	0.0	0.1	0.0	0.0	33.3	-13.9	4997.0	-1673.0	661.5	0.0	989.6	-394.0	4997.0	-1739.4	689.3	396.5	1030.0	369.9	1386.1	413.8	1010.7	387.3	1366.9
7	13	0.0	0.1	0.0	0.0	29.6	-13.9	4997.0	-1498.0	661.5	0.0	884.2	-398.3	4997.0	-1557.1	689.3	427.1	996.0	419.6	1331.0	442.5	978.3	435.0	1313.9
7	14	0.0	0.1	0.0	0.0	25.9	-13.9	4997.0	-1322.0	661.5	0.0	777.7	-402.6	4997.0	-1373.7	689.3	457.6	962.1	469.2	1275.9	471.1	947.1	482.7	1260.9
7	15	0.0	0.1	0.0	0.0	22.2	-13.9	4997.0	-1146.0	661.5	0.0	670.0	-406.9	4997.0	-1190.3	689.3	487.5	928.9	518.2	1221.5	499.1	916.1	529.8	1208.7
7	16	0.0	0.1	0.0	0.0	18.5	-13.9	4997.0	-969.7	661.5	0.0	561.2	-411.2	4997.0	-1006.6	689.3	517.0	896.2	566.8	1167.6	526.6	885.5	576.5	1156.9
7	17	0.0	0.0	0.0	0.0	14.8	-13.9	4997.0	-793.7	661.5	0.0	451.2	-415.5	4997.0	-823.2	689.3	545.7	864.3	614.7	1114.4	553.4	855.8	622.4	1105.9
7	18	0.0	0.0	0.0	0.0	11.1	-13.9	4997.0	-617.8	661.5	0.0	340.1	-419.7	4997.0	-639.9	689.3	573.8	833.2	661.9	1062.1	579.6	826.8	667.7	1055.6
7	19	0.0	0.0	0.0	0.0	7.4	-13.9	4997.0	-441.8	661.5	0.0	227.9	-424.0	4997.0	-456.6	689.3	601.3	802.6	708.5	1010.3	605.2	798.3	712.4	1006.0
7	20	0.0	0.0	0.0	0.0	3.7	-13.9	4997.0	-265.9	661.5	0.0	114.5	-428.3	4997.0	-273.3	689.3	626.2	772.8	754.5	959.2	630.1	770.6	756.4	957.1
7	21	0.0	0.0	0.0	0.0	0.0	-13.9	4997.0	-89.9	661.5	0.0	0.0	-432.6	4997.0	-89.9	689.3	654.5	743.6	800.0	908.8	654.5	743.6	800.0	908.8

CÁLCULO DE TENSIONES EN PUENTES

Fase : PUENTE COMPLETO EN TIEMPO INICIAL

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1518.3

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	PP,Inicial + CM + 0.9 x Pret,Inicial + 0.6 x SC(+) + 0.5 x GRAD	891	5
2	PP,Inicial + CM + 1.1 x Pret,Inicial + 0.6 x SC(+) + 0.5 x GRAD	1244	14
3	PP,Inicial + CM + 0.9 x Pret,Inicial + 0.6 x SC(-) + 0.5 x GRAD	1064	88
4	PP,Inicial + CM + 1.1 x Pret,Inicial + 0.6 x SC(-) + 0.5 x GRAD	1655	73
5	PP,Inicial + CM + 0.9 x Pret,Inicial + 1.0 x SC(+) + 0.6 x GRAD	1048	-49
6	PP,Inicial + CM + 1.1 x Pret,Inicial + 1.0 x SC(+) + 0.6 x GRAD	998	-22
7	PP,Inicial + CM + 0.9 x Pret,Inicial + 1.0 x SC(-) + 0.6 x GRAD	1067	35
8	PP,Inicial + CM + 1.1 x Pret,Inicial + 1.0 x SC(-) + 0.6 x GRAD	1655	59

PP,Inicial= Peso propio en tiempo inicial
Pret,Inicial = Pretensado en tiempo inicial
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INICIAL																		TENSIONES EN FIBRAS SUPERIOR E INFERIOR															
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	147.8	1727.0	39.7	-321.8	0.0	0.0	66.7	0.0	0.0	-2.9	0.0	0.0	119.0	0.0	0.0	14.87	195	167	238	204	195	167	238	204	195	167	238	204	195	167	238	204
1	2	0.0	121.8	129.1	1727.0	-225.9	-281.8	0.0	55.3	58.9	0.0	106.4	114.2	0.0	-12.0	-13.6	0.0	13.1	14.87	198	163	224	224	172	199	198	260	212	142	238	204	171	201	197	263
1	3	0.0	227.2	110.4	1727.0	-456.3	-241.9	0.0	103.7	51.2	0.0	201.0	100.9	0.0	-23.9	-13.6	0.0	26.2	14.87	235	189	252	284	185	266	202	362	263	145	280	241	181	271	198	367
1	4	0.0	317.5	94.7	1727.0	-707.0	-202.0	0.0	145.3	43.4	0.0	283.9	87.6	0.0	-35.9	-13.6	0.0	39.3	14.87	222	208	222	330	150	318	150	440	262	147	262	269	145	326	145	448
1	5	0.0	393.8	78.9	1727.0	-867.2	-162.1	0.0	180.1	35.7	0.0	355.2	74.3	0.0	-47.8	-13.6	0.0	52.3	14.87	228	200	217	338	137	339	126	478	278	123	267	261	130	349	119	488
1	6	0.0	456.3	63.1	1727.0	-992.3	-122.2	0.0	208.1	27.9	0.0	414.7	61.0	0.0	-59.8	-13.6	0.0	65.4	14.87	235	189	215	341	127	355	107	506	293	99	274	251	118	367	99	519
1	7	0.0	505.0	47.3	1727.0	-1082.2	-82.2	0.0	229.3	20.2	0.0	462.5	47.7	0.0	-71.7	-13.6	0.0	78.5	14.87	243	176	217	338	120	364	95	525	309	76	283	237	111	379	85	540
1	8	0.0	539.6	31.5	1727.0	-1137.1	-42.3	0.0	243.7	12.5	0.0	498.6	34.4	0.0	-83.7	-13.6	0.0	91.6	14.87	252	162	223	329	118	368	89	535	323	53	294	220	106	386	77	553
1	9	0.0	560.4	15.8	1727.0	-1156.7	-2.4	0.0	251.2	4.7	0.0	523.0	21.1	0.0	-95.6	-13.6	0.0	104.7	14.87	263	145	233	314	119	366	88	535	338	31	307	200	106	386	75	555
1	10	0.0	567.4	0.0	1825.0	-1211.3	35.3	0.0	252.0	-3.0	0.0	535.6	7.8	0.0	-107.6	-13.6	0.0	117.8	14.87	266	172	235	349	115	404	83	581	343	54	312	231	100	426	68	604
1	11	0.0	560.4	-15.8	1825.0	-1164.1	71.3	0.0	245.9	-10.8	0.0	536.6	-5.5	0.0	-119.5	-13.6	0.0	130.9	14.87	279	153	250	325	122	392	94	565	356	34	328	206	106	417	78	590
1	12	0.0	539.5	-31.6	1825.0	-1085.3	107.7	0.0	233.0	-18.5	0.0	525.9	-18.8	0.0	-131.5	-13.6	0.0	143.9	14.87	291	133	268	298	133	377	109	541	368	16	345	180	115	404	92	568
1	13	0.0	504.8	-47.4	1825.0	-974.7	144.0	0.0	213.3	-26.3	0.0	503.5	-32.2	0.0	-143.4	-13.6	0.0	157.0	14.87	304	113	289	266	145	357	130	510	378	0	363	153	126	387	110	540
1	14	0.0	456.1	-63.2	1825.0	-832.1	180.3	0.0	186.8	-34.0	0.0	469.4	-45.5	0.0	-155.4	-13.6	0.0	170.1	14.87	318	93	312	231	161	333	155	471	388	-14	382	124	140	365	134	503
1	15	0.0	393.5	-78.9	1873.0	-677.9	222.0	0.0	153.4	-41.8	0.0	423.5	-58.8	0.0	-167.3	-13.6	0.0	183.2	14.87	331	86	337	211	179	320	185	443	395	-10	401	113	157	355	163	478
1	16	0.0	317.1	-94.7	1873.0	-466.1	259.3	0.0	113.3	-49.5	0.0	365.9	-72.1	0.0	-179.3	-13.6	0.0	196.3	14.87	347	63	367	164	202	285	223	386	403	-23	424	78	178	323	198	424
1	17	0.0	226.8	-110.5	1873.0	-221.6	296.6	0.0	66.3	-57.2	0.0	296.6	-85.4	0.0	-191.2	-13.6	0.0	209.4	14.87	363	39	400	114	228	246	265	321	411	-34	448	41	202	286	239	361
1	18	0.0	122.7	-126.3	1873.0	46.4	301.5	0.0	12.5	-65.0	0.0	215.6	-98.7	0.0	-203.1	-13.6	0.0	222.5	14.87	377	17	433	64	254	206	309	254	414	-40	470	8	226	249	281	296
1	19	0.0	4.6	-142.1	1838.0	252.2	187.5	0.0	-48.1	-72.7	0.0	122.9	-112.0	0.0	-215.2	-13.6	0.0	235.6	14.87	358	35	427	60	249	202	318	227	383	-3	452	22	220	247	268	272
1	20	0.0	-128.6	-160.7	1838.0	436.8	98.5	0.0	-115.5	-80.5	0.0	18.5	-125.3	0.0	-227.2	-13.6	0.0	248.6	14.87	296	59	370	60	205	194	279	195	307	43	381	44	174	240	248	241
1	21	0.0	-278.3	-179.4	1838.0	484.3	9.4	0.0	-189.7	-88.2	0.0	0.0	0.0	0.0	-353.6	-153.2	0.0	261.7	14.87	234	151	311	148	119	322	196	319	243	138	320	135	71	393	148	389
2	1	0.0	-278.3	159.7	1769.0	472.3	5.6	0.0	-189.7	76.2	0.0	0.0	0.0	0.0	-353.6	134.1	0.0	261.7	0.1133	216	147	289	145	104	306	177	304	225	135	297	133	58	371	131	369
2	2	0.0	-146.0	141.0	1769.0	438.2	-82.9	0.0	-126.1	68.4	0.0	0.0	0.0	0.0	-241.4	120.7	0.0	261.8	0.1133	270	70	341	71	180	198	251	199	279	58	349	59	149	243	219	244
2	3	0.0	-30.1	122.4	1769.0	326.4	-171.2	0.0	-69.3	60.7	0.0	56.9	103.8	0.0	-175.9	0.5	0.0	261.9	0.1133	344	34	416	50	252	176	324	191	361	9	433	24	228	212	300	228
2	4	0.0	70.7	106.6	1769.0	80.2	-259.7	0.0	-19.3	53.0	0.0	142.4	90.5	0.0	-175.5	0.5	0.0	262.0	0.1133	338	44	393	85	228	212	283	253	366	1	421	42	204	249	259	290
2	5	0.0	157.5	90.8	1700.0	-153.3	-268.6	0.0	23.9	45.2	0.0	216.1	77.2	0.0	-175.0	0.5	0.0	262.1	0.1133	317	55	354	118	192	245	229	309	355	-4	392	59	168	282	205	345
2	6	0.0	230.5	75.0	1700.0	-361.3	-214.2	0.0	60.3	37.5	0.0	278.2	63.9	0.0	-174.6	0.5	0.0	262.2	0.1133	303	76	326	161	166	286	189	371	350	4	373	89	142	322	165	407
2	7	0.0	289.5	59.2	1700.0	-530.4	-170.3	0.0	89.9	29.7	0.0	328.6	50.6	0.0	-174.2	0.5	0.0	262.3	0.1133	292	93	303	196	144	319	156	422	345	11	357	114	121	355	132	458
2	8	0.0	334.7	43.5	1700.0	-660.9	-126.3	0.0	112.6	22.0	0.0	367.2	37.3	0.0	-173.7	0.5	0.0	262.4	0.1133	283	107	285	223	128	345	130	461	342	16	344	133	104	381	106	497
2	9	0.0	366.0	27.7	1700.0	-752.7	-82.4	0.0	128.5	14.2	0.0	394.1	24.0	0.0	-173.8	-1.1	0.0	262.5	0.1133	276	117	272	243	115	363	112	489	339	21	335	147	92	399	88	525
2	10	0.0	383.4	11.9	1700.0	-805.9	-38.4	0.0	137.6	6.5	0.0	409.4	10.6	0.0	-174.8	-1.1	0.0	262.6	0.1133	272	123	265	255	108	375	101	506	337	24	329	156	84	411	77	543
2	11	0.0	386.9	-3.9	1700.0	-820.3	5.5	0.0	139.9	-1.3	0.0	413.0	0.5	0.0	-175.8	-1.1	0.0	262.7	0.1133	270	126	262	259	105	379	97	512	336	26	327	159	81	415	73	548
2	12	0.0	376.6	-19.7	1628.0	-753.1	47.6	0.0	135.4	-9.0	0.0	407.6	-12.8	0.0	-176.8	-1.1	0.0	262.8	0.1133	276	95	270	219	112	346	106	470	340	-4	334	120	88	383	82	507
2	13	0.0	352.3	-35.5	1628.0	-692.7	89.7	0.0	124.1	-16.8	0.0	390.5	-26.1	0.0	-177.7	-1.1	0.0	262.9	0.1133	279	90	277	208	118	337	116	454	341	-5	339	113	94	374	92	491
2	14	0.0	314.2	-51.2	1628.0	-595.2	131.9	0.0	105.9	-24.5	0.0	361.6	-39.4	0.0	-179.6	-2.7	0.0	263.0	0.1133	284	83	288	190	128	321	133	428	342	-7	347	101	104	358	109	466
2	15	0.0	262.1	-67.0	1628.0	-460.7	174.0	0.0	81.0	-32.2	0.0	321.0	-52.7	0.0	-182.0	-2.7	0.0	263.1	0.1133	290	72	304	166	143	299	157	392	343	-8	357	85	118	337	132	430
2	16	0.0	196.2	-82.8	1628.0	-289.0	216.1	0.0	49.2	-40.0	0.0	268.9	-66.0	0.0	-184.3	-2.7	0.0	263.2	0.1133	299	59	325	135	162	270	187	345	345	-11	370	65	136	308	162	384
2	17	0.0	116.4	-98.6	1628.0	-80.5	258.2	0.0	10.6	-47.7	0.0	204.9	-79.3	0.0	-186.6	-2.7	0.0	263.3	0.1133	310	43	349	97	185	234	225	288	346	-14	386	40	159	273	199	327
2	18	0.0	22.7	-114.4	1628.0	157.0	271.9	0.0	-34.8	-55.5	0.0	129.2	-92.6	0.0	-189.0	-2.7	0.0	263.4	0.1133	320	28	376	57	210	196	266	225	346	-13	402	16	184	235	240	264
2	19	0.0	-84.8	-130.1	1700.0	344.8	175.6	0.0	-87.0	-63.2	0.0	41.8	-106.0	0.0	-191.3	-2.7	0.0	263.5	0.1133	314	59	385	71	221	201	292	212	329	37	399	48	195	241	266	252
2	20	0.0	-207.6	-148.8	1700.0	516.4	90.6	0.0	-146.1	-71.0	0.0	0.0	0.0	0.0	-276.1	-125.1	0.0	263.6	0.1133	267	65	343	54	167	213	243	203	276	52	352	41	130	268	206	258
2	21	0.0	-346.7	-167.5	1700.0	558.6	5.6	0.0	-211.9	-78.7	0.0	0.0	0.0	0.0	-392.1	-138.4	0.0	263.7	0.1133	211	148	290	133	88	331	167	316	220	135	299	120	35	409	114	394
3	1	0.0	-346.7	183.3	1769.0	570.5	-15.0	0.0	-211.9	89.5	0.0	0.0	0.0	0.0	-392.1	155.3	0.0	263.7	-14.98	216	147	295	136	96	318	175	306	225	135	304	124	45	390	124	379
3	2	0.0	-193.7	164.6	1769.0	519.6	-100.6	0.0	-136.6	81.7	0.0	7.2	126.0	0.0	-261.2	142.1	0.0	250.5	-14.98	275	64	350	57	181	197	257	190	284	51	360	44	147	245	223	239
3	3	0.0	-57.0	145.9	1769.0	393.4	-186.2	0.0	-68.1	74.0	0.0	112.2	112.7	0.0	-238.6	15.1	0.0	237.3	-14.98	363	5	439	14	251	177	327	185	387	-30	463	-22	219	227	295	235
3	4	0.0	64.5	130.2	1769.0	135.2	-271.9	0.0	-6.4	66.3	0.0	205.5	99.4	0.0	-225.4	15.1	0.0	224.2	-14.98	363	5	422	40	237	199	296	234	399	-49	458	-14	206	246	265	281
3	5	0.0	172.1	114.4	1838.0	-135.8	-307.9	0.0	48.5	58.5	0.0	287.2	86.1	0.0	-212.1	15.1	0.0	211.0	-14.98	359	34	401	100	221	246	263	311	405	-37	447	29	192	290	234	355
3	6	0.0	265.8	98.6	1838.0	-380.8	-260.2	0.0	96.6	50.8	0.0	357.0	72.8	0.0	-198.9	15.1	0.0	197.8	-14.98	344	57	369	148	197	283	222	374	399	-28	425	63	170	324	195	415
3	7	0.0	345.6	82.8	1838.0	-593.7	-223.6	0.0	137.9	43.0	0.0	415.2	59.4	0.0	-185.6	15.1	0.0	184.6	-14.98	330	79	340	192	175	315	186	428	392	-17	403	96	150	354	161	467

		TIEMPO INICIAL																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	8	0.0	411.6	67.0	1838.0	-774.4	-187.0	0.0	172.3	35.3	0.0	461.7	46.1	0.0	-172.3	15.1	0.0	171.4	-14.98	316	100	314	232	157	344	155	476	384	-5	383	127	133	380	132	512
3	9	0.0	463.6	51.3	1873.0	-943.2	-153.0	0.0	200.0	27.5	0.0	496.3	32.8	0.0	-159.1	15.1	0.0	158.2	-14.98	300	135	288	286	139	382	127	532	373	23	361	174	118	415	106	565
3	10	0.0	501.9	35.5	1873.0	-1061.4	-115.7	0.0	220.8	19.8	0.0	519.4	19.5	0.0	-145.8	15.1	0.0	145.0	-14.98	287	156	267	319	126	402	106	565	362	40	342	203	106	433	86	596
3	11	0.0	526.2	19.7	1873.0	-1146.9	-78.5	0.0	234.8	12.0	0.0	530.7	6.2	0.0	-132.6	15.1	0.0	131.9	-14.98	274	176	248	348	116	418	90	590	350	58	324	230	97	446	72	618
3	12	0.0	536.6	3.9	1873.0	-1199.8	-41.2	0.0	242.0	4.3	0.0	530.3	-7.1	0.0	-119.3	15.1	0.0	118.7	-14.98	261	195	231	373	108	430	79	607	337	78	308	256	92	455	62	632
3	13	0.0	533.1	-11.9	1873.0	-1218.7	-2.9	0.0	242.3	-3.4	0.0	518.2	-20.4	0.0	-106.1	15.1	0.0	105.5	-14.98	249	213	219	392	104	436	73	615	324	99	293	279	89	458	59	638
3	14	0.0	515.7	-27.6	1825.0	-1168.7	39.7	0.0	235.9	-11.2	0.0	494.4	-33.7	0.0	-92.8	15.1	0.0	92.3	-14.98	243	207	215	380	108	415	79	588	314	99	285	272	95	434	66	607
3	15	0.0	484.3	-43.4	1825.0	-1115.6	81.9	0.0	222.6	-18.9	0.0	458.9	-47.0	0.0	-79.6	15.1	0.0	79.1	-14.98	235	220	210	387	112	409	86	576	300	120	275	287	101	426	76	593
3	16	0.0	439.2	-59.2	1824.0	-1024.5	124.1	0.0	202.6	-26.7	0.0	411.8	-60.3	0.0	-66.3	15.1	0.0	65.9	-14.98	229	229	210	387	120	396	101	554	287	140	268	297	111	410	92	567
3	17	0.0	380.1	-75.0	1824.0	-896.8	166.3	0.0	175.7	-34.4	0.0	352.8	-73.6	0.0	-53.0	15.1	0.0	52.7	-14.98	224	236	214	380	132	377	122	521	274	159	264	304	125	388	115	532
3	18	0.0	307.2	-90.8	1824.0	-731.9	208.4	0.0	142.0	-42.2	0.0	282.1	-86.9	0.0	-39.8	15.1	0.0	39.6	-14.98	222	240	223	367	149	351	150	478	262	179	263	306	144	359	145	486
3	19	0.0	220.4	-106.5	1824.0	-530.0	250.6	0.0	101.5	-49.9	0.0	199.8	-100.2	0.0	-26.5	15.1	0.0	26.4	-14.98	221	240	236	347	171	318	185	424	249	197	264	303	167	324	182	430
3	20	0.0	118.4	-125.2	1824.0	-232.5	292.8	0.0	54.1	-57.7	0.0	105.8	-113.5	0.0	-13.3	15.1	0.0	13.2	-14.98	210	183	239	250	184	221	213	289	225	161	254	228	182	224	211	291
3	21	0.0	0.0	-143.9	1824.0	43.6	334.9	0.0	0.0	-65.4	0.0	0.0	3.3	0.0	0.0	-117.3	0.0	0.0	-14.98	212	180	260	219	212	180	260	219	212	180	260	219	212	180	260	219
4	1	0.0	0.0	419.4	4982.0	-89.7	-641.9	0.0	0.0	123.4	0.0	0.0	99.7	0.0	0.0	210.0	0.0	0.0	-11.08	653	741	798	906	653	741	798	906	653	741	798	906	653	741	798	906
4	2	0.0	117.0	414.9	4982.0	-269.7	-641.9	0.0	34.6	123.4	0.0	62.6	223.1	0.0	0.0	0.0	0.0	-3.1	-11.08	666	727	792	912	647	747	773	933	679	712	805	898	647	747	773	933
4	3	0.0	232.8	410.4	4982.0	-449.8	-641.9	0.0	69.3	123.4	0.0	125.1	223.1	0.0	0.0	0.0	0.0	-6.2	-11.08	679	712	786	919	641	754	749	960	704	684	812	890	641	754	749	960
4	4	0.0	347.3	405.9	4982.0	-629.8	-641.9	0.0	103.9	123.4	0.0	187.7	223.1	0.0	0.0	0.0	0.0	-9.3	-11.08	691	699	779	926	634	762	723	989	729	656	818	883	634	762	723	989
4	5	0.0	460.5	401.3	4982.0	-809.9	-641.9	0.0	138.5	123.4	0.0	250.3	223.1	0.0	0.0	0.0	0.0	-12.4	-11.08	702	686	772	935	627	770	697	1018	754	629	823	877	627	770	697	1018
4	6	0.0	572.5	396.8	4982.0	-989.9	-641.9	0.0	173.1	123.4	0.0	312.9	223.1	0.0	0.0	0.0	0.0	-15.5	-11.08	713	675	764	943	619	779	670	1048	777	603	826	872	619	779	670	1048
4	7	0.0	683.2	392.3	4982.0	-1170.2	-641.9	0.0	207.8	123.4	0.0	375.5	223.1	0.0	0.0	0.0	0.0	-18.7	-11.08	723	664	755	953	610	788	642	1078	800	578	832	867	610	788	642	1078
4	8	0.0	792.6	387.8	4982.0	-1350.4	-641.9	0.0	242.4	123.4	0.0	438.0	223.1	0.0	0.0	0.0	0.0	-21.8	-11.08	732	653	745	964	601	799	614	1110	822	553	836	864	601	799	614	1110
4	9	0.0	900.7	383.2	4982.0	-1529.6	-641.9	0.0	277.0	123.4	0.0	500.5	223.1	0.0	0.0	0.0	0.0	-24.9	-11.08	741	643	736	975	591	810	586	1141	844	529	839	860	591	810	586	1141
4	10	0.0	1007.1	378.7	4982.0	-1709.8	-641.9	0.0	311.6	123.4	0.0	563.3	223.1	0.0	0.0	0.0	0.0	-28.0	-11.08	749	635	725	987	580	822	556	1174	865	506	841	858	580	822	556	1174
4	11	0.0	1113.1	374.2	5001.0	-1897.0	-644.2	0.0	346.3	123.4	0.0	625.7	223.1	0.0	0.0	0.0	0.0	-31.1	-11.08	756	632	713	1007	568	841	525	1215	885	489	842	864	568	841	525	1215
4	12	0.0	1217.1	369.7	5001.0	-2077.2	-644.2	0.0	380.9	123.4	0.0	688.3	223.1	0.0	0.0	0.0	0.0	-34.2	-11.08	762	625	701	1021	556	854	494	1250	904	468	842	863	556	854	494	1250
4	13	0.0	1320.1	365.1	5001.0	-2258.4	-644.2	0.0	415.5	123.4	0.0	750.9	223.1	0.0	0.0	0.0	0.0	-37.3	-11.08	768	619	687	1035	542	869	462	1285	922	448	842	864	542	869	462	1285
4	14	0.0	1422.1	360.6	5001.0	-2438.6	-644.2	0.0	450.1	123.4	0.0	813.5	223.1	0.0	0.0	0.0	0.0	-40.4	-11.08	773	613	674	1050	529	884	430	1321	941	427	841	864	529	884	430	1321
4	15	0.0	1523.2	356.1	5001.0	-2619.8	-644.2	0.0	484.8	123.4	0.0	876.1	223.1	0.0	0.0	0.0	0.0	-43.5	-11.08	778	608	659	1066	515	900	397	1358	958	408	840	866	515	900	397	1358
4	16	0.0	1622.2	351.6	5001.0	-2799.9	-644.2	0.0	519.4	123.4	0.0	938.6	223.1	0.0	0.0	0.0	0.0	-46.6	-11.08	781	604	644	1083	500	916	363	1395	975	389	838	868	500	916	363	1395
4	17	0.0	1720.2	347.0	5001.0	-2981.1	-644.2	0.0	554.0	123.4	0.0	1001.2	223.1	0.0	0.0	0.0	0.0	-49.7	-11.08	784	601	628	1101	484	934	328	1434	991	372	835	872	484	934	328	1434
4	18	0.0	1817.2	342.5	5001.0	-3161.3	-644.2	0.0	588.6	123.4	0.0	1063.7	223.1	0.0	0.0	0.0	0.0	-52.8	-11.08	787	598	612	1118	468	952	294	1472	1006	354	832	875	468	952	294	1472
4	19	0.0	1912.2	338.0	5001.0	-3342.5	-644.2	0.0	623.3	123.4	0.0	1126.4	223.1	0.0	0.0	0.0	0.0	-56.0	-11.08	789	596	595	1138	451	971	257	1513	1021	338	827	880	451	971	257	1513
4	20	0.0	2006.2	333.4	5001.0	-3522.7	-644.2	0.0	657.9	123.4	0.0	1189.0	223.1	0.0	0.0	0.0	0.0	-59.1	-11.08	790	595	577	1157	433	990	221	1553	1035	323	822	885	433	990	221	1553
4	21	0.0	2099.2	328.9	5001.0	-3703.9	-644.3	0.0	692.5	123.4	0.0	1251.4	223.1	0.0	0.0	0.0	0.0	-62.2	-11.08	790	594	559	1178	415	1011	184	1594	1048	308	817	892	415	1011	184	1594
5	1	0.0	1558.2	-10.2	5150.0	-2972.7	216.8	0.0	543.8	-41.0	0.0	1047.2	-78.9	0.0	-29.6	2.2	0.0	-48.8	3.676	734	700	584	1204	410	1060	259	1564	950	461	799	964	404	1067	253	1571
5	2	0.0	1548.2	-20.9	5150.0	-2828.0	216.9	0.0	516.7	-41.0	0.0	994.8	-78.9	0.0	-28.1	2.2	0.0	-46.4	3.676	767	664	631	1151	459	1006	324	1493	972	436	836	923	453	1012	318	1499
5	3	0.0	1530.2	-31.6	5150.0	-2684.4	216.9	0.0	489.5	-41.0	0.0	942.4	-78.9	0.0	-26.6	2.2	0.0	-43.9	3.676	795	633	674	1103	503	957	383	1427	989	417	869	888	498	963	377	1433
5	4	0.0	1506.2	-42.3	5150.0	-2540.8	216.9	0.0	462.3	-41.0	0.0	890.1	-78.9	0.0	-25.1	2.2	0.0	-41.5	3.676	820	605	714	1059	544	911	439	1365	1003	402	898	855	539	917	434	1370
5	5	0.0	1474.1	-53.0	5150.0	-2396.1	216.9	0.0	435.1	-41.0	0.0	837.6	-78.9	0.0	-23.7	2.2	0.0	-39.1	3.676	841	582	751	1018	582	869	491	1306	1014	390	923	827	577	875	487	1312
5	6	0.0	1435.1	-63.7	5150.0	-2252.5	216.8	0.0	407.9	-41.0	0.0	785.2	-78.9	0.0	-22.2	2.2	0.0	-36.6	3.676	858	563	783	983	615	832	540	1253	1020	383	945	803	610	837	535	1258
5	7	0.0	1389.1	-74.5	5150.0	-2108.9	216.8	0.0	380.7	-41.0	0.0	733.1	-78.9	0.0	-20.7	2.2	0.0	-34.2	3.676	872	548	811	951	645	799	584	1203	1023	380	962	783	640	804	580	1208
5	8	0.0	1336.1	-85.2	5150.0	-1964.2	216.8	0.0	353.5	-41.0	0.0	680.7	-78.9	0.0	-19.2	2.2	0.0	-31.7	3.676	882	536	837	923	671	770	626	1157	1022	380	977	767	667	774	622	1161
5	9	0.0	1276.1	-95.9	5150.0	-1820.6	216.8	0.0	326.3	-41.0	0.0	628.4	-78.9	0.0	-17.7	2.2	0.0	-29.3	3.676	888	529	858	900	694	745	663	1115	1018	386	987	756	690	749	660	1119
5	10	0.0	1209.1	-106.6	5149.0	-1677.0	216.8	0.0	299.1	-41.0	0.0	575.9	-78.9	0.0	-16.3	2.2	0.0	-26.9	3.676	891	526	875	880	712	724	697	1078	1009	395	994	748	709	728	694	1082
5	11	0.0	1135.1	-117.3	5149.0	-1532.3	216.8	0.0	271.9	-41.0	0.0	523.5	-78.9	0.0	-14.8	2.2	0.0	-24.4	3.676	890	527	890	864	728	707	728	1044	998	407	998	744	725	710	725	1047
5	12	0.0	1053.1	-128.0	5149.0	-1388.7	216.8	0.0	244.7	-41.0	0.0	471.2	-78.9	0.0	-13.3	2.2	0.0	-22.0	3.676	885	533	899	853	739	695	753	1015	982	425	996	745	736	698	751	1018
5	13	0.0	964.8	-138.7	5149.0	-1245.1	216.8	0.0	217.5	-41.0	0.0	418.8	-78.9	0.0	-11.8	2.2	0.0	-19.5	3.676	876	542	906	846	746	686	776	990	962	447	992	750	744	689	774	993
5	14	0.0	869.1	-149.5	5149.0	-1100.4	216.8	0.0	190.3	-41.0	0.0	366.4	-78.9	0.0	-10.3	2.2	0.0	-17.1	3.676	864	556	909	843	751	682	795	968	940	472	984	759	748	684	793	971
5	15	0.0	766.3	-160.2	5149.0	-956.7	216.8	0.0	163.2	-41.0	0.0	314.1	-78.9	0.0	-8.9	2.2	0.0	-14.7	3.676	848	573	908	844	751	681	811	952	913	502	973	772	749	683	809	954
5	16	0.0	656.4	-170.9	5149.0	-812.7	216.8	0.0	136.0	-41.0	0.0	261.7	-78.9	0.0	-7.4	2.2	0.0	-12.2	3.676	828	595	903	849	747	685	822	939	882	535	957	789	746	687	821	940
5	17	0.0	539.4	-181.6	5149.0	-668.7	216.8	0.0	108.8	-41.0	0.0	209.4	-78.9	0.0	-5.9	2.2	0.0	-9.8	3.676	805	621	895	858	740	693	830	930	848	573	938	810	739	695	829	931
5	18	0.0	415.1	-192.3	5149.0	-524.8	216.8	0.0	81.6	-41.0	0.0	157.1	-78.9	0.0	-4.4	2.2	0.0	-7.3	3.676	778	651	883	872	729	705	834	926	810	615	915	836	728	706	833	927
5	19	0.0	283.9	-203.0	5149.0	-380.8	216.8	0.0	54.4	-41.0	0.0	104.7	-78.9	0.0	-3.0	2.2	0.0	-4.9	3.676	747	686	867	889	715	721	835	925	769	662	889	865	714	722	834	926
5	20	0.0	145.5	-213.8	5149.0	-236.8	216.8	0.0	27.2	-41.0	0.0	52.4	-78.9	0.0	-1.5	2.2	0.0	-2.4	3.676	713	724	847	911	696	742	831	929	723	712	858	899	696	742	831	929
5	21	0.0	0.0	-224.5	5149.0	-92.8	216.8	0.0	0.0	-41.0	0.0	0.0	2.2	0.0	0.0	-64.1	0.0	0.0	3.676	674	766	824	937	674	766	824	937	674	766	824	937	674	766	824	937
6	1	0.0	0.0	221.7	5056.0	-91.0	-211.8	0.0	0.0	39.5	0.0	0.0	-1.8	0.0	0.0	69.7	0.0	0.0	-3.548	662	752	809	920	662	752	809	920	662	752	809	920	662	752	809	920
6	2	0.0	145.8	210.8	5056.0	-233.9	-211.8	0.0	26.7	39.5	0.0	51.2	76.0	0.0	-1.2	-1.8	0.0	-2.4	-3.548	701	710	833	894	685	727	817	911	711	698	843	882	685	728	817	911
6	3	0.0	284.3	199.9	5056.0	-376.7	-211.8	0.0	53.3	39.5	0.0	102.5	76.0	0.0	-2.4	-1.8	0.0	-4.8	-3.548	735	672	852	872	703	707	821	907	756	648	874	848	703	707	820	907
6	4	0.0	415.5	189.0	5056.0	-519.5	-211.8	0.0	80.0	39.5	0.0	153.7	76.0	0.0	-3.6	-1.8	0.0	-7.2	-3.548	766	637	868	854	718	690	821	907	797	602	900	819	718	691	820	908
6	5	0.0	539.4	178.1	5056.0	-662.4	-211.8	0.0	106.6	39.5	0.0	205.0	76.0	0.0	-4.8	-1.8	0.0	-9.6	-3.548	793	608	880	841	729	678	817	911	835	561	922	794	728	679	816	912
6	6	0.0	655.9	167.2	5056.0	-805.2	-211.8	0.0	133.3	39.5	0.0	256.2	76.0	0.0	-5.9	-1.8	0.0	-12.0	-3.548	816	582	888	832	737	670	809	920	868	524	941	773	735	671	808	921
6	7	0.0	765.0	156.4	5056.0	-948.1	-211.8	0.0	160.0	39.5	0.0	307.4	76.0	0.0	-7.1	-1.8	0.0	-14.4	-3.548	835	561	893	827	740	666	798	932	898	491	956	757	739	668	796	934
6	8	0.0	866.8	145.5	5056.0	-1091.4	-211.8	0.0	186.6	39.5	0.0	358.6	76.0	0.0	-8.3	-1.8	0.0	-16.8	-3.548	850	544	893	827	739	667	782	950	924	462	967	745	738	669	781	952
6	9	0.0	961.3	134.6	5056.0	-1234.1	-211.8	0.0	213.3	39.5	0.0	409.9	76.0	0.0	-9.5	-1.8	0.0	-19.2	-3.548	861	531	889	831	735	671	763	971	946	437	974	737	733	673	761	973
6	10	0.0	1048.1	123.7	5056.0	-1376.9	-211.8	0.0	239.9	39.5	0.0	461.2	76.0	0.0	-10.7	-1.8	0.0	-21.5	-3.548	869	523	882	839	727	680	740	996	964	417	977	733	725	683	738	999
6	11	0.0	1128.1	112.8	5056.0	-1519.7	-211.8	0.0	266.6	39.5	0.0	512.3	76.0	0.0	-11.9	-1.8	0.0	-23.9	-3.548	873	518	871	851	715	693	714	1026	979	401	977	734	713	696	711	1029
6	12	0.0	1200.1	101.9	5056.0	-1662.4	-211.8	0.0	293.3	39.5	0.0	563.7	76.0	0.0	-13.1	-1.8	0.0	-26.3	-3.548	873	518	856	867	699	711	683	1060	989	389	972	739	697	714	680	1063
6	13	0.0	1266.1	91.1	5056.0	-1805.2	-211.8	0.0	319.9	39.5	0.0	614.9	76.0	0.0	-14.3	-1.8	0.0	-28.7	-3.548	870	522	838	888	680	732	649	1098	996	381	965	747	677	736	646	1101
6	14	0.0	1323.1	80.2	5056.0	-1948.0	-211.8	0.0	346.6	39.5	0.0	666.2	76.0	0.0	-15.4	-1.8	0.0	-31.1	-3.548	862	531	815	913	657	759	610	1141	999	379	953	761	653	762	607	1144
6	15	0.0	1374.1	69.3	5056.0	-2090.8	-211.8	0.0	373.3	39.5	0.0	717.4	76.0	0.0	-16.6	-1.8	0.0	-33.5	-3.548	851	543	789	942	630	788	568	1187	999	379	937	778	626	792	565	1191

		TIEMPO INICIAL																		TENSIONES EN FIBRAS SUPERIOR E INFERIOR															
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
6	16	0.0	1417.1	58.4	5056.0	-2233.5	-211.8	0.0	399.9	39.5	0.0	768.6	76.0	0.0	-17.8	-1.8	0.0	-35.9	-3.548	835	560	759	975	599	823	522	1238	994	384	916	600	595	827	519	1242
6	17	0.0	1452.1	47.5	5056.0	-2376.3	-211.8	0.0	426.6	39.5	0.0	819.9	76.0	0.0	-19.0	-1.8	0.0	-38.3	-3.548	816	582	725	1013	564	862	472	1294	985	394	894	626	560	866	468	1298
6	18	0.0	1481.1	36.6	5056.0	-2519.1	-211.8	0.0	453.2	39.5	0.0	871.2	76.0	0.0	-20.2	-1.8	0.0	-40.7	-3.548	793	607	687	1055	525	905	419	1353	973	408	867	656	521	909	415	1357
6	19	0.0	1502.2	25.7	5056.0	-2662.8	-211.8	0.0	479.9	39.5	0.0	922.3	76.0	0.0	-21.4	-1.8	0.0	-43.1	-3.548	766	637	645	1102	482	952	361	1417	956	426	835	691	478	957	357	1422
6	20	0.0	1516.2	14.9	5056.0	-2805.6	-211.8	0.0	506.6	39.5	0.0	973.6	76.0	0.0	-22.6	-1.8	0.0	-45.5	-3.548	736	671	600	1152	436	1003	300	1485	936	448	801	929	431	1009	295	1490
6	21	0.0	1522.2	4.0	5056.0	-2948.4	-210.7	0.0	533.2	39.5	0.0	1024.8	76.0	0.0	-23.8	-1.8	0.0	-47.9	-3.548	701	709	550	1207	386	1059	235	1557	912	475	762	973	381	1065	230	1563
7	1	0.0	2073.2	-346.8	5009.0	-3765.6	693.6	0.0	684.4	-128.7	0.0	1234.8	-232.1	0.0	0.0	0.0	0.0	-61.4	11.55	739	653	502	1244	369	1064	132	1655	994	371	756	962	369	1064	132	1655
7	2	0.0	1980.2	-351.1	5009.0	-3581.2	689.9	0.0	650.2	-128.7	0.0	1173.0	-232.1	0.0	0.0	0.0	0.0	-58.4	11.55	741	651	523	1221	389	1041	171	1611	983	383	764	953	389	1041	171	1611
7	3	0.0	1886.2	-355.4	5009.0	-3397.9	690.9	0.0	616.0	-128.7	0.0	1111.3	-232.1	0.0	0.0	0.0	0.0	-55.3	11.55	742	650	543	1199	409	1020	209	1569	971	396	772	945	409	1020	209	1569
7	4	0.0	1791.2	-359.7	5009.0	-3213.5	690.9	0.0	581.8	-128.7	0.0	1049.5	-232.1	0.0	0.0	0.0	0.0	-52.2	11.55	742	650	563	1177	428	999	248	1526	959	410	779	937	428	999	248	1526
7	5	0.0	1695.2	-363.9	5009.0	-3030.1	690.9	0.0	547.6	-128.7	0.0	987.8	-232.1	0.0	0.0	0.0	0.0	-49.2	11.55	742	650	581	1156	446	979	285	1485	946	424	785	930	446	979	285	1485
7	6	0.0	1598.2	-368.2	5009.0	-2846.7	690.9	0.0	513.3	-128.7	0.0	926.0	-232.1	0.0	0.0	0.0	0.0	-46.1	11.55	741	651	600	1136	463	959	322	1444	932	439	790	924	463	959	322	1444
7	7	0.0	1499.1	-372.5	5009.0	-2662.3	690.9	0.0	479.1	-128.7	0.0	864.4	-232.1	0.0	0.0	0.0	0.0	-43.0	11.55	740	653	617	1116	481	940	358	1403	918	455	795	918	481	940	358	1403
7	8	0.0	1400.1	-376.8	5009.0	-2479.0	690.9	0.0	444.9	-128.7	0.0	802.6	-232.1	0.0	0.0	0.0	0.0	-39.9	11.55	738	655	634	1097	497	922	394	1364	903	471	800	913	497	922	394	1364
7	9	0.0	1299.1	-381.1	4997.0	-2269.6	689.3	0.0	410.7	-128.7	0.0	740.9	-232.1	0.0	0.0	0.0	0.0	-36.9	11.55	736	653	652	1073	514	900	430	1320	889	484	805	904	514	900	430	1320
7	10	0.0	1197.1	-385.4	4997.0	-2106.2	689.3	0.0	376.4	-128.7	0.0	679.1	-232.1	0.0	0.0	0.0	0.0	-33.8	11.55	732	657	668	1056	529	883	464	1282	872	502	807	900	529	883	464	1282
7	11	0.0	1094.1	-389.7	4997.0	-1922.8	689.3	0.0	342.2	-128.7	0.0	617.4	-232.1	0.0	0.0	0.0	0.0	-30.7	11.55	728	661	683	1039	543	867	498	1244	856	520	810	898	543	867	498	1244
7	12	0.0	989.6	-394.0	4997.0	-1739.4	689.3	0.0	308.0	-128.7	0.0	555.6	-232.1	0.0	0.0	0.0	0.0	-27.7	11.55	724	667	697	1023	557	852	531	1208	838	540	812	896	557	852	531	1208
7	13	0.0	884.2	-398.3	4997.0	-1557.1	689.3	0.0	273.8	-128.7	0.0	493.9	-232.1	0.0	0.0	0.0	0.0	-24.6	11.55	718	673	710	1008	570	838	562	1173	820	560	812	895	570	838	562	1173
7	14	0.0	777.7	-402.6	4997.0	-1373.7	689.3	0.0	239.6	-128.7	0.0	432.1	-232.1	0.0	0.0	0.0	0.0	-21.5	11.55	712	680	724	993	583	823	594	1137	801	581	813	895	583	823	594	1137
7	15	0.0	670.0	-406.9	4997.0	-1190.3	689.3	0.0	205.3	-128.7	0.0	370.4	-232.1	0.0	0.0	0.0	0.0	-18.4	11.55	706	687	736	979	595	810	625	1103	782	602	813	895	595	810	625	1103
7	16	0.0	561.2	-411.2	4997.0	-1006.6	689.3	0.0	171.1	-128.7	0.0	308.6	-232.1	0.0	0.0	0.0	0.0	-15.4	11.55	699	695	749	966	606	797	656	1069	762	624	812	895	606	797	656	1069
7	17	0.0	451.2	-415.5	4997.0	-823.2	689.3	0.0	136.9	-128.7	0.0	246.9	-232.1	0.0	0.0	0.0	0.0	-12.3	11.55	691	703	760	953	617	785	686	1035	742	646	811	897	617	785	686	1035
7	18	0.0	340.1	-419.7	4997.0	-639.9	689.3	0.0	102.7	-128.7	0.0	185.2	-232.1	0.0	0.0	0.0	0.0	-9.2	11.55	683	712	771	941	627	774	715	1003	721	670	809	899	627	774	715	1003
7	19	0.0	227.9	-424.0	4997.0	-456.6	689.3	0.0	68.4	-128.7	0.0	123.5	-232.1	0.0	0.0	0.0	0.0	-6.1	11.55	674	722	781	930	637	763	744	971	699	694	807	901	637	763	744	971
7	20	0.0	114.5	-428.3	4997.0	-273.3	689.3	0.0	34.2	-128.7	0.0	61.7	-232.1	0.0	0.0	0.0	0.0	-3.1	11.55	665	732	791	919	646	753	772	939	677	718	804	905	646	753	772	939
7	21	0.0	0.0	-432.6	4997.0	-89.9	689.3	0.0	0.0	-128.7	0.0	0.0	-105.0	0.0	0.0	-116.0	0.0	0.0	11.55	655	744	800	909	655	744	800	909	655	744	800	909	655	744	800	909

CÁLCULO DE TENSIONES EN PUENTES

Fase : PUENTE COMPLETO EN TIEMPO INFINITO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: E-1518.3

Resumen de combinaciones:

		Tension máxima (t/m2)	Tension mínima (t/m2)
1	PP,Inicial + CM + 0.9 x Pret,Inicial + 0.6 x SC(+) + 0.5 x GRAD	925	-15
2	PP,Inicial + CM + 1.1 x Pret,Inicial + 0.6 x SC(+) + 0.5 x GRAD	890	8
3	PP,Inicial + CM + 0.9 x Pret,Inicial + 0.6 x SC(-) + 0.5 x GRAD	768	42
4	PP,Inicial + CM + 1.1 x Pret,Inicial + 0.6 x SC(-) + 0.5 x GRAD	1232	95
5	PP,Inicial + CM + 0.9 x Pret,Inicial + 1.0 x SC(+) + 0.6 x GRAD	1183	-95
6	PP,Inicial + CM + 1.1 x Pret,Inicial + 1.0 x SC(+) + 0.6 x GRAD	1009	-39
7	PP,Inicial + CM + 0.9 x Pret,Inicial + 1.0 x SC(-) + 0.6 x GRAD	774	-11
8	PP,Inicial + CM + 1.1 x Pret,Inicial + 1.0 x SC(-) + 0.6 x GRAD	1232	58

PP,final= Peso propio en tiempo final
Pret,final = Pretensado en tiempo final
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INFINITO																			TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	0.0	147.8	1503.0	34.6	-280.0	0.0	0.0	66.7	0.0	0.0	-2.9	0.0	0.0	119.0	0.0	0.0	14.87	170	145	207	177	170	145	207	177	170	145	207	177	170	145	207	177
1	2	0.0	121.8	129.1	1503.0	-196.5	-245.2	0.0	55.3	58.9	0.0	106.4	114.2	0.0	-12.0	-13.6	0.0	13.1	14.87	182	127	205	180	157	163	180	216	197	106	219	160	156	165	178	219
1	3	0.0	227.2	110.4	1503.0	-397.0	-210.5	0.0	103.7	51.2	0.0	201.0	100.9	0.0	-23.9	-13.6	0.0	26.2	14.87	225	133	240	216	175	210	190	293	253	89	268	173	171	215	186	298
1	4	0.0	317.5	94.7	1503.0	-615.1	-175.7	0.0	145.3	43.4	0.0	283.9	87.6	0.0	-35.9	-13.6	0.0	39.3	14.87	222	137	222	243	150	247	150	353	262	76	262	182	145	255	145	361
1	5	0.0	393.8	78.9	1503.0	-754.5	-141.0	0.0	180.1	35.7	0.0	355.2	74.3	0.0	-47.8	-13.6	0.0	52.3	14.87	234	119	225	239	143	258	134	379	284	42	275	162	136	268	127	389
1	6	0.0	456.3	63.1	1503.0	-863.3	-106.3	0.0	208.1	27.9	0.0	414.7	61.0	0.0	-59.8	-13.6	0.0	65.4	14.87	246	100	229	232	138	266	121	398	305	10	288	142	130	279	113	411
1	7	0.0	504.9	47.3	1503.0	-941.5	-71.5	0.0	229.3	20.2	0.0	462.5	47.7	0.0	-71.7	-13.6	0.0	78.5	14.87	258	82	236	222	135	270	113	410	324	-18	301	122	126	285	103	425
1	8	0.0	539.5	31.5	1503.0	-989.2	-36.8	0.0	243.7	12.5	0.0	498.6	34.4	0.0	-83.7	-13.6	0.0	91.6	14.87	270	64	244	210	135	271	110	416	341	-44	315	101	124	288	98	433
1	9	0.0	560.3	15.8	1503.0	-1006.0	-2.0	0.0	251.2	4.7	0.0	523.0	21.1	0.0	-95.6	-13.6	0.0	104.7	14.87	281	46	255	193	137	268	110	414	356	-68	330	79	124	287	97	434
1	10	0.0	567.3	0.0	1587.0	-1053.0	30.7	0.0	252.0	-3.0	0.0	535.6	7.8	0.0	-107.6	-13.6	0.0	117.8	14.87	285	68	257	222	133	300	106	454	362	-50	334	104	119	322	91	476
1	11	0.0	560.3	-15.8	1587.0	-1013.0	62.1	0.0	245.9	-10.8	0.0	536.6	-5.5	0.0	-119.5	-13.6	0.0	130.9	14.87	295	52	270	202	139	292	114	442	373	-67	348	83	122	317	98	467
1	12	0.0	539.4	-31.6	1587.0	-944.3	93.7	0.0	233.0	-18.5	0.0	525.9	-18.8	0.0	-131.5	-13.6	0.0	143.9	14.87	305	37	285	180	146	281	126	424	381	-80	361	63	128	308	108	451
1	13	0.0	504.7	-47.4	1587.0	-848.0	125.2	0.0	213.3	-26.3	0.0	503.5	-32.2	0.0	-143.4	-13.6	0.0	157.0	14.87	313	24	300	157	154	268	141	400	387	-89	374	44	135	298	121	430
1	14	0.0	456.1	-63.2	1587.0	-723.9	156.8	0.0	186.8	-34.0	0.0	469.4	-45.5	0.0	-155.4	-13.6	0.0	170.1	14.87	321	12	316	132	164	252	159	372	391	-95	386	25	143	285	138	405
1	15	0.0	393.5	-76.9	1629.0	-589.8	193.2	0.0	153.4	-41.8	0.0	423.5	-58.8	0.0	-167.3	-13.6	0.0	183.2	14.87	328	16	333	123	176	248	181	355	392	-82	397	25	153	283	158	390
1	16	0.0	317.1	-94.7	1629.0	-405.5	225.6	0.0	113.3	-49.5	0.0	365.9	-72.1	0.0	-179.3	-13.6	0.0	196.3	14.87	335	4	353	92	190	226	208	314	391	-82	409	6	166	264	183	352
1	17	0.0	226.8	-110.5	1629.0	-192.7	256.0	0.0	66.3	-57.2	0.0	296.6	-85.4	0.0	-191.2	-13.6	0.0	209.4	14.87	341	-6	374	60	206	202	238	267	389	-78	421	-13	180	242	212	307
1	18	0.0	122.7	-126.3	1629.0	40.3	282.3	0.0	12.5	-65.0	0.0	215.6	-98.7	0.0	-203.1	-13.6	0.0	222.5	14.87	345	-11	393	31	221	178	269	220	382	-67	430	-26	194	221	242	262
1	19	0.0	4.6	-142.1	1599.0	219.4	163.1	0.0	-48.1	-72.7	0.0	122.9	-112.0	0.0	-215.2	-13.6	0.0	235.6	14.87	348	20	378	42	209	188	269	209	343	-18	403	4	180	233	239	254
1	20	0.0	-128.6	-160.7	1599.0	380.0	85.7	0.0	-115.5	-80.5	0.0	18.5	-125.3	0.0	-227.2	-13.6	0.0	248.6	14.87	253	58	317	59	162	194	226	195	264	42	328	43	131	239	195	240
1	21	0.0	-278.3	-179.4	1599.0	421.3	8.2	0.0	-169.7	-88.2	0.0	0.0	0.0	0.0	-353.6	-153.2	0.0	261.7	14.87	189	154	256	150	73	324	141	321	197	141	265	137	26	395	93	392
2	1	0.0	-278.3	159.7	1539.0	410.9	4.9	0.0	-189.7	76.2	0.0	0.0	0.0	0.0	-353.6	134.1	0.0	261.7	0.1133	174	148	237	146	62	307	125	305	182	136	246	134	16	373	79	371
2	2	0.0	-146.0	141.0	1539.0	381.3	-72.1	0.0	-126.1	68.4	0.0	0.0	0.0	0.0	-241.4	120.7	0.0	261.8	0.1133	229	70	290	71	139	197	200	198	238	57	299	58	108	242	169	243
2	3	0.0	-30.1	122.4	1539.0	284.0	-149.0	0.0	-69.3	60.7	0.0	56.9	103.8	0.0	-175.9	0.5	0.0	261.9	0.1133	303	25	365	39	210	167	273	180	319	0	381	13	186	203	249	217
2	4	0.0	70.7	106.6	1539.0	69.8	-226.0	0.0	-19.3	53.0	0.0	142.4	90.5	0.0	-175.5	0.5	0.0	262.0	0.1133	306	21	353	56	196	188	244	224	334	-23	382	13	172	225	220	261
2	5	0.0	157.5	90.8	1479.0	-133.4	-233.7	0.0	23.9	45.2	0.0	216.1	77.2	0.0	-175.0	0.5	0.0	262.1	0.1133	295	17	327	73	171	208	203	264	334	-41	366	14	147	245	179	300
2	6	0.0	230.5	75.0	1479.0	-314.3	-186.4	0.0	60.3	37.5	0.0	278.2	63.9	0.0	-174.6	0.5	0.0	262.2	0.1133	290	26	310	100	153	236	172	310	337	-46	356	28	129	273	149	347
2	7	0.0	289.5	59.2	1479.0	-461.5	-148.2	0.0	89.9	29.7	0.0	328.6	50.6	0.0	-174.2	0.5	0.0	262.3	0.1133	285	33	295	122	138	259	148	348	339	-49	349	40	114	295	124	385
2	8	0.0	334.7	43.5	1479.0	-575.0	-109.9	0.0	112.6	22.0	0.0	367.2	37.3	0.0	-173.7	0.5	0.0	262.4	0.1133	281	39	283	140	126	277	128	378	340	-52	342	50	102	313	105	414
2	9	0.0	366.0	27.7	1479.0	-654.9	-71.7	0.0	128.5	14.2	0.0	394.1	24.0	0.0	-173.8	-1.1	0.0	262.5	0.1133	278	43	275	153	118	290	114	399	341	-53	338	57	94	326	91	435
2	10	0.0	383.4	11.9	1479.0	-701.1	-33.4	0.0	137.6	6.5	0.0	409.4	10.6	0.0	-174.8	-1.1	0.0	262.6	0.1133	276	46	270	161	112	298	106	412	341	-53	335	62	89	334	82	449
2	11	0.0	386.9	-3.9	1479.0	-713.7	4.8	0.0	139.9	-1.3	0.0	413.0	0.5	0.0	-175.8	-1.1	0.0	262.7	0.1133	275	48	268	164	110	301	103	417	341	-52	333	64	86	338	79	453
2	12	0.0	376.6	-19.7	1416.0	-655.2	41.4	0.0	135.4	-9.0	0.0	407.6	-12.8	0.0	-176.8	-1.1	0.0	262.8	0.1133	279	22	274	130	115	274	110	381	344	-77	339	31	91	310	86	418
2	13	0.0	352.3	-35.5	1416.0	-602.6	78.1	0.0	124.1	-16.8	0.0	390.5	-26.1	0.0	-177.7	-1.1	0.0	262.9	0.1133	280	21	278	124	119	268	117	370	342	-74	340	28	95	305	93	407
2	14	0.0	314.2	-51.2	1416.0	-517.8	114.7	0.0	105.9	-24.5	0.0	361.6	-39.4	0.0	-179.6	-2.7	0.0	263.0	0.1133	281	20	285	113	125	258	130	351	339	-69	343	24	101	295	105	389
2	15	0.0	262.1	-67.0	1416.0	-400.8	151.3	0.0	81.0	-32.2	0.0	321.0	-52.7	0.0	-182.0	-2.7	0.0	263.1	0.1133	282	18	294	99	134	244	147	325	335	-63	347	18	110	282	122	363
2	16	0.0	196.2	-82.8	1416.0	-251.5	188.0	0.0	49.2	-40.0	0.0	268.9	-66.0	0.0	-184.3	-2.7	0.0	263.2	0.1133	284	15	306	81	146	225	169	291	330	-55	352	11	121	264	144	330
2	17	0.0	116.4	-98.6	1416.0	-70.0	224.6	0.0	10.6	-47.7	0.0	204.9	-79.3	0.0	-186.6	-2.7	0.0	263.3	0.1133	286	11	321	58	161	203	196	249	323	-45	358	2	136	242	171	268
2	18	0.0	22.7	-114.4	1416.0	136.6	236.5	0.0	-34.8	-55.5	0.0	129.2	-92.6	0.0	-189.0	-2.7	0.0	263.4	0.1133	287	11	335	36	177	179	226	204	313	-30	362	-5	151	218	200	244
2	19	0.0	-84.8	-130.1	1479.0	300.0	152.8	0.0	-87.0	-63.2	0.0	41.8	-106.0	0.0	-191.3	-2.7	0.0	263.5	0.1133	272	53	334	62	180	194	242	204	287	30	349	40	154	234	215	244
2	20	0.0	-207.6	-148.8	1479.0	449.2	78.8	0.0	-146.1	-71.0	0.0	0.0	0.0	0.0	-276.1	-125.1	0.0	263.6	0.1133	223	71	289	62	123	219	189	210	232	57	298	49	86	274	152	265
2	21	0.0	-346.7	-167.5	1479.0	486.0	4.9	0.0	-211.9	-78.7	0.0	0.0	0.0	0.0	-392.1	-138.4	0.0	263.7	0.1133	165	156	234	144	42	339	110	326	174	143	242	130	-11	417	58	405
3	1	0.0	-346.7	183.3	1539.0	496.4	-13.0	0.0	-211.9	89.5	0.0	0.0	0.0	0.0	-392.1	155.3	0.0	263.7	-14.98	170	154	238	144	50	324	119	314	178	142	247	132	-1	397	67	387
3	2	0.0	-193.7	164.6	1539.0	452.1	-87.6	0.0	-136.6	81.7	0.0	7.2	126.0	0.0	-261.2	142.1	0.0	250.5	-14.98	231	68	296	62	137	200	203	195	240	55	306	49	103	249	169	243
3	3	0.0	-57.0	145.9	1539.0	342.3	-162.1	0.0	-68.1	74.0	0.0	112.2	112.7	0.0	-238.6	15.1	0.0	237.3	-14.98	319	1	385	8	207	172	273	179	342	-35	408	-28	174	222	240	229
3	4	0.0	64.5	130.2	1539.0	117.6	-236.6	0.0	-6.4	66.3	0.0	205.5	99.4	0.0	-225.4	15.1	0.0	224.2	-14.98	329	-15	360	15	203	178	254	209	365	-70	416	-39	172	225	223	256
3	5	0.0	172.1	114.4	1599.0	-116.1	-267.9	0.0	48.5	58.5	0.0	287.2	86.1	0.0	-212.1	15.1	0.0	211.0	-14.98	334	-4	371	53	196	207	233	264	380	-75	417	-18	167	252	204	309
3	6	0.0	265.8	98.6	1599.0	-331.3	-226.4	0.0	96.6	50.8	0.0	357.0	72.8	0.0	-198.9	15.1	0.0	197.8	-14.98	329	4	351	83	182	229	204	309	384	-81	407	-2	155	271	177	350

		TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
3	7	0.0	345.6	82.8	1599.0	-516.6	-194.6	0.0	137.9	43.0	0.0	415.2	59.4	0.0	-185.6	15.1	0.0	184.6	-14.98	323	13	333	111	169	249	178	348	386	-84	395	15	144	288	153	386
3	8	0.0	411.6	67.0	1599.0	-673.8	-162.7	0.0	172.3	35.3	0.0	461.7	46.1	0.0	-172.3	15.1	0.0	171.4	-14.98	316	23	315	138	158	266	156	381	385	-82	384	33	134	302	133	417
3	9	0.0	463.6	51.3	1629.0	-820.6	-133.1	0.0	200.0	27.5	0.0	496.3	32.8	0.0	-159.1	15.1	0.0	158.2	-14.98	307	47	297	178	146	293	136	424	380	-65	370	66	125	327	114	458
3	10	0.0	501.8	35.5	1629.0	-923.5	-100.7	0.0	220.8	19.8	0.0	519.4	19.5	0.0	-145.8	15.1	0.0	145.0	-14.98	298	61	281	202	138	307	120	449	374	-55	356	86	118	337	100	479
3	11	0.0	526.1	19.7	1629.0	-997.8	-68.3	0.0	234.8	12.0	0.0	530.7	6.2	0.0	-132.6	15.1	0.0	131.9	-14.98	289	75	266	225	131	317	108	467	365	-42	343	107	113	345	90	495
3	12	0.0	536.5	3.9	1629.0	-1044.0	-35.9	0.0	242.0	4.3	0.0	530.3	-7.1	0.0	-119.3	15.1	0.0	118.7	-14.98	278	91	252	246	125	326	99	480	354	-25	329	129	109	351	83	506
3	13	0.0	533.0	-11.9	1629.0	-1061.0	-2.5	0.0	242.3	-3.4	0.0	518.2	-20.4	0.0	-106.1	15.1	0.0	105.5	-14.98	267	108	240	264	122	331	95	488	341	-5	314	151	107	353	80	510
3	14	0.0	515.6	-27.6	1587.0	-1017.0	34.5	0.0	235.9	-11.2	0.0	494.4	-33.7	0.0	-92.8	15.1	0.0	92.3	-14.98	260	106	235	256	124	314	99	464	331	-2	306	148	112	333	87	483
3	15	0.0	484.3	-43.4	1587.0	-970.2	71.2	0.0	222.6	-18.9	0.0	458.9	-47.0	0.0	-79.6	15.1	0.0	79.1	-14.98	250	122	228	267	126	311	104	456	315	22	293	167	115	327	94	473
3	16	0.0	439.2	-59.2	1587.0	-891.3	107.9	0.0	202.6	-26.7	0.0	411.8	-60.3	0.0	-66.3	15.1	0.0	65.9	-14.98	240	137	223	274	131	304	115	441	298	47	282	185	122	317	105	455
3	17	0.0	380.1	-75.0	1587.0	-780.2	144.6	0.0	175.7	-34.4	0.0	352.8	-73.6	0.0	-53.0	15.1	0.0	52.7	-14.98	230	151	221	277	138	292	130	418	280	75	271	201	131	303	122	429
3	18	0.0	307.2	-90.8	1587.0	-636.8	181.3	0.0	142.0	-42.2	0.0	282.1	-86.9	0.0	-39.8	15.1	0.0	39.6	-14.98	221	165	222	276	149	276	150	387	261	104	262	215	143	285	144	395
3	19	0.0	220.4	-106.5	1587.0	-461.1	218.0	0.0	101.5	-49.9	0.0	199.8	-100.2	0.0	-26.5	15.1	0.0	26.4	-14.98	213	178	226	271	162	256	175	348	241	135	254	228	158	262	171	354
3	20	0.0	118.4	-125.2	1587.0	-202.3	254.7	0.0	54.1	-57.7	0.0	105.6	-113.5	0.0	-13.3	15.1	0.0	13.2	-14.98	194	143	218	202	167	182	192	241	208	121	233	180	166	185	191	243
3	21	0.0	0.0	-143.9	1587.0	38.0	291.4	0.0	0.0	-65.4	0.0	0.0	3.3	0.0	0.0	-117.3	0.0	0.0	-14.98	185	156	226	191	185	156	226	191	185	156	226	191	185	156	226	191
4	1	0.0	0.0	419.4	4335.0	-78.0	-558.4	0.0	0.0	123.4	0.0	0.0	99.7	0.0	0.0	210.0	0.0	0.0	-11.08	568	645	694	788	568	645	694	788	568	645	694	788	568	645	694	788
4	2	0.0	117.0	414.9	4335.0	-234.7	-558.4	0.0	34.6	123.4	0.0	62.6	223.1	0.0	0.0	0.0	0.0	-3.1	-11.08	592	618	702	780	573	639	683	800	605	604	715	765	573	639	683	800
4	3	0.0	232.8	410.4	4335.0	-391.3	-558.4	0.0	69.3	123.4	0.0	125.1	223.1	0.0	0.0	0.0	0.0	-6.2	-11.08	616	592	709	771	578	633	672	813	642	563	735	743	578	633	672	813
4	4	0.0	347.3	405.9	4335.0	-547.9	-558.4	0.0	103.9	123.4	0.0	187.7	223.1	0.0	0.0	0.0	0.0	-9.3	-11.08	639	566	716	764	583	629	660	826	678	523	755	721	583	629	660	826
4	5	0.0	460.5	401.3	4335.0	-704.6	-558.4	0.0	138.5	123.4	0.0	250.3	223.1	0.0	0.0	0.0	0.0	-12.4	-11.08	661	541	722	757	586	625	647	841	713	484	774	700	586	625	647	841
4	6	0.0	572.4	396.8	4335.0	-861.2	-558.4	0.0	173.1	123.4	0.0	312.9	223.1	0.0	0.0	0.0	0.0	-15.5	-11.08	683	517	727	751	589	622	634	856	747	446	792	680	589	622	634	856
4	7	0.0	683.1	392.3	4335.0	-1018.0	-558.4	0.0	207.8	123.4	0.0	375.5	223.1	0.0	0.0	0.0	0.0	-18.7	-11.08	704	494	732	746	591	619	619	871	781	408	809	660	591	619	619	871
4	8	0.0	792.5	387.8	4335.0	-1174.0	-558.4	0.0	242.4	123.4	0.0	438.0	223.1	0.0	0.0	0.0	0.0	-21.8	-11.08	724	471	736	741	593	617	605	887	815	371	827	641	593	617	605	887
4	9	0.0	900.6	383.2	4335.0	-1331.0	-558.4	0.0	277.0	123.4	0.0	500.5	223.1	0.0	0.0	0.0	0.0	-24.9	-11.08	744	450	739	738	594	616	589	905	847	335	843	624	594	616	589	905
4	10	0.0	1007.0	378.7	4335.0	-1488.0	-558.4	0.0	311.6	123.4	0.0	563.3	223.1	0.0	0.0	0.0	0.0	-28.0	-11.08	763	429	742	735	594	616	573	923	879	300	858	607	594	616	573	923
4	11	0.0	1113.0	374.2	4351.0	-1650.0	-560.4	0.0	346.3	123.4	0.0	625.7	223.1	0.0	0.0	0.0	0.0	-31.1	-11.08	781	413	744	739	593	622	556	947	910	270	873	596	593	622	556	947
4	12	0.0	1217.0	369.7	4351.0	-1807.0	-560.4	0.0	380.9	123.4	0.0	688.3	223.1	0.0	0.0	0.0	0.0	-34.2	-11.08	798	394	745	738	592	623	538	967	940	237	885	581	592	623	538	967
4	13	0.0	1320.0	365.1	4351.0	-1965.0	-560.4	0.0	415.5	123.4	0.0	750.9	223.1	0.0	0.0	0.0	0.0	-37.3	-11.08	815	376	745	738	589	626	519	988	969	204	899	566	589	626	519	988
4	14	0.0	1422.0	360.6	4351.0	-2122.0	-560.4	0.0	450.1	123.4	0.0	813.5	223.1	0.0	0.0	0.0	0.0	-40.4	-11.08	831	358	744	738	587	628	501	1009	998	172	912	552	587	628	501	1009
4	15	0.0	1523.0	356.1	4351.0	-2279.0	-560.4	0.0	484.8	123.4	0.0	876.1	223.1	0.0	0.0	0.0	0.0	-43.5	-11.08	847	340	744	739	584	632	481	1030	1027	140	924	538	584	632	481	1030
4	16	0.0	1622.0	351.6	4351.0	-2436.0	-560.4	0.0	519.4	123.4	0.0	938.6	223.1	0.0	0.0	0.0	0.0	-46.6	-11.08	862	324	742	740	580	636	461	1053	1055	109	936	526	580	636	461	1053
4	17	0.0	1720.0	347.0	4351.0	-2593.0	-560.4	0.0	554.0	123.4	0.0	1001.2	223.1	0.0	0.0	0.0	0.0	-49.7	-11.08	876	308	740	743	576	641	440	1076	1082	79	946	514	576	641	440	1076
4	18	0.0	1817.0	342.5	4351.0	-2750.0	-560.4	0.0	588.6	123.4	0.0	1063.7	223.1	0.0	0.0	0.0	0.0	-52.8	-11.08	889	293	737	746	570	647	419	1100	1108	50	957	503	570	647	419	1100
4	19	0.0	1912.0	338.0	4351.0	-2908.0	-560.4	0.0	623.3	123.4	0.0	1126.4	223.1	0.0	0.0	0.0	0.0	-56.0	-11.08	902	279	733	751	564	654	396	1125	1134	22	965	493	564	654	396	1125
4	20	0.0	2006.0	333.4	4351.0	-3065.0	-560.4	0.0	657.9	123.4	0.0	1189.0	223.1	0.0	0.0	0.0	0.0	-59.1	-11.08	914	266	729	755	557	661	373	1151	1159	-6	974	483	557	661	373	1151
4	21	0.0	2099.0	328.9	4351.0	-3222.0	-560.5	0.0	692.5	123.4	0.0	1251.4	223.1	0.0	0.0	0.0	0.0	-62.2	-11.08	925	253	724	761	550	669	349	1177	1183	-33	982	474	550	669	349	1177
5	1	0.0	1558.0	-10.2	4480.0	-2586.0	188.6	0.0	543.8	-41.0	0.0	1047.2	-78.9	0.0	-29.6	2.2	0.0	-48.8	3.676	822	406	691	844	498	765	367	1204	1038	166	907	604	492	772	361	1210
5	2	0.0	1548.0	-20.9	4480.0	-2461.0	188.7	0.0	516.7	-41.0	0.0	994.8	-78.9	0.0	-28.1	2.2	0.0	-46.4	3.676	845	380	728	803	538	721	420	1145	1050	152	933	576	532	728	414	1151
5	3	0.0	1530.0	-31.6	4480.0	-2335.0	188.6	0.0	489.5	-41.0	0.0	942.4	-78.9	0.0	-26.6	2.2	0.0	-43.9	3.676	865	358	761	767	574	681	469	1090	1059	142	955	551	568	687	463	1097
5	4	0.0	1506.0	-42.3	4480.0	-2210.0	188.6	0.0	462.3	-41.0	0.0	890.1	-78.9	0.0	-25.1	2.2	0.0	-41.5	3.676	881	340	790	734	606	645	514	1040	1065	136	973	531	601	651	509	1046
5	5	0.0	1474.0	-53.0	4480.0	-2085.0	188.6	0.0	435.1	-41.0	0.0	837.6	-78.9	0.0	-23.7	2.2	0.0	-39.1	3.676	893	326	815	706	634	614	556	994	1066	135	988	515	629	619	551	1000
5	6	0.0	1435.0	-63.7	4480.0	-1960.0	188.6	0.0	407.9	-41.0	0.0	785.2	-78.9	0.0	-22.2	2.2	0.0	-36.6	3.676	902	317	836	683	659	587	593	952	1064	137	998	503	654	592	589	957
5	7	0.0	1389.0	-74.5	4480.0	-1834.0	188.6	0.0	380.7	-41.0	0.0	733.1	-78.9	0.0	-20.7	2.2	0.0	-34.2	3.676	907	311	855	662	680	563	628	914	1058	143	1006	494	676	568	624	919
5	8	0.0	1336.0	-85.2	4480.0	-1709.0	188.6	0.0	353.5	-41.0	0.0	680.7	-78.9	0.0	-19.2	2.2	0.0	-31.7	3.676	908	310	869	646	698	544	658	880	1048	154	1009	491	694	548	654	885
5	9	0.0	1276.0	-95.9	4480.0	-1584.0	188.6	0.0	326.3	-41.0	0.0	628.4	-78.9	0.0	-17.7	2.2	0.0	-29.3	3.676	906	313	879	635	711	529	685	851	1035	169	1009	491	708	533	681	855
5	10	0.0	1209.0	-106.6	4480.0	-1459.0	188.6	0.0	299.1	-41.0	0.0	575.9	-78.9	0.0	-16.3	2.2	0.0	-26.9	3.676	899	320	886	627	721	517	708	825	1018	188	1005	495	718	521	705	829
5	11	0.0	1135.0	-117.3	4480.0	-1333.0	188.6	0.0	271.9	-41.0	0.0	523.5	-78.9	0.0	-14.8	2.2	0.0	-24.4	3.676	890	330	890	623	728	510	728	803	998	210	998	503	725	513	725	806
5	12	0.0	1053.0	-128.0	4480.0	-1208.0	188.6	0.0	244.7	-41.0	0.0	471.2	-78.9	0.0	-13.3	2.2	0.0	-22.0	3.676	876	346	889	624	730	507	743	786	973	238	986	516	727	511	740	789
5	13	0.0	964.7	-138.7	4480.0	-1063.0	188.6	0.0	217.5	-41.0	0.0	418.8	-78.9	0.0	-11.8	2.2	0.0	-19.5	3.676	859	365	885	629	729	509	755	773	945	269	971	533	727	511	753	776
5	14	0.0	869.0	-149.5	4480.0	-957.6	188.6	0.0	190.3	-41.0	0.0	366.4	-78.9	0.0	-10.3	2.2	0.0	-17.1	3.676	838	388	877	638	724	514	763	764	913	304	952	554	722	516	761	766
5	15	0.0	766.2	-160.2	4480.0	-832.3	188.6	0.0	163.2	-41.0	0.0	314.1	-78.9	0.0	-8.9	2.2	0.0	-14.7	3.676	813	415	865	651	716	523	768	758	878	344	930	579	714	525	766	761
5	16	0.0	656.3	-170.9	4480.0	-707.1	188.6	0.0	136.0	-41.0	0.0	261.7	-78.9	0.0	-7.4	2.2	0.0	-12.2	3.676	785	447	850	668	704	537	769	758	839	387	904	608	702	539	767	759
5	17	0.0	539.3	-181.6	4480.0	-581.6	188.6	0.0	108.8	-41.0	0.0	209.4	-78.9	0.0	-5.9	2.2	0.0	-9.8	3.676	752	483	831	689	688	555	766	761	796	435	874	641	686	556	765	762
5	18	0.0	415.1	-192.3	4480.0	-456.5	188.6	0.0	81.6	-41.0	0.0	157.1	-78.9	0.0	-4.4	2.2	0.0	-7.3	3.676	717	523	808	714	668	577	759	768	749	487	840	678	667	578	758	769
5	19	0.0	283.9	-203.0	4480.0	-331.3	188.6	0.0	54.4	-41.0	0.0	104.7	-78.9	0.0	-3.0	2.2	0.0	-4.9	3.676	677	566	781	744	645	602	749	780	699	543	803	720	644	603	748	780
5	20	0.0	145.5	-213.8	4480.0	-206.0	188.6	0.0	27.2	-41.0	0.0	52.4	-78.9	0.0	-1.5	2.2	0.0	-2.4	3.676	634	615	751	777	618	633	735	795	645	603	762	765	617	633	735	795
5	21	0.0	0.0	-224.5	4480.0	-80.8	188.6	0.0	0.0	-41.0	0.0	0.0	2.2	0.0	0.0	-64.1	0.0	0.0	3.676	587	667	717	815	587	667	717	815	587	667	717	815	587	667	717	815
6	1	0.0	0.0	221.7	4398.0	-79.2	-184.3	0.0	0.0	39.5	0.0	0.0	-1.8	0.0	0.0	69.7	0.0	0.0	-3.548	576	654	704	800	576	654	704	800	576	654	704	800	576	654	704	800
6	2	0.0	145.8	210.8	4398.0	-203.4	-184.3	0.0	26.7	39.5	0.0	51.2	76.0	0.0	-1.2	-1.8	0.0	-2.4	-3.548	623	602	738	762	607	620	722	780	634	591	749	750	607	620	722	780
6	3	0.0	284.3	199.9	4398.0	-327.7	-184.3	0.0	53.3	39.5	0.0	102.5	76.0	0.0	-2.4	-1.8	0.0	-4.8	-3.548	666	554	768	728	635	589	737	764	687	531	789	705	634	590	736	764
6	4	0.0	415.5	189.0	4398.0	-452.0	-184.3	0.0	80.0	39.5	0.0	153.7	76.0	0.0	-3.6	-1.8	0.0	-7.2	-3.548	706	511	795	699	658	563	747	752	737	475	826	664	658	564	747	753
6	5	0.0	539.3	178.1	4398.0	-576.3	-184.3	0.0	106.6	39.5	0.0	205.0	76.0	0.0	-4.8	-1.8	0.0	-9.6	-3.548	741	471	817	674	678	541	754	744	783	424	860	627	677	542	753	745
6	6	0.0	655.8	167.2	4398.0	-700.6	-184.3	0.0	133.3	39.5	0.0	256.2	76.0	0.0	-5.9	-1.8	0.0	-12.0	-3.548	773	436	836	653	694	524	757	741	826	377	889	595	693	525	756	742
6	7	0.0	764.9	156.4	4398.0	-824.8	-184.3	0.0	160.0	39.5	0.0	307.4	76.0	0.0	-7.1	-1.8	0.0	-14.4	-3.548	801	405	851	637	706	510	756	742	864	335	914	566	705	512	755	743
6	8	0.0	866.7	145.5	4398.0	-949.1	-184.3	0.0	186.6	39.5	0.0	358.6	76.0	0.0	-8.3	-1.8	0.0	-16.8	-3.548	825	378	862	624	714	501	752	747	899	296	936	542	713	503	750	749
6	9	0.0	961.2	134.6	4398.0	-1073.0	-184.3	0.0	213.3	39.5	0.0	409.9	76.0	0.0	-9.5	-1.8	0.0	-19.2	-3.548	845	356	870	616	719	496	743	756	930	262	954	522	717	498	741	758
6	10	0.0	1048.0	123.7	4398.0	-1198.0	-184.3	0.0	239.9	39.5	0.0	461.2	76.0	0.0	-10.7	-1.8	0.0	-21.5	-3.548	861	338	873	613	719	496	731	770	956	232	968	507	717	498	728	773
6	11	0.0	1128.0	112.8	4398.0	-1322.0	-184.3	0.0	266.6	39.5	0.0	512.3	76.0	0.0	-11.9	-1.8	0.0	-23.9	-3.548	874	324	872	613	716	499	715	788	980	207	978	496	714	502	712	791
6	12	0.0	1200.0	101.9	4398.0	-1446.0	-184.3	0.0	293.3	39.5	0.0	563.7	76.0	0.0	-13.1	-1.8	0.0	-26.3	-3.548	883	314	868	618	709	507	695	810	999	185	984	489	706	510	692	813
6	13	0.0	1266.0	91.1	4398.0	-1571.0	-184.3	0.0	319.9	39.5	0.0	614.9	76.0	0.0	-14.3	-1.8	0.0	-28.7	-3.548	888	308	860	627	698	519	671	837	1014	168	987	486	695	522	668	840

Vano	Seccion	TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
		N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
6	14	0.0	1323.0	80.2	4398.0	-1695.0	-184.3	0.0	346.6	39.5	0.0	666.2	76.0	0.0	-15.4	-1.8	0.0	-31.1	-3.548	889	308	848	640	683	535	643	868	1026	155	985	488	680	539	640	871
6	15	0.0	1374.0	69.3	4398.0	-1819.0	-184.3	0.0	373.3	39.5	0.0	717.4	76.0	0.0	-16.6	-1.8	0.0	-33.5	-3.548	886	310	833	657	665	555	612	902	1034	146	981	493	662	559	609	906
6	16	0.0	1417.0	58.4	4398.0	-1943.0	-184.3	0.0	399.9	39.5	0.0	768.6	76.0	0.0	-17.8	-1.8	0.0	-35.9	-3.548	880	317	813	678	643	580	577	941	1038	141	972	503	639	584	573	945
6	17	0.0	1452.0	47.5	4398.0	-2068.0	-184.3	0.0	426.6	39.5	0.0	819.9	76.0	0.0	-19.0	-1.8	0.0	-38.3	-3.548	869	330	789	705	616	610	537	985	1038	142	958	518	612	614	533	990
6	18	0.0	1481.0	36.6	4398.0	-2192.0	-184.3	0.0	453.2	39.5	0.0	871.2	76.0	0.0	-20.2	-1.8	0.0	-40.7	-3.548	855	345	763	735	587	643	494	1032	1035	146	942	536	583	647	490	1037
6	19	0.0	1502.0	25.7	4398.0	-2316.0	-184.3	0.0	479.9	39.5	0.0	922.3	76.0	0.0	-21.4	-1.8	0.0	-43.1	-3.548	837	365	732	769	553	680	448	1084	1027	154	922	558	549	685	443	1089
6	20	0.0	1516.0	14.9	4398.0	-2441.0	-184.3	0.0	506.6	39.5	0.0	973.6	76.0	0.0	-22.6	-1.8	0.0	-45.5	-3.548	815	389	697	806	515	722	397	1141	1016	166	897	585	511	727	392	1146
6	21	0.0	1522.0	4.0	4399.0	-2565.0	-183.3	0.0	533.2	39.5	0.0	1024.8	76.0	0.0	-23.8	-1.8	0.0	-47.9	-3.548	789	418	658	851	474	768	343	1201	1001	184	869	617	469	774	338	1207
7	1	0.0	2073.0	-346.8	4358.0	-3276.0	603.4	0.0	684.4	-128.7	0.0	1234.8	-232.1	0.0	0.0	0.0	0.0	-61.4	11.55	878	307	672	821	508	718	301	1232	1133	25	926	539	508	718	301	1232
7	2	0.0	1980.0	-351.1	4358.0	-3116.0	600.2	0.0	650.2	-128.7	0.0	1173.0	-232.1	0.0	0.0	0.0	0.0	-58.4	11.55	869	318	679	814	517	708	327	1204	1110	50	920	546	517	708	327	1204
7	3	0.0	1886.0	-355.4	4358.0	-2956.0	601.0	0.0	616.0	-128.7	0.0	1111.3	-232.1	0.0	0.0	0.0	0.0	-55.3	11.55	858	329	685	807	525	699	352	1176	1087	75	914	553	525	699	352	1176
7	4	0.0	1791.0	-359.7	4358.0	-2796.0	601.0	0.0	581.8	-128.7	0.0	1049.5	-232.1	0.0	0.0	0.0	0.0	-52.2	11.55	847	341	691	800	533	691	376	1149	1064	102	907	560	533	691	376	1149
7	5	0.0	1695.0	-363.9	4358.0	-2636.0	601.0	0.0	547.6	-128.7	0.0	987.8	-232.1	0.0	0.0	0.0	0.0	-49.2	11.55	836	354	696	794	540	683	400	1123	1040	128	900	568	540	683	400	1123
7	6	0.0	1596.0	-368.2	4358.0	-2476.0	601.0	0.0	513.3	-128.7	0.0	926.0	-232.1	0.0	0.0	0.0	0.0	-46.1	11.55	824	367	701	789	547	675	423	1097	1015	156	892	577	547	675	423	1097
7	7	0.0	1499.0	-372.5	4358.0	-2317.0	601.0	0.0	479.1	-128.7	0.0	864.4	-232.1	0.0	0.0	0.0	0.0	-43.0	11.55	811	382	704	785	552	670	445	1073	989	184	882	588	552	670	445	1073
7	8	0.0	1400.0	-376.8	4358.0	-2157.0	601.0	0.0	444.9	-128.7	0.0	802.6	-232.1	0.0	0.0	0.0	0.0	-39.9	11.55	798	396	708	781	557	663	467	1048	963	213	873	598	557	663	467	1048
7	9	0.0	1299.0	-381.1	4347.0	-1992.0	599.6	0.0	410.7	-128.7	0.0	740.9	-232.1	0.0	0.0	0.0	0.0	-36.9	11.55	785	408	712	773	563	654	490	1019	937	238	864	603	563	654	490	1019
7	10	0.0	1197.0	-385.4	4347.0	-1833.0	599.6	0.0	376.4	-128.7	0.0	679.1	-232.1	0.0	0.0	0.0	0.0	-33.8	11.55	770	424	713	771	566	650	510	997	910	269	853	616	566	650	510	997
7	11	0.0	1094.0	-389.7	4347.0	-1673.0	599.6	0.0	342.2	-128.7	0.0	617.4	-232.1	0.0	0.0	0.0	0.0	-30.7	11.55	755	441	715	769	570	646	530	975	882	300	842	628	570	646	530	975
7	12	0.0	989.5	-394.0	4347.0	-1514.0	599.6	0.0	308.0	-128.7	0.0	555.6	-232.1	0.0	0.0	0.0	0.0	-27.7	11.55	739	459	716	769	572	644	549	954	853	332	830	642	572	644	549	954
7	13	0.0	884.1	-398.3	4347.0	-1354.0	599.6	0.0	273.8	-128.7	0.0	493.9	-232.1	0.0	0.0	0.0	0.0	-24.6	11.55	723	477	716	768	574	641	568	933	824	364	818	655	574	641	568	933
7	14	0.0	777.6	-402.6	4347.0	-1195.0	599.6	0.0	239.6	-128.7	0.0	432.1	-232.1	0.0	0.0	0.0	0.0	-21.5	11.55	705	496	715	769	576	640	586	913	794	397	804	670	576	640	586	913
7	15	0.0	669.9	-406.9	4347.0	-1035.0	599.6	0.0	205.3	-128.7	0.0	370.4	-232.1	0.0	0.0	0.0	0.0	-18.4	11.55	688	515	715	770	577	639	604	893	764	431	791	685	577	639	604	893
7	16	0.0	561.1	-411.2	4347.0	-875.7	599.6	0.0	171.1	-128.7	0.0	308.6	-232.1	0.0	0.0	0.0	0.0	-15.4	11.55	669	536	713	772	577	638	620	874	733	465	776	701	577	638	620	874
7	17	0.0	451.2	-415.5	4347.0	-716.2	599.6	0.0	136.9	-128.7	0.0	246.9	-232.1	0.0	0.0	0.0	0.0	-12.3	11.55	651	557	711	774	577	639	637	856	702	500	762	718	577	639	637	856
7	18	0.0	340.1	-419.7	4347.0	-556.7	599.6	0.0	102.7	-128.7	0.0	185.2	-232.1	0.0	0.0	0.0	0.0	-9.2	11.55	631	578	708	777	576	640	652	839	669	536	746	735	576	640	652	839
7	19	0.0	227.9	-424.0	4347.0	-397.2	599.6	0.0	68.4	-128.7	0.0	123.5	-232.1	0.0	0.0	0.0	0.0	-6.1	11.55	611	600	705	781	574	641	667	822	637	572	730	753	574	641	667	822
7	20	0.0	114.5	-428.3	4347.0	-237.7	599.6	0.0	34.2	-128.7	0.0	61.7	-232.1	0.0	0.0	0.0	0.0	-3.1	11.55	591	623	701	785	572	644	682	806	603	609	713	771	572	644	682	806
7	21	0.0	0.0	-432.6	4347.0	-78.2	599.6	0.0	0.0	-128.7	0.0	0.0	-105.0	0.0	0.0	-116.0	0.0	0.0	11.55	569	647	696	791	569	647	696	791	569	647	696	791	569	647	696	791

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1518.3

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
1	1	0.0	0.0	8.485	1.750	9.500	3.500	134.400	0.700	1.050	0.00	10.29	21.470	5.93
1	2	444.7	141.4	8.485	1.750	9.500	3.500	134.400	0.859	0.891	33.45	0.00	21.470	5.93
1	3	837.1	261.9	7.173	1.750	9.500	3.500	134.400	0.997	0.753	20.44	0.00	21.470	5.01
1	4	1178.9	362.7	7.173	1.750	9.500	3.500	134.400	1.115	0.635	17.03	0.00	21.470	5.01
1	5	1472.2	444.8	7.173	1.750	9.500	3.500	134.400	1.212	0.538	14.22	0.00	21.470	5.01
1	6	1716.7	508.3	7.173	1.750	9.500	3.500	134.400	1.290	0.460	11.96	0.00	21.470	5.01
1	7	1912.9	553.2	7.173	1.750	9.500	3.500	134.400	1.346	0.404	10.34	0.00	21.470	5.01
1	8	2060.1	579.4	7.173	1.750	9.500	3.500	134.400	1.383	0.367	9.27	0.00	21.470	5.01
1	9	2158.8	586.9	7.173	1.750	9.500	3.500	134.400	1.399	0.351	8.81	0.00	21.470	5.01
1	10	2209.1	576.0	7.173	1.750	9.500	3.500	134.400	1.396	0.354	8.89	0.00	21.470	5.01
1	11	2210.6	546.3	7.173	1.750	9.500	3.500	134.400	1.375	0.375	9.50	0.00	21.470	5.01
1	12	2163.3	497.9	7.173	1.750	9.500	3.500	134.400	1.336	0.414	10.63	0.00	21.470	5.01
1	13	2067.7	431.0	7.173	1.750	9.500	3.500	134.400	1.280	0.470	12.25	0.00	21.470	5.01
1	14	1923.5	345.5	7.173	1.750	9.500	3.500	134.400	1.206	0.544	14.39	0.00	21.470	5.01
1	15	1730.4	241.2	7.173	1.750	9.500	3.500	134.400	1.115	0.635	17.03	0.00	21.470	5.01
1	16	1488.9	118.4	7.173	1.750	9.500	3.500	134.400	1.006	0.744	20.18	0.00	21.470	5.01
1	17	1198.7	-23.0	7.173	1.750	9.500	3.500	134.400	0.880	0.870	23.83	8.88	21.470	5.01
1	18	860.0	-183.0	7.173	1.750	9.500	3.500	134.400	0.742	1.008	27.82	7.41	21.470	5.01
1	19	501.4	-390.8	7.173	1.750	9.500	3.500	134.400	0.635	1.115	30.92	6.27	21.470	5.01
1	20	181.0	-706.9	8.485	1.750	9.500	3.500	134.400	0.571	1.179	41.78	8.91	21.470	5.93
1	21	-28.7	-1232.3	8.485	1.750	9.500	3.500	134.400	0.550	1.200	0.00	8.69	21.470	5.93

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
2	1	-28.7	-1232.3	8.485	1.750	9.500	3.500	134.400	0.550	1.200	0.00	8.69	21.470	5.93
2	2	147.8	-770.3	8.485	1.750	9.500	3.500	134.400	0.572	1.178	41.76	8.92	21.470	5.93
2	3	388.8	-412.9	7.173	1.750	9.500	3.500	134.400	0.638	1.112	30.83	6.30	21.470	5.01
2	4	695.2	-228.5	7.173	1.750	9.500	3.500	134.400	0.748	1.002	27.65	7.48	21.470	5.01
2	5	989.4	-99.3	7.173	1.750	9.500	3.500	134.400	0.891	0.859	23.51	9.00	21.470	5.01
2	6	1246.8	-0.2	7.173	1.750	9.500	3.500	134.400	1.016	0.734	19.89	10.33	21.470	5.01
2	7	1455.4	80.2	7.173	1.750	9.500	3.500	134.400	1.118	0.632	16.94	0.00	21.470	5.01
2	8	1615.3	142.0	7.173	1.750	9.500	3.500	134.400	1.198	0.552	14.62	0.00	21.470	5.01
2	9	1726.7	184.3	7.173	1.750	9.500	3.500	134.400	1.255	0.495	12.97	0.00	21.470	5.01
2	10	1789.5	206.7	7.173	1.750	9.500	3.500	134.400	1.289	0.461	11.99	0.00	21.470	5.01
2	11	1803.8	210.4	7.173	1.750	9.500	3.500	134.400	1.300	0.450	11.67	0.00	21.470	5.01
2	12	1773.6	195.7	7.173	1.750	9.500	3.500	134.400	1.289	0.461	11.99	0.00	21.470	5.01
2	13	1694.7	162.2	7.173	1.750	9.500	3.500	134.400	1.255	0.495	12.97	0.00	21.470	5.01
2	14	1567.1	108.6	7.173	1.750	9.500	3.500	134.400	1.198	0.552	14.62	0.00	21.470	5.01
2	15	1390.8	35.8	7.173	1.750	9.500	3.500	134.400	1.118	0.632	16.94	0.00	21.470	5.01
2	16	1166.2	-55.6	7.173	1.750	9.500	3.500	134.400	1.016	0.734	19.89	10.33	21.470	5.01
2	17	892.8	-165.7	7.173	1.750	9.500	3.500	134.400	0.891	0.859	23.51	9.00	21.470	5.01
2	18	591.6	-315.2	7.173	1.750	9.500	3.500	134.400	0.748	1.002	27.65	7.48	21.470	5.01
2	19	303.3	-544.8	7.173	1.750	9.500	3.500	134.400	0.638	1.112	30.83	6.30	21.470	5.01
2	20	77.1	-944.7	8.485	1.750	9.500	3.500	134.400	0.572	1.178	41.76	8.92	21.470	5.93
2	21	-107.2	-1426.0	8.485	1.750	9.500	3.500	134.400	0.550	1.200	0.00	8.69	21.470	5.93

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
3	1	-107.2	-1426.0	8.485	1.750	9.500	3.500	134.400	0.550	1.200	0.00	8.69	21.470	5.93
3	2	89.3	-887.3	8.485	1.750	9.500	3.500	134.400	0.571	1.179	41.78	8.91	21.470	5.93
3	3	411.7	-545.6	7.173	1.750	9.500	3.500	134.400	0.635	1.115	30.92	6.27	21.470	5.01
3	4	735.6	-289.5	7.173	1.750	9.500	3.500	134.400	0.742	1.008	27.82	7.41	21.470	5.01
3	5	1078.2	-119.5	7.173	1.750	9.500	3.500	134.400	0.880	0.870	23.83	8.88	21.470	5.01
3	6	1375.8	27.8	7.173	1.750	9.500	3.500	134.400	1.006	0.744	20.18	0.00	21.470	5.01
3	7	1624.9	156.7	7.173	1.750	9.500	3.500	134.400	1.115	0.635	17.03	0.00	21.470	5.01
3	8	1825.4	267.0	7.173	1.750	9.500	3.500	134.400	1.206	0.544	14.39	0.00	21.470	5.01

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1518.3

3	9	1977.2	358.6	7.173	1.750	9.500	3.500	134.400	1.280	0.470	12.25	0.00	21.470	5.01
3	10	2080.5	431.6	7.173	1.750	9.500	3.500	134.400	1.336	0.414	10.63	0.00	21.470	5.01
3	11	2135.3	485.9	7.173	1.750	9.500	3.500	134.400	1.375	0.375	9.50	0.00	21.470	5.01
3	12	2141.3	521.7	7.173	1.750	9.500	3.500	134.400	1.396	0.354	8.89	0.00	21.470	5.01
3	13	2098.6	538.7	7.173	1.750	9.500	3.500	134.400	1.399	0.351	8.81	0.00	21.470	5.01
3	14	2007.3	537.2	7.173	1.750	9.500	3.500	134.400	1.383	0.367	9.27	0.00	21.470	5.01
3	15	1867.4	516.9	7.173	1.750	9.500	3.500	134.400	1.346	0.404	10.34	0.00	21.470	5.01
3	16	1679.2	478.2	7.173	1.750	9.500	3.500	134.400	1.290	0.460	11.96	0.00	21.470	5.01
3	17	1442.0	420.7	7.173	1.750	9.500	3.500	134.400	1.212	0.538	14.22	0.00	21.470	5.01
3	18	1156.3	344.6	7.173	1.750	9.500	3.500	134.400	1.115	0.635	17.03	0.00	21.470	5.01
3	19	822.2	249.9	7.173	1.750	9.500	3.500	134.400	0.997	0.753	20.44	0.00	21.470	5.01
3	20	437.2	135.4	8.485	1.750	9.500	3.500	134.400	0.859	0.891	33.45	0.00	21.470	5.93
3	21	0.0	0.0	8.485	1.750	9.500	3.500	134.400	0.700	1.050	0.00	10.29	21.470	5.93

VANO	SECCIÓN	Md(+)	Md(-)	Area	Canto	Ancho	Ancho inf.				SEGÚN ARTICULO 47.8		Perimetro	ART.51.3
				A	h	b	bi	Ap	dp,inf	dp,sup	As min.inf.	As min.sup.	u	As min.
		(mt)	(mt)	(m2)	(m.)	(m.)	(m.)	(cm2.)	(m.)	(m.)	(cm2/m.)	(cm2/m.)	(m.)	(cm2/m.)
4	1	0.0	0.0	6.455	1.650	4.700	3.500	378.000	0.800	0.850	0.00	0.00	12.700	7.62
4	2	321.3	131.8	6.455	1.650	4.700	3.500	378.000	0.968	0.682	0.00	0.00	12.700	7.62
4	3	640.8	262.5	6.455	1.650	4.700	3.500	378.000	1.135	0.515	0.00	0.00	12.700	7.62
4	4	958.4	392.1	6.455	1.650	4.700	3.500	378.000	1.303	0.347	0.00	0.00	12.700	7.62
4	5	1273.9	520.5	6.455	1.650	4.700	3.500	378.000	1.470	0.180	0.00	0.00	12.700	7.62
4	6	1587.6	647.6	6.455	1.650	4.700	3.500	378.000	1.303	0.347	0.00	0.00	12.700	7.62
4	7	1899.6	773.8	6.455	1.650	4.700	3.500	378.000	1.135	0.515	0.00	0.00	12.700	7.62
4	8	2209.3	898.8	6.455	1.650	4.700	3.500	378.000	0.968	0.682	0.00	0.00	12.700	7.62
4	9	2517.2	1022.5	6.455	1.650	4.700	3.500	378.000	0.800	0.850	0.00	0.00	12.700	7.62
4	10	2822.8	1144.8	6.455	1.650	4.700	3.500	378.000	1.102	0.548	0.00	0.00	12.700	7.62
4	11	3127.5	1266.8	6.455	1.650	4.700	3.500	378.000	1.135	0.515	0.00	0.00	12.700	7.62
4	12	3429.3	1386.8	6.455	1.650	4.700	3.500	378.000	1.169	0.481	0.00	0.00	12.700	7.62
4	13	3729.6	1506.0	6.455	1.650	4.700	3.500	378.000	1.202	0.448	0.00	0.00	12.700	7.62
4	14	4028.4	1624.3	6.455	1.650	4.700	3.500	378.000	1.236	0.414	0.00	0.00	12.700	7.62
4	15	4325.8	1741.7	6.455	1.650	4.700	3.500	378.000	1.269	0.381	0.00	0.00	12.700	7.62
4	16	4620.1	1857.3	6.455	1.650	4.700	3.500	378.000	1.303	0.347	0.00	0.00	12.700	7.62
4	17	4912.8	1972.0	6.455	1.650	4.700	3.500	378.000	1.336	0.314	0.00	0.00	12.700	7.62
4	18	5203.9	2085.8	6.455	1.650	4.700	3.500	378.000	1.370	0.280	0.00	0.00	12.700	7.62
4	19	5492.5	2197.8	6.455	1.650	4.700	3.500	378.000	1.403	0.247	0.00	0.00	12.700	7.62
4	20	5779.3	2308.9	6.455	1.650	4.700	3.500	378.000	1.437	0.213	0.00	0.00	12.700	7.62
4	21	6064.4	2419.1	6.455	1.650	4.700	3.500	378.000	1.470	0.180	0.00	0.00	12.700	7.62

VANO	SECCIÓN	Md(+)	Md(-)								SEGÚN ARTICULO 47.8			ART.51.3
								Ap	dp,inf	dp,sup	As min.inf.	As min.sup.		As min.
		(mt)	(mt)					(cm2.)	(m.)	(m.)	(cm2/m.)	(cm2/m.)		(cm2/m.)
5	1	4723.5	1774.1	6.455	1.650	4.700	3.500	378.000	1.470	0.180	0.00	0.00	12.700	7.62
5	2	4589.2	1746.6	6.455	1.650	4.700	3.500	378.000	1.437	0.213	0.00	0.00	12.700	7.62
5	3	4442.8	1711.7	6.455	1.650	4.700	3.500	378.000	1.403	0.247	0.00	0.00	12.700	7.62
5	4	4287.5	1671.5	6.455	1.650	4.700	3.500	378.000	1.370	0.280	0.00	0.00	12.700	7.62
5	5	4120.1	1624.1	6.455	1.650	4.700	3.500	378.000	1.336	0.314	0.00	0.00	12.700	7.62
5	6	3942.2	1570.4	6.455	1.650	4.700	3.500	378.000	1.303	0.347	0.00	0.00	12.700	7.62
5	7	3754.2	1510.4	6.455	1.650	4.700	3.500	378.000	1.269	0.381	0.00	0.00	12.700	7.62
5	8	3555.2	1444.1	6.455	1.650	4.700	3.500	378.000	1.236	0.414	0.00	0.00	12.700	7.62
5	9	3346.0	1371.5	6.455	1.650	4.700	3.500	378.000	1.202	0.448	0.00	0.00	12.700	7.62
5	10	3126.1	1292.6	6.455	1.650	4.700	3.500	378.000	1.169	0.481	0.00	0.00	12.700	7.62
5	11	2895.6	1207.4	6.455	1.650	4.700	3.500	378.000	1.135	0.515	0.00	0.00	12.700	7.62
5	12	2653.4	1115.0	6.455	1.650	4.700	3.500	378.000	1.102	0.548	0.00	0.00	12.700	7.62
5	13	2401.5	1017.0	6.455	1.650	4.700	3.500	378.000	1.068	0.582	0.00	0.00	12.700	7.62
5	14	2138.6	912.2	6.455	1.650	4.700	3.500	378.000	1.035	0.615	0.00	0.00	12.700	7.62
5	15	1865.3	801.2	6.455	1.650	4.700	3.500	378.000	1.001	0.649	0.00	0.00	12.700	7.62
5	16	1581.0	683.7	6.455	1.650	4.700	3.500	378.000	0.968	0.682	0.00	0.00	12.700	7.62
5	17	1286.3	559.8	6.455	1.650	4.700	3.500	378.000	0.934	0.716	0.00	0.00	12.700	7.62
5	18	980.6	429.4	6.455	1.650	4.700	3.500	378.000	0.901	0.749	0.00	0.00	12.700	7.62
5	19	664.5	292.7	6.455	1.650	4.700	3.500	378.000	0.867	0.783	0.00	0.00	12.700	7.62
5	20	337.6	149.5	6.455	1.650	4.700	3.500	378.000	0.834	0.816	0.00	0.00	12.700	7.62

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1518.3

5	21	0.0	0.0	6.455	1.650	4.700	3.500	378.000	0.800	0.850	0.00	0.00	12.700	7.62

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)					Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.Inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)		ART.51.3 As min. (cm2/m.)
6	1	0.0	0.0	6.455	1.650	4.700	3.500	378.000	0.800	0.850	0.00	0.00	12.700	7.62
6	2	335.5	149.8	6.455	1.650	4.700	3.500	378.000	0.834	0.816	0.00	0.00	12.700	7.62
6	3	660.1	293.1	6.455	1.650	4.700	3.500	378.000	0.867	0.783	0.00	0.00	12.700	7.62
6	4	973.8	429.8	6.455	1.650	4.700	3.500	378.000	0.901	0.749	0.00	0.00	12.700	7.62
6	5	1276.3	559.8	6.455	1.650	4.700	3.500	378.000	0.934	0.716	0.00	0.00	12.700	7.62
6	6	1567.9	683.3	6.455	1.650	4.700	3.500	378.000	0.968	0.682	0.00	0.00	12.700	7.62
6	7	1848.5	800.2	6.455	1.650	4.700	3.500	378.000	1.001	0.649	0.00	0.00	12.700	7.62
6	8	2117.8	910.4	6.455	1.650	4.700	3.500	378.000	1.035	0.615	0.00	0.00	12.700	7.62
6	9	2376.6	1014.1	6.455	1.650	4.700	3.500	378.000	1.068	0.582	0.00	0.00	12.700	7.62
6	10	2623.6	1110.8	6.455	1.650	4.700	3.500	378.000	1.102	0.548	0.00	0.00	12.700	7.62
6	11	2860.4	1201.4	6.455	1.650	4.700	3.500	378.000	1.135	0.515	0.00	0.00	12.700	7.62
6	12	3085.5	1284.9	6.455	1.650	4.700	3.500	378.000	1.169	0.481	0.00	0.00	12.700	7.62
6	13	3301.2	1362.9	6.455	1.650	4.700	3.500	378.000	1.202	0.448	0.00	0.00	12.700	7.62
6	14	3503.6	1432.8	6.455	1.650	4.700	3.500	378.000	1.236	0.414	0.00	0.00	12.700	7.62
6	15	3697.1	1497.4	6.455	1.650	4.700	3.500	378.000	1.269	0.381	0.00	0.00	12.700	7.62
6	16	3878.3	1554.6	6.455	1.650	4.700	3.500	378.000	1.303	0.347	0.00	0.00	12.700	7.62
6	17	4047.7	1604.8	6.455	1.650	4.700	3.500	378.000	1.336	0.314	0.00	0.00	12.700	7.62
6	18	4208.0	1649.5	6.455	1.650	4.700	3.500	378.000	1.370	0.280	0.00	0.00	12.700	7.62
6	19	4356.3	1687.0	6.455	1.650	4.700	3.500	378.000	1.403	0.247	0.00	0.00	12.700	7.62
6	20	4494.3	1718.3	6.455	1.650	4.700	3.500	378.000	1.437	0.213	0.00	0.00	12.700	7.62
6	21	4619.9	1742.2	6.455	1.650	4.700	3.500	378.000	1.470	0.180	0.00	0.00	12.700	7.62

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)					Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGÚN ARTICULO 47.8 As min.Inf. (cm2/m.)	SEGÚN ARTICULO 47.8 As min.sup. (cm2/m.)		ART.51.3 As min. (cm2/m.)
7	1	5988.3	2389.5	6.455	1.650	4.700	3.500	378.000	1.470	0.180	0.00	0.00	12.700	7.62
7	2	5704.8	2279.6	6.455	1.650	4.700	3.500	378.000	1.437	0.213	0.00	0.00	12.700	7.62
7	3	5420.0	2168.9	6.455	1.650	4.700	3.500	378.000	1.403	0.247	0.00	0.00	12.700	7.62
7	4	5133.5	2057.2	6.455	1.650	4.700	3.500	378.000	1.370	0.280	0.00	0.00	12.700	7.62
7	5	4845.7	1944.6	6.455	1.650	4.700	3.500	378.000	1.336	0.314	0.00	0.00	12.700	7.62
7	6	4556.0	1831.1	6.455	1.650	4.700	3.500	378.000	1.303	0.347	0.00	0.00	12.700	7.62
7	7	4263.7	1715.8	6.455	1.650	4.700	3.500	378.000	1.269	0.381	0.00	0.00	12.700	7.62
7	8	3971.2	1600.5	6.455	1.650	4.700	3.500	378.000	1.235	0.415	0.00	0.00	12.700	7.62
7	9	3675.9	1483.4	6.455	1.650	4.700	3.500	378.000	1.202	0.448	0.00	0.00	12.700	7.62
7	10	3378.7	1365.4	6.455	1.650	4.700	3.500	378.000	1.168	0.482	0.00	0.00	12.700	7.62
7	11	3080.4	1246.5	6.455	1.650	4.700	3.500	378.000	1.135	0.515	0.00	0.00	12.700	7.62
7	12	2779.6	1126.3	6.455	1.650	4.700	3.500	378.000	1.101	0.549	0.00	0.00	12.700	7.62
7	13	2477.7	1005.2	6.455	1.650	4.700	3.500	378.000	1.068	0.582	0.00	0.00	12.700	7.62
7	14	2174.0	883.2	6.455	1.650	4.700	3.500	378.000	1.034	0.616	0.00	0.00	12.700	7.62
7	15	1868.5	760.0	6.455	1.650	4.700	3.500	378.000	1.001	0.649	0.00	0.00	12.700	7.62
7	16	1561.3	635.9	6.455	1.650	4.700	3.500	378.000	0.967	0.683	0.00	0.00	12.700	7.62
7	17	1252.6	510.9	6.455	1.650	4.700	3.500	378.000	0.934	0.716	0.00	0.00	12.700	7.62
7	18	942.0	384.7	6.455	1.650	4.700	3.500	378.000	0.900	0.750	0.00	0.00	12.700	7.62
7	19	629.7	257.5	6.455	1.650	4.700	3.500	378.000	0.867	0.783	0.00	0.00	12.700	7.62
7	20	315.7	129.2	6.455	1.650	4.700	3.500	378.000	0.833	0.817	0.00	0.00	12.700	7.62
7	21	0.0	0.0	6.455	1.650	4.700	3.500	378.000	0.833	0.817	0.00	0.00	12.700	7.62

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1518.3

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.DI (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./ m2.)	Tens.inf. σ i (t./ m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	170	145	0.000	0.00	0.00	0.00	0.00	0.000	7	170	145	0.000	0.00	0.000	0.00	10.29	10.29	5.93	5.93	5.93
0.00	0.000	5	197	106	0.000	0.00	0.00	0.00	0.00	0.000	7	156	165	0.000	0.00	0.000	0.00	5.93	5.93	33.45	5.93	5.93
0.00	0.000	5	253	89	0.000	0.00	0.00	0.00	0.00	0.000	7	171	215	0.000	0.00	0.000	0.00	5.01	5.01	20.44	5.01	5.01
0.00	0.000	5	262	76	0.000	0.00	0.00	0.00	0.00	0.000	7	145	255	0.000	0.00	0.000	0.00	5.01	5.01	17.03	5.01	5.01
0.00	0.000	5	284	42	0.000	0.00	0.00	0.00	0.00	0.000	7	136	268	0.000	0.00	0.000	0.00	5.01	5.01	14.22	5.01	5.01
0.00	0.000	5	305	10	0.000	0.00	0.00	0.00	0.00	0.000	7	130	279	0.000	0.00	0.000	0.00	5.01	5.01	11.86	5.01	5.01
0.00	0.000	5	324	-18	1.656	0.00	0.33	4.70	0.00	0.000	7	126	285	0.000	0.00	0.000	0.00	5.01	5.01	10.34	5.01	5.01
0.00	0.000	5	341	-44	1.548	0.00	0.71	10.10	0.00	0.000	7	124	288	0.000	0.00	0.000	0.00	5.01	5.01	10.10	5.01	5.01
0.00	0.000	5	356	-68	1.469	0.00	0.98	14.06	0.00	0.000	7	124	287	0.000	0.00	0.000	0.00	5.01	5.01	14.06	5.01	5.01
0.00	0.000	5	362	-50	1.536	0.00	0.75	10.68	0.00	0.000	7	119	322	0.000	0.00	0.000	0.00	5.01	5.01	10.68	5.01	5.01
0.00	0.000	5	373	-67	1.484	0.00	0.93	13.32	0.00	0.000	7	122	317	0.000	0.00	0.000	0.00	5.01	5.01	13.32	5.01	5.01
0.00	0.000	5	381	-80	1.446	0.00	1.06	15.18	0.00	0.000	7	128	308	0.000	0.00	0.000	0.00	5.01	5.01	15.18	5.01	5.01
0.00	0.000	5	387	-89	1.422	0.00	1.15	16.39	0.00	0.000	7	135	298	0.000	0.00	0.000	0.00	5.01	5.01	16.39	5.01	5.01
0.00	0.000	5	391	-95	1.409	0.00	1.19	17.06	0.00	0.000	7	143	285	0.000	0.00	0.000	0.00	5.01	5.01	17.06	5.01	5.01
0.00	0.000	5	392	-82	1.446	0.00	1.06	15.21	0.00	0.000	7	153	283	0.000	0.00	0.000	0.00	5.01	5.01	17.03	5.01	5.01
0.00	0.000	5	391	-82	1.446	0.00	1.06	15.19	0.00	0.000	7	166	264	0.000	0.00	0.000	0.00	5.01	5.01	20.18	5.01	5.01
0.00	0.000	5	389	-78	1.456	0.00	1.03	14.69	0.00	0.000	7	180	242	0.000	0.00	0.000	0.00	8.88	8.88	23.83	5.01	5.01
0.00	0.000	5	382	-67	1.488	0.00	0.92	13.12	0.00	0.000	7	194	221	0.000	0.00	0.000	0.00	7.41	7.41	27.82	5.01	5.01
0.00	0.000	5	343	-18	1.664	0.00	0.30	4.29	0.00	0.000	7	180	233	0.000	0.00	0.000	0.00	6.27	6.27	30.92	5.01	5.01
0.00	0.000	5	264	42	0.000	0.00	0.00	0.00	0.00	0.000	7	131	239	0.000	0.00	0.000	0.00	8.91	8.91	41.78	5.93	5.93
0.00	0.000	5	197	141	0.000	0.00	0.00	0.00	0.00	0.000	7	26	395	0.000	0.00	0.000	0.00	8.69	8.69	5.93	5.93	5.93

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.DI (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	182	136	0.000	0.00	0.00	0.00	0.00	0.000	7	16	373	0.000	0.00	0.000	0.00	8.69	8.69	5.93	5.93	5.93
0.00	0.000	5	238	57	0.000	0.00	0.00	0.00	0.00	0.000	7	108	242	0.000	0.00	0.000	0.00	8.92	8.92	41.76	5.93	5.93
0.00	0.000	5	319	0	1.749	0.00	0.00	0.05	0.00	0.000	7	186	203	0.000	0.00	0.000	0.00	6.30	6.30	30.83	5.01	5.01
0.00	0.000	5	334	-23	1.638	0.00	0.39	5.60	0.00	0.000	7	172	225	0.000	0.00	0.000	0.00	7.48	7.48	27.65	5.01	5.01
0.00	0.000	5	334	-41	1.557	0.00	0.67	9.64	0.00	0.000	7	147	245	0.000	0.00	0.000	0.00	9.00	9.00	23.51	5.01	5.01
0.00	0.000	5	337	-46	1.540	0.00	0.73	10.50	0.00	0.000	7	129	273	0.000	0.00	0.000	0.00	10.33	10.33	19.89	5.01	5.01
0.00	0.000	5	339	-49	1.528	0.00	0.78	11.11	0.00	0.000	7	114	295	0.000	0.00	0.000	0.00	5.01	5.01	16.94	5.01	5.01
0.00	0.000	5	340	-52	1.520	0.00	0.81	11.52	0.00	0.000	7	102	313	0.000	0.00	0.000	0.00	5.01	5.01	14.62	5.01	5.01
0.00	0.000	5	341	-53	1.515	0.00	0.82	11.73	0.00	0.000	7	94	326	0.000	0.00	0.000	0.00	5.01	5.01	12.97	5.01	5.01
0.00	0.000	5	341	-53	1.515	0.00	0.82	11.75	0.00	0.000	7	89	334	0.000	0.00	0.000	0.00	5.01	5.01	11.99	5.01	5.01
0.00	0.000	5	341	-52	1.518	0.00	0.81	11.58	0.00	0.000	7	86	338	0.000	0.00	0.000	0.00	5.01	5.01	11.67	5.01	5.01
0.00	0.000	5	344	-77	1.430	0.00	1.12	15.99	0.00	0.000	7	91	310	0.000	0.00	0.000	0.00	5.01	5.01	15.99	5.01	5.01
0.00	0.000	5	342	-74	1.438	0.00	1.09	15.58	0.00	0.000	7	95	305	0.000	0.00	0.000	0.00	5.01	5.01	15.58	5.01	5.01
0.00	0.000	5	339	-69	1.452	0.00	1.04	14.88	0.00	0.000	7	101	295	0.000	0.00	0.000	0.00	5.01	5.01	14.88	5.01	5.01
0.00	0.000	5	335	-63	1.473	0.00	0.97	13.87	0.00	0.000	7	110	282	0.000	0.00	0.000	0.00	5.01	5.01	16.94	5.01	5.01
0.00	0.000	5	330	-55	1.500	0.00	0.88	12.52	0.00	0.000	7	121	264	0.000	0.00	0.000	0.00	10.33	10.33	19.89	5.01	5.01
0.00	0.000	5	323	-45	1.535	0.00	0.75	10.73	0.00	0.000	7	136	242	0.000	0.00	0.000	0.00	9.00	9.00	23.51	5.01	5.01
0.00	0.000	5	313	-30	1.597	0.00	0.54	7.67	0.00	0.000	7	151	218	0.000	0.00	0.000	0.00	7.48	7.48	27.65	5.01	5.01
0.00	0.000	5	287	30	0.000	0.00	0.00	0.00	0.00	0.000	7	154	234	0.000	0.00	0.000	0.00	6.30	6.30	30.83	5.01	5.01
0.00	0.000	5	232	57	0.000	0.00	0.00	0.00	0.00	0.000	7	86	274	0.000	0.00	0.000	0.00	8.92	8.92	41.76	5.93	5.93
0.00	0.000	5	174	143	0.000	0.00	0.00	0.00	0.00	0.000	7	-11	417	0.045	0.00	0.428	2.25	8.69	8.69	5.93	5.93	5.93

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.DI (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	178	142	0.000	0.00	0.00	0.00	0.00	0.000	7	-1	397	0.006	0.00	0.059	0.31	8.69	8.69	5.93	5.93	5.93
0.00	0.000	5	240	55	0.000	0.00	0.00	0.00	0.00	0.000	7	103	249	0.000	0.00	0.000	0.00	8.91	8.91	41.78	5.93	5.93
0.00	0.000	5	342	-35	1.586	0.00	0.57	8.19	0.00	0.000	7	174	222	0.000	0.00	0.000	0.00	6.27	6.27	30.92	5.01	5.01
0.00	0.000	5	365	-70	1.468	0.00	0.99	14.08	0.00	0.000	7	172	225	0.000	0.00	0.000	0.00	7.41	7.41	27.82	5.01	5.01
0.00	0.000	5	360	-75	1.462	0.00	1.01	14.41	0.00	0.000	7	167	252	0.000	0.00	0.000	0.00	8.88	8.88	23.83	5.01	5.01
0.00	0.000	5	384	-81	1.445	0.00	1.07	15.25	0.00	0.000	7	155	271	0.000	0.00	0.000	0.00	5.01	5.01	20.18	5.01	5.01
0.00	0.000	5	386	-84	1.439	0.00	1.09	15.57	0.00	0.000	7	144	288	0.000	0.00	0.000	0.00	5.01	5.01	17.03	5.01	5.01
0.00	0.000	5	385	-82	1.442	0.00	1.08	15.40	0.00	0.000	7	134	302	0.000	0.00	0.000	0.00	5.01	5.01	15.40	5.01	5.01
0.00	0.000	5	380	-65	1.494	0.00	0.90	12.79	0.00	0.000	7	125	327	0.000	0.00	0.000	0.00	5.01	5.01	12.79	5.01	5.01
0.00	0.000	5	374	-55	1.524	0.00	0.79	11.30	0.00	0.000	7	118	337	0.000	0.00	0.000	0.00	5.01	5.01	11.30	5.01	5.01
0.00	0.000	5	365	-42	1.568	0.00	0.64	9.09	0.00	0.000	7	113	345	0.000	0.00	0.000	0.00	5.01	5.01	9.50	5.01	5.01
0.00	0.000	5	354	-25	1.633	0.00	0.41	5.87	0.00	0.000	7	109	351	0.000	0.00	0.000	0.00	5.01	5.01	8.89	5.01	5.01
0.00	0.000	5	341	-5	1.723	0.00	0.10	1.36	0.00	0.000	7	107	353	0.000	0.00	0.000	0.00	5.01	5.01	8.81	5.01	5.01
0.00	0.000	5	331	-2	1.738	0.00	0.04	0.62	0.00	0.000	7	112	333	0.000	0.00	0.000	0.00	5.01	5.01	9.27	5.01	5.01
0.00	0.000	5	315	22	0.000	0.00	0.00	0.00	0.00	0.000	7	115	327	0.000	0.00	0.000	0.00	5.01	5.01	10.34	5.01	5.01
0.00	0.000	5	298	47	0.000	0.00	0.00	0.00	0.00	0.000	7	122	317	0.000	0.00	0.000	0.00	5.01	5.01	11.96	5.01	5.01

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1518.3

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	280	75	0.000	0.00	0.00	0.00	0.00	0.000	7	131	303	0.000	0.00	0.000	0.00	5.01	5.01	14.22	5.01	5.01
0.00	0.000	5	261	104	0.000	0.00	0.00	0.00	0.00	0.000	7	143	285	0.000	0.00	0.000	0.00	5.01	5.01	17.03	5.01	5.01
0.00	0.000	5	241	135	0.000	0.00	0.00	0.00	0.00	0.000	7	158	262	0.000	0.00	0.000	0.00	5.01	5.01	20.44	5.01	5.01
0.00	0.000	5	208	121	0.000	0.00	0.00	0.00	0.00	0.000	7	166	185	0.000	0.00	0.000	0.00	5.93	5.93	33.45	5.93	5.93
0.00	0.000	5	185	156	0.000	0.00	0.00	0.00	0.00	0.000	7	185	156	0.000	0.00	0.000	0.00	10.29	10.29	5.93	5.93	5.93

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	568	645	0.000	0.00	0.00	0.00	0.00	0.000	7	568	645	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	605	604	0.000	0.00	0.00	0.00	0.00	0.000	7	573	639	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	642	563	0.000	0.00	0.00	0.00	0.00	0.000	7	578	633	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	678	523	0.000	0.00	0.00	0.00	0.00	0.000	7	583	629	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	713	484	0.000	0.00	0.00	0.00	0.00	0.000	7	586	625	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	747	446	0.000	0.00	0.00	0.00	0.00	0.000	7	589	622	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	781	408	0.000	0.00	0.00	0.00	0.00	0.000	7	591	619	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	815	371	0.000	0.00	0.00	0.00	0.00	0.000	7	593	617	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	847	335	0.000	0.00	0.00	0.00	0.00	0.000	7	594	616	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	879	300	0.000	0.00	0.00	0.00	0.00	0.000	7	594	616	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	910	270	0.000	0.00	0.00	0.00	0.00	0.000	7	593	622	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	940	237	0.000	0.00	0.00	0.00	0.00	0.000	7	592	623	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	969	204	0.000	0.00	0.00	0.00	0.00	0.000	7	589	626	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	998	172	0.000	0.00	0.00	0.00	0.00	0.000	7	587	628	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1027	140	0.000	0.00	0.00	0.00	0.00	0.000	7	584	632	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1055	109	0.000	0.00	0.00	0.00	0.00	0.000	7	580	636	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1082	79	0.000	0.00	0.00	0.00	0.00	0.000	7	576	641	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1108	50	0.000	0.00	0.00	0.00	0.00	0.000	7	570	647	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1134	22	0.000	0.00	0.00	0.00	0.00	0.000	7	564	654	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1159	-6	1.641	0.00	0.03	0.43	0.00	0.000	7	557	661	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1183	-33	1.605	0.00	0.16	2.26	0.00	0.000	7	550	669	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	1038	166	0.000	0.00	0.00	0.00	0.00	0.000	7	492	772	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1050	152	0.000	0.00	0.00	0.00	0.00	0.000	7	532	728	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1059	142	0.000	0.00	0.00	0.00	0.00	0.000	7	568	687	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1065	136	0.000	0.00	0.00	0.00	0.00	0.000	7	601	651	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1066	135	0.000	0.00	0.00	0.00	0.00	0.000	7	629	619	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1064	137	0.000	0.00	0.00	0.00	0.00	0.000	7	654	592	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1058	143	0.000	0.00	0.00	0.00	0.00	0.000	7	676	568	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1048	154	0.000	0.00	0.00	0.00	0.00	0.000	7	694	548	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1035	169	0.000	0.00	0.00	0.00	0.00	0.000	7	708	533	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1018	188	0.000	0.00	0.00	0.00	0.00	0.000	7	718	521	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	998	210	0.000	0.00	0.00	0.00	0.00	0.000	7	725	513	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	973	238	0.000	0.00	0.00	0.00	0.00	0.000	7	727	511	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	945	269	0.000	0.00	0.00	0.00	0.00	0.000	7	727	511	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	913	304	0.000	0.00	0.00	0.00	0.00	0.000	7	722	516	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	878	344	0.000	0.00	0.00	0.00	0.00	0.000	7	714	525	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	839	387	0.000	0.00	0.00	0.00	0.00	0.000	7	702	539	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	796	435	0.000	0.00	0.00	0.00	0.00	0.000	7	686	556	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	749	487	0.000	0.00	0.00	0.00	0.00	0.000	7	667	576	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	699	543	0.000	0.00	0.00	0.00	0.00	0.000	7	644	603	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	645	603	0.000	0.00	0.00	0.00	0.00	0.000	7	617	633	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	587	667	0.000	0.00	0.00	0.00	0.00	0.000	7	587	667	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	576	654	0.000	0.00	0.00	0.00	0.00	0.000	7	576	654	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	634	591	0.000	0.00	0.00	0.00	0.00	0.000	7	607	620	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	687	531	0.000	0.00	0.00	0.00	0.00	0.000	7	634	590	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	737	475	0.000	0.00	0.00	0.00	0.00	0.000	7	658	564	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	783	424	0.000	0.00	0.00	0.00	0.00	0.000	7	677	542	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	826	377	0.000	0.00	0.00	0.00	0.00	0.000	7	693	525	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	864	335	0.000	0.00	0.00	0.00	0.00	0.000	7	705	512	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	899	296	0.000	0.00	0.00	0.00	0.00	0.000	7	713	503	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	930	262	0.000	0.00	0.00	0.00	0.00	0.000	7	717	498	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	956	232	0.000	0.00	0.00	0.00	0.00	0.000	7	717	498	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1518.3

0.00	0.000	5	980	207	0.000	0.00	0.00	0.00	0.00	0.000	7	714	502	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	999	185	0.000	0.00	0.00	0.00	0.00	0.000	7	706	510	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1014	168	0.000	0.00	0.00	0.00	0.00	0.000	7	695	522	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1026	155	0.000	0.00	0.00	0.00	0.00	0.000	7	680	539	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1034	146	0.000	0.00	0.00	0.00	0.00	0.000	7	662	559	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1038	141	0.000	0.00	0.00	0.00	0.00	0.000	7	639	584	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1038	142	0.000	0.00	0.00	0.00	0.00	0.000	7	612	614	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1035	146	0.000	0.00	0.00	0.00	0.00	0.000	7	583	647	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1027	154	0.000	0.00	0.00	0.00	0.00	0.000	7	549	685	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1016	166	0.000	0.00	0.00	0.00	0.00	0.000	7	511	727	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1001	184	0.000	0.00	0.00	0.00	0.00	0.000	7	469	774	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.inf. (cm2/m)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion			Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As min.sup. (cm2/m.)	ENVOLVENTE TOTAL				
																		As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	1133	25	0.000	0.00	0.00	0.00	0.00	0.000	7	508	718	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1110	50	0.000	0.00	0.00	0.00	0.00	0.000	7	517	708	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1087	75	0.000	0.00	0.00	0.00	0.00	0.000	7	525	699	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1064	102	0.000	0.00	0.00	0.00	0.00	0.000	7	533	691	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1040	128	0.000	0.00	0.00	0.00	0.00	0.000	7	540	683	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	1015	156	0.000	0.00	0.00	0.00	0.00	0.000	7	547	675	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	989	184	0.000	0.00	0.00	0.00	0.00	0.000	7	552	670	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	963	213	0.000	0.00	0.00	0.00	0.00	0.000	7	557	663	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	937	238	0.000	0.00	0.00	0.00	0.00	0.000	7	563	654	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	910	269	0.000	0.00	0.00	0.00	0.00	0.000	7	566	650	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	882	300	0.000	0.00	0.00	0.00	0.00	0.000	7	570	646	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	853	332	0.000	0.00	0.00	0.00	0.00	0.000	7	572	644	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	824	364	0.000	0.00	0.00	0.00	0.00	0.000	7	574	641	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	794	397	0.000	0.00	0.00	0.00	0.00	0.000	7	576	640	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	764	431	0.000	0.00	0.00	0.00	0.00	0.000	7	577	639	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	733	465	0.000	0.00	0.00	0.00	0.00	0.000	7	577	638	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	702	500	0.000	0.00	0.00	0.00	0.00	0.000	7	577	639	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	669	536	0.000	0.00	0.00	0.00	0.00	0.000	7	576	640	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	637	572	0.000	0.00	0.00	0.00	0.00	0.000	7	574	641	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	603	609	0.000	0.00	0.00	0.00	0.00	0.000	7	572	644	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62
0.00	0.000	5	569	647	0.000	0.00	0.00	0.00	0.00	0.000	7	569	647	0.000	0.00	0.000	0.00	7.62	7.62	7.62	7.62	7.62

14/07/98

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO: L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA: E-1518.3

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 17.60 tg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
1	1	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
1	2	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
1	3	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	4	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	5	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	6	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	7	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	8	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	9	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	10	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	11	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	12	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	13	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	14	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	15	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	16	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	17	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	18	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	19	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
1	20	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
1	21	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
1	1	0.0	147.8	0.0	66.7	128	0	-14	0	0.0	14.87			34.56	-280	1503
1	2	121.8	129.1	55.3	58.9	114	106	-14	-12	13.1	14.87			-196.5	-245.2	1503
1	3	227.2	110.4	103.7	51.2	101	201	-14	-24	26.2	14.87			-397	-210.5	1503
1	4	317.5	94.7	145.3	43.4	88	284	-14	-36	39.3	14.87			-615.1	-175.7	1503
1	5	393.8	78.9	180.1	35.7	74	355	-14	-48	52.3	14.87			-754.5	-141	1503
1	6	456.3	63.1	208.1	27.9	61	415	-14	-60	65.4	14.87			-863.3	-106.3	1503
1	7	504.9	47.3	229.3	20.2	48	463	-14	-72	78.5	14.87			-941.5	-71.53	1503
1	8	539.5	31.5	243.7	12.5	34	499	-14	-84	91.6	14.87			-989.2	-36.79	1503
1	9	560.3	15.8	251.2	4.7	21	523	-14	-96	104.7	14.87			-1006	-2.043	1503
1	10	567.3	0.0	252.0	-3.0	8	536	-14	-108	117.8	14.87			-1053	30.7	1587
1	11	560.3	-15.8	245.9	-10.8	0	0	-20	409	130.9	14.87			-1013	62.06	1587
1	12	539.4	-31.6	233.0	-18.5	0	0	-33	385	143.9	14.87			-944.3	93.65	1587
1	13	504.7	-47.4	213.3	-26.3	0	0	-47	350	157.0	14.87			-848	125.2	1587
1	14	456.1	-63.2	186.8	-34.0	0	0	-60	303	170.1	14.87			-723.9	156.8	1587
1	15	393.5	-78.9	153.4	-41.8	0	0	-73	244	183.2	14.87			-589.8	193.2	1629
1	16	317.1	-94.7	113.3	-49.5	0	0	-87	174	196.3	14.87			-405.5	225.6	1629
1	17	226.8	-110.5	66.3	-57.2	0	0	-100	92	209.4	14.87			-192.7	258	1629
1	18	122.7	-126.3	12.5	-65.0	0	0	-113	-2	222.5	14.87			40.31	262.3	1629
1	19	4.6	-142.1	-48.1	-72.7	0	0	-127	-107	235.6	14.87			219.4	163.1	1599
1	20	-128.6	-160.7	-115.5	-80.5	0	0	-140	-225	248.6	14.87			380	85.65	1599
1	21	-278.3	-179.4	-189.7	-88.2	0	0	-153	-354	261.7	14.87			421.3	8.212	1599

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 17.60 tg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
2	1	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
2	2	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
2	3	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	4	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	5	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	6	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	7	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	8	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	9	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	10	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	11	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	12	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	13	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	14	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	15	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	16	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	17	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	18	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	19	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
2	20	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
2	21	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
2	1	-278.3	159.7	-189.7	76.2	137	-291	-4	-52	261.7	0.1133			410.9	4.855	1539
2	2	-146.0	141.0	-126.1	68.4	123	-177	-4	-55	261.8	0.1133			381.3	-72.09	1539
2	3	-30.1	122.4	-69.3	60.7	110	-74	-4	-59	261.9	0.1133			284	-149	1539
2	4	70.7	106.6	-19.3	53.0	97	17	-4	-63	262.0	0.1133			69.76	-226	1539
2	5	157.5	90.8	23.9	45.2	83	96	-4	-67	262.1	0.1133			-133.4	-233.7	1479
2	6	230.5	75.0	60.3	37.5	70	164	-4	-70	262.2	0.1133			-314.3	-186.4	1479
2	7	289.5	59.2	89.9	29.7	57	220	-4	-74	262.3	0.1133			-461.5	-148.2	1479
2	8	334.7	43.5	112.6	22.0	44	264	-4	-78	262.4	0.1133			-575	-109.9	1479
2	9	366.0	27.7	128.5	14.2	30	297	-4	-82	262.5	0.1133			-654.9	-71.67	1479
2	10	383.4	11.9	137.6	6.5	17	317	-4	-85	262.6	0.1133			-701.1	-33.42	1479
2	11	386.9	-3.9	139.9	-1.3	4	326	-7	324	262.7	0.1133			-713.7	4.823	1479
2	12	376.6	-19.7	135.4	-9.0	3	-84	-20	312	262.8	0.1133			-655.2	41.44	1416
2	13	352.3	-35.5	124.1	-16.8	3	-81	-34	286	262.9	0.1133			-602.6	78.06	1416
2	14	314.2	-51.2	105.9	-24.5	3	-78	-47	253	263.0	0.1133			-517.8	114.7	1416
2	15	262.1	-67.0	81.0	-32.2	3	-75	-60	206	263.1	0.1133			-400.8	151.3	1416
2	16	196.2	-82.8	49.2	-40.0	3	-73	-73	147	263.2	0.1133			-251.5	188	1416
2	17	116.4	-98.6	10.6	-47.7	3	-70	-87	76	263.3	0.1133			-69.97	224.6	1416
2	18	22.7	-114.4	-34.8	-55.5	3	-67	-100	-6	263.4	0.1133			136.6	236.5	1416
2	19	-84.8	-130.1	-87.0	-63.2	3	-64	-113	-100	263.5	0.1133			300	152.8	1479
2	20	-207.6	-148.8	-146.1	-71.0	3	-61	-127	-206	263.6	0.1133			449.2	78.81	1479
2	21	-346.7	-167.5	-211.9	-78.7	3	-59	-140	-323	263.7	0.1133			486	4.86	1479

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 17.60 tg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
3	1	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
3	2	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
3	3	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	4	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	5	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	6	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	7	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	8	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	9	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	10	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	11	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	12	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	13	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	14	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	15	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
3	1	-346.7	183.3	-211.9	89.5	155	-392	0	0	263.7	-14.98			496.4	-13	1539
3	2	-193.7	164.6	-136.6	81.7	142	-261	0	0	250.5	-14.98			452.1	-87.58	1539
3	3	-57.0	145.9	-68.1	74.0	129	-142	0	0	237.3	-14.98			342.3	-162.1	1539
3	4	64.5	130.2	-6.4	66.3	115	-35	0	0	224.2	-14.98			117.6	-236.6	1539
3	5	172.1	114.4	48.5	58.5	102	61	0	0	211.0	-14.98			-118.1	-267.9	1599
3	6	265.8	98.6	96.6	50.8	89	145	0	0	197.8	-14.98			-331.3	-226.4	1599
3	7	345.6	82.8	137.9	43.0	75	217	0	0	184.6	-14.98			-516.6	-194.6	1599
3	8	411.6	67.0	172.3	35.3	62	278	0	0	171.4	-14.98			-673.8	-162.7	1599
3	9	463.6	51.3	200.0	27.5	49	327	0	0	158.2	-14.98			-820.6	-133.1	1629
3	10	501.8	35.5	220.8	19.8	36	364	0	0	145.0	-14.98			-923.5	-100.7	1629
3	11	526.1	19.7	234.8	12.0	22	389	0	0	131.9	-14.98			-997.8	-68.28	1629
3	12	536.5	3.9	242.0	4.3	15	-119	-7	530	118.7	-14.98			-1044	-35.86	1629
3	13	533.0	-11.9	242.3	-3.4	15	-106	-20	518	105.5	-14.98			-1061	-2.507	1629
3	14	515.6	-27.6	235.9	-11.2	15	-93	-34	494	92.3	-14.98			-1017	34.52	1587
3	15	484.3	-43.4	222.6	-18.9	15	-80	-47	459	79.1	-14.98			-970.2	71.22	1587

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 5.61 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
3	16	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	17	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	18	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	19	7.173	2.029	0.691	-1.059	0.000	153.0	2.200	3.500	1.750	170.0	90
3	20	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90
3	21	8.485	2.215	0.724	-1.026	0.000	153.0	3.500	3.500	1.750	170.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
3	16	439.2	-59.2	202.6	-26.7	15	-66	-60	412	65.9	-14.98			-891.3	107.9	1587
3	17	380.1	-75.0	175.7	-34.4	15	-53	-74	353	52.7	-14.98			-780.2	144.6	1587
3	18	307.2	-90.8	142.0	-42.2	15	-40	-87	282	39.6	-14.98			-636.8	181.3	1587
3	19	220.4	-106.5	101.5	-49.9	15	-27	-100	200	26.4	-14.98			-461.1	218	1587
3	20	118.4	-125.2	54.1	-57.7	15	-13	-114	106	13.2	-14.98			-202.3	254.7	1587
3	21	0.0	-143.9	0.0	-65.4	15	0	-127	0	0.0	-14.98			37.97	291.4	1587

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 5.61 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
4	1	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	2	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	3	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	4	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	5	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	6	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	7	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	8	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	9	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	10	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	11	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	12	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	13	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	14	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	15	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	16	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	17	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	18	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	19	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	20	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
4	21	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
4	1	0.0	419.4	0.0	123.4	223	0	0	0	0.0	-11.08			-78.02	-558.4	4335
4	2	117.0	414.9	34.6	123.4	223	63	0	0	-3.1	-11.08			-234.7	-558.4	4335
4	3	232.8	410.4	69.3	123.4	223	125	0	0	-6.2	-11.08			-391.3	-558.4	4335
4	4	347.3	405.9	103.9	123.4	223	188	0	0	-9.3	-11.08			-547.9	-558.4	4335
4	5	460.5	401.3	138.5	123.4	223	250	0	0	-12.4	-11.08			-704.6	-558.4	4335
4	6	572.4	396.8	173.1	123.4	223	313	0	0	-15.5	-11.08			-861.2	-558.4	4335
4	7	683.1	392.3	207.8	123.4	223	376	0	0	-18.7	-11.08			-1018	-558.4	4335
4	8	792.5	387.8	242.4	123.4	223	438	0	0	-21.8	-11.08			-1174	-558.4	4335
4	9	900.6	383.2	277.0	123.4	223	501	0	0	-24.9	-11.08			-1331	-558.4	4335
4	10	1007.0	378.7	311.6	123.4	223	563	0	0	-28.0	-11.08			-1488	-558.4	4335
4	11	1113.0	374.2	346.3	123.4	223	626	0	0	-31.1	-11.08			-1650	-560.4	4351
4	12	1217.0	369.7	380.9	123.4	223	688	0	0	-34.2	-11.08			-1807	-560.4	4351
4	13	1320.0	365.1	415.5	123.4	223	751	0	0	-37.3	-11.08			-1965	-560.4	4351
4	14	1422.0	360.6	450.1	123.4	223	813	0	0	-40.4	-11.08			-2122	-560.4	4351
4	15	1523.0	356.1	484.8	123.4	223	876	0	0	-43.5	-11.08			-2279	-560.4	4351
4	16	1622.0	351.6	519.4	123.4	223	939	0	0	-46.6	-11.08			-2436	-560.4	4351
4	17	1720.0	347.0	554.0	123.4	223	1001	0	0	-49.7	-11.08			-2593	-560.4	4351
4	18	1817.0	342.5	588.6	123.4	223	1064	0	0	-52.8	-11.08			-2750	-560.4	4351
4	19	1912.0	338.0	623.3	123.4	223	1126	0	0	-56.0	-11.08			-2908	-560.4	4351
4	20	2006.0	333.4	657.9	123.4	223	1189	0	0	-59.1	-11.08			-3065	-560.4	4351
4	21	2099.0	328.9	692.5	123.4	223	1251	0	0	-62.2	-11.08			-3222	-560.5	4351

VANO	SECCIÓN					LUZ VANO= 13.28 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
5	1	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	2	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	3	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	4	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	5	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	6	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	7	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	8	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	9	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	10	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	11	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	12	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	13	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	14	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	15	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	16	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	17	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	18	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	19	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	20	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
5	21	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
5	1	1558.0	-10.2	543.8	-41.0	2	-30	-79	1047	-48.8	3.676			-2586	188.6	4480
5	2	1548.0	-20.9	516.7	-41.0	2	-28	-79	995	-46.4	3.676			-2461	188.7	4480
5	3	1530.0	-31.6	489.5	-41.0	2	-27	-79	942	-43.9	3.676			-2335	188.6	4480
5	4	1506.0	-42.3	462.3	-41.0	2	-25	-79	890	-41.5	3.676			-2210	188.6	4480
5	5	1474.0	-53.0	435.1	-41.0	2	-24	-79	838	-39.1	3.676			-2085	188.6	4480
5	6	1435.0	-63.7	407.9	-41.0	2	-22	-79	785	-36.6	3.676			-1960	188.6	4480
5	7	1389.0	-74.5	380.7	-41.0	2	-21	-79	733	-34.2	3.676			-1834	188.6	4480
5	8	1336.0	-85.2	353.5	-41.0	2	-19	-79	681	-31.7	3.676			-1709	188.6	4480
5	9	1276.0	-95.9	326.3	-41.0	2	-18	-79	628	-29.3	3.676			-1584	188.6	4480
5	10	1209.0	-106.6	299.1	-41.0	2	-16	-79	576	-26.9	3.676			-1459	188.6	4480
5	11	1135.0	-117.3	271.9	-41.0	2	-15	-79	524	-24.4	3.676			-1333	188.6	4480
5	12	1053.0	-128.0	244.7	-41.0	2	-13	-79	471	-22.0	3.676			-1208	188.6	4480
5	13	964.7	-138.7	217.5	-41.0	2	-12	-79	419	-19.5	3.676			-1083	188.6	4480
5	14	869.0	-149.5	190.3	-41.0	2	-10	-79	366	-17.1	3.676			-957.6	188.6	4480
5	15	766.2	-160.2	163.2	-41.0	2	-9	-79	314	-14.7	3.676			-832.3	188.6	4480
5	16	656.3	-170.9	136.0	-41.0	2	-7	-79	262	-12.2	3.676			-707.1	188.6	4480
5	17	539.3	-181.6	108.8	-41.0	2	-6	-79	209	-9.8	3.676			-581.8	188.6	4480
5	18	415.1	-192.3	81.6	-41.0	2	-4	-79	157	-7.3	3.676			-456.5	188.6	4480
5	19	283.9	-203.0	54.4	-41.0	2	-3	-79	105	-4.9	3.676			-331.3	188.6	4480
5	20	145.5	-213.8	27.2	-41.0	2	-1	-79	52	-2.4	3.676			-206	188.6	4480
5	21	0.0	-224.5	0.0	-41.0	2	0	-79	0	0.0	3.676			-80.77	188.6	4480

VANO	SECCIÓN					LUZ VANO= 13.49 lg(β)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
6	1	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
6	2	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
6	3	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
6	4	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
6	5	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
6	6	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
6	7	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
6	8	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
6	9	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
6	10	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
6	11	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
6	12	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMIC Mgrad (m.t)	GRAD. TERMIC Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
6	1	0.00	221.70	0.00	39.53	75.97	0.00	-1.76	0.00	0.00	-3.55			-79.17	-184.30	4398.00
6	2	145.80	210.80	26.66	39.53	75.97	51.23	-1.76	-1.19	-2.39	-3.55			-203.40	-184.30	4398.00
6	3	284.30	199.90	53.32	39.53	75.97	102.48	-1.76	-2.38	-4.79	-3.55			-327.70	-184.30	4398.00
6	4	415.50	189.00	79.98	39.53	75.97	153.72	-1.76	-3.56	-7.18	-3.55			-452.00	-184.30	4398.00
6	5	539.30	178.10	106.60	39.53	75.97	204.96	-1.76	-4.75	-9.57	-3.55			-576.30	-184.30	4398.00
6	6	655.80	167.20	133.30	39.53	75.97	256.17	-1.76	-5.94	-11.97	-3.55			-700.60	-184.30	4398.00
6	7	764.90	156.40	160.00	39.53	75.97	307.44	-1.76	-7.12	-14.36	-3.55			-824.80	-184.30	4398.00
6	8	866.70	145.50	186.60	39.53	75.97	358.60	-1.76	-8.31	-16.75	-3.55			-949.10	-184.30	4398.00
6	9	961.20	134.60	213.30	39.53	75.97	409.88	-1.76	-9.50	-19.15	-3.55			-1073.00	-184.30	4398.00
6	10	1048.00	123.70	239.90	39.53	75.97	461.16	-1.76	-10.69	-21.54	-3.55			-1198.00	-184.30	4398.00
6	11	1128.00	112.80	266.60	39.53	75.97	512.32	-1.76	-11.87	-23.93	-3.55			-1322.00	-184.30	4398.00
6	12	1200.00	101.90	293.30	39.53	75.97	563.72	-1.76	-13.07	-26.33	-3.55			-1446.00	-184.30	4398.00

14/07/98

6	13	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90	6	13	1266.00	91.05	319.90	39.53	75.97	614.88	-1.76	-14.25	-28.72	-3.55		-1571.00	-184.30	4398.00
6	14	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90	6	14	1323.00	80.17	346.60	39.53	75.97	666.16	-1.76	-15.44	-31.11	-3.55		-1695.00	-184.30	4398.00
6	15	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90	6	15	1374.00	69.28	373.30	39.53	75.97	717.44	-1.76	-16.62	-33.51	-3.55		-1819.00	-184.30	4398.00
6	16	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90	6	16	1417.00	58.40	399.90	39.53	75.97	768.60	-1.76	-17.82	-35.90	-3.55		-1943.00	-184.30	4398.00
6	17	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90	6	17	1452.00	47.51	426.60	39.53	75.97	819.88	-1.76	-19.00	-38.29	-3.55		-2068.00	-184.30	4398.00
6	18	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90	6	18	1481.00	36.63	453.20	39.53	75.97	871.16	-1.76	-20.19	-40.69	-3.55		-2192.00	-184.30	4398.00
6	19	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90	6	19	1502.00	25.74	479.90	39.53	75.97	922.32	-1.76	-21.37	-43.08	-3.55		-2316.00	-184.30	4398.00
6	20	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90	6	20	1516.00	14.86	506.60	39.53	75.97	973.60	-1.76	-22.57	-45.47	-3.55		-2441.00	-184.30	4398.00
6	21	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90	6	21	1522.00	3.97	533.20	39.53	75.97	1024.76	-1.76	-23.75	-47.87	-3.55		-2565.00	-183.30	4399.00

VANO	SECCIÓN					LUZ VANO=	5.32	Ancho corl.	Ancho Inf.	Canto	Canto útil	
						lg(3)	z=d*0.9 (cm.)	bw (m.)	bi (m.)	h (m.)	d (cm.)	α (°)
7	1	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	2	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	3	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	4	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	5	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	6	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	7	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	8	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	9	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	10	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	11	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	12	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	13	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	14	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	15	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	16	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	17	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	18	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	19	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	20	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90
7	21	6.455	1.500	0.782	-0.868	0.000	144.0	3.500	3.500	1.650	160.0	90

VANO	SECCIÓN	PESO PROPIO		CARGA MUERTA		Vmax(+) y Mconc		Vmin(-) y Mconc		GRAD. TERMIC		ASIENTOS DIF.		PRETENSADO FINAL		
		Mpp (m.t)	Vpp (t.)	Mse (m.t)	Vse (t.)	Vsc (m.t)	Msc (t.)	Vsc (m.t)	Msc (t.)	Mgrad (m.t)	Vgrad (t.)	Masi (m.t)	Vasi (t.)	Mpf (m.t)	Vpf (t.)	Npf (t.)
7	1	2073.00	-346.80	684.40	-128.70	0.00	0.00	-232.09	1234.80	-61.44	11.55			-3276.00	603.40	4358.00
7	2	1980.00	-351.10	650.20	-128.70	0.00	0.00	-232.09	1173.00	-58.37	11.55			-3116.00	600.20	4358.00
7	3	1886.00	-355.40	616.00	-128.70	0.00	0.00	-232.09	1111.32	-55.30	11.55			-2956.00	601.00	4358.00
7	4	1791.00	-359.70	581.80	-128.70	0.00	0.00	-232.09	1049.52	-52.22	11.55			-2796.00	601.00	4358.00
7	5	1695.00	-363.90	547.60	-128.70	0.00	0.00	-232.09	987.84	-49.15	11.55			-2636.00	601.00	4358.00
7	6	1598.00	-368.20	513.30	-128.70	0.00	0.00	-232.09	926.04	-46.08	11.55			-2476.00	601.00	4358.00
7	7	1499.00	-372.50	479.10	-128.70	0.00	0.00	-232.09	864.36	-43.01	11.55			-2317.00	601.00	4358.00
7	8	1400.00	-376.80	444.90	-128.70	0.00	0.00	-232.09	802.56	-39.94	11.55			-2157.00	601.00	4358.00
7	9	1299.00	-381.10	410.70	-128.70	0.00	0.00	-232.09	740.88	-36.86	11.55			-1992.00	599.60	4347.00
7	10	1197.00	-385.40	376.40	-128.70	0.00	0.00	-232.09	679.07	-33.79	11.55			-1833.00	599.60	4347.00
7	11	1094.00	-389.70	342.20	-128.70	0.00	0.00	-232.09	617.40	-30.72	11.55			-1673.00	599.60	4347.00
7	12	989.50	-394.00	308.00	-128.70	0.00	0.00	-232.09	555.59	-27.65	11.55			-1514.00	599.60	4347.00
7	13	884.10	-398.30	273.80	-128.70	0.00	0.00	-232.09	493.92	-24.58	11.55			-1354.00	599.60	4347.00
7	14	777.60	-402.60	239.60	-128.70	0.00	0.00	-232.09	432.12	-21.50	11.55			-1195.00	599.60	4347.00
7	15	669.90	-406.90	205.30	-128.70	0.00	0.00	-232.09	370.44	-18.43	11.55			-1035.00	599.60	4347.00
7	16	561.10	-411.20	171.10	-128.70	0.00	0.00	-232.09	308.64	-15.36	11.55			-875.70	599.60	4347.00
7	17	451.20	-415.50	136.90	-128.70	0.00	0.00	-232.09	246.93	-12.29	11.55			-716.20	599.60	4347.00
7	18	340.10	-419.70	102.70	-128.70	0.00	0.00	-232.09	185.19	-9.22	11.55			-556.70	599.60	4347.00
7	19	227.90	-424.00	68.44	-128.70	0.00	0.00	-232.09	123.48	-6.14	11.55			-397.20	599.60	4347.00
7	20	114.50	-428.30	34.22	-128.70	0.00	0.00	-232.09	61.74	-3.07	11.55			-237.70	599.60	4347.00
7	21	0.00	-432.60	0.00	-128.70	0.00	0.00	-232.09	0.00	0.00	11.55			-78.24	599.60	4347.00

14/07/98

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1518.3

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd.(+) (t.)	CORT. Vrd.(-) (t.)	MOMEN. Md.(+) (t x m.)	MOMEN. Md.(-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
1	1	0.0	0.0	255.3	-107.4	34.6	34.6	255.3	34.6	188.4	161.1	-244.3	A-B
1	2	0.0	0.0	230.4	-96.4	248.2	-55.1	230.4	248.2	258.2	62.1	-244.3	A-B
1	3	0.0	0.0	205.5	-85.5	440.1	-135.1	205.5	440.1	359.4	-20.1	-244.3	A-B
1	4	0.0	0.0	185.1	-71.8	563.8	-252.4	185.1	563.8	401.5	-84.7	-244.3	A-B
1	5	0.0	0.0	164.6	-58.3	717.7	-309.7	164.6	717.7	453.9	-165.0	-244.3	A-B
1	6	0.0	0.0	144.0	-44.7	853.4	-355.0	144.0	853.4	500.2	-235.9	-244.3	A-B
1	7	0.0	0.0	123.6	-31.1	971.4	-388.3	123.6	971.4	540.4	-297.5	-244.3	C
1	8	0.0	0.0	103.0	-17.6	1070.9	-409.8	103.0	1070.9	574.2	-349.4	-244.3	C
1	9	0.0	0.0	82.6	-4.0	1152.8	-419.1	82.6	1152.8	602.1	-392.2	-244.3	C
1	10	0.0	0.0	61.9	5.7	664.5	14.6	61.9	664.5	447.6	-125.6	-244.3	A-B
1	11	0.0	0.0	60.4	-8.0	-91.1	809.3	60.4	-91.1	190.2	268.8	-244.3	A-B
1	12	0.0	0.0	70.9	-31.6	-33.3	792.0	70.9	-33.3	209.9	238.6	-244.3	A-B
1	13	0.0	0.0	81.2	-55.3	33.7	753.8	81.2	33.7	232.7	203.7	-244.3	A-B
1	14	0.0	0.0	91.7	-78.9	109.9	695.0	91.7	109.9	258.7	163.9	-244.3	A-B
1	15	0.0	0.0	106.9	-97.8	177.2	597.0	106.9	177.2	287.5	134.6	-244.3	A-B
1	16	0.0	0.0	118.1	-120.6	276.3	500.9	120.6	500.9	397.7	-34.4	-244.3	A-B
1	17	0.0	0.0	129.3	-143.5	385.2	384.8	143.5	384.8	358.2	26.3	-244.3	A-B
1	18	0.0	0.0	112.4	-194.5	495.8	240.3	194.5	240.3	308.9	101.7	-244.3	A-B
1	19	0.0	0.0	-7.9	-348.9	533.7	-7.0	348.9	-7.0	220.5	226.6	-244.3	A-B
1	20	0.0	0.0	-109.1	-485.9	533.2	-323.1	485.9	-323.1	82.9	338.2	-244.3	A-B
1	21	0.0	0.0	-210.3	-623.0	392.7	-811.0	623.0	-811.0	-76.5	564.2	-244.3	A-B

VANO	SECCIÓN	Pd. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
1	1	1503.0	177.1	1.31	37.28	90	VERIFICA	350.0	170.0	0.267	4588.4	255.3	VERIFICA
1	2	1503.0	177.1	1.31	37.28	90	VERIFICA	350.0	170.0	0.267	4588.4	230.4	VERIFICA
1	3	1503.0	209.5	1.36	36.27	90	VERIFICA	220.0	170.0	0.267	2854.1	205.5	VERIFICA
1	4	1503.0	209.5	1.36	36.27	90	VERIFICA	220.0	170.0	0.267	2854.1	185.1	VERIFICA
1	5	1503.0	209.5	1.36	36.27	90	VERIFICA	220.0	170.0	0.267	2854.1	164.6	VERIFICA
1	6	1503.0	209.5	1.36	36.27	90	VERIFICA	220.0	170.0	0.267	2854.1	144.0	VERIFICA
1	7	1503.0	209.5	1.36	36.27	90	VERIFICA	220.0	170.0	0.267	2854.1	123.6	VERIFICA
1	8	1503.0	209.5	1.36	36.27	90	VERIFICA	220.0	170.0	0.267	2854.1	103.0	VERIFICA
1	9	1503.0	209.5	1.36	36.27	90	VERIFICA	220.0	170.0	0.267	2854.1	82.6	VERIFICA
1	10	1587.0	221.2	1.38	35.92	90	VERIFICA	220.0	170.0	0.267	2843.0	61.9	VERIFICA
1	11	1587.0	221.2	1.38	35.92	90	VERIFICA	220.0	170.0	0.267	2843.0	60.4	VERIFICA
1	12	1587.0	221.2	1.38	35.92	90	VERIFICA	220.0	170.0	0.267	2843.0	70.9	VERIFICA
1	13	1587.0	221.2	1.38	35.92	90	VERIFICA	220.0	170.0	0.267	2843.0	81.2	VERIFICA
1	14	1587.0	221.2	1.38	35.92	90	VERIFICA	220.0	170.0	0.267	2843.0	91.7	VERIFICA
1	15	1629.0	227.1	1.39	35.75	90	VERIFICA	220.0	170.0	0.267	2837.4	106.9	VERIFICA
1	16	1629.0	227.1	1.39	35.75	90	VERIFICA	220.0	170.0	0.267	2837.4	120.6	VERIFICA
1	17	1629.0	227.1	1.39	35.75	90	VERIFICA	220.0	170.0	0.267	2837.4	143.5	VERIFICA
1	18	1629.0	227.1	1.39	35.75	90	VERIFICA	220.0	170.0	0.267	2837.4	194.5	VERIFICA
1	19	1599.0	222.9	1.38	35.87	90	VERIFICA	220.0	170.0	0.267	2841.4	348.9	VERIFICA
1	20	1599.0	188.5	1.33	36.92	90	VERIFICA	350.0	170.0	0.267	4571.9	485.9	VERIFICA
1	21	1599.0	188.5	1.33	36.92	90	VERIFICA	350.0	170.0	0.267	4571.9	623.0	VERIFICA

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd.(+) (t.)	CORT. Vrd.(-) (t.)	MOMEN. Md.(+) (t x m.)	MOMEN. Md.(-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
2	1	0.0	0.0	563.9	210.7	-335.4	-87.7	563.9	-335.4	71.8	336.8	-244.3	A-B
2	2	0.0	0.0	427.3	110.0	100.7	53.4	427.3	100.7	214.3	134.7	-244.3	A-B
2	3	0.0	0.0	291.0	9.4	416.8	105.9	291.0	416.8	356.5	-3.0	-244.3	A-B
2	4	0.0	0.0	158.7	-88.8	565.4	21.7	158.7	565.4	407.1	-80.6	-244.3	A-B
2	5	0.0	0.0	95.7	-117.7	676.5	-70.1	117.7	-70.1	182.3	242.8	-244.3	A-B
2	6	0.0	0.0	87.8	-91.6	761.1	-158.2	91.6	-158.2	152.3	288.8	-244.3	A-B
2	7	0.0	0.0	70.7	-74.6	830.9	-231.3	74.6	-231.3	127.4	326.9	-244.3	A-B
2	8	0.0	0.0	53.8	-57.4	885.6	-289.3	57.4	-289.3	107.6	357.2	-244.3	A-B
2	9	0.0	0.0	36.8	-40.4	925.5	-332.4	40.4	-332.4	93.0	379.7	-244.3	A-B
2	10	0.0	0.0	19.8	-23.3	950.4	-360.4	23.3	-360.4	83.5	394.3	-244.3	A-B
2	11	0.0	0.0	5.9	-13.3	644.2	562.0	13.3	562.0	397.6	-87.1	-244.3	A-B
2	12	0.0	0.0	20.6	-31.9	74.2	580.4	31.9	580.4	395.1	-105.5	-244.3	A-B
2	13	0.0	0.0	36.0	-50.5	99.1	544.1	50.5	544.1	382.7	-86.6	-244.3	A-B
2	14	0.0	0.0	51.5	-69.2	137.5	491.3	69.2	491.3	364.7	-59.0	-244.3	A-B
2	15	0.0	0.0	66.9	-87.8	189.5	422.1	87.8	422.1	341.2	-22.9	-244.3	A-B
2	16	0.0	0.0	82.4	-106.3	255.2	336.7	106.3	336.7	312.1	21.7	-244.3	A-B
2	17	0.0	0.0	97.9	-125.0	334.6	234.8	125.0	234.8	277.4	74.8	-244.3	A-B
2	18	0.0	0.0	88.5	-168.4	420.3	109.5	168.4	109.5	234.7	140.2	-244.3	A-B
2	19	0.0	0.0	-16.3	-307.2	444.2	-107.6	307.2	-107.6	169.5	262.4	-244.3	A-B
2	20	0.0	0.0	-114.0	-440.9	434.1	-389.6	440.9	-389.6	47.0	354.8	-244.3	A-B
2	21	0.0	0.0	-211.8	-574.4	290.8	-836.3	574.4	-836.3	-98.9	561.8	-244.3	A-B

VANO	SECCIÓN	Pd. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
2	1	1539.0	181.4	1.32	37.15	90	VERIFICA	350.0	170.0	0.267	4582.2	563.9	VERIFICA
2	2	1539.0	181.4	1.32	37.15	90	VERIFICA	350.0	170.0	0.267	4582.2	427.3	VERIFICA
2	3	1539.0	214.6	1.37	36.12	90	VERIFICA	220.0	170.0	0.267	2849.3	291.0	VERIFICA
2	4	1539.0	214.6	1.37	36.12	90	VERIFICA	220.0	170.0	0.267	2849.3	158.7	VERIFICA
2	5	1479.0	206.2	1.36	36.37	90	VERIFICA	220.0	170.0	0.267	2857.2	117.7	VERIFICA
2	6	1479.0	206.2	1.36	36.37	90	VERIFICA	220.0	170.0	0.267	2857.2	91.6	VERIFICA
2	7	1479.0	206.2	1.36	36.37	90	VERIFICA	220.0	170.0	0.267	2857.2	74.6	VERIFICA
2	8	1479.0	206.2	1.36	36.37	90	VERIFICA	220.0	170.0	0.267	2857.2	57.4	VERIFICA
2	9	1479.0	206.2	1.36	36.37	90	VERIFICA	220.0	170.0	0.267	2857.2	40.4	VERIFICA
2	10	1479.0	206.2	1.36	36.37	90	VERIFICA	220.0	170.0	0.267	2857.2	23.3	VERIFICA
2	11	1479.0	206.2	1.36	36.37	90	VERIFICA	220.0	170.0	0.267	2857.2	13.3	VERIFICA
2	12	1416.0	197.4	1.34	36.64	90	VERIFICA	220.0	170.0	0.267	2865.4	31.9	VERIFICA
2	13	1416.0	197.4	1.34	36.64	90	VERIFICA	220.0	170.0	0.267	2865.4	50.5	VERIFICA
2	14	1416.0	197.4	1.34	36.64	90	VERIFICA	220.0	170.0	0.267	2865.4	69.2	VERIFICA
2	15	1416.0	197.4	1.34	36.64	90	VERIFICA	220.0	170.0	0.267	2865.4	87.8	VERIFICA
2	16	1416.0	197.4	1.34	36.64	90	VERIFICA	220.0	170.0	0.267	2865.4	106.3	VERIFICA
2	17	1416.0	197.4	1.34	36.64	90	VERIFICA	220.0	170.0	0.267	2865.4	125.0	VERIFICA
2	18	1416.0	197.4	1.34	36.64	90	VERIFICA	220.0	170.0	0.267	2865.4	168.4	VERIFICA
2	19	1479.0	206.2	1.36	36.37	90	VERIFICA	220.0	170.0	0.267	2857.2	307.2	VERIFICA
2	20	1479.0	174.3	1.31	37.38	90	VERIFICA	350.0	170.0	0.267	4592.5	440.9	VERIFICA
2	21	1479.0	174.3	1.31	37.38	90	VERIFICA	350.0	170.0	0.267	4592.5	574.4	VERIFICA

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd.(+) (t.)	CORT. Vrd.(-) (t.)	MOMEN. Md.(+) (t x m.)	MOMEN. Md.(-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
3	1	0.0	0.0	629.1	210.0	-929.6	389.2	629.1	-929.6	-122.4	612.1	-244.3	A-B
3	2	0.0	0.0	495.0	111.7	-435.2	530.6	495.0	-435.2	39.2	383.0	-244.3	A-B
3	3	0.0	0.0	360.8	13.3	-58.4	585.7	360.8	-58.4	194.7	245.0	-244.3	A-B
3	4	0.0	0.0	231.2	-82.3	152.9	506.2	231.2	152.9	266.6	134.8	-244.3	A-B
3	5	0.0	0.0	144.6	-134.8	304.5	397.0	144.6	304.5	326.6	64.0	-244.3	A-B
3	6	0.0	0.0	130.8	-114.4	429.9	291.6	130.8	429.9	369.3	-1.5	-244.3	A-B
3	7	0.0	0.0	107.4	-103.8	534.6	195.5	107.4	534.6	405.0	-56.1	-244.3	A-B
3	8	0.0	0.0	84.0	-93.1	619.0	108.8	93.1	108.8	260.0	166.1	-244.3	A-B
3	9	0.0	0.0	58.4	-84.7	665.0	13.9	84.7	13.9	231.8	219.8	-244.3	A-B
3	10	0.0	0.0	35.6	-73.4	706.3	-55.7	73.4	-55.7	208.1	256.2	-244.3	A-B
3	11	0.0	0.0	12.7	-62.2	727.7	-115.1	62.2	-115.1	187.9	287.2	-244.3	A-B
3	12	0.0	0.0	-0.9	-61.6	-55.2	630.2	61.6	630.2	441.7	-101.8	-244.3	A-B

VANO	SECCIÓN	Pd. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
3	1	1539.0	181.4	1.32	37.15	90	VERIFICA	350.0	170.0	0.267	4582.2	629.1	VERIFICA
3	2	1539.0	181.4	1.32	37.15	90	VERIFICA	350.0	170.0	0.267	4582.2	495.0	VERIFICA
3	3	1539.0	214.6	1.37	36.12	90	VERIFICA	220.0	170.0	0.267	2849.3	360.8	VERIFICA
3	4	1539.0	214.6	1.37	36.12	90	VERIFICA	220.0	170.0	0.267	2849.3	231.2	VERIFICA
3	5	1599.0	222.9	1.38	35.87	90	VERIFICA	220.0	170.0	0.267	2841.4	144.6	VERIFICA
3	6	1599.0	222.9	1.38	35.87	90	VERIFICA	220.0	170.0	0.267	2841.4	130.8	VERIFICA
3	7	1599.0	222.9	1.38	35.87	90	VERIFICA	220.0	170.0	0.267	2841.4	107.4	VERIFICA
3	8	1599.0	222.9	1.38	35.87	90	VERIFICA	220.0	170.0	0.267	2841.4	93.1	VERIFICA
3	9	1629.0	227.1	1.39	35.75	90	VERIFICA	220.0	170.0	0.267	2837.4	84.7	VERIFICA
3	10	1629.0	227.1	1.39	35.75	90	VERIFICA	220.0	170.0	0.267	2837.4	73.4	VERIFICA
3	11	1629.0	227.1	1.39	35.75	90	VERIFICA	220.0	170.0	0.267	2837.4	62.2	VERIFICA
3	12	1629.0	227.1	1.39	35.75	90	VERIFICA	220.0	170.0	0.267	2837.4	61.6	VERIFICA

3	13	0.0	0.0	6.3	-78.5	-522.3	1037.6	78.5	1037.6	580.5	-314.4	-244.3	C
3	14	0.0	0.0	22.2	-96.7	-479.8	990.3	96.7	990.3	558.5	-295.6	-244.3	C
3	15	0.0	0.0	37.7	-115.3	-453.3	897.2	115.3	897.2	526.8	-247.0	-244.3	C
3	16	0.0	0.0	53.2	-133.8	-413.1	787.9	133.8	787.9	489.6	-190.0	-244.3	A-B
3	17	0.0	0.0	68.7	-152.4	-359.5	661.8	152.4	661.8	446.6	-124.2	-244.3	A-B
3	18	0.0	0.0	84.3	-170.9	-292.2	519.5	170.9	519.5	398.2	-49.9	-244.3	A-B
3	19	0.0	0.0	99.8	-189.4	-211.2	361.1	189.4	361.1	344.2	32.8	-244.3	A-B
3	20	0.0	0.0	112.7	-212.3	-66.9	234.9	212.3	234.9	263.8	78.2	-244.3	A-B
3	21	0.0	0.0	125.6	-235.3	38.0	38.0	235.3	38.0	199.4	169.4	-244.3	A-B

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
4	1	0.0	0.0	590.4	-86.5	-78.0	-78.0	590.4	-78.0	630.9	716.7	-244.3	A-B
4	2	0.0	0.0	583.7	-90.6	86.6	-102.9	583.7	86.6	716.7	621.5	-244.3	A-B
4	3	0.0	0.0	576.9	-94.6	249.5	-128.8	576.9	249.5	801.6	527.2	-244.3	A-B
4	4	0.0	0.0	570.2	-98.7	410.5	-155.8	570.2	410.5	885.6	434.0	-244.3	A-B
4	5	0.0	0.0	563.3	-102.8	569.3	-184.1	563.3	569.3	968.4	342.1	-244.3	A-B
4	6	0.0	0.0	556.5	-106.8	726.4	-213.6	556.5	726.4	1050.3	251.2	-244.3	A-B
4	7	0.0	0.0	549.8	-110.9	881.6	-244.2	549.8	881.6	1131.2	161.4	-244.3	A-B
4	8	0.0	0.0	543.0	-114.9	1035.3	-275.2	543.0	1035.3	1211.3	72.5	-244.3	A-B
4	9	0.0	0.0	536.1	-119.1	1186.2	-308.5	536.1	1186.2	1290.0	-14.9	-244.3	A-B
4	10	0.0	0.0	529.4	-123.1	1334.8	-343.2	529.4	1334.8	1367.4	-100.8	-244.3	A-B
4	11	0.0	0.0	520.6	-129.2	1477.5	-383.3	520.6	1477.5	1444.3	-180.9	-244.3	A-B
4	12	0.0	0.0	513.9	-133.2	1622.3	-420.2	513.9	1622.3	1519.8	-264.7	-244.3	C
4	13	0.0	0.0	507.0	-137.4	1764.6	-459.0	507.0	1764.6	1594.0	-347.0	-244.3	C
4	14	0.0	0.0	500.2	-141.4	1906.4	-497.7	500.2	1906.4	1667.9	-429.1	-244.3	C
4	15	0.0	0.0	493.5	-145.5	2046.8	-537.3	493.5	2046.8	1741.1	-510.4	-244.3	C
4	16	0.0	0.0	486.7	-149.5	2184.1	-578.7	486.7	2184.1	1812.7	-589.8	-244.3	C
4	17	0.0	0.0	479.8	-153.7	2319.8	-621.0	479.8	2319.8	1883.5	-668.4	-244.3	C
4	18	0.0	0.0	473.1	-157.7	2453.9	-664.2	473.1	2453.9	1953.4	-746.0	-244.3	C
4	19	0.0	0.0	466.3	-161.8	2584.5	-710.2	466.3	2584.5	2021.5	-821.5	-244.3	C
4	20	0.0	0.0	459.4	-165.9	2714.3	-756.1	459.4	2714.3	2089.1	-896.6	-244.3	C
4	21	0.0	0.0	452.6	-170.1	2842.4	-802.9	452.6	2842.4	2155.9	-970.7	-244.3	C

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
5	1	0.0	0.0	151.5	-6.3	-811.9	2137.5	151.5	-811.9	270.7	1163.9	-244.3	A-B
5	2	0.0	0.0	141.9	-22.3	-714.4	2128.2	141.9	-714.4	321.6	1107.5	-244.3	A-B
5	3	0.0	0.0	132.2	-38.5	-623.3	2107.8	132.2	-623.3	369.1	1054.7	-244.3	A-B
5	4	0.0	0.0	122.5	-54.6	-538.5	2077.5	122.5	-538.5	413.3	1005.6	-244.3	A-B
5	5	0.0	0.0	112.9	-70.6	-460.9	2035.1	112.9	-460.9	453.8	960.7	-244.3	A-B
5	6	0.0	0.0	103.2	-86.7	-389.6	1982.2	103.2	-389.6	491.0	919.5	-244.3	A-B
5	7	0.0	0.0	93.6	-102.8	-323.6	1920.2	102.8	1920.2	1695.1	-417.1	-244.3	C
5	8	0.0	0.0	83.9	-118.9	-264.9	1846.2	118.9	1846.2	1656.5	-374.3	-244.3	C
5	9	0.0	0.0	74.3	-134.9	-212.5	1762.0	134.9	1762.0	1612.6	-325.6	-244.3	C
5	10	0.0	0.0	64.7	-151.0	-166.4	1667.1	151.0	1667.1	1563.1	-270.6	-244.3	C
5	11	0.0	0.0	55.0	-167.1	-125.6	1562.6	167.1	1562.6	1508.7	-210.2	-244.3	A-B
5	12	0.0	0.0	45.4	-183.1	-93.0	1445.4	183.1	1445.4	1447.6	-142.4	-244.3	A-B
5	13	0.0	0.0	35.8	-199.2	-66.0	1318.5	199.2	1318.5	1381.4	-69.0	-244.3	A-B
5	14	0.0	0.0	26.0	-215.4	-45.4	1181.0	215.4	1181.0	1309.7	10.7	-244.3	A-B
5	15	0.0	0.0	16.4	-231.4	-31.1	1033.0	231.4	1033.0	1232.6	96.3	-244.3	A-B
5	16	0.0	0.0	6.8	-247.5	-23.4	873.9	247.5	873.9	1149.6	188.3	-244.3	A-B
5	17	0.0	0.0	-2.8	-263.5	-22.0	704.5	263.5	704.5	1061.3	286.4	-244.3	A-B
5	18	0.0	0.0	-12.5	-279.6	-27.1	524.1	279.6	524.1	967.3	390.7	-244.3	A-B
5	19	0.0	0.0	-22.1	-295.6	-38.6	333.2	295.6	333.2	867.7	501.2	-244.3	A-B
5	20	0.0	0.0	-31.8	-311.8	-56.5	131.6	311.8	131.6	762.6	617.9	-244.3	A-B
5	21	0.0	0.0	-41.5	-327.9	-80.8	-80.8	327.9	-80.8	651.9	740.8	-244.3	A-B

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
6	1	0.0	0.0	321.5	42.8	-79.2	-79.2	321.5	-79.2	640.1	727.1	-244.3	A-B
6	2	0.0	0.0	305.1	33.0	132.1	-53.6	305.1	132.1	750.2	604.9	-244.3	A-B
6	3	0.0	0.0	288.8	23.2	332.4	-34.6	288.8	332.4	854.6	489.0	-244.3	A-B
6	4	0.0	0.0	272.4	13.4	521.8	-22.2	272.4	521.8	953.4	379.4	-244.3	A-B
6	5	0.0	0.0	256.1	3.6	700.0	-16.5	256.1	700.0	1046.3	276.3	-244.3	A-B
6	6	0.0	0.0	239.7	-6.2	867.3	-17.3	239.7	867.3	1133.5	179.5	-244.3	A-B
6	7	0.0	0.0	223.5	-15.9	1023.7	-24.6	223.5	1023.7	1215.0	88.9	-244.3	A-B

3	13	1629.0	227.1	1.39	35.75	90	VERIFICA	220.0	170.0	0.267	2837.4	78.5	VERIFICA
3	14	1587.0	221.2	1.38	35.92	90	VERIFICA	220.0	170.0	0.267	2843.0	96.7	VERIFICA
3	15	1587.0	221.2	1.38	35.92	90	VERIFICA	220.0	170.0	0.267	2843.0	115.3	VERIFICA
3	16	1587.0	221.2	1.38	35.92	90	VERIFICA	220.0	170.0	0.267	2843.0	133.8	VERIFICA
3	17	1587.0	221.2	1.38	35.92	90	VERIFICA	220.0	170.0	0.267	2843.0	152.4	VERIFICA
3	18	1587.0	221.2	1.38	35.92	90	VERIFICA	220.0	170.0	0.267	2843.0	170.9	VERIFICA
3	19	1587.0	221.2	1.38	35.92	90	VERIFICA	220.0	170.0	0.267	2843.0	189.4	VERIFICA
3	20	1587.0	187.0	1.33	36.96	90	VERIFICA	350.0	170.0	0.267	4574.0	212.3	VERIFICA
3	21	1587.0	187.0	1.33	36.96	90	VERIFICA	350.0	170.0	0.267	4574.0	235.3	VERIFICA

VANO	SECCIÓN	Pd. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
4	1	4335.0	671.6	1.94	27.31	90	VERIFICA	350.0	160.0	0.267	3653.1	590.4	VERIFICA
4	2	4335.0	671.6	1.94	27.31	90	VERIFICA	350.0	160.0	0.267	3653.1	583.7	VERIFICA
4	3	4335.0	671.6	1.94	27.31	90	VERIFICA	350.0	160.0	0.267	3653.1	576.9	VERIFICA
4	4	4335.0	671.6	1.94	27.31	90	VERIFICA	350.0	160.0	0.267	3653.1	570.2	VERIFICA
4	5	4335.0	671.6	1.94	27.31	90	VERIFICA	350.0	160.0	0.267	3653.1	563.3	VERIFICA
4	6	4335.0	671.6	1.94	27.31	90	VERIFICA	350.0	160.0	0.267	3653.1	556.5	VERIFICA
4	7	4335.0	671.6	1.94	27.31	90	VERIFICA	350.0	160.0	0.267	3653.1	549.8	VERIFICA
4	8	4335.0	671.6	1.94	27.31	90	VERIFICA	350.0	160.0	0.267	3653.1	543.0	VERIFICA
4	9	4335.0	671.6	1.94	27.31	90	VERIFICA	350.0	160.0	0.267	3653.1	536.1	VERIFICA
4	10	4335.0	671.6	1.94	27.31	90	VERIFICA	350.0	160.0	0.267	3653.1	529.4	VERIFICA
4	11	4351.0	674.1	1.94	27.28	90	VERIFICA	350.0	160.0	0.267	3650.3	520.6	VERIFICA
4	12	4351.0	674.1	1.94	27.28	90	VERIFICA	350.0	160.0	0.267	3650.3	513.9	VERIFICA
4	13	4351.0	674.1	1.94	27.28	90	VERIFICA	350.0	160.0	0.267	3650.3	507.0	VERIFICA
4	14	4351.0	674.1	1.94	27.28	90	VERIFICA	350.0	160.0	0.267	3650.3	500.2	VERIFICA
4	15	4351.0	674.1	1.94	27.28	90	VERIFICA	350.0	160.0	0.267	3650.3	493.5	VERIFICA
4	16	4351.0	674.1	1.94	27.28	90	VERIFICA	350.0	160.0	0.267	3650.3	486.7	VERIFICA
4	17	4351.0	674.1	1.94	27.28	90	VERIFICA	350.0	160.0	0.267	3650.3	479.8	VERIFICA
4	18	4351.0	674.1	1.94	27.28	90	VERIFICA	350.0	160.0	0.267	3650.3	473.1	VERIFICA
4	19	4351.0	674.1	1.94	27.28	90	VERIFICA	350.0	160.0	0.267	3650.3	466.3	VERIFICA
4	20	4351.0	674.1	1.94	27.28	90	VERIFICA	350.0	160.0	0.267	3650.3	459.4	VERIFICA
4	21	4351.0	674.1	1.94	27.28	90	VERIFICA	350.0	160.0	0.267	3650.3	452.6	VERIFICA

VANO	SECCIÓN	Pd. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
5	1	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	151.5	VERIFICA
5	2	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	141.9	VERIFICA
5	3	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	132.2	VERIFICA
5	4	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	122.5	VERIFICA
5	5	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	112.9	VERIFICA
5	6	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	103.2	VERIFICA
5	7	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	102.8	VERIFICA
5	8	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	118.9	VERIFICA
5	9	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	134.9	VERIFICA
5	10	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	151.0	VERIFICA
5	11	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	167.1	VERIFICA
5	12	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	183.1	VERIFICA
5	13	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	199.2	VERIFICA
5	14	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	215.4	VERIFICA
5	15	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	231.4	VERIFICA
5	16	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	247.5	VERIFICA
5	17	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	263.5	VERIFICA
5	18	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	279.6	VERIFICA
5	19	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	295.6	VERIFICA
5	20	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	311.8	VERIFICA
5	21	4480.0	694.0	1.96	27.03	90	VERIFICA	350.0	160.0	0.267	3627.4	327.9	VERIFICA

VANO	SECCIÓN	Pd. (Ton.)	σ xd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
6	1	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	321.5	VERIFICA
6	2	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	305.1	VERIFICA
6	3	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	288.8	VERIFICA
6	4	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	272.4	VERIFICA
6	5	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	256.1	VERIFICA
6	6	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	239.7	VERIFICA
6	7	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	223.5	VERIFICA

6	8	0.0	0.0	207.2	-25.7	1168.7	-38.7	207.2	1168.7	1290.6	5.0	-244.3	A-B
6	9	0.0	0.0	190.8	-35.5	1303.6	-58.9	190.8	1303.6	1360.9	-73.0	-244.3	A-B
6	10	0.0	0.0	174.5	-45.4	1425.6	-87.2	174.5	1425.6	1424.5	-143.6	-244.3	A-B
6	11	0.0	0.0	158.1	-55.2	1538.4	-120.6	158.1	1538.4	1483.3	-208.9	-244.3	A-B
6	12	0.0	0.0	141.8	-65.0	1639.5	-161.1	141.8	1639.5	1536.1	-267.4	-244.3	C
6	13	0.0	0.0	125.5	-74.7	1730.2	-208.1	125.5	1730.2	1583.3	-319.9	-244.3	C
6	14	0.0	0.0	109.2	-84.5	1808.6	-262.2	109.2	1808.6	1624.2	-365.3	-244.3	C
6	15	0.0	0.0	92.9	-94.3	1878.1	-321.6	94.3	-321.6	513.7	867.4	-244.3	A-B
6	16	0.0	0.0	76.5	-104.1	1935.3	-388.4	104.1	-388.4	478.9	906.1	-244.3	A-B
6	17	0.0	0.0	60.2	-113.9	1979.7	-463.2	113.9	-463.2	439.9	949.4	-244.3	A-B
6	18	0.0	0.0	43.9	-123.7	2016.0	-542.5	123.7	-542.5	398.5	995.3	-244.3	A-B
6	19	0.0	0.0	27.6	-133.5	2040.3	-629.0	133.5	-629.0	353.4	1045.3	-244.3	A-B
6	20	0.0	0.0	11.2	-143.3	2053.3	-722.7	143.3	-722.7	304.6	1099.5	-244.3	A-B
6	21	0.0	0.0	-4.1	-152.1	2054.9	-822.8	152.1	-822.8	252.6	1157.6	-244.3	A-B

VANO	SECCIÓN	CORT. Vcd.(+) canto var.	CORT. Vcd.(-) canto var.	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)	CORT. Vrd. (t.)	MOMEN. Md. (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f cd,k (t/m2.)	ZONA
7	1	0.0	0.0	192.8	-458.0	-886.5	2712.3	458.0	2712.3	2089.1	-894.4	-244.3	C
7	2	0.0	0.0	185.7	-467.6	-836.4	2588.8	467.6	2588.8	2024.8	-822.9	-244.3	C
7	3	0.0	0.0	182.6	-473.3	-787.2	2464.0	473.3	2464.0	1959.7	-750.7	-244.3	C
7	4	0.0	0.0	178.8	-479.7	-738.8	2337.5	479.7	2337.5	1893.7	-677.5	-244.3	C
7	5	0.0	0.0	175.0	-486.0	-691.4	2209.7	486.0	2209.7	1827.1	-603.5	-244.3	C
7	6	0.0	0.0	171.1	-492.5	-645.0	2080.0	492.5	2080.0	1759.5	-528.5	-244.3	C
7	7	0.0	0.0	167.2	-498.9	-601.2	1946.7	498.9	1946.7	1690.0	-451.3	-244.3	C
7	8	0.0	0.0	163.4	-505.4	-556.5	1814.2	505.4	1814.2	1620.9	-374.7	-244.3	C
7	9	0.0	0.0	158.1	-513.2	-508.6	1683.9	513.2	1683.9	1551.3	-301.0	-244.3	C
7	10	0.0	0.0	154.2	-519.7	-467.6	1545.7	519.7	1545.7	1479.3	-221.0	-244.3	A-B
7	11	0.0	0.0	150.4	-526.1	-426.5	1407.4	526.1	1407.4	1407.2	-141.0	-244.3	A-B
7	12	0.0	0.0	146.5	-532.6	-387.7	1265.6	532.6	1265.6	1333.3	-59.0	-244.3	A-B
7	13	0.0	0.0	142.6	-539.0	-348.8	1123.7	539.0	1123.7	1259.3	23.2	-244.3	A-B
7	14	0.0	0.0	138.8	-545.5	-311.8	979.0	545.5	979.0	1183.8	106.9	-244.3	A-B
7	15	0.0	0.0	134.9	-551.9	-275.0	833.5	551.9	833.5	1107.9	191.1	-244.3	A-B
7	16	0.0	0.0	131.0	-558.4	-239.8	685.6	558.4	685.6	1030.8	276.7	-244.3	A-B
7	17	0.0	0.0	127.1	-564.8	-205.3	536.4	564.8	536.4	953.0	363.1	-244.3	A-B
7	18	0.0	0.0	123.4	-571.1	-172.0	385.3	571.1	385.3	874.3	450.5	-244.3	A-B
7	19	0.0	0.0	119.5	-577.6	-139.7	232.5	577.6	232.5	794.7	538.9	-244.3	A-B
7	20	0.0	0.0	115.6	-584.0	-108.5	78.0	584.0	78.0	714.1	628.3	-244.3	A-B
7	21	0.0	0.0	111.8	-590.5	-78.2	-78.2	590.5	-78.2	632.6	718.7	-244.3	A-B

6	8	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	207.2	VERIFICA
6	9	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	190.8	VERIFICA
6	10	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	174.5	VERIFICA
6	11	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	158.1	VERIFICA
6	12	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	141.8	VERIFICA
6	13	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	125.5	VERIFICA
6	14	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	109.2	VERIFICA
6	15	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	94.3	VERIFICA
6	16	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	104.1	VERIFICA
6	17	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	113.9	VERIFICA
6	18	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	123.7	VERIFICA
6	19	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	133.5	VERIFICA
6	20	4398.0	681.3	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.9	143.3	VERIFICA
6	21	4399.0	681.5	1.95	27.19	90	VERIFICA	350.0	160.0	0.267	3641.7	152.1	VERIFICA

VANO	SECCIÓN	Pd. (Ton.)	σ sd (T/m2.)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2.)	Vu1 (ton.)	Vrd (ton.)	COMPRO. Vrd<=Vu1
7	1	4358.0	675.1	1.94	27.27	90	VERIFICA	350.0	160.0	0.267	3649.0	458.0	VERIFICA
7	2	4358.0	675.1	1.94	27.27	90	VERIFICA	350.0	160.0	0.267	3649.0	467.6	VERIFICA
7	3	4358.0	675.1	1.94	27.27	90	VERIFICA	350.0	160.0	0.267	3649.0	473.3	VERIFICA
7	4	4358.0	675.1	1.94	27.27	90	VERIFICA	350.0	160.0	0.267	3649.0	479.7	VERIFICA
7	5	4358.0	675.1	1.94	27.27	90	VERIFICA	350.0	160.0	0.267	3649.0	486.0	VERIFICA
7	6	4358.0	675.1	1.94	27.27	90	VERIFICA	350.0	160.0	0.267	3649.0	492.5	VERIFICA
7	7	4358.0	675.1	1.94	27.27	90	VERIFICA	350.0	160.0	0.267	3649.0	498.9	VERIFICA
7	8	4358.0	675.1	1.94	27.27	90	VERIFICA	350.0	160.0	0.267	3649.0	505.4	VERIFICA
7	9	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	513.2	VERIFICA
7	10	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	519.7	VERIFICA
7	11	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	526.1	VERIFICA
7	12	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	532.6	VERIFICA
7	13	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	539.0	VERIFICA
7	14	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	545.5	VERIFICA
7	15	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	551.9	VERIFICA
7	16	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	558.4	VERIFICA
7	17	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	564.8	VERIFICA
7	18	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	571.1	VERIFICA
7	19	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	577.6	VERIFICA
7	20	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	584.0	VERIFICA
7	21	4347.0	673.4	1.94	27.29	90	VERIFICA	350.0	160.0	0.267	3651.0	590.5	VERIFICA

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1518.3

VANO	SECCIÓN	$f_{y\alpha,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα calculada (cm2/m.)	Aα mínima (cm2/m.)	Aα necesaria (cm2/m.)
1	1	4.2	485.82	-576.7	-	-	485.82	0.0	44.4	44.4
1	2	4.2	485.82	578.8	-	-	485.82	0.0	44.4	44.4
1	3	4.2	305.37	798.5	-	-	305.37	0.0	44.4	44.4
1	4	4.2	305.37	1016.6	-	-	305.37	0.0	44.4	44.4
1	5	4.2	305.37	1156.0	-	-	305.37	0.0	44.4	44.4
1	6	4.2	305.37	1264.8	-	-	305.37	0.0	44.4	44.4
1	7	4.2	305.37	1343.0	1.881	0.951	546.19	0.0	44.4	44.4
1	8	4.2	305.37	1390.7	1.827	0.959	535.21	0.0	44.4	44.4
1	9	4.2	305.37	1407.5	1.778	0.967	525.11	0.0	44.4	44.4
1	10	4.2	305.37	1476.9	-	-	305.37	0.0	44.4	44.4
1	11	4.2	305.37	1436.9	-	-	305.37	0.0	44.4	44.4
1	12	4.2	305.37	1368.2	-	-	305.37	0.0	44.4	44.4
1	13	4.2	305.37	1271.9	-	-	305.37	0.0	44.4	44.4
1	14	4.2	305.37	1147.8	-	-	305.37	0.0	44.4	44.4
1	15	4.2	305.37	1024.9	-	-	305.37	0.0	44.4	44.4
1	16	4.2	305.37	840.6	-	-	305.37	0.0	44.4	44.4
1	17	4.2	305.37	627.8	-	-	305.37	0.0	44.4	44.4
1	18	4.2	305.37	-707.2	-	-	305.37	0.0	44.4	44.4
1	19	4.2	305.37	-874.0	-	-	305.37	4.9	44.4	44.4
1	20	4.2	485.82	-956.8	-	-	485.82	0.0	44.4	44.4
1	21	4.2	485.82	-998.1	-	-	485.82	16.0	44.4	44.4

VANO	SECCIÓN	$f_{y\alpha,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα calculada (cm2/m.)	Aα mínima (cm2/m.)	Aα necesaria (cm2/m.)
2	1	4.2	485.82	-966.0	-	-	485.82	9.2	44.4	44.4
2	2	4.2	485.82	-936.4	-	-	485.82	0.0	44.4	44.4
2	3	4.2	305.37	-914.0	-	-	305.37	0.0	44.4	44.4
2	4	4.2	305.37	-699.8	-	-	305.37	0.0	44.4	44.4
2	5	4.2	305.37	528.5	-	-	305.37	0.0	44.4	44.4
2	6	4.2	305.37	709.4	-	-	305.37	0.0	44.4	44.4
2	7	4.2	305.37	856.6	-	-	305.37	0.0	44.4	44.4
2	8	4.2	305.37	970.1	-	-	305.37	0.0	44.4	44.4
2	9	4.2	305.37	1050.0	-	-	305.37	0.0	44.4	44.4
2	10	4.2	305.37	1096.2	-	-	305.37	0.0	44.4	44.4
2	11	4.2	305.37	1108.8	-	-	305.37	0.0	44.4	44.4
2	12	4.2	305.37	1033.4	-	-	305.37	0.0	44.4	44.4
2	13	4.2	305.37	980.8	-	-	305.37	0.0	44.4	44.4
2	14	4.2	305.37	896.0	-	-	305.37	0.0	44.4	44.4
2	15	4.2	305.37	779.0	-	-	305.37	0.0	44.4	44.4
2	16	4.2	305.37	629.7	-	-	305.37	0.0	44.4	44.4
2	17	4.2	305.37	448.2	-	-	305.37	0.0	44.4	44.4
2	18	4.2	305.37	-716.3	-	-	305.37	0.0	44.4	44.4
2	19	4.2	305.37	-905.4	-	-	305.37	0.2	44.4	44.4
2	20	4.2	485.82	-982.7	-	-	485.82	0.0	44.4	44.4
2	21	4.2	485.82	-1019.5	-	-	485.82	10.5	44.4	44.4

VANO	SECCIÓN	$f_{y\alpha,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα calculada (cm2/m.)	Aα mínima (cm2/m.)	Aα necesaria (cm2/m.)
3	1	4.2	485.82	-1051.5	-	-	485.82	16.9	44.4	44.4
3	2	4.2	485.82	-1007.2	-	-	485.82	1.1	44.4	44.4

3	3	4.2	305.37	-972.3	-	-	305.37	6.3	44.4	44.4
3	4	4.2	305.37	-747.6	-	-	305.37	0.0	44.4	44.4
3	5	4.2	305.37	545.2	-	-	305.37	0.0	44.4	44.4
3	6	4.2	305.37	758.4	-	-	305.37	0.0	44.4	44.4
3	7	4.2	305.37	943.7	-	-	305.37	0.0	44.4	44.4
3	8	4.2	305.37	1100.9	-	-	305.37	0.0	44.4	44.4
3	9	4.2	305.37	1255.7	-	-	305.37	0.0	44.4	44.4
3	10	4.2	305.37	1358.6	-	-	305.37	0.0	44.4	44.4
3	11	4.2	305.37	1432.9	-	-	305.37	0.0	44.4	44.4
3	12	4.2	305.37	1479.1	-	-	305.37	0.0	44.4	44.4
3	13	4.2	305.37	1496.1	1.881	0.967	555.21	0.0	44.4	44.4
3	14	4.2	305.37	1440.9	1.901	0.960	557.31	0.0	44.4	44.4
3	15	4.2	305.37	1394.1	1.963	0.952	570.66	0.0	44.4	44.4
3	16	4.2	305.37	1315.2	-	-	305.37	0.0	44.4	44.4
3	17	4.2	305.37	1204.1	-	-	305.37	0.0	44.4	44.4
3	18	4.2	305.37	1060.7	-	-	305.37	0.0	44.4	44.4
3	19	4.2	305.37	885.0	-	-	305.37	0.0	44.4	44.4
3	20	4.2	485.82	606.0	-	-	485.82	0.0	44.4	44.4
3	21	4.2	485.82	-610.4	-	-	485.82	0.0	44.4	44.4

VANO	SECCION	$f_{ya,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα calculada (cm2/m.)	Aα minima (cm2/m.)	Aα necesaria (cm2/m.)
4	1	4.2	457.24	1238.6	-	-	457.24	11.4	44.4	44.4
4	2	4.2	457.24	1395.3	-	-	457.24	10.8	44.4	44.4
4	3	4.2	457.24	1551.9	-	-	457.24	10.2	44.4	44.4
4	4	4.2	457.24	1708.5	-	-	457.24	9.6	44.4	44.4
4	5	4.2	457.24	1865.2	-	-	457.24	9.1	44.4	44.4
4	6	4.2	457.24	2021.8	-	-	457.24	8.5	44.4	44.4
4	7	4.2	457.24	2178.6	-	-	457.24	7.9	44.4	44.4
4	8	4.2	457.24	2334.6	-	-	457.24	7.3	44.4	44.4
4	9	4.2	457.24	2491.6	-	-	457.24	6.7	44.4	44.4
4	10	4.2	457.24	2648.6	-	-	457.24	6.2	44.4	44.4
4	11	4.2	457.24	2814.8	-	-	457.24	5.4	44.4	44.4
4	12	4.2	457.24	2971.8	1.112	0.648	329.63	15.7	44.4	44.4
4	13	4.2	457.24	3129.8	1.108	0.653	330.97	15.0	44.4	44.4
4	14	4.2	457.24	3286.8	1.105	0.658	332.40	14.3	44.4	44.4
4	15	4.2	457.24	3443.8	1.103	0.662	333.96	13.6	44.4	44.4
4	16	4.2	457.24	3600.8	1.101	0.667	335.66	12.9	44.4	44.4
4	17	4.2	457.24	3757.8	1.099	0.672	337.50	12.1	44.4	44.4
4	18	4.2	457.24	3914.8	1.098	0.676	339.35	11.4	44.4	44.4
4	19	4.2	457.24	4072.8	1.096	0.681	341.30	10.7	44.4	44.4
4	20	4.2	457.24	4229.8	1.095	0.686	343.33	9.9	44.4	44.4
4	21	4.2	457.24	4386.8	1.094	0.690	345.39	9.1	44.4	44.4

VANO	SECCION	$f_{ya,d}$ (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα calculada (cm2/m.)	Aα minima (cm2/m.)	Aα necesaria (cm2/m.)
5	1	4.2	457.24	3785.4	-	-	457.24	0.0	44.4	44.4
5	2	4.2	457.24	3660.4	-	-	457.24	0.0	44.4	44.4
5	3	4.2	457.24	3534.4	-	-	457.24	0.0	44.4	44.4
5	4	4.2	457.24	3409.4	-	-	457.24	0.0	44.4	44.4
5	5	4.2	457.24	3284.4	-	-	457.24	0.0	44.4	44.4
5	6	4.2	457.24	3159.4	-	-	457.24	0.0	44.4	44.4
5	7	4.2	457.24	3033.4	1.063	0.928	451.28	0.0	44.4	44.4
5	8	4.2	457.24	2908.4	1.063	0.917	445.74	0.0	44.4	44.4
5	9	4.2	457.24	2783.4	1.063	0.906	440.34	0.0	44.4	44.4
5	10	4.2	457.24	2658.4	1.064	0.894	435.12	0.0	44.4	44.4
5	11	4.2	457.24	2532.4	-	-	457.24	0.0	44.4	44.4
5	12	4.2	457.24	2407.4	-	-	457.24	0.0	44.4	44.4
5	13	4.2	457.24	2282.4	-	-	457.24	0.0	44.4	44.4
5	14	4.2	457.24	2157.0	-	-	457.24	0.0	44.4	44.4

5	15	4.2	457.24	2031.7	-	-	457.24	0.0	44.4	44.4
5	16	4.2	457.24	1906.5	-	-	457.24	0.0	44.4	44.4
5	17	4.2	457.24	1781.2	-	-	457.24	0.0	44.4	44.4
5	18	4.2	457.24	1655.9	-	-	457.24	0.0	44.4	44.4
5	19	4.2	457.24	1530.7	-	-	457.24	0.0	44.4	44.4
5	20	4.2	457.24	1405.4	-	-	457.24	0.0	44.4	44.4
5	21	4.2	457.24	1280.1	-	-	457.24	0.0	44.4	44.4

VANO	SECCIÓN	fyα,d (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
6	1	4.2	457.24	1256.6	-	-	457.24	0.0	44.4	44.4
6	2	4.2	457.24	1380.8	-	-	457.24	0.0	44.4	44.4
6	3	4.2	457.24	1505.1	-	-	457.24	0.0	44.4	44.4
6	4	4.2	457.24	1629.4	-	-	457.24	0.0	44.4	44.4
6	5	4.2	457.24	1753.7	-	-	457.24	0.0	44.4	44.4
6	6	4.2	457.24	1878.0	-	-	457.24	0.0	44.4	44.4
6	7	4.2	457.24	2002.2	-	-	457.24	0.0	44.4	44.4
6	8	4.2	457.24	2126.5	-	-	457.24	0.0	44.4	44.4
6	9	4.2	457.24	2250.4	-	-	457.24	0.0	44.4	44.4
6	10	4.2	457.24	2375.4	-	-	457.24	0.0	44.4	44.4
6	11	4.2	457.24	2499.4	-	-	457.24	0.0	44.4	44.4
6	12	4.2	457.24	2623.4	1.086	0.902	447.80	0.0	44.4	44.4
6	13	4.2	457.24	2748.4	1.085	0.913	453.12	0.0	44.4	44.4
6	14	4.2	457.24	2872.4	1.085	0.925	458.69	0.0	44.4	44.4
6	15	4.2	457.24	2996.4	-	-	457.24	0.0	44.4	44.4
6	16	4.2	457.24	3120.4	-	-	457.24	0.0	44.4	44.4
6	17	4.2	457.24	3245.4	-	-	457.24	0.0	44.4	44.4
6	18	4.2	457.24	3369.4	-	-	457.24	0.0	44.4	44.4
6	19	4.2	457.24	3493.4	-	-	457.24	0.0	44.4	44.4
6	20	4.2	457.24	3618.4	-	-	457.24	0.0	44.4	44.4
6	21	4.2	457.24	3742.7	-	-	457.24	0.0	44.4	44.4

VANO	SECCIÓN	fyα,d (T/cm2)	Vcuo (Ton.)	Mo (T/m)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton.)	Aα. calculada (cm2/m.)	Aα. minima (cm2/m.)	Aα. necesaria (cm2/m.)
7	1	4.2	457.24	4442.7	1.098	0.686	344.58	9.7	44.4	44.4
7	2	4.2	457.24	4282.7	1.099	0.680	341.56	10.7	44.4	44.4
7	3	4.2	457.24	4122.7	1.100	0.676	339.96	11.4	44.4	44.4
7	4	4.2	457.24	3962.7	1.102	0.671	338.15	12.1	44.4	44.4
7	5	4.2	457.24	3802.7	1.103	0.667	336.44	12.7	44.4	44.4
7	6	4.2	457.24	3642.7	1.105	0.663	334.76	13.4	44.4	44.4
7	7	4.2	457.24	3483.7	1.107	0.658	333.22	14.1	44.4	44.4
7	8	4.2	457.24	3323.7	1.110	0.654	331.75	14.8	44.4	44.4
7	9	4.2	457.24	3155.8	1.116	0.649	331.11	15.5	44.4	44.4
7	10	4.2	457.24	2996.8	-	-	457.24	5.3	44.4	44.4
7	11	4.2	457.24	2836.8	-	-	457.24	5.9	44.4	44.4
7	12	4.2	457.24	2677.8	-	-	457.24	6.4	44.4	44.4
7	13	4.2	457.24	2517.8	-	-	457.24	7.0	44.4	44.4
7	14	4.2	457.24	2358.8	-	-	457.24	7.5	44.4	44.4
7	15	4.2	457.24	2198.8	-	-	457.24	8.1	44.4	44.4
7	16	4.2	457.24	2039.5	-	-	457.24	8.6	44.4	44.4
7	17	4.2	457.24	1880.0	-	-	457.24	9.2	44.4	44.4
7	18	4.2	457.24	1720.5	-	-	457.24	9.7	44.4	44.4
7	19	4.2	457.24	1561.0	-	-	457.24	10.3	44.4	44.4
7	20	4.2	457.24	1401.5	-	-	457.24	10.8	44.4	44.4
7	21	4.2	457.24	1242.0	-	-	457.24	11.4	44.4	44.4

ARMADURA DE RASANTE

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1518.3

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT Vrd.(+) (t.)	CORT Vrd.(-) (t.)	MOMEN Md.(+) (t x m.)	MOMEN Md.(-) (t x m.)
1	1	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	255.3	-107.4	34.6	34.6
1	2	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	230.4	-96.4	248.2	-55.1
1	3	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	205.5	-85.5	440.1	-135.1
1	4	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	185.1	-71.8	563.8	-252.4
1	5	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	164.6	-58.3	717.7	-309.7
1	6	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	144.0	-44.7	853.4	-355.0
1	7	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	123.6	-31.1	971.4	-388.3
1	8	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	103.0	-17.6	1070.9	-409.8
1	9	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	82.6	-4.0	1152.8	-419.1
1	10	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	61.9	5.7	664.5	14.6
1	11	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	60.4	-8.0	-91.1	809.3
1	12	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	70.9	-31.6	-33.3	792.0
1	13	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	81.2	-55.3	33.7	753.8
1	14	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	91.7	-78.9	109.9	695.0
1	15	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	106.9	-97.8	177.2	597.0
1	16	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	118.1	-120.6	276.3	500.9
1	17	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	129.3	-143.5	385.2	384.8
1	18	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	112.4	-184.5	495.8	240.3
1	19	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	-7.9	-348.9	533.7	-7.0
1	20	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	-109.1	-485.9	533.2	-323.1
1	21	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	-210.3	-623.0	392.7	-811.0

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT Vrd.(+) (t.)	CORT Vrd.(-) (t.)	MOMEN Md.(+) (t x m.)	MOMEN Md.(-) (t x m.)
2	1	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	563.9	210.7	-335.4	-87.7
2	2	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	427.3	110.0	100.7	53.4
2	3	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	291.0	9.4	416.8	105.8
2	4	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	158.7	-88.8	565.4	21.7
2	5	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	95.7	-117.7	676.5	-70.1
2	6	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	87.8	-91.6	761.1	-158.2
2	7	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	70.7	-74.6	830.9	-231.3
2	8	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	53.8	-57.4	885.6	-289.3
2	9	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	36.8	-40.4	925.5	-332.4
2	10	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	19.8	-23.3	950.4	-360.4
2	11	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	5.9	-13.3	644.2	562.0
2	12	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	20.6	-31.9	74.2	580.4
2	13	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	36.0	-50.5	99.1	544.1
2	14	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	51.5	-69.2	137.5	491.3
2	15	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	66.9	-87.8	189.5	422.1
2	16	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	82.4	-106.3	255.2	336.7
2	17	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	97.9	-125.0	334.6	234.8
2	18	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	88.5	-168.4	420.3	109.5
2	19	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	-16.3	-307.2	444.2	-107.6
2	20	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	-114.0	-440.9	434.1	-389.6
2	21	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	-211.8	-574.4	290.8	-836.3

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup. bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd.(+) (t.)	CORT. Vrd.(-) (t.)	MOMEN. Md.(+) (t x m.)	MOMEN. Md.(-) (t x m.)
3	1	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	629.1	210.0	-929.6	389.2
3	2	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	495.0	111.7	-435.2	530.6
3	3	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	360.8	13.3	-58.4	585.7
3	4	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	231.2	-82.3	152.9	506.2
3	5	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	144.6	-134.8	304.5	397.0
3	6	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	130.8	-114.4	429.9	291.6
3	7	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	107.4	-103.8	534.6	195.5
3	8	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	84.0	-93.1	619.0	108.8
3	9	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	58.4	-84.7	665.0	13.9
3	10	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	35.6	-73.4	706.3	-55.7
3	11	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	12.7	-62.2	727.7	-115.1
3	12	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	-0.9	-61.6	-55.2	630.2
3	13	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	6.3	-78.5	-522.3	1037.6
3	14	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	22.2	-96.7	-479.8	990.3
3	15	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	37.7	-115.3	-453.3	897.2
3	16	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	53.2	-133.8	-413.1	787.9
3	17	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	68.7	-152.4	-359.5	661.8
3	18	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	84.3	-170.9	-292.2	519.5
3	19	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	99.8	-189.4	-211.2	361.1
3	20	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	112.7	-212.3	-66.9	234.9
3	21	9.500	3.900	1.750	0.506	90	5.65	13.4	15.8	52.3	0	4435	4200	15455	125.6	-235.3	38.0	38.0

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1518.3

VANO	SECCIÓN	A (cm2)	τ d ala comp (Kp/cm2)	τ d ala tracc (Kp/cm2)	q (°)	Aσ (+) (cm2/m)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2)	t d ala tracc (Kp/cm2)	θ (°)	Aσ (-) (cm2/m)	Situacion del ala	ENVOLVENTE Aσ (cm2/m)
1	1	-	10.6	-	30.0	7.39	ALA COMPRIMIDA	-	4.5	-	30.0	3.11	ALA COMPRIMIDA	7.39
1	2	-	9.6	-	30.0	6.67	ALA COMPRIMIDA	83.90	-	2.6	45.0	3.09	ALA TRACCIONADA	6.67
1	3	-	8.6	-	30.0	5.95	ALA COMPRIMIDA	83.90	-	2.3	45.0	2.74	ALA TRACCIONADA	5.95
1	4	-	7.7	-	30.0	5.36	ALA COMPRIMIDA	83.90	-	1.9	45.0	2.30	ALA TRACCIONADA	5.36
1	5	-	6.8	-	30.0	4.76	ALA COMPRIMIDA	83.90	-	1.6	45.0	1.87	ALA TRACCIONADA	4.76
1	6	-	6.0	-	30.0	4.17	ALA COMPRIMIDA	83.90	-	1.2	45.0	1.44	ALA TRACCIONADA	4.17
1	7	-	5.1	-	30.0	3.58	ALA COMPRIMIDA	83.90	-	0.8	45.0	1.00	ALA TRACCIONADA	3.58
1	8	-	4.3	-	30.0	2.98	ALA COMPRIMIDA	83.90	-	0.5	45.0	0.56	ALA TRACCIONADA	2.98
1	9	-	3.4	-	30.0	2.39	ALA COMPRIMIDA	83.90	-	0.1	45.0	0.13	ALA TRACCIONADA	2.39
1	10	-	2.6	-	30.0	1.79	ALA COMPRIMIDA	-	0.2	-	30.0	0.17	ALA COMPRIMIDA	1.79
1	11	83.90	-	1.6	45.0	1.94	ALA TRACCIONADA	-	0.3	-	30.0	0.23	ALA COMPRIMIDA	1.94
1	12	83.90	-	1.9	45.0	2.27	ALA TRACCIONADA	-	1.3	-	30.0	0.91	ALA COMPRIMIDA	2.27
1	13	-	3.4	-	30.0	2.35	ALA COMPRIMIDA	-	2.3	-	30.0	1.60	ALA COMPRIMIDA	2.35
1	14	-	3.8	-	30.0	2.65	ALA COMPRIMIDA	-	3.3	-	30.0	2.28	ALA COMPRIMIDA	2.65
1	15	-	4.4	-	30.0	3.09	ALA COMPRIMIDA	-	4.1	-	30.0	2.83	ALA COMPRIMIDA	3.09
1	16	-	4.9	-	30.0	3.42	ALA COMPRIMIDA	-	5.0	-	30.0	3.49	ALA COMPRIMIDA	3.49
1	17	-	5.4	-	30.0	3.74	ALA COMPRIMIDA	-	6.0	-	30.0	4.15	ALA COMPRIMIDA	4.15
1	18	-	4.7	-	30.0	3.25	ALA COMPRIMIDA	-	8.1	-	30.0	5.63	ALA COMPRIMIDA	5.63
1	19	-	0.3	-	30.0	0.23	ALA COMPRIMIDA	83.90	-	9.3	45.0	11.19	ALA TRACCIONADA	11.19
1	20	-	4.5	-	30.0	3.16	ALA COMPRIMIDA	83.90	-	12.9	45.0	15.58	ALA TRACCIONADA	15.58
1	21	-	8.8	-	30.0	6.09	ALA COMPRIMIDA	83.90	-	16.6	45.0	19.98	ALA TRACCIONADA	19.98

VANO	SECCIÓN	b (°)	t d (Kp/cm2)	t max (Kp/cm2)	e (cm)	armadura superior Aσ,sup (cm2/m)	armadura inferior Aσ,inf (cm2/m)
1	1	30	10.6	69.28	0.21	0.57	6.82
1	2	30	9.6	69.28	0.22	0.46	6.21
1	3	30	8.6	69.28	0.22	0.37	5.58
1	4	30	7.7	69.28	0.22	0.30	5.06
1	5	30	6.8	69.28	0.23	0.24	4.53
1	6	30	6.0	69.28	0.23	0.18	3.99
1	7	30	5.1	69.28	0.23	0.13	3.44
1	8	30	4.3	69.28	0.24	0.09	2.89
1	9	30	3.4	69.28	0.24	0.06	2.33
1	10	30	2.6	69.28	0.24	0.03	1.76
1	11	45	1.6	80.00	0.25	0.02	1.92
1	12	45	1.9	80.00	0.25	0.03	2.25
1	13	30	3.4	69.28	0.24	0.06	2.29
1	14	30	3.8	69.28	0.24	0.07	2.58
1	15	30	4.4	69.28	0.24	0.10	2.99
1	16	30	5.0	69.28	0.23	0.13	3.36
1	17	30	6.0	69.28	0.23	0.18	3.97
1	18	30	8.1	69.28	0.22	0.33	5.30
1	19	45	9.3	80.00	0.22	0.65	10.54
1	20	45	12.9	80.00	0.21	1.26	14.32
1	21	45	16.6	80.00	0.20	2.07	17.91

VANO	SECCIÓN	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc. (Kp/cm2.)	q (°)	Aσ (+) (cm2/m.)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc (Kp/cm2.)	θ (°)	Aσ (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aσ (cm2/m.)
2	1	83.90	-	15.0	45.0	18.08	ALA TRACCIONADA	83.90	-	5.6	45.0	6.76	ALA TRACCIONADA	18.08
2	2	-	17.8	-	30.0	12.37	ALA COMPRIMIDA	-	4.6	-	30.0	3.18	ALA COMPRIMIDA	12.37
2	3	-	12.1	-	30.0	8.42	ALA COMPRIMIDA	-	0.4	-	30.0	0.27	ALA COMPRIMIDA	8.42
2	4	-	6.6	-	30.0	4.59	ALA COMPRIMIDA	-	3.7	-	30.0	2.57	ALA COMPRIMIDA	4.59
2	5	-	4.0	-	30.0	2.77	ALA COMPRIMIDA	83.90	-	3.1	45.0	3.78	ALA TRACCIONADA	3.78
2	6	-	3.7	-	30.0	2.54	ALA COMPRIMIDA	83.90	-	2.4	45.0	2.94	ALA TRACCIONADA	2.94
2	7	-	2.9	-	30.0	2.05	ALA COMPRIMIDA	83.90	-	2.0	45.0	2.39	ALA TRACCIONADA	2.39
2	8	-	2.2	-	30.0	1.56	ALA COMPRIMIDA	83.90	-	1.5	45.0	1.84	ALA TRACCIONADA	1.84
2	9	-	1.5	-	30.0	1.06	ALA COMPRIMIDA	83.90	-	1.1	45.0	1.29	ALA TRACCIONADA	1.29
2	10	-	0.8	-	30.0	0.57	ALA COMPRIMIDA	83.90	-	0.6	45.0	0.75	ALA TRACCIONADA	0.75
2	11	-	0.2	-	30.0	0.17	ALA COMPRIMIDA	-	0.6	-	30.0	0.39	ALA COMPRIMIDA	0.39
2	12	-	0.9	-	30.0	0.59	ALA COMPRIMIDA	-	1.3	-	30.0	0.92	ALA COMPRIMIDA	0.92
2	13	-	1.5	-	30.0	1.04	ALA COMPRIMIDA	-	2.1	-	30.0	1.46	ALA COMPRIMIDA	1.46
2	14	-	2.1	-	30.0	1.49	ALA COMPRIMIDA	-	2.9	-	30.0	2.00	ALA COMPRIMIDA	2.00
2	15	-	2.8	-	30.0	1.94	ALA COMPRIMIDA	-	3.7	-	30.0	2.54	ALA COMPRIMIDA	2.54
2	16	-	3.4	-	30.0	2.39	ALA COMPRIMIDA	-	4.4	-	30.0	3.08	ALA COMPRIMIDA	3.08
2	17	-	4.1	-	30.0	2.83	ALA COMPRIMIDA	-	5.2	-	30.0	3.62	ALA COMPRIMIDA	3.62
2	18	-	3.7	-	30.0	2.56	ALA COMPRIMIDA	-	7.0	-	30.0	4.87	ALA COMPRIMIDA	4.87
2	19	-	0.7	-	30.0	0.47	ALA COMPRIMIDA	83.90	-	8.2	45.0	9.85	ALA TRACCIONADA	9.85
2	20	-	4.7	-	30.0	3.30	ALA COMPRIMIDA	83.90	-	11.7	45.0	14.14	ALA TRACCIONADA	14.14
2	21	-	8.8	-	30.0	6.13	ALA COMPRIMIDA	83.90	-	15.3	45.0	18.42	ALA TRACCIONADA	18.42

VANO	SECCIÓN	b (°)	t d (Kp/cm2)	t max (Kp/cm2.)	e (cm)	armadura superior Aσ,sup (cm2/m.)	armadura inferior Aσ,inf (cm2/m.)
2	1	45	15.0	80.00	0.21	1.70	16.39
2	2	30	17.8	69.28	0.19	1.59	10.78
2	3	30	12.1	69.28	0.21	0.74	7.68
2	4	30	6.6	69.28	0.23	0.22	4.37
2	5	45	3.1	80.00	0.24	0.07	3.70
2	6	45	2.4	80.00	0.25	0.04	2.89
2	7	45	2.0	80.00	0.25	0.03	2.36
2	8	45	1.5	80.00	0.25	0.02	1.82
2	9	45	1.1	80.00	0.25	0.01	1.29
2	10	45	0.6	80.00	0.25	0.00	0.74
2	11	30	0.6	69.28	0.25	0.00	0.38
2	12	30	1.3	69.28	0.25	0.01	0.92
2	13	30	2.1	69.28	0.25	0.02	1.44
2	14	30	2.9	69.28	0.24	0.04	1.96
2	15	30	3.7	69.28	0.24	0.07	2.47
2	16	30	4.4	69.28	0.24	0.10	2.98
2	17	30	5.2	69.28	0.23	0.14	3.48
2	18	30	7.0	69.28	0.23	0.25	4.63
2	19	45	8.2	80.00	0.23	0.50	9.35
2	20	45	11.7	80.00	0.22	1.04	13.10
2	21	45	15.3	80.00	0.20	1.76	16.66

VANO	SECCIÓN	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc (Kp/cm2.)	q (°)	Aσ (+) (cm2/m.)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc (Kp/cm2.)	θ (°)	Aσ (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aσ (cm2/m.)
3	1	83.90	-	16.7	45.0	20.17	ALA TRACCIONADA	-	8.7	-	30.0	6.06	ALA COMPRIMIDA	20.17
3	2	83.90	-	13.2	45.0	15.87	ALA TRACCIONADA	-	4.6	-	30.0	3.23	ALA COMPRIMIDA	15.87
3	3	83.90	-	9.6	45.0	11.57	ALA TRACCIONADA	-	0.6	-	30.0	0.39	ALA COMPRIMIDA	11.57
3	4	-	9.6	-	30.0	6.69	ALA COMPRIMIDA	-	3.4	-	30.0	2.38	ALA COMPRIMIDA	6.69
3	5	-	6.0	-	30.0	4.18	ALA COMPRIMIDA	-	5.6	-	30.0	3.90	ALA COMPRIMIDA	4.18
3	6	-	5.4	-	30.0	3.79	ALA COMPRIMIDA	-	4.8	-	30.0	3.31	ALA COMPRIMIDA	3.79
3	7	-	4.5	-	30.0	3.11	ALA COMPRIMIDA	-	4.3	-	30.0	3.00	ALA COMPRIMIDA	3.11
3	8	-	3.5	-	30.0	2.43	ALA COMPRIMIDA	-	3.9	-	30.0	2.69	ALA COMPRIMIDA	2.69
3	9	-	2.4	-	30.0	1.69	ALA COMPRIMIDA	-	3.5	-	30.0	2.45	ALA COMPRIMIDA	2.45
3	10	-	1.5	-	30.0	1.03	ALA COMPRIMIDA	83.90	-	2.0	45.0	2.35	ALA TRACCIONADA	2.35
3	11	-	0.5	-	30.0	0.37	ALA COMPRIMIDA	83.90	-	1.7	45.0	1.99	ALA TRACCIONADA	1.99
3	12	83.90	-	0.0	45.0	0.03	ALA TRACCIONADA	-	2.6	-	30.0	1.78	ALA COMPRIMIDA	1.78
3	13	83.90	-	0.2	45.0	0.20	ALA TRACCIONADA	-	3.3	-	30.0	2.27	ALA COMPRIMIDA	2.27
3	14	83.90	-	0.6	45.0	0.71	ALA TRACCIONADA	-	4.0	-	30.0	2.80	ALA COMPRIMIDA	2.80
3	15	83.90	-	1.0	45.0	1.21	ALA TRACCIONADA	-	4.8	-	30.0	3.34	ALA COMPRIMIDA	3.34
3	16	83.90	-	1.4	45.0	1.71	ALA TRACCIONADA	-	5.6	-	30.0	3.87	ALA COMPRIMIDA	3.87
3	17	83.90	-	1.8	45.0	2.20	ALA TRACCIONADA	-	6.3	-	30.0	4.41	ALA COMPRIMIDA	4.41
3	18	83.90	-	2.2	45.0	2.70	ALA TRACCIONADA	-	7.1	-	30.0	4.95	ALA COMPRIMIDA	4.95
3	19	83.90	-	2.7	45.0	3.20	ALA TRACCIONADA	-	7.9	-	30.0	5.48	ALA COMPRIMIDA	5.48
3	20	83.90	-	3.0	45.0	3.61	ALA TRACCIONADA	-	8.8	-	30.0	6.15	ALA COMPRIMIDA	6.15
3	21	-	5.2	-	30.0	3.64	ALA COMPRIMIDA	-	9.8	-	30.0	6.81	ALA COMPRIMIDA	6.81

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm)	armadura superior Aσ,sup (cm2/m.)	armadura inferior Aσ,inf (cm2/m.)
3	1	45	16.7	80.00	0.20	2.11	18.06
3	2	45	13.2	80.00	0.21	1.31	14.57
3	3	45	9.6	80.00	0.22	0.69	10.88
3	4	30	9.6	69.28	0.22	0.46	6.23
3	5	30	6.0	69.28	0.23	0.18	4.00
3	6	30	5.4	69.28	0.23	0.15	3.64
3	7	30	4.5	69.28	0.24	0.10	3.01
3	8	30	3.9	69.28	0.24	0.08	2.62
3	9	30	3.5	69.28	0.24	0.06	2.39
3	10	45	2.0	80.00	0.25	0.03	2.33
3	11	45	1.7	80.00	0.25	0.02	1.97
3	12	30	2.6	69.28	0.24	0.03	1.75
3	13	30	3.3	69.28	0.24	0.05	2.22
3	14	30	4.0	69.28	0.24	0.08	2.72
3	15	30	4.8	69.28	0.24	0.12	3.22
3	16	30	5.6	69.28	0.23	0.16	3.72
3	17	30	6.3	69.28	0.23	0.20	4.21
3	18	30	7.1	69.28	0.23	0.25	4.69
3	19	30	7.9	69.28	0.22	0.31	5.17
3	20	30	8.8	69.28	0.22	0.39	5.75
3	21	30	9.8	69.28	0.22	0.48	6.33

DISTRIBUCIÓN CONJUNTA DE ARMADURA DE RASANTE Y FLEXIÓN EN VOLADIZOS

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1518,3

ARMADURA SUPERIOR DISPUESTA=	20.91	CM2/M
ARMADURA INFERIOR DISPUESTA=	10.05	CM2/M

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
1	1	7.39	0.57	6.82	5.34	0.00	5.90	6.82	0.00	15.01	0.00	0.00
1	2	6.67	0.46	6.21	5.34	0.00	5.80	6.21	0.00	15.12	0.00	0.00
1	3	5.95	0.37	5.58	5.34	0.00	5.70	5.58	0.00	15.21	0.00	0.00
1	4	5.36	0.30	5.06	5.34	0.00	5.63	5.06	0.00	15.28	0.00	0.00
1	5	4.76	0.24	4.53	5.34	0.00	5.57	4.53	0.00	15.34	0.00	0.00
1	6	4.17	0.18	3.99	5.34	0.00	5.52	3.99	0.00	15.40	0.00	0.00
1	7	3.58	0.13	3.44	5.34	0.00	5.47	3.44	0.00	15.44	0.00	0.00
1	8	2.98	0.09	2.89	5.34	0.00	5.43	2.89	0.00	15.48	0.00	0.00
1	9	2.39	0.06	2.33	5.34	0.00	5.39	2.33	0.00	15.52	0.00	0.00
1	10	1.79	0.03	1.76	5.34	0.00	5.37	1.76	0.00	15.54	0.00	0.00
1	11	1.94	0.02	1.92	5.34	0.00	5.35	1.92	0.00	15.56	0.00	0.00
1	12	2.27	0.03	2.25	5.34	0.00	5.36	2.25	0.00	15.55	0.00	0.00
1	13	2.35	0.06	2.29	5.34	0.00	5.39	2.29	0.00	15.52	0.00	0.00
1	14	2.65	0.07	2.58	5.34	0.00	5.41	2.58	0.00	15.50	0.00	0.00
1	15	3.09	0.10	2.99	5.34	0.00	5.43	2.99	0.00	15.48	0.00	0.00
1	16	3.49	0.13	3.36	5.34	0.00	5.46	3.36	0.00	15.45	0.00	0.00
1	17	4.15	0.18	3.97	5.34	0.00	5.51	3.97	0.00	15.40	0.00	0.00
1	18	5.63	0.33	5.30	5.34	0.00	5.66	5.30	0.00	15.25	0.00	0.00
1	19	11.19	0.65	10.54	5.34	0.00	5.98	10.54	0.00	14.93	0.00	0.00
1	20	15.58	1.26	14.32	5.34	0.00	6.59	14.32	0.00	14.32	0.00	0.00
1	21	19.98	2.07	17.91	5.34	0.00	7.41	17.91	0.00	13.51	4.40	0.00

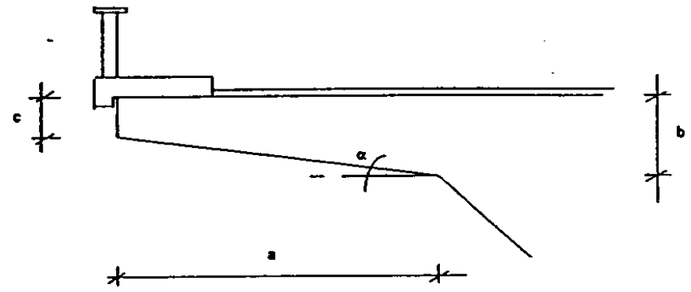
VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
2	1	18.06	1.70	16.39	5.34	0.00	7.03	16.39	0.00	13.88	2.51	0.00
2	2	12.37	1.59	10.78	5.34	0.00	6.92	10.78	0.00	13.99	0.00	0.00
2	3	8.42	0.74	7.68	5.34	0.00	6.07	7.68	0.00	14.84	0.00	0.00
2	4	4.59	0.22	4.37	5.34	0.00	5.55	4.37	0.00	15.36	0.00	0.00
2	5	3.78	0.07	3.70	5.34	0.00	5.41	3.70	0.00	15.50	0.00	0.00
2	6	2.94	0.04	2.89	5.34	0.00	5.38	2.89	0.00	15.53	0.00	0.00
2	7	2.39	0.03	2.36	5.34	0.00	5.36	2.36	0.00	15.55	0.00	0.00
2	8	1.84	0.02	1.82	5.34	0.00	5.35	1.82	0.00	15.56	0.00	0.00
2	9	1.29	0.01	1.29	5.34	0.00	5.34	1.29	0.00	15.57	0.00	0.00
2	10	0.75	0.00	0.74	5.34	0.00	5.34	0.74	0.00	15.57	0.00	0.00
2	11	0.39	0.00	0.38	5.34	0.00	5.34	0.38	0.00	15.58	0.00	0.00
2	12	0.92	0.01	0.92	5.34	0.00	5.34	0.92	0.00	15.57	0.00	0.00
2	13	1.46	0.02	1.44	5.34	0.00	5.36	1.44	0.00	15.55	0.00	0.00
2	14	2.00	0.04	1.96	5.34	0.00	5.38	1.96	0.00	15.54	0.00	0.00
2	15	2.54	0.07	2.47	5.34	0.00	5.40	2.47	0.00	15.51	0.00	0.00
2	16	3.08	0.10	2.98	5.34	0.00	5.43	2.98	0.00	15.48	0.00	0.00
2	17	3.62	0.14	3.48	5.34	0.00	5.47	3.48	0.00	15.44	0.00	0.00
2	18	4.87	0.25	4.63	5.34	0.00	5.58	4.63	0.00	15.33	0.00	0.00
2	19	9.85	0.50	9.35	5.34	0.00	5.84	9.35	0.00	15.07	0.00	0.00
2	20	14.14	1.04	13.10	5.34	0.00	6.37	13.10	0.00	14.54	0.00	0.00
2	21	18.42	1.76	16.66	5.34	0.00	7.10	16.66	0.00	13.82	2.84	0.00

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
3	1	20.17	2.11	18.06	5.34	0.00	7.45	18.06	0.00	13.47	4.60	0.00
3	2	15.87	1.31	14.57	5.34	0.00	6.64	14.57	0.00	14.27	0.30	0.00
3	3	11.57	0.69	10.88	5.34	0.00	6.03	10.88	0.00	14.88	0.00	0.00
3	4	6.69	0.46	6.23	5.34	0.00	5.80	6.23	0.00	15.11	0.00	0.00
3	5	4.18	0.18	4.00	5.34	0.00	5.52	4.00	0.00	15.40	0.00	0.00
3	6	3.79	0.15	3.64	5.34	0.00	5.48	3.64	0.00	15.43	0.00	0.00
3	7	3.11	0.10	3.01	5.34	0.00	5.44	3.01	0.00	15.48	0.00	0.00
3	8	2.69	0.08	2.62	5.34	0.00	5.41	2.62	0.00	15.50	0.00	0.00
3	9	2.45	0.06	2.39	5.34	0.00	5.40	2.39	0.00	15.51	0.00	0.00
3	10	2.35	0.03	2.33	5.34	0.00	5.36	2.33	0.00	15.55	0.00	0.00
3	11	1.99	0.02	1.97	5.34	0.00	5.36	1.97	0.00	15.56	0.00	0.00
3	12	1.78	0.03	1.75	5.34	0.00	5.37	1.75	0.00	15.54	0.00	0.00
3	13	2.27	0.05	2.22	5.34	0.00	5.39	2.22	0.00	15.52	0.00	0.00
3	14	2.80	0.08	2.72	5.34	0.00	5.42	2.72	0.00	15.50	0.00	0.00
3	15	3.34	0.12	3.22	5.34	0.00	5.45	3.22	0.00	15.46	0.00	0.00
3	16	3.87	0.16	3.72	5.34	0.00	5.49	3.72	0.00	15.42	0.00	0.00
3	17	4.41	0.20	4.21	5.34	0.00	5.54	4.21	0.00	15.38	0.00	0.00
3	18	4.95	0.25	4.69	5.34	0.00	5.59	4.69	0.00	15.32	0.00	0.00
3	19	5.48	0.31	5.17	5.34	0.00	5.65	5.17	0.00	15.27	0.00	0.00
3	20	6.15	0.39	5.75	5.34	0.00	5.73	5.75	0.00	15.19	0.00	0.00
3	21	6.81	0.48	6.33	5.34	0.00	5.82	6.33	0.00	15.10	0.00	0.00

CALCULO DE ARMADURA DE VOLADIZO

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : E-1518.3

DATOS GEOMETRIA

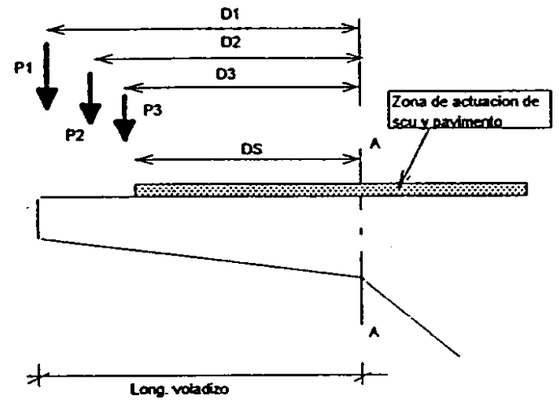


a (longitud voladizo) (m.) =	2.8
b (canto en base del voladizo) (m.) =	0.506
c (canto en extremo del voladizo) (m.) =	0.200
α (angulo cara inferior voladizo) (rad) =	0.109
Recubrimiento (c.d.g. armadura) (m.) =	0.050

DATOS MATERIALES

HORMIGONES		
	Fck(kp/cm2)	γc
Tablero	400	1.5
ACEROS		
	Fk(kp/cm2)	γs
Acero pasivo	5100	1.15

DATOS CARGAS (P1, P2, P3 son cargas permanentes).



Cargas actuantes (valores caracteristicos)

Peso propio hormigón (t/m3) =	2.50

P1(t/m)=	0.75	D1(m.)=	2.80
P2(t/m)=	0.00	D2(m.)=	0.00
P3(t/m)=	0.00	D3(m)=	0.00

Peso pavimento (t/m2)=	0.00
Valor s.c.u. (t/m2)=	0.50

Distancia actuacion s.c. DS(m.)=	2.80

Esfuerzos debidos al carro en Seccion A-A

Momento Mk(m.t/m)=	0.00
Cortante Vk(m.t/m)=	0.00

Coeficientes de ponderacion de acciones

ESTADOS LIMITES ULTIMOS	
	γf
Acciones permanentes desfav.	1.5
Acciones variables desfavorables	1.5

CALCULO

ESFUERZOS (DE SERVICIO) DEBIDOS A LAS CARGAS:

Carga		Momento(mT/	ortante (T/m)
Peso propio		-2.96	2.47
P1		-2.10	0.75
P2		0.00	0.00
P3		0.00	0.00
Pavimento		0.00	0.00
Sobrecarga repartida (s.c.u.)		-1.96	1.40
Carro		0.00	0.00
	TOTAL	-7.02	4.62

ESFUERZOS DE DISEÑO PARA EL DIMENSIONAMIENTO

Carga		Momento(mT/	ortante (T/m	V.reducido (T/
Peso propio		-4.44	3.71	2.64
P1		-3.15	1.13	0.37
P2		0.00	0.00	0.00
P3		0.00	0.00	0.00
Pavimento		0.00	0.00	0.00
Sobrecarga repartida (s.c.u.)		-2.94	2.10	1.40
Carro		0.00	0.00	0.00
	TOTAL	-10.53	6.93	4.41

ARMADO FLEXION (por metro)

As sup.(cm²)	omprobació	Def.sup.(o/oo	Def.inf.(o/oo)	ef. acero(o/oo)
5.34	Vale	-11.179	0.750	-10.000

ARMADO CORTANTE (como viga, por metro)

As 90°(cm²/m)	omprobació	Vu1 (T)	Vcu (T)	Vsu (T)
0.00	Vale	364.80	37.23	0.00

CÁLCULO DE ARMADURA DE TORSION . ART. 48.2 EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA . SUBTRAMO XV
ESTRUCTURA : E-1518.3

VANO	SECC	PP	PRET	CM	GRAD	SC1	SC2	SC3	SC4	SC5	SC6	ENVOLVENTE SC		VALORES EN E.L.U		Datos geometricos		Dimensionamiento armaduras			
		T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T(+) (m.t.)	T(-) (m.t.)	Td(+) (m.t.)	Td(-) (m.t.)	Ae (m2)	he (m.)	Tu1 (m.t.)	Td/Tu1	At (cm2/m)	Al (cm2/m)
1	1	-177	237	-49	4	-102	30	-38	-29	3	3	37	-139	125	-311	5.027	0.292	1321	0.24	7.36	6.97
1	2	-177	237	-49	4	-96	24	-38	-29	3	3	31	-133	116	-302	5.027	0.292	1321	0.23	7.14	6.77
1	3	-177	237	-49	4	-90	17	-38	-29	3	3	25	-127	106	-292	5.254	0.200	946	0.31	6.63	6.28
1	4	-177	237	-49	4	-83	11	-38	-29	3	3	19	-121	97	-283	5.254	0.200	946	0.30	6.42	6.08
1	5	-177	237	-49	4	-77	5	-38	-29	3	3	12	-115	88	-274	5.254	0.200	946	0.29	6.21	5.88
1	6	-177	237	-49	4	-71	-1	-38	-29	3	3	7	-109	80	-265	5.254	0.200	946	0.28	6.00	5.68
1	7	-177	237	-49	4	-65	-7	-38	-29	3	3	7	-103	80	-255	5.254	0.200	946	0.27	5.79	5.48
1	8	-177	237	-49	4	-59	-13	-38	-29	3	3	7	-96	80	-246	5.254	0.200	946	0.26	5.58	5.28
1	9	-177	237	-49	4	-53	-19	-38	-29	3	3	7	-90	80	-237	5.254	0.200	946	0.25	5.37	5.09
1	10	-177	237	-49	4	-46	-26	-38	-29	3	3	7	-84	80	-228	5.254	0.200	946	0.24	5.16	4.89
1	11	-177	237	-49	4	-40	-32	-38	-29	3	3	7	-78	80	-219	5.254	0.200	946	0.23	4.95	4.69
1	12	-177	237	-49	4	-34	-38	-38	-29	3	3	7	-75	80	-215	5.254	0.200	946	0.23	4.87	4.61
1	13	-177	237	-49	4	-28	-44	-38	-29	3	3	7	-82	80	-224	5.254	0.200	946	0.24	5.08	4.81
1	14	-177	237	-49	4	-22	-50	-38	-29	3	3	7	-88	80	-233	5.254	0.200	946	0.25	5.29	5.01
1	15	-177	237	-49	4	-16	-56	-38	-29	3	3	7	-94	80	-243	5.254	0.200	946	0.26	5.50	5.21
1	16	-177	237	-49	4	-10	-63	-38	-29	3	3	7	-100	80	-252	5.254	0.200	946	0.27	5.71	5.41
1	17	-177	237	-49	4	-3	-69	-38	-29	3	3	7	-106	80	-261	5.254	0.200	946	0.28	5.92	5.60
1	18	-177	237	-49	4	3	-75	-38	-29	3	3	10	-112	84	-270	5.254	0.200	946	0.29	6.13	5.80
1	19	-177	237	-49	4	9	-81	-38	-29	3	3	16	-119	94	-280	5.254	0.200	946	0.30	6.34	6.00
1	20	-177	237	-49	4	15	-87	-38	-29	3	3	22	-125	103	-289	5.027	0.292	1321	0.22	6.84	6.48
1	21	-177	237	-49	4	21	-93	-38	-29	3	3	29	-131	112	-298	5.027	0.292	1321	0.23	7.06	6.69
2	1	364	-488	100	-9	38	29	6	130	30	39	207	-9	518	-157	5.027	0.292	1321	0.39	12.28	11.63
2	2	364	-488	100	-9	38	29	13	124	30	39	201	-9	509	-157	5.027	0.292	1321	0.39	12.06	11.42
2	3	364	-488	100	-9	38	29	19	118	30	39	194	-9	500	-157	5.254	0.200	946	0.53	11.33	10.73
2	4	364	-488	100	-9	38	29	25	111	30	39	188	-9	491	-157	5.254	0.200	946	0.52	11.12	10.53
2	5	364	-488	100	-9	38	29	31	105	30	39	182	-9	481	-157	5.254	0.200	946	0.51	10.91	10.33
2	6	364	-488	100	-9	38	29	37	99	30	39	176	-9	472	-157	5.254	0.200	946	0.50	10.70	10.13
2	7	364	-488	100	-9	38	29	43	93	30	39	170	-9	463	-157	5.254	0.200	946	0.49	10.49	9.93
2	8	364	-488	100	-9	38	29	50	87	30	39	164	-9	454	-157	5.254	0.200	946	0.48	10.28	9.74
2	9	364	-488	100	-9	38	29	56	81	30	39	157	-9	445	-157	5.254	0.200	946	0.47	10.07	9.54
2	10	364	-488	100	-9	38	29	62	74	30	39	151	-9	435	-157	5.254	0.200	946	0.46	9.86	9.34
2	11	364	-488	100	-9	38	29	68	68	30	39	145	-9	426	-157	5.254	0.200	946	0.45	9.65	9.14
2	12	364	-488	100	-9	38	29	74	62	30	39	151	-9	435	-157	5.254	0.200	946	0.46	9.85	9.33
2	13	364	-488	100	-9	38	29	80	56	30	39	157	-9	444	-157	5.254	0.200	946	0.47	10.06	9.53
2	14	364	-488	100	-9	38	29	86	50	30	39	163	-9	453	-157	5.254	0.200	946	0.48	10.27	9.73
2	15	364	-488	100	-9	38	29	93	44	30	39	169	-9	463	-157	5.254	0.200	946	0.49	10.48	9.92

CÁLCULO DE ARMADURA DE TORSION . ART. 48.2 EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA . SUBTRAMO XV
ESTRUCTURA : E-1518.3

VANO	SECC	PP	PRET	CM	GRAD	SC1	SC2	SC3	SC4	SC5	SC6	ENVOLVENTE SC		VALORES EN E.L.U		Datos geometricos		Dimensionamiento armaduras			
		T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T (m.t.)	T(+) (m.t.)	T(-) (m.t.)	Td(+) (m.t.)	Td(-) (m.t.)	Ae (m2)	he (m.)	Tu1 (m.t.)	Td/Tu1	At (cm2/m)	Al (cm2/m)
2	16	364	-488	100	-9	38	29	99	38	30	39	176	-9	472	-157	5.254	0.200	946	0.50	10.69	10.12
2	17	364	-488	100	-9	38	29	105	31	30	39	182	-9	481	-157	5.254	0.200	946	0.51	10.90	10.32
2	18	364	-488	100	-9	38	29	111	25	30	39	188	-9	490	-157	5.254	0.200	946	0.52	11.11	10.52
2	19	364	-488	100	-9	38	29	117	19	30	39	194	-9	499	-157	5.254	0.200	946	0.53	11.32	10.72
2	20	364	-488	100	-9	38	29	124	13	30	39	200	-9	509	-157	5.027	0.292	1321	0.39	12.05	11.41
2	21	364	-488	100	-9	38	29	130	7	30	39	206	-9	518	-157	5.027	0.292	1321	0.39	12.27	11.62
3	1	-187	251	-51	5	3	2	-30	-39	-95	20	27	-134	114	-308	5.027	0.292	1321	0.23	7.29	6.90
3	2	-187	251	-51	5	3	2	-30	-39	-88	14	21	-128	105	-298	5.027	0.292	1321	0.23	7.07	6.69
3	3	-187	251	-51	5	3	2	-30	-39	-82	7	15	-122	96	-289	5.254	0.200	946	0.31	6.55	6.21
3	4	-187	251	-51	5	3	2	-30	-39	-76	1	8	-116	86	-280	5.254	0.200	946	0.30	6.34	6.01
3	5	-187	251	-51	5	3	2	-30	-39	-70	-5	7	-109	85	-271	5.254	0.200	946	0.29	6.13	5.81
3	6	-187	251	-51	5	3	2	-30	-39	-64	-11	7	-103	85	-261	5.254	0.200	946	0.28	5.92	5.61
3	7	-187	251	-51	5	3	2	-30	-39	-58	-17	7	-97	85	-252	5.254	0.200	946	0.27	5.71	5.41
3	8	-187	251	-51	5	3	2	-30	-39	-51	-23	7	-91	85	-243	5.254	0.200	946	0.26	5.51	5.21
3	9	-187	251	-51	5	3	2	-30	-39	-45	-30	7	-85	85	-234	5.254	0.200	946	0.25	5.30	5.02
3	10	-187	251	-51	5	3	2	-30	-39	-39	-36	7	-79	85	-224	5.254	0.200	946	0.24	5.09	4.82
3	11	-187	251	-51	5	3	2	-30	-39	-33	-42	7	-81	85	-229	5.254	0.200	946	0.24	5.18	4.90
3	12	-187	251	-51	5	3	2	-30	-39	-27	-48	7	-87	85	-238	5.254	0.200	946	0.25	5.39	5.10
3	13	-187	251	-51	5	3	2	-30	-39	-21	-54	7	-94	85	-247	5.254	0.200	946	0.26	5.60	5.30
3	14	-187	251	-51	5	3	2	-30	-39	-15	-60	7	-100	85	-256	5.254	0.200	946	0.27	5.81	5.50
3	15	-187	251	-51	5	3	2	-30	-39	-8	-66	7	-106	85	-265	5.254	0.200	946	0.28	6.02	5.70
3	16	-187	251	-51	5	3	2	-30	-39	-2	-73	7	-112	85	-275	5.254	0.200	946	0.29	6.22	5.89
3	17	-187	251	-51	5	3	2	-30	-39	4	-79	11	-118	91	-284	5.254	0.200	946	0.30	6.43	6.09
3	18	-187	251	-51	5	3	2	-30	-39	10	-85	17	-124	100	-293	5.254	0.200	946	0.31	6.64	6.29
3	19	-187	251	-51	5	3	2	-30	-39	16	-91	23	-131	109	-302	5.254	0.200	946	0.32	6.85	6.49
3	20	-187	251	-51	5	3	2	-30	-39	22	-97	30	-137	118	-312	5.027	0.292	1321	0.24	7.38	6.99
3	21	-187	251	-51	5	3	2	-30	-39	29	-103	36	-143	127	-321	5.027	0.292	1321	0.24	7.60	7.20

ESTADO LIMITE ULTIMO DE ROTURA POR FLEXION

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1518.3

ESTADO LIMITE ULTIMO DE ROTURA POR FLEXION.

Se verificara que el momento que Md < Mu para las secciones mas comprometidas del tablero .

Md= momento de diseño que solicita la seccion.
Mu= momento ultimo que resiste la seccion.

Para el calculo de Md se tienen en cuenta los siguientes estado de carga y coeficientes de ponderacion:

	Coeficiente caso desfavorable	Coeficiente caso favorable
CARGA PERMANENTE	1.50	0.90
SOBRECARGAS DE USO	1.50	0.00
GRADIENTE TERMICO	1.50	0.00
PRETENSADO HIPERESTATICO	1.00	0.70

Para el calculo de Mu se utilizara el programa FAGUS-2 . En este programa se introducira la geometria y armaduras de cada seccion junto con la predeformacion del acero activo hasta el estado de neutralizacion .
Para calcular las predeformaciones del acero activo se utiliza la hoja de calculo FLEXION.XLS cuyo metodo de calculo se explica en las hojas adjuntas.

OBTENCION DE MOMENTOS DE DISEÑO

	HIPOTESIS					Md(m.t)
SECCION	PESO PROPIO	CARGA MUERTA	ENVOL. SOBREC.	GRADIENTE TERMICO	PRET. HIPEREST.	
S10 - VANO 1	567.3	252.0	535.6	117.8	65.8	2274.9
S01- VANO 2	-278.3	-189.7	-353.6	0.0	144.7	-1131.1
S11- VANO 2	386.9	139.9	413.0	262.7	187.0	1990.8
S21-VANO 4	2099.0	692.5	1251.4	0.0	-228.5	5904.4

ESTADO LIMITE ULTIMO DE AGOTAMIENTO POR FLEXION

CALCULO DE PREDEFORMACION DE ACERO ACTIVO

DATOS:

Proyecto	L.A.V. MADRID-ZARAGOZA
Nombre estructura:	E-1518.3
Vano nº:	1
Seccion nº:	10

	DATOS PRETENSADO	
Hipotesis	(t=0)	(t=infinito)
AXIL(t.)	1824.1	1587
MOMENTO(m.t)	-1210.3	-1053
M.HIPERESTATICO	75.6	65.8

CARACT. DE SECCION BRUTA	
AREA(m2)	7.173
INERCIA(m4)	2.029
V(m.)	0.691
V' (m.)	-1.059

MODULOS ELASTICIDAD		
ACERO ACTIVO (KP/CM2)	Ep=	1900000
HORMIGON (KP/CM2)	Ec=	350000

SECCION HOMOGENEIZADA.	
AREA(m2)	7.173
INERCIA(m4)	2.029
V(m.)	0.691
V' (m.)	-1.059

DATOS DE FAMILIAS DE CABLES DE PRETENSADO
(Dejar en blanco las que no existan)

FAMILIA Nº	Nº CABLES	AREA CABLE (cm2)	DIAM VAINA. (cm.)	DISTANCIA A BORDE SUP(m.)
1	8	16.8	7.5	1.396
2				
3				
4				
5				
6				
7				
8				
9				
10				

RESULTADOS:

PREDEFORMACIONES DE FAMILIAS DE CABLES DE PRETENSADO

FAMILIA Nº	Alargamiento de tesado Epf	P.Isostatico inicial S.Neta Ecpo	Perd.diferidas S.Homogeneiz. EcΔpf	Suma de def. anteriores Estado neutralizado
1	6.21E-03	2.02E-04	-2.60E-05	6.39E-03
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-

ESTADO LIMITE ULTIMO DE AGOTAMIENTO POR FLEXION

CALCULO DE PREDEFORMACION DE ACERO ACTIVO

DATOS:

Proyecto	L.A.V. MADRID-ZARAGOZA
Nombre estructura:	E-1518.3
Vano nº:	2
Seccion nº:	11

	DATOS PRETENSADO	
Hipotesis	(t=0)	(t=infinito)
AXIL(t.)	1700.0	1479
MOMENTO(m.t)	-820.3	-713.7
M.HIPERESTATICO	214.9	187

CARACT. DE SECCION BRUTA	
AREA(m2)	7.173
INERCIA(m4)	2.029
V(m.)	0.691
V' (m.)	-1.059

MODULOS ELASTICIDAD		
ACERO ACTIVO (KP/CM2)	Ep=	1900000
HORMIGON (KP/CM2)	Ec=	350000

SECCION HOMOGENEIZADA.	
AREA(m2)	7.173
INERCIA(m4)	2.029
V(m.)	0.691
V' (m.)	-1.059

DATOS DE FAMILIAS DE CABLES DE PRETENSADO
(Dejar en blanco las que no existan)

FAMILIA Nº	Nº CABLES	AREA CABLE (cm2)	DIAM VAINA. (cm.)	DISTANCIA A BORDE SUP(m.)
1	8	16.8	7.5	1.3
2				
3				
4				
5				
6				
7				
8				
9				
10				

RESULTADOS:

PREDEFORMACIONES DE FAMILIAS DE CABLES DE PRETENSADO

FAMILIA Nº	Alargamiento de tesado εpf	P.Isostatico inicial S.Neta εcpo	Perd.diferidas S.Homogeneiz. εcΔpf	Suma de def. anteriores Estado neutralizado
1	5.79E-03	1.58E-04	-2.03E-05	5.93E-03
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-

ESTADO LIMITE ULTIMO DE AGOTAMIENTO POR FLEXION

CALCULO DE PREDEFORMACION DE ACERO ACTIVO

DATOS:

Proyecto	L.A.V. MADRID-ZARAGOZA
Nombre estructura:	E-1518.3
Vano nº:	2
Seccion nº:	1

	DATOS PRETENSADO	
Hipotesis	(t=0)	(t=infinito)
AXIL(t.)	1769.0	1539
MOMENTO(m.t)	472.3	410.9
M.HIPERESTATICO	166.3	144.7

CARACT. DE SECCION BRUTA	
AREA(m2)	8.485
INERCIA(m4)	2.215
V(m.)	0.723
V' (m.)	-1.027

MODULOS ELASTICIDAD		
ACERO ACTIVO (KP/CM2)	Ep=	1900000
HORMIGON (KP/CM2)	Ec=	350000

SECCION HOMOGENEIZADA.	
AREA(m2)	8.485
INERCIA(m4)	2.215
V(m.)	0.723
V' (m.)	-1.027

DATOS DE FAMILIAS DE CABLES DE PRETENSADO
(Dejar en blanco las que no existan)

FAMILIA Nº	Nº CABLES	AREA CABLE (cm2)	DIAM VAINA. (cm.)	DISTANCIA A BORDE SUP(m.)
1	8	16.8	7.5	0.55
2				
3				
4				
5				
6				
7				
8				
9				
10				

RESULTADOS:

PREDEFORMACIONES DE FAMILIAS DE CABLES DE PRETENSADO

FAMILIA Nº	Alargamiento de tesado εpf	P.Isostatico inicial S.Neta εcpo	Perd.diferidas S.Homogeneiz. εcΔpf	Suma de def. anteriores Estado neutralizado
1	6.03E-03	6.67E-05	-8.63E-06	6.08E-03
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-

ESTADO LIMITE ULTIMO DE AGOTAMIENTO POR FLEXION

CALCULO DE PREDEFORMACION DE ACERO ACTIVO

DATOS:

Proyecto	L.A.V. MADRID-ZARAGOZA
Nombre estructura:	E-1518.3.
Vano nº:	4
Seccion nº:	21

	DATOS PRETENSADO	
Hipotesis	(t=0)	(t=infinito)
AXIL(t.)	5001.1	4351
MOMENTO(m.t)	-3703.4	-3222
M.HIPERESTATICO	-262.6	-228.5

CARACT. DE SECCION BRUTA	
AREA(m2)	6.455
INERCIA(m4)	1.5
V(m.)	0.782
V' (m.)	0.868

MODULOS ELASTICIDAD		
ACERO ACTIVO '(KP/CM2)	Ep=	1900000
HORMIGON (KP/CM2)	Ec=	350000

SECCION HOMOGENEIZADA.	
AREA(m2)	6.455
INERCIA(m4)	1.5
V(m.)	0.782
V' (m.)	0.868

DATOS DE FAMILIAS DE CABLES DE PRETENSADO
(Dejar en blanco las que no existan)

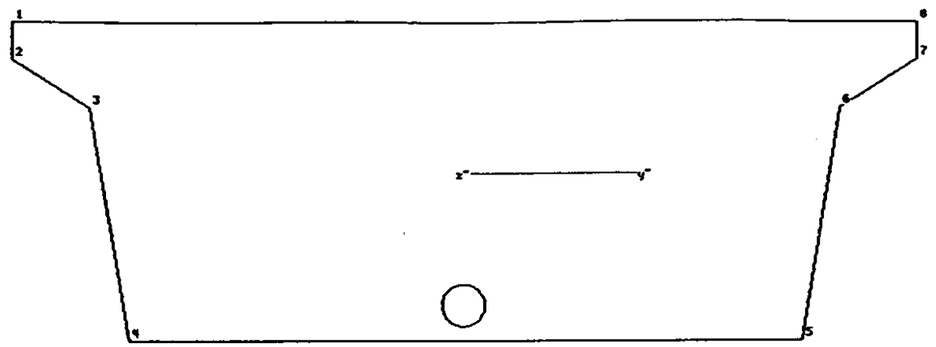
FAMILIA Nº	Nº CABLES	AREA CABLE (cm2)	DIAM VAINA. (cm.)	DISTANCIA A BORDE SUP(m.)
1	10	37.8	12	1.47
2				
3				
4				
5				
6				
7				
8				
9				
10				

RESULTADOS:

PREDEFORMACIONES DE FAMILIAS DE CABLES DE PRETENSADO

FAMILIA Nº	Alargamiento de tesado εpf	P.Isostatico inicial S.Neta εcpo	Perd.diferidas S.Homogeneiz. εcΔpf	Suma de def. anteriores Estado neutralizado
1	6.06E-03	7.02E-04	-8.74E-05	6.67E-03
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-

Mstb. 1 : 30.0



Sección :"RIOSTRA" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	-235.00	0.00	2	-235.00	-20.00
3	-195.00	-45.00	4	-175.00	-165.00
5	175.00	-165.00	6	195.00	-45.00
7	235.00	-20.00	8	235.00	0.00

Características mecánicas de la sección:
Area : Ax= 6.455 [m2]
Momentos de inercia : Iy= 1.500 [m4] Iz= 8.481 [m4]
Inercia a torsión : Ix= 6.631 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.782836 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-2.350	-3.609	0.559
dch.	Iz	2.350	3.609	-0.559
abajo	Iy	-0.867	-1.730	0.297
arriba	Iy	0.783	1.916	-0.268

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	378.00	0.00	-147.00		
	Total:		378.00	Cuantía de armadura: 0.586 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

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Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	6.670E-0003				

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H400"	380000.0	-226.600	-2.000	0.0	8.170	400.000
"A1900"	2.00E+06	15540.0				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

---

Cálculo Resistencia Ultima: Viga "RIOSTRA"/"B1"

Solicitación Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				5904.400	

Coeficiente de seguridad 1.170

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-235.00	0.00	-3.500	-226.600	"H400"
Hormigón-Max	175.00	-165.00	4.296	0.000	"H400"
Armadura-Max	-0.00	-147.00	3.446	15540.0	"A1900"

Fibra neutra zn -74.07 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 74.07 cm Zona comprimida/Canto útil 0.50

Esfuerzos (Rotura) :		Rigideces secantes:		Deformaciones:	
N =	0.000 [t]	*EAx=	--1-- [t]	1.988805E-04	
My=	6910.715 [tm]	Ely=	--1-- [tm2]	4.724973E-03	[1/m]
Mz=	0.000 [tm]	*Elz=	--1-- [tm2]	-1.051585E-12	[1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones en vertices de la sección (Rotura):

Coordenadas y [cm]	z [cm]	Eps [o/oo]	Est. I [kp/cm2]	Est. II [kp/cm2]	Dist.Fuerz.Compr. [t]	[cm]
-235.00	0.00	-3.500		-226.6	-5875.364	48.91
-235.00	-20.00	-2.555		-226.6		
-195.00	-45.00	-1.374		-204.4		
-175.00	-165.00	4.296		0.0		
175.00	-165.00	4.296		0.0		
195.00	-45.00	-1.374		-204.4		
235.00	-20.00	-2.555		-226.6		
235.00	0.00	-3.500		-226.6		

Deformaciones y tensiones de armadura de pretensado (Rotura):

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [kp/cm2]	Sigma-p [kp/cm2
1	0.000	-147.000	6.670	3.446	10.116	2200.000	15540.0

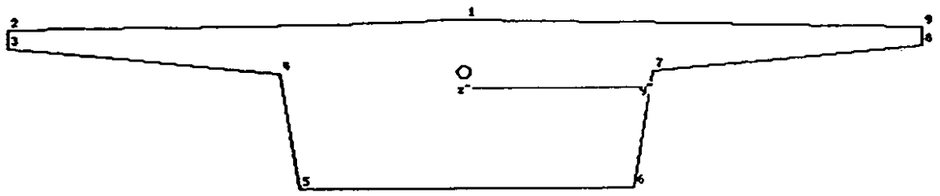
Parámetros globales de cálculo :

Norma .....: EH-1991
Inclinación estándar bielas comprimidas hormigón ..: 45.00 [Grados]
Coeficiente de fluencia phi .....: 0.00
Factor minoración de la resistencia de la sección : 1.00
Def. máxima en compresión centrada del hormigón ..: -2.00 [o/oo]
Deformación máxima en flexión en vigas .....: -3.50 [o/oo]
Def. máxima en tracción del acero en vigas .....: 10.00 [o/oo]
Modo de análisis / Inclinación del eje neutro ....: flexión esviada
Cuantía mínima de armadura long. para pilas .....: 0.40 [o/o]
Cuantía máxima de armadura long. .....: 8.00 [o/o]
Modo de pretensado .....: adherente
NO se usaron coef. de homogeneización para calcular las caract. mecánicas

Modelo para dimensionamiento a cortante:

Usar un canto útil constante en los cálculos a cortante
Se tomará el cortante como tracción longitudinal adicional

Mstb. 1 : 60.0



Sección :"S01-V2" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			

Características mecánicas de la sección:
Area : Ax= 8.485 [m2]
Momentos de inercia : Iy= 2.215 [m4] Iz= 28.448 [m4]
Inercia a torsión : Ix= 11.458 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.723786 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.989	0.706
dch.	Iz	4.750	5.989	-0.706
abajo	Iy	-1.026	-2.158	0.361
arriba	Iy	0.724	3.060	-0.254

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	134.40	0.00	-55.00		
Total:			134.40	Cuantía de armadura: 0.158 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	6.080E-0003				

¡No se han definido valores para el cálculo a cortante!

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Características del material:

Nom.Mat.	Módulo E	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcv,min [kp/cm2]
"H400"	380000.0	-226.600	-2.000	0.0	8.170	400.000
"A1900"	2.00E+06	15540.0				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Cálculo Resistencia Ultima: Viga "S01-V2"/"B1"

Solicitación Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				-1131.100	

Coeficiente de seguridad 1.968

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	175.00	-175.00	-3.500	-226.600	"H400"
Hormigón-Max	-0.00	0.00	15.564	0.000	"H400"
Armadura-Max	-0.00	-55.00	9.572	15540.0	"A1900"

Fibra neutra zn -142.87 cm yn 0.00 cm Angulo 0.0
Ancho zona comprim. 32.13 cm Zona comprimida/Canto útil 0.27

Esfuerzos (Rotura)	: Rigideces secantes:		Deformaciones:	
N = 0.000 [t]	*EAx=	--1-- [t]	7.679254E-03	
My= -2226.282 [tm]	Ely=	--1-- [tm2]	-1.089368E-02	[1/m]
Mz= 0.000 [tm]	*Elz=	--1-- [tm2]	1.330654E-12	[1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones en vertices de la sección (Rotura):

Coordenadas y [cm]	z [cm]	Eps [o/oo]	Est. I [kp/cm2]	Est. II [kp/cm2]	Dist.Fuerz.Compr. [t]	[cm]
0.00	0.00	15.564		0.0	-2088.916	89.20
-475.00	-9.50	14.529		0.0		
-475.00	-29.50	12.350		0.0		
-195.00	-54.50	9.627		0.0		
-175.00	-175.00	-3.500		-226.6		
175.00	-175.00	-3.500		-226.6		
195.00	-54.50	9.627		0.0		
475.00	-29.50	12.350		0.0		
475.00	-9.50	14.529		0.0		

Deformaciones y tensiones de armadura de pretensado (Rotura):

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot (o/oo]	D-Sigma-p [kp/cm2]	Sigma-p [kp/cm2
1	0.000	-55.000	6.080	9.572	15.652	3380.000	15540.0

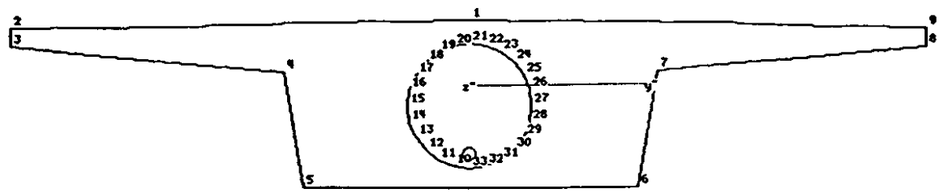
Parámetros globales de cálculo :

Norma .....: EH-1991
Inclinación estándar bielas comprimidas hormigón ..: 45.00 [Grados]
Coeficiente de fluencia phi .....: 0.00
Factor minoración de la resistencia de la sección : 1.00
Def. máxima en compresión centrada del hormigón ..: -2.00 [o/oo]
Deformación máxima en flexión en vigas .....: -3.50 [o/oo]
Def. máxima en tracción del acero en vigas .....: 10.00 [o/oo]
Modo de análisis / Inclinación del eje neutro ....: flexión esviada
Cuantía mínima de armadura long. para pilas .....: 0.40 [o/o]
Cuantía máxima de armadura long. .....: 8.00 [o/o]
Modo de pretensado .....: adherente
NO se usaron coef. de homogeneización para calcular las caract. mecánicas

Modelo para dimensionamiento a cortante:

Usar un canto útil constante en los cálculos a cortante
Se tomará el cortante como tracción longitudinal adicional

Mstb. 1 : 60.0



Sección :"S10-V1" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			
Puntos aligeramiento: 10			-16.82	-152.78	
11	-32.50	-146.29	12	-45.96	-135.96
13	-56.29	-122.50	14	-62.78	-106.82
15	-65.00	-90.00	16	-62.78	-73.18
17	-56.29	-57.50	18	-45.96	-44.04
19	-32.50	-33.71	20	-16.82	-27.21
21	0.00	-25.00	22	16.82	-27.21
23	32.50	-33.71	24	45.96	-44.04
25	56.29	-57.50	26	62.78	-73.18
27	65.00	-90.00	28	62.78	-106.82
29	56.29	-122.50	30	45.96	-135.96
31	32.50	-146.29	32	16.82	-152.78
33	0.00	-155.00			

Características mecánicas de la sección:
Area : Ax= 7.173 [m2]
Momentos de inercia : Iy= 2.029 [m4] Iz= 28.311 [m4]
Inercia a torsión : Ix= 8.188 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.691547 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.960	0.831
dch.	Iz	4.750	5.960	-0.831
abajo	Iy	-1.058	-1.917	0.409
arriba	Iy	0.692	2.935	-0.267

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	134.40	0.00	-139.60		
Total:			134.40	Cuantía de armadura: 0.187 [o/o]			

Cód. dimensionamiento: (0) = As constante

Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	6.390E-0003				

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H400"	380000.0	-226.600	-2.000	0.0	8.170	400.000
"A1900"	2.00E+06	15540.0				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Cálculo Resistencia Ultima: Viga "S10-V1"/"B1"

Solicitación Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				2274.900	

Coeficiente de seguridad 1.185

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-0.00	0.00	-1.877	-225.743	"H400"
Hormigón-Max	175.00	-175.00	13.012	0.000	"H400"
Armadura-Max	-0.00	-139.60	10.000	15540.0	"A1900"

Fibra neutra zn -22.06 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 22.06 cm Zona comprimida/Canto útil 0.16

Esfuerzos (Rotura)		: Rigideces secantes:			Deformaciones:	
N =	0.000 [t]	*EAx=	--1--	[t]	4.006594E-03	
My=	2694.754 [tm]	EIy=	--1--	[tm2]	8.507891E-03	[1/m]
Mz=	0.000 [tm]	*EIz=	--1--	[tm2]	-9.727015E-14	[1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones en vertices de la sección (Rotura):

Coordenadas y [cm]	z [cm]	Eps [o/oo]	Est. I [kp/cm2]	Est. II [kp/cm2]	Dist.Fuerz.Compr. [t]	[cm]
0.00	0.00	-1.877		-225.7	-2088.971	58.57
-475.00	-9.50	-1.069		-177.5		
-475.00	-29.50	0.633		0.0		
-195.00	-54.50	2.760		0.0		
-175.00	-175.00	13.012		0.0		
175.00	-175.00	13.012		0.0		
195.00	-54.50	2.760		0.0		
475.00	-29.50	0.633		0.0		
475.00	-9.50	-1.069		-177.5		
0.00	0.00	-1.877		-225.7		
-16.82	-152.78	11.122		0.0		
-32.50	-146.29	10.569		0.0		
-45.96	-135.96	9.690		0.0		
-56.29	-122.50	8.545		0.0		
-62.78	-106.82	7.211		0.0		
-65.00	-90.00	5.780		0.0		
-62.78	-73.18	4.349		0.0		
-56.29	-57.50	3.015		0.0		
-45.96	-44.04	1.870		0.0		
-32.50	-33.71	0.991		0.0		
-16.82	-27.21	0.438		0.0		
0.00	-25.00	0.250		0.0		
16.82	-27.21	0.438		0.0		

Programa F A G U S - 2 V.1.32
GINPROSA Ingenieros Consultores 14.07.98

32.50	-33.71	0.991	0.0
45.96	-44.04	1.870	0.0
56.29	-57.50	3.015	0.0
62.78	-73.18	4.349	0.0
65.00	-90.00	5.780	0.0
62.78	-106.82	7.211	0.0
56.29	-122.50	8.545	0.0
45.96	-135.96	9.690	0.0
32.50	-146.29	10.569	0.0
16.82	-152.78	11.122	0.0
0.00	-155.00	11.310	0.0
-16.82	-152.78	11.122	0.0

Deformaciones y tensiones de armadura de pretensado (Rotura):

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [kp/cm2]	Sigma-p [kp/cm2
1	0.000	-139.600	6.390	10.000	16.390	2760.000	15540.0

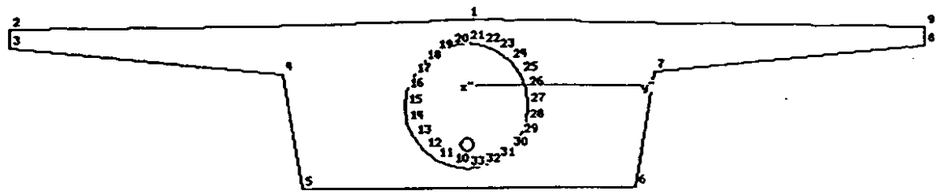
Parámetros globales de cálculo :

Norma .....: EH-1991
Inclinación estándar bielas comprimidas hormigón .: 45.00 [Grados]
Coeficiente de fluencia phi .....: 0.00
Factor minoración de la resistencia de la sección : 1.00
Def. máxima en compresión centrada del hormigón ..: -2.00 [o/oo]
Deformación máxima en flexión en vigas .....: -3.50 [o/oo]
Def. máxima en tracción del acero en vigas .....: 10.00 [o/oo]
Modo de análisis / Inclinación del eje neutro ....: flexión esviada
Cuantía mínima de armadura long. para pilas .....: 0.40 [o/o]
Cuantía máxima de armadura long. .....: 8.00 [o/o]
Modo de pretensado .....: adherente
NO se usaron coef. de homogeneización para calcular las caract. mecánicas

Modelo para dimensionamiento a cortante:

Usar un canto útil constante en los cálculos a cortante
Se tomará el cortante como tracción longitudinal adicional

Mstb. 1 : 60.0



Sección :"S11-V2" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			
Puntos aligeramiento:	10		-16.82	-152.78	
11	-32.50	-146.29	12	-45.96	-135.96
13	-56.29	-122.50	14	-62.78	-106.82
15	-65.00	-90.00	16	-62.78	-73.18
17	-56.29	-57.50	18	-45.96	-44.04
19	-32.50	-33.71	20	-16.82	-27.21
21	0.00	-25.00	22	16.82	-27.21
23	32.50	-33.71	24	45.96	-44.04
25	56.29	-57.50	26	62.78	-73.18
27	65.00	-90.00	28	62.78	-106.82
29	56.29	-122.50	30	45.96	-135.96
31	32.50	-146.29	32	16.82	-152.78
33	0.00	-155.00			

Características mecánicas de la sección:
Area : Ax= 7.173 [m2]
Momentos de inercia : Iy= 2.029 [m4] Iz= 28.311 [m4]
Inercia a torsión : Ix= 8.188 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.691547 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.960	0.831
dch.	Iz	4.750	5.960	-0.831
abajo	Iy	-1.058	-1.917	0.409
arriba	Iy	0.692	2.935	-0.267

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	134.40	0.00	-130.00		
Total:			134.40	Cuantía de armadura: 0.187 [o/o]			

Cód. dimensionamiento: (0) = As constante

Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	5.930E-0003				

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H400"	380000.0	-226.600	-2.000	0.0	8.170	400.000
"A1900"	2.00E+06	15540.0				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Cálculo Resistencia Ultima: Viga "S11-V2"/"81"

Solicitación Unidades : (tm)

N	Vy	Vz	Mx	My	Mz
				1990.800	

Coeficiente de seguridad 1.255

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-0.00	0.00	-1.984	-226.586	"H400"
Hormigón-Max	175.00	-175.00	14.148	0.000	"H400"
Armadura-Max	-0.00	-130.00	10.000	15540.0	"A1900"

Fibra neutra zn -21.52 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 21.52 cm Zona comprimida/Canto útil 0.17

Esfuerzos (Rotura)		: Rigideces secantes:		Deformaciones:	
N =	0.000 [t]	*EAx=	--1-- [t]	4.390956E-03	
My=	2497.679 [tm]	EIy=	--1-- [tm2]	9.218537E-03	[1/m]
Mz=	0.000 [tm]	*EIz=	--1-- [tm2]	-1.380961E-13	[1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones en vertices de la sección (Rotura):

Coordenadas y [cm]	z [cm]	Eps [o/oo]	Est. I [kp/cm2]	Est. II [kp/cm2]	Dist.Fuerz.Compr. [t]	[cm]
0.00	0.00	-1.984		-226.6	-2089.030	58.74
-475.00	-9.50	-1.108		-181.6		
-475.00	-29.50	0.735		0.0		
-195.00	-54.50	3.040		0.0		
-175.00	-175.00	14.148		0.0		
175.00	-175.00	14.148		0.0		
195.00	-54.50	3.040		0.0		
475.00	-29.50	0.735		0.0		
475.00	-9.50	-1.108		-181.6		
0.00	0.00	-1.984		-226.6		
-16.82	-152.78	12.100		0.0		
-32.50	-146.29	11.502		0.0		
-45.96	-135.96	10.550		0.0		
-56.29	-122.50	9.309		0.0		
-62.78	-106.82	7.863		0.0		
-65.00	-90.00	6.313		0.0		
-62.78	-73.18	4.762		0.0		
-56.29	-57.50	3.317		0.0		
-45.96	-44.04	2.076		0.0		
-32.50	-33.71	1.123		0.0		
-16.82	-27.21	0.525		0.0		
0.00	-25.00	0.321		0.0		
16.82	-27.21	0.525		0.0		

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32.50	-33.71	1.123	0.0
45.96	-44.04	2.076	0.0
56.29	-57.50	3.317	0.0
62.78	-73.18	4.762	0.0
65.00	-90.00	6.313	0.0
62.78	-106.82	7.863	0.0
56.29	-122.50	9.309	0.0
45.96	-135.96	10.550	0.0
32.50	-146.29	11.502	0.0
16.82	-152.78	12.100	0.0
0.00	-155.00	12.305	0.0
-16.82	-152.78	12.100	0.0

Deformaciones y tensiones de armadura de pretensado (Rotura):

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [kp/cm2]	Sigma-p [kp/cm2
1	0.000	-130.000	5.930	10.000	15.930	3680.000	15540.0

Parámetros globales de cálculo :

Norma .....: EH-1991
Inclinación estándar bielas comprimidas hormigón ..: 45.00 [Grados]
Coeficiente de fluencia phi .....: 0.00
Factor minoración de la resistencia de la sección : 1.00
Def. máxima en compresión centrada del hormigón ..: -2.00 [o/oo]
Deformación máxima en flexión en vigas .....: -3.50 [o/oo]
Def. máxima en tracción del acero en vigas .....: 10.00 [o/oo]
Modo de análisis / Inclinación del eje neutro ....: flexión esviada
Cuantía mínima de armadura long. para pilas .....: 0.40 [o/o]
Cuantía máxima de armadura long. .....: 8.00 [o/o]
Modo de pretensado .....: adherente
NO se usaron coef. de homogeneización para calcular las caract. mecánicas

Modelo para dimensionamiento a cortante:

Usar un canto útil constante en los cálculos a cortante
Se tomará el cortante como tracción longitudinal adicional

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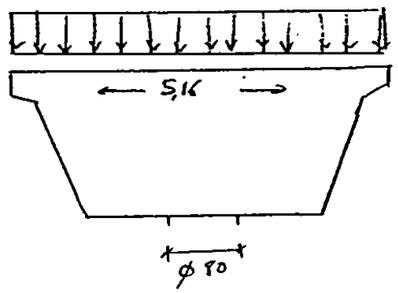
ASUNTO
E-1518.3
ARMADURA EN RIOSTRA DE PILAS

FECHA

PAG. 1

En la situación más desfavorable tenemos: una maniobra vertical

$R_{J,max} = 1100$ tm.



$q = \frac{1100}{5,16} = 213,2$ t/m.

$M_J = 213,2 \cdot \left(\frac{5,16}{2}\right) \cdot \frac{5,16}{4} = 709,5$ mt.

$V_J = 550$ tm.

Suponemos un ancho de viga colaborante de 2,00 m.

$A_{s,flexión} = 53$ cm²/m. → ϕ32/0,15

$V_{cu} = 302,1$ tm → $A_{90} = 47,73$ cm²/m. → 4cϕ16/0,15

GINPROSA

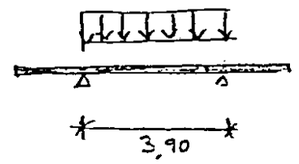
ASUNTO
E-1518.3
ARMADURA EN RIOSTRA DE ESTRIBOS

PAG. 1

La reacción máxima sobre los apoyos de estribos es:

$R_{max} = 370$ t/m x 2 = 740 tm.

Para calcular la armadura inferior suponemos concentrada la reacción en los 2,40 del nivel inferior:



$q = \frac{740}{3,90} = 190$ t/m.

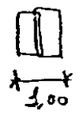
$M_J = 190 \cdot \frac{3,9^2}{8} = 360$ mt

$V_J = 370$ tm.

Suponemos un ancho de 2,00 m para tomar estos esfuerzos y tenemos

$A_{s,flexión} = 25$ cm²/m. → ϕ25/0,15

$A_{90,cortante} = 7,18$ cm²/m. → 2cϕ16/0,20



GINPROSA

ASUNTO
E-1518.3
DIMENSIONAMIENTO DE TACOS EN ESTRIBOS.

FECHA

PAG. 1

Según la disposición de apoyos adoptada la fuerza de frenado y viento se toma íntegramente por los tacos dispuestos al eje en los estribos. Las fuerzas de frenado y coacción se toman por el tensón dispuesto en el estribo 1. Las fuerzas de viento y fuerza centrífuga son:

VIENTO

$f_w = 154\,(2-0{,}7\lambda) = 200$ kp/m²

$A = 0{,}2 \times (1{,}75 + 0{,}70 + 3{,}50 + 1{,}50) = 1{,}50$ t/m.

FUERZA CENTRIFUGA

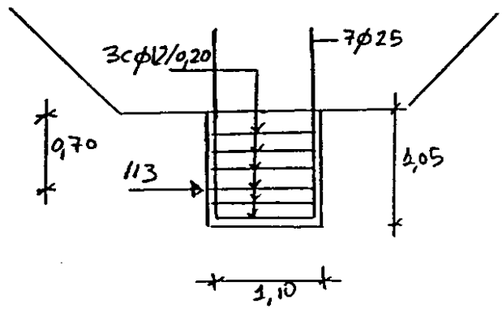
$F_c = Q \cdot \frac{v^2}{127\,r} =$ $\quad r = 2500$, $Q = 121$ t, $v = 220$ km/h.

$F_c = 1{,}83$ t/m.

Las fuerzas transversales actuantes sobre Cos altura son:

$F_T = \left(\frac{4 + 17{,}60 \times 3}{2}\right) \times (1{,}83 + 1{,}50) = 95$ ton.

$F_{Td} = 1{,}50 \times 95 = 113$ ton.



$H_d = 113 \times 0{,}70 = 80$ mt.

$A_{s.\,flexion} = 28{,}1$ cm² → 7φ25

$V_d = 113$ ton. $V_{cu} = 60$ ton.

$A_{90} = \frac{113 - 60}{0{,}9 \cdot 4{,}2 \cdot 1{,}05} = 13{,}40$ cm²/m.

GINPROSA

ASUNTO
E-1518.3
TENDONES DE ANCLAJE AL ESTRIBO

PAG. 1

Peso propio + carga muerta = 2175 ton.

Fuerza de coacción sobre punto fijo = $0{,}03 \times 2175 = 65{,}25$ ton.

Carga de frenado = $\frac{(10 \times 56{,}8 + 30 \times 2)}{8} = 78{,}50$ ton.

Fuerza total en punto fijo = $78{,}5 + 65{,}25 = 143{,}75$ ton.

Esta fuerza se toma con un tensón Las fuerzas de diseño del mismo son:

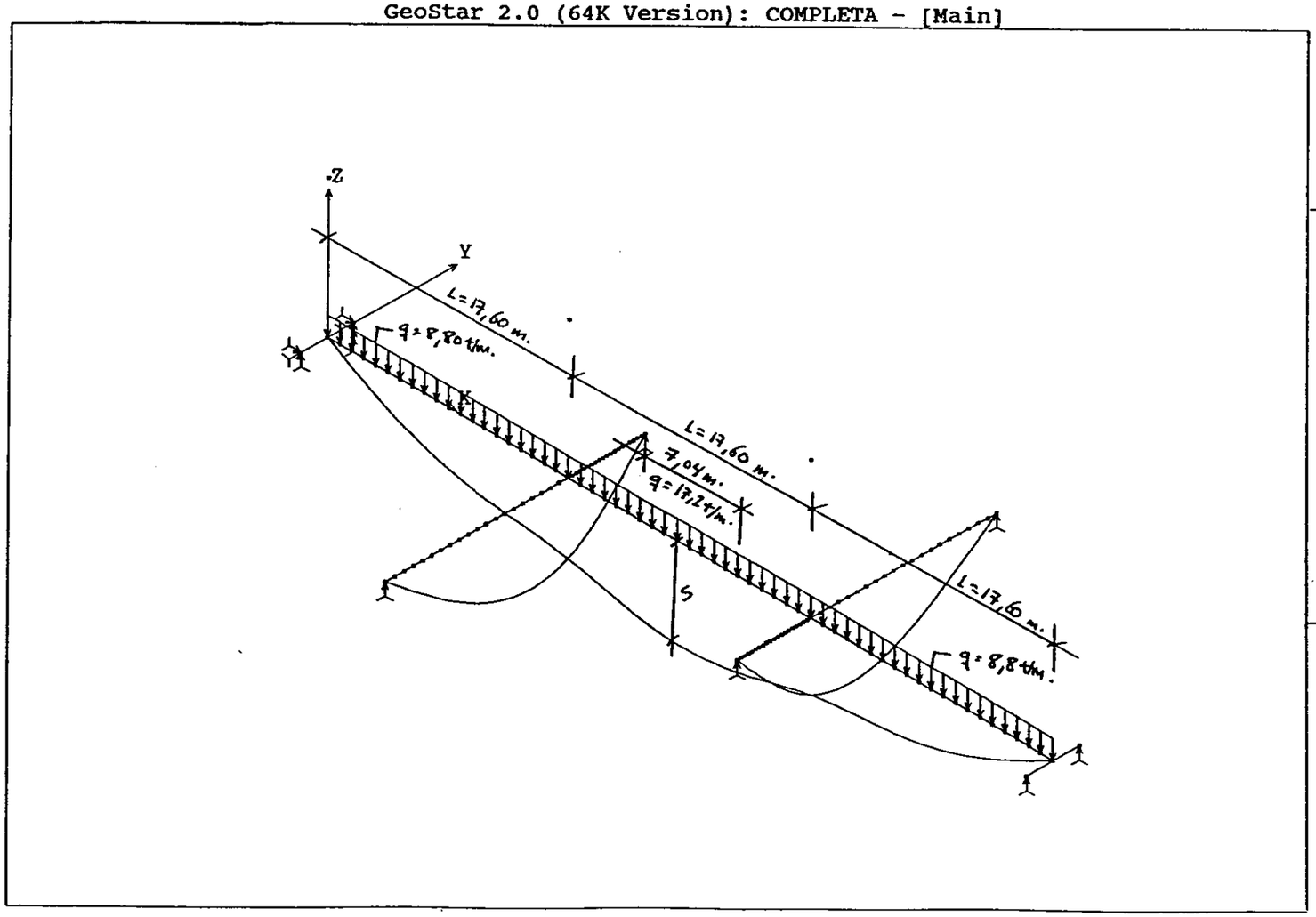
En servicio $H_s = 143{,}75$ ton.

En rotura $H_d = H_c \times 1{,}50 = 215$ ton.

Se dispone un tensón de $15 \times 0{,}6''$ con una carga de rotura de 399 ton. Este tensón se tesa al 40 % de su carga de rotura $P_o = 159{,}60$ ton.

Se disponen 2 neoprenos de $200 \times 400 \times 60$ (24)

E-1518.3 ESTADO LIMITE DE DEFORMACIONES



$$\frac{S}{L} = \frac{3,9}{17600} = \frac{1}{4518} < \frac{1}{1363} \quad \therefore \text{VERIFICA}$$

Load case 9

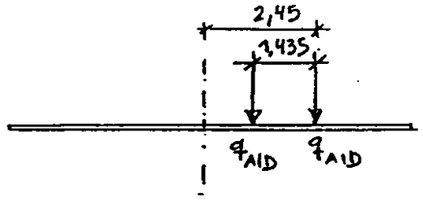
Node	UX	UY	UZ	RX	RY	RZ
1	0.000000	0.000000	0.000000	0.000000	0.000339	0.000000
2	0.000000	0.000000	-0.000298	0.000014	0.000336	0.000000
3	0.000000	0.000000	-0.000590	0.000028	0.000328	0.000000
4	0.000000	0.000000	-0.000873	0.000041	0.000315	0.000000
5	0.000000	0.000000	-0.001142	0.000055	0.000297	0.000000
6	0.000000	0.000000	-0.001395	0.000069	0.000276	0.000000
7	0.000000	0.000000	-0.001628	0.000083	0.000253	0.000000
8	0.000000	0.000000	-0.001840	0.000096	0.000228	0.000000
9	0.000000	0.000000	-0.002029	0.000110	0.000202	0.000000
10	0.000000	0.000000	-0.002196	0.000124	0.000176	0.000000
11	0.000000	0.000000	-0.002340	0.000138	0.000151	0.000000
12	0.000000	0.000000	-0.002462	0.000151	0.000127	0.000000
13	0.000000	0.000000	-0.002564	0.000165	0.000105	0.000000
14	0.000000	0.000000	-0.002649	0.000179	0.000087	0.000000
15	0.000000	0.000000	-0.002718	0.000193	0.000072	0.000000
16	0.000000	0.000000	-0.002776	0.000206	0.000061	0.000000
17	0.000000	0.000000	-0.002827	0.000220	0.000056	0.000000
18	0.000000	0.000000	-0.002876	0.000234	0.000057	0.000000
19	0.000000	0.000000	-0.002929	0.000248	0.000065	0.000000
20	0.000000	0.000000	-0.002992	0.000261	0.000079	0.000000
21	0.000000	0.000000	-0.003070	0.000275	0.000100	0.000000
22	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24	0.000000	0.000000	-0.003168	0.000247	0.000122	0.000000
25	0.000000	0.000000	-0.003281	0.000219	0.000134	0.000000
26	0.000000	0.000000	-0.003401	0.000190	0.000138	0.000000
27	0.000000	0.000000	-0.003522	0.000162	0.000134	0.000000
28	0.000000	0.000000	-0.003635	0.000134	0.000122	0.000000
29	0.000000	0.000000	-0.003735	0.000106	0.000104	0.000000
30	0.000000	0.000000	-0.003816	0.000077	0.000080	0.000000
31	0.000000	0.000000	-0.003875	0.000049	0.000052	0.000000
32	0.000000	0.000000	-0.003907	0.000021	0.000020	0.000000
33	0.000000	0.000000	-0.003910	-0.000007	-0.000012	0.000000
34	0.000000	0.000000	-0.003885	-0.000035	-0.000045	0.000000
35	0.000000	0.000000	-0.003832	-0.000064	-0.000076	0.000000
36	0.000000	0.000000	-0.003752	-0.000092	-0.000103	0.000000
37	0.000000	0.000000	-0.003651	-0.000120	-0.000126	0.000000
38	0.000000	0.000000	-0.003532	-0.000148	-0.000143	0.000000
39	0.000000	0.000000	-0.003401	-0.000177	-0.000153	0.000000
40	0.000000	0.000000	-0.003265	-0.000205	-0.000155	0.000000
41	0.000000	0.000000	-0.003130	-0.000233	-0.000149	0.000000
42	0.000000	0.000000	-0.003005	-0.000261	-0.000134	0.000000
43	0.000000	0.000000	-0.002897	-0.000289	-0.000110	0.000000
46	0.000000	0.000000	-0.002811	-0.000275	-0.000086	0.000000
47	0.000000	0.000000	-0.002743	-0.000260	-0.000069	0.000000
48	0.000000	0.000000	-0.002688	-0.000246	-0.000059	0.000000
49	0.000000	0.000000	-0.002638	-0.000232	-0.000055	0.000000
50	0.000000	0.000000	-0.002588	-0.000217	-0.000058	0.000000
51	0.000000	0.000000	-0.002534	-0.000203	-0.000067	0.000000
52	0.000000	0.000000	-0.002470	-0.000188	-0.000080	0.000000
53	0.000000	0.000000	-0.002392	-0.000174	-0.000096	0.000000
54	0.000000	0.000000	-0.002299	-0.000159	-0.000116	0.000000
55	0.000000	0.000000	-0.002187	-0.000145	-0.000139	0.000000
56	0.000000	0.000000	-0.002054	-0.000130	-0.000163	0.000000
57	0.000000	0.000000	-0.001900	-0.000116	-0.000187	0.000000
58	0.000000	0.000000	-0.001725	-0.000101	-0.000212	0.000000
59	0.000000	0.000000	-0.001528	-0.000087	-0.000236	0.000000
60	0.000000	0.000000	-0.001310	-0.000072	-0.000258	0.000000
61	0.000000	0.000000	-0.001074	-0.000058	-0.000278	0.000000
62	0.000000	0.000000	-0.000821	-0.000043	-0.000295	0.000000
60	0.000141	0.000600	-0.002393	-0.000191	-0.000782	-0.000012
61	0.000136	0.000583	-0.001177	-0.000180	-0.000736	-0.000012
62	0.000131	0.000565	-0.000063	-0.000160	-0.000653	-0.000012

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ASUNTO: COMPROBACIONES FRENTE AL DESCARRILAMIENTO SEGÚN EUROCODIGO . E-1518.3

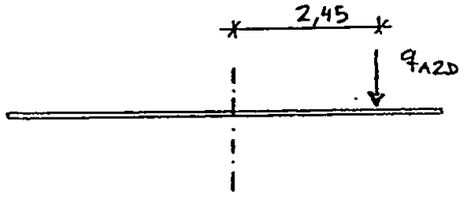
FECHA:

SITUACIÓN 1



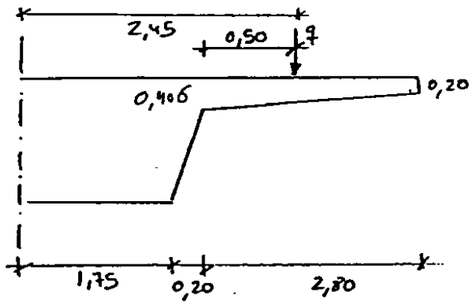
q_{A1D} = 50 KN/m. Continuas en bloques de 6,40 m separados 1,40 m

SITUACIÓN 2



q_{A2D} = 80 KN/m. y 20 m. de longitud.

COMPROBACION DEL VOLADIZO



q_{AZ} = 80 kN/m.

$V_d = \left(0,20 + \frac{0,206}{2}\right) \cdot 2,8 \cdot 2,5 + 0,75 + 8 = 10,9$ t/m.

$M_d = \left(0,20 \frac{2,80}{2} + \frac{0,206}{2} \cdot \frac{2,8}{3}\right) \cdot 2,8 \cdot 2,5 + 0,75 \cdot 2,8 + 8 \cdot 0,5 = 8,73$ mt/m.

V_{cu} = 25,0 t >

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ASUNTO: COMPROBACIONES FRENTE AL DESCARRILAMIENTO SEGÚN EUROCODIGO . E-1518.3

ESTABILIDAD DEL CONJUNTO

Dada la forma en planta del tablero es imposible el vuelco del mismo

El tensor máximo que podría actuar sobre la sección

$T_d = \left(2,45 - \frac{1,435}{2}\right) \cdot 10 \cdot \frac{77,60}{2} = 152,5$ mt.

El tensor último es:

$T_u = 2 \cdot A_c \cdot A_x \cdot f_{td} = 2 \cdot 5,254 \cdot 20,91 \cdot 4,2 = 922,9$ mt.

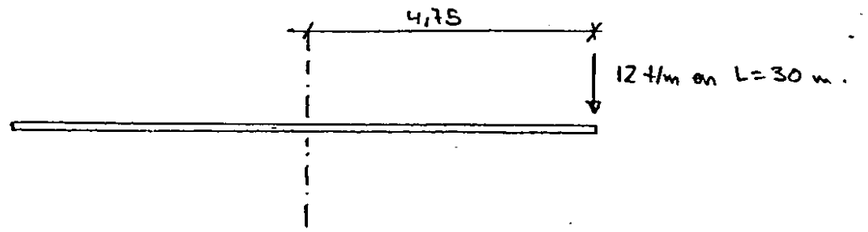
$T_u >> T_d$ ok

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ASUNTO

COMPROBACION FRENTE AL DESCARRILAMIENTO SEGÚN UIC-776-1 . E-1518.3

CASO A



Momento volcador = 30 x 12 x 4,75 = 1710 mt

Debido a la dispersión en planta del tablero, es imposible el vuelco de la estructura

Tasar momento = 4,75 x 12 x 17,6/2 = 501,6 mt

Tasar último = 922,7 mt > 501,6 ok

Reacciones

	Node	PP	CM	PRET T=INF	GRAD	REACCIONES DEBIDAS A TREN B Y SC. EN PASEOS					
						VANO 1		VANO 2		VANO 3	
						T+ SC1	T- SC2	T+ SC3	T- SC4	T+ SC5	T- SC6
E1	154	50	30	65	9	24	58	-13	-11	0	-1
	156	141	55	-57	6	77	43	6	3	-2	-2
P1	67	419	123	-41	-11	79	86	80	89	1	2
	109	225	41	37	-4	32	27	30	25	-2	-2
P2	111	222	40	34	-4	-1	-1	24	29	26	31
	153	433	129	-52	-12	3	2	92	83	89	82
E2	155	141	55	-58	6	-2	-2	3	6	43	77
	157	45	28	71	9	-1	-1	-12	-14	57	24
SUMAS		1675	500	0	0	211	211	211	211	211	211

	Node	Envolvente SC		Reacciones en E.L.S		Reacciones en E.L.U		
		Rmax	Rmin	Rmax	Rmin	Rmax	Rmin	
E1	154	66	-14	228	124	293	116	POT 300 T
	156	89	-2	233	121	370	107	POT 300 T
P1	67	177	-11	683	480	1039	425	POT 800 T
	109	63	-5	375	294	535	268	POT 400 T
P2	111	60	-5	365	287	522	262	POT 400 T
	153	184	-12	699	484	1066	428	POT 800 T
E2	155	89	-2	233	120	370	106	POT 300 T
	157	66	-15	229	123	291	115	POT 300 T

PUENTE 1518.3

3º CALCULO DE PILAS

GINPROSA

ASUNTO
E - 1518.3
CALCULO DE PILAS

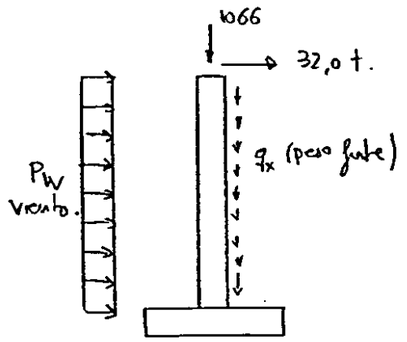
En todas las pilas se dispusieron apoyos POT libres por lo que las fuerzas actuantes en cabeza de las mismas son el 3% de la carga vertical total. Del cálculo de reacciones en ELU efectuado para el tablero se obtienen las siguientes reacciones:

P1 - DCHA y P2 - IZDA $R_{max,d}$ = 535 t. H_d = 16,05

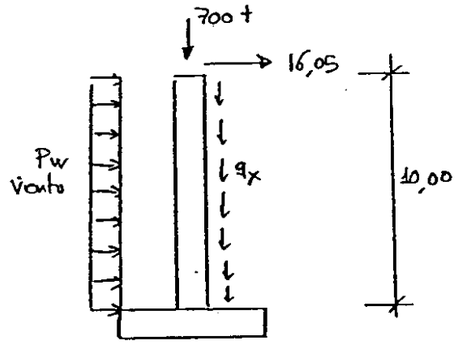
P1 - IZDA y P2 - DCHA $R_{max,d}$ = 1066 t. H_d = 32 t.

La altura de los fustes es de 10 m. aprox. Se realiza un cálculo con el programa PYRUS que tiene en cuenta los efectos de 2º orden.

PILAS P1-DCHA y P2-IZDA



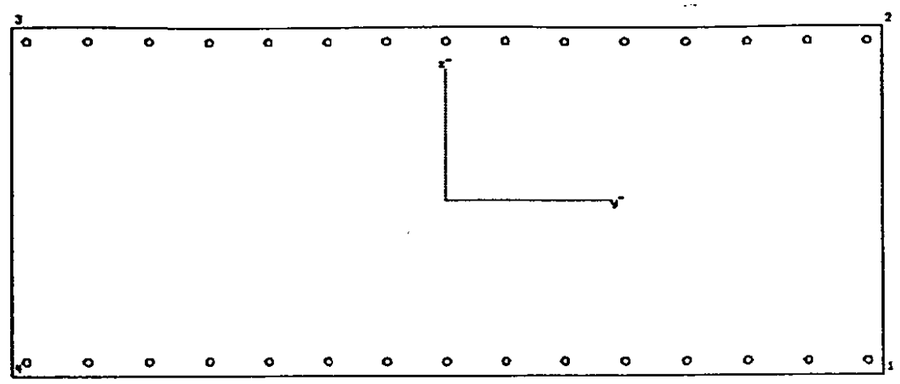
PILAS P1-IZDA y P2-DCHA



$q_x = 3,75 \times 2,5 \times 1,50 = 14,1$ t/m.

$P_W = 3,25 \times 920 \times 1,50 = 0,98$ t/m.

Nstb. 1 : 20.0



Sección :"FUSTE" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H300PIL"

Ancho = 300.00 cm Canto = 120.00 cm

Características mecánicas de la sección:
Area : Ax= 3.600 [m2]
Momentos de inercia : Iy= 0.432000 [m4] Iz= 2.700 [m4]
Inercia a torsión : Ix= 1.293 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.600000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-1.500	-1.800	0.500
dch.	Iz	1.500	1.800	-0.500
abajo	Iy	-0.600	-0.719999	0.200
arriba	Iy	0.600	0.719999	-0.200

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	73.63	-145.00	5.00	145.00	5.00
2	AEH500	(2)	73.63	-145.00	115.00	145.00	115.00
	Total:		147.26	Cuantía de armadura: 0.409 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H300PIL")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	300.00 [cm]	116.00 [cm]	0.00
Vy	0.00 [cm2/m]	120.00 [cm]	296.00 [cm]	0.00

Programa F A G U S - 2 V.1.32
GINPROSA Ingenieros Consultores 15.07.98

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcu,mín [kp/cm2]
"H300PIL"	210000.0	-153.000	-2.000	0.0	10.000	300.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Pila ''P1-D'
****

Título : 'PILAS E-1501.8. SUBTRAMO XV'
Altura de la pila : 10.000 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo
Nu [m] d-xyz r-xyz

Nu	[m]	d-xyz	r-xyz
2	10.000		
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba		Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :						
Nudo	2	Fuerza	x [kN]	-10660.000		
		Fuerza	z [kN]	320.000		
Barra	1	Fuerza	x [kN/m]	-141.000		
Barra	1	Fuerza	z [kN/m]	9.800		

D I M E N S I O N A M I E N T O (global) <8.P1-D.1>

PARAMETROS DE CALCULO:
Norma..... EH
Criterio de rotura..... Agotamiento de secciones o del sistema
Rotura de secciones..... Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada).... -2.000 [o/oo]
- Hormigón (flexión)..... -3.500 [o/oo]
- Acero ..... 10.00 [o/oo]
Coef. min. resist. (gamma_r)... 1.000
Coeficiente de fluencia..... 2.000
Carga contribuyente a fluencia. 1.000 * Carga permanente G1
No de elementos 6
Tolerancia desequi. fuerzas.... 0.120 [kN]
Tolerancia desequi. momentos... 0.037 [kNm]
Mayoración de cargas..... 1.000 * Carga permanente G1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	3.000	1.200	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-5.69	0.00	0.00	0.000	-7.302	0.000
Máxima	0.00	0.00	49.22	0.000	0.000	0.000

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-11952.50	0.00	-409.83	0.00	-2.27	0.00
Máxima	-10777.50	0.00	-328.17	0.00	4239.12	0.00

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	Ely [kNm²]	Elz [kNm²]
Mínima	-6.7	-300.5	-0.503	-1.431	2.703E+6	1.186E+7
Máxima	0.0	60.8	0.123	0.289	2.946E+6	1.474E+7

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	10.00	FUSTE	147.3	0.41	18
	8.333	FUSTE	147.3	0.41	20
	6.667	FUSTE	147.3	0.41	23
	5.000	FUSTE	147.3	0.41	26
	3.333	FUSTE	147.3	0.41	30
	1.667	FUSTE	147.3	0.41	34
	0.000	FUSTE	147.3	0.41	39

(≤) : Armadura ≤ ρ_min = 0.40%
(≥) : Armadura ≥ ρ_max = 8.00%

Programm: P Y R U S V.2.20 Bn:2019. 1
GINPROSA Ingenieros Consultores 15.07.98
PILAS E-1501.8. SUBTRAMO XV 10:46

Pila ''P1-I'
****

Título : 'PILAS E-1501.8. SUBTRAMO XV'
Altura de la pila : 10.000 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo
Nu [m] d-xyz r-xyz

Nu	[m]	d-xyz	r-xyz
2	10.000		
1	0.000	888	888

Apoyo: 8=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba		Tipo Car.		Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :							
Nudo	2	Fuerza	x	[kN]	-7000.000		
		Fuerza	z	[kN]	160.500		
Barra	1	Fuerza	x	[kN/m]	-141.000		
Barra	1	Fuerza	z	[kN/m]	9.800		

D I M E N S I O N A M I E N T O (global) <8.P1-1.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia.	1.000 * Carga permanente G1
Nº de elementos	6
Tolerancia desequi. fuerzas	0.083 [kN]
Tolerancia desequi. momentos	0.021 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	3.000	1.200	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-3.74	0.00	0.00	0.000	-3.596	0.000
Máxima	0.00	0.00	24.36	0.000	0.000	0.000

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-8292.50	0.00	-250.33	0.00	-2.27	0.00
Máxima	-7117.50	0.00	-168.67	0.00	2276.43	0.00

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	EIy [kNm²]	EIz [kNm²]
Mínima	-4.1	-172.8	-0.287	-0.823	2.966E+6	1.504E+7
Máxima	0.0	4.0	0.019	0.019	3.013E+6	4.071E+7

Programm: P Y R U S V.2.20 Bn:2019. 1
GINPROSA Ingenieros Consultores 15.07.98
PILAS E-1501.8. SUBTRAMO XV 10:46

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	10.00	FUSTE	147.3	0.41	12
	8.333	FUSTE	147.3	0.41	13
	6.667	FUSTE	147.3	0.41	15
	5.000	FUSTE	147.3	0.41	16
	3.333	FUSTE	147.3	0.41	18
	1.667	FUSTE	147.3	0.41	21
	0.000	FUSTE	147.3	0.41	23

(≤) : Armadura ≤ ρ_min = 0.40%
(≥) : Armadura ≥ ρ_max = 8.00%

SUBTRAMO XV
E-1518.3

DIMENSIONAMIENTO DE ZAPATAS DE PILAS

PILAS P1-IZDA. Y P2-DCHA.

Dimensiones de zapata

A=	6.00	m.	Peso de zapata=	112.50 t.
B=	5.00	m.		
Cz=	1.50	m.		

Cargas de servicio

	En cabeza de fustes	En cara sup. de zapata	En cara infe. de zapata
N=	699	792.750	905.3
H=	20.97	27.470	27.470
M=	0	242.200	283.405

Tension cobaricentrica= 34 t/m2

Armaduras de la zapata

Direcc. Z	Vuelo flexion	2.08 m.	Md,z=	111.9 m.t/m
			As,inf,z=	21.03 cm2/m
	Vuelo cortante	1.15 m.	Vd,z=	59.5 t/m
			Vcu=	90.4 t/m
				No necesita armadura de cortante
Direcc. Y	Vuelo flexion	1.88 m.	Md,y=	91.4 m.t/m
			As,inf,y=	17.18 cm2/m
	Vuelo cortante	0.65 m.	Vd,y=	33.6 t/m
			Vcu=	90.4 t/m
				No necesita armadura de cortante

PILAS P1-DCHA. Y P2-IZDA.

Dimensiones de zapata

A=	6.00	m.	Peso de zapata=	101.25 t.
B=	4.50	m.		
Cz=	1.50	m.		

Cargas de servicio

	En cabeza de fustes	En cara sup. de zapata	En cara infe. de zapata
N=	375	468.750	570.0
H=	11.25	17.750	17.750
M=	0	145.000	171.625

Tension cobaricentrica= 24 t/m2

Armaduras de la zapata

Direcc. Z	Vuelo flexion	1.83 m.	Md,z=	61.2 m.t/m
			As,inf,z=	11.50 cm2/m
	Vuelo cortante	0.9 m.	Vd,z=	32.9 t/m
			Vcu=	90.4 t/m
				No necesita armadura de cortante
Direcc. Y	Vuelo flexion	1.88 m.	Md,y=	64.6 m.t/m
			As,inf,y=	12.14 cm2/m
	Vuelo cortante	0.65 m.	Vd,y=	23.8 t/m
			Vcu=	90.4 t/m
				No necesita armadura de cortante

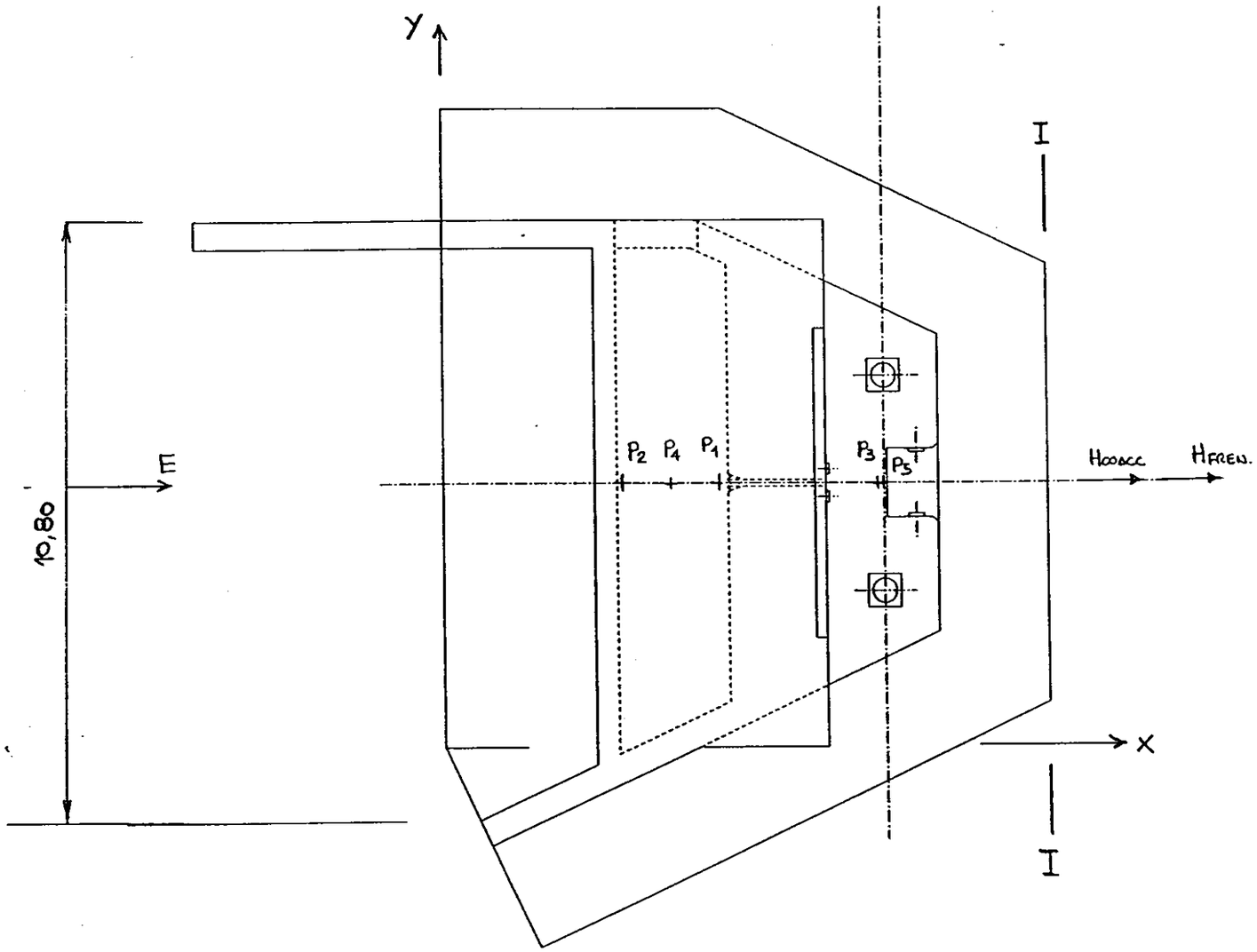
PUENTE 1518.3

4º CALCULO DE ESTRIBOS

E. 1518.3

CALCULO ESTRIBO 1

CARGAS SOBRE LA ZAPATA



ESTADOS LIMITES DE EQUILIBRIO

CARGAS VERTICALES

	Permanentes ton.	Variables ton.	X m.
P-1	637		5.03
P-2	1597	202	3.26
P-3	304		7.92
P-4	-69		4.12
P-5	244	101	8.00
TOTAL =	2714	303	

CARGAS HORIZONTALES

		H coacc ton.	H frenado ton.			
H-5		66	79			
	Empuje de tierras					
E-1	0.5	8.778	13.3	10.80	630 ton.	
	1.0	0.990	13.2	10.80	141 ton.	
					772 ton.	

SEGURIDAD AL DESLIZAMIENTO

En Construcción v_D máx = 1.35

Cargas Deslizantes		772 ton.
Cargas Resistentes		1566 ton.
	v_D =	2.03

En Servicio sin Frenado v_D máx = 1.5

		66 ton.
		772 ton.
Cargas Deslizantes		838 ton.
Cargas Resistentes		1683 ton.
	v_D =	2.01

En Servicio con Frenado v_D máx = 1.35

		66 ton.
		79 ton.
		772 ton.
Cargas Deslizantes		917 ton.
Cargas Resistentes		1683 ton.
	v_D =	1.84

SEGURIDAD AL VOLCAMIENTO

Ancho de Zapata = 11 m.

	Permanentes Totales ton.	Ancho - x m.	mT.	Variables Totales ton.	Ancho - x m.	mT.
P-1	637	5.98	3807	0	5.98	0
P-2	1597	7.74	12360	202	7.74	1565
P-3	304	3.08	938	0	3.08	0
P-4	-69	6.88	-474	0	6.88	0
P-5	244	3.00	732	101	3.00	303
TOTAL =	2714	6.40	17363	303	6.16	1868

En Servicio con Frenado v v máx = 1.35

Momento de Vuelco

66	10.70	706
79	10.70	845
630	4.43	2795
141	6.60	931
		5278 Tm.

Momento Resistente

2714	6.40	17363
303	6.16	1868
		19231 Tm.

v v = 3.64

SEGURIDAD AL HUNDIMIENTO

Area = 134.14 m2.
Inercia = 1233.49 m4.
Distancia fibra mas comprimida = 5.98 m.
Distancia fibra menos comprimida = 5.03 m.

	Ancho - x		
	Ton.	m.	Tm.
	2714	6.40	17363
	303	6.16	1868
V =	3017	6.37	19231 Tm.

Distancia de V respecto a I-I = 6.37

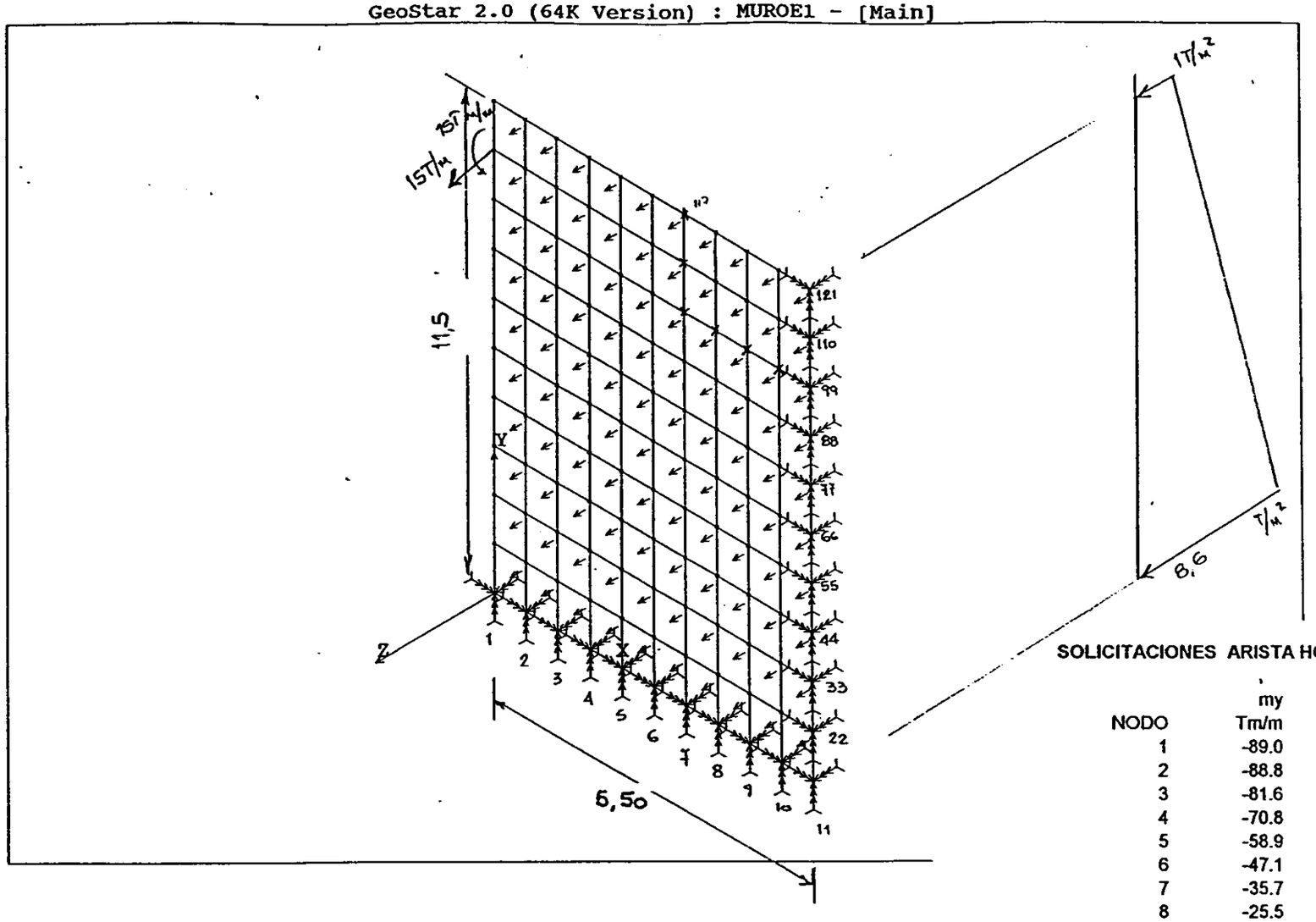
M tierras =	630	4.43	2795
	141	6.60	931
			3726 Tm.

M frenado+coacción =	145	10.70	1552
			1552 Tm.

Esfuerzos sobre el centro de Gravedad de la zapata

V =	3017 Ton.
M v =	-1203 mT.
M fren.+coacc =	1552 mT.
M tierras =	3726 mT.
σ máx =	42.2 T/m2.
σ med =	22.5 T/m2.
σ min =	5.9 T/m2.
σ adm =	35.0 T/m2.
1.25 x σ adm =	43.8 T/m2.

E_1518.3
ESTRIBO 1



CALCULO DE LA TRACCION SOBRE LOS NODOS 1 a 6

$$M = \frac{7,6\,(11,5)^2}{6} \times 10,8 + \frac{1,0\,(11,5)^2}{2} \times 10,8 + 144 \times 11,0 = 4107\ Tm$$

$$n_x = \frac{M}{2 \cdot b \cdot z} = \frac{4107\ Tm}{2 \times 3,0m \times 6,5m} = 105\ Ton/m$$

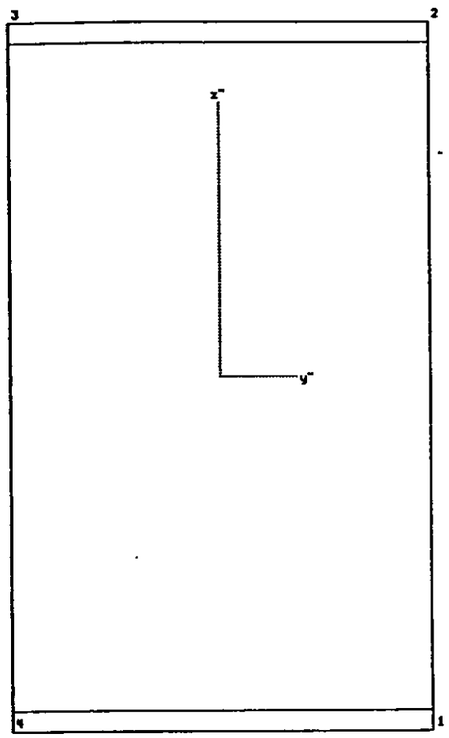
SOLICITACIONES ARISTA HORIZONTAL

NODO	my Tm/m	vy T/m	Tracción nx T/m
1	-89.0	-54.3	105
2	-88.8	-49.3	105
3	-81.6	-41.5	105
4	-70.8	-34.1	105
5	-58.9	-27.4	105
6	-47.1	-21.3	105
7	-35.7	-15.6	
8	-25.5	-10.3	
9	-16.9	-5.8	
10	-9.8	-3.0	

SOLICITACIONES ARISTA VERTICAL

NODO	mx Tm/m	vx	Espesor m.	Empuje Coacción +frenado Ton	Empuje s/ muro frontal T/m	Tracción nx T/m
121	-17.6	-7.6	0.50	31.3		
110	-22.8	-12.1	0.62	62.6	12.3	74.9
99	-32.2	-15.8	0.74	62.6	17.6	72.1
88	-40.5	-19.7	0.86	62.6	22.9	85.5
77	-46.7	-22.9	0.98	62.6	28.3	90.9
66	-49.3	-24.6	1.10	62.6	33.6	96.2
55	-47.2	-24.0	1.22			
44	-39.9	-20.4	1.34			
33	-28.5	-13.6	1.46			
22	-15.9	-5.9	1.58			
11			1.70			

Mstb. 1 : 15.0



Sección :"E1HOR01" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 170.00 cm

Características mecánicas de la sección:
Area : Ax= 1.700 [m2]
Momentos de inercia : Iy= 0.409416 [m4] Iz= 0.141667 [m4]
Inercia a torsión : Ix= 0.358742 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.850000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.500	-0.283333	0.167
dch.	Iz	0.500	0.283333	-0.167
abajo	Iy	-0.850	-0.481666	0.283
arriba	Iy	0.850	0.481666	-0.283

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	49.10	-50.00	5.00	50.00	5.00

2	AEH500	(2)	24.55	-50.00	165.00	50.00	165.00

Total: 73.65 Cuantía de armadura: 0.433 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	166.00 [cm]	0.00
Vy	0.00 [cm2/m]	170.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

$N_d = 105 \cdot 1,5 = 157,5$ Ton

$M_d = 89 \cdot 1,5 = 133,5$ Ton

Dimensionamiento : Viga "E1HOR01"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
157.500				133.500		45.0

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección 1.34
Factor necesario de minoración de la resistencia de la sección .. 1.00

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado (As-min)	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	49.10	-	49.10
2 "AEH500"	-50.0	165.0	50.0	165.0	24.55	-	24.55

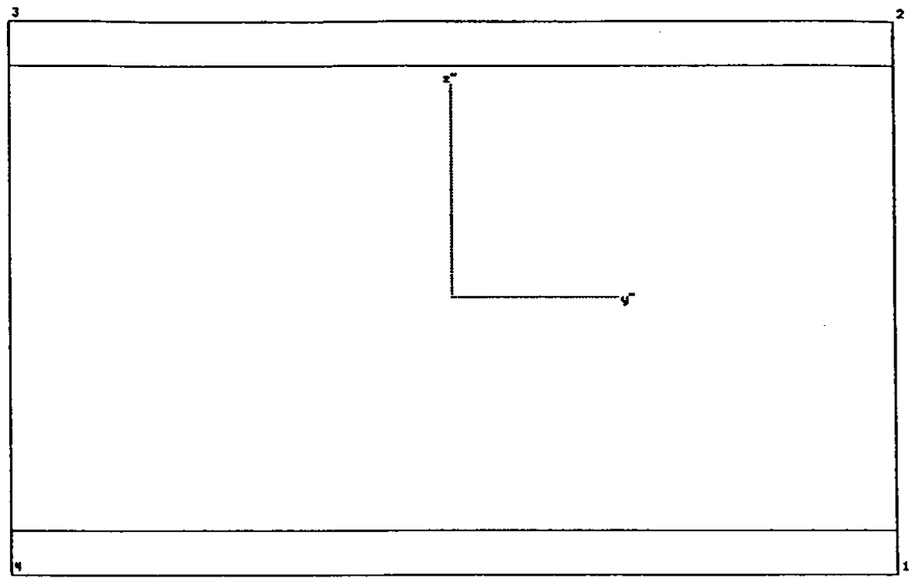
Cuantía arm. 0.43 [o/o] Suma 73.65

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-11 [kp/cm2]	
Hormigón-Min	-50.00	170.00	-0.274	-36.090	"H250"
Armadura-Min	-50.00	165.00	0.038	79.246	"AEH500"
Hormigón-Max	50.00	-0.00	10.311	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 165.61 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 4.39 cm Zona comprimida/Canto útil 0.03

Mstb. 1 : 7.0



Sección :"E1VERT01" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 62.00 cm

Características mecánicas de la sección:
Area : Ax= 0.620000 [m2]
Momentos de inercia : Iy= 0.019861 [m4] Iz= 0.051667 [m4]
Inercia a torsión : Ix= 0.048791 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.310000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.500	-0.103333	0.167
dch.	Iz	0.500	0.103333	-0.167
abajo	Iy	-0.310	-0.064067	0.103
arriba	Iy	0.310	0.064067	-0.103

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	24.55	-50.00	5.00	50.00	5.00
2	AEH500	(2)	15.70	-50.00	57.00	50.00	57.00

Total: 40.25 Cuantía de armadura: 0.649 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada

Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	58.00 [cm]	0.00
Vy	0.00 [cm2/m]	62.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E	0.85*fcd,fyd	eps-fc	fct	fcv	fcw,mín
	[kp/cm2]	[kp/cm2]	[o/oo]	[kp/cm2]	[kp/cm2]	[kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

$N_d = 72,1 \times 1,50 = 112,4$
$M_d = 22,8 \times 1,50 = 34,2$

Dimensionamiento : Viga "E1VERT01"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
112.350				34.200		45.0

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	24.55	27.23	27.23
2 "AEH500"	-50.0	57.0	50.0	57.0	15.70	-	15.70

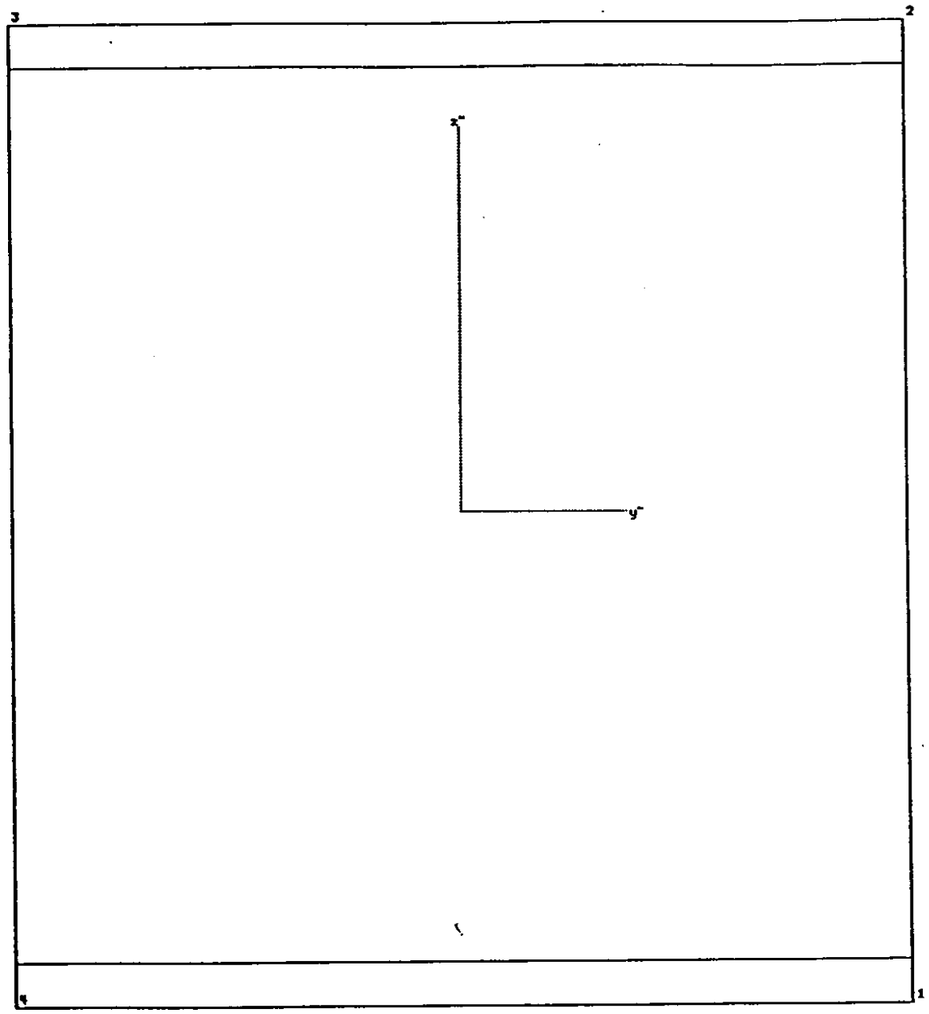
Cuantía arm. 0.69 [o/o] Suma 42.93

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	62.00	-0.700	-81.746	"H250"
Armadura-Min	-50.00	57.00	0.239	501.636	"AEH500"
Hormigón-Max	50.00	0.00	10.939	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 58.27 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 3.73 cm Zona comprimida/Canto útil 0.07

Nstb. 1 : 7.0



Sección :"E1VERT02" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 110.00 cm

Características mecánicas de la sección:
Area : Ax= 1.100 [m2]
Momentos de inercia : Iy= 0.110917 [m4] Iz= 0.091667 [m4]
Inercia a torsión : Ix= 0.168506 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.550000 [m]

I: R=dist.borde [m] W=I/R [m3] W/Ax [m]

izq.	Iz	-0.500	-0.183333	0.167
dch.	Iz	0.500	0.183333	-0.167
abajo	Iy	-0.550	-0.201666	0.183
arriba	Iy	0.550	0.201666	-0.183

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	24.55	-50.00	5.00	50.00	5.00
2	AEH500	(2)	15.70	-50.00	105.00	50.00	105.00
	Total:		40.25	Cuantía de armadura: 0.366 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	106.00 [cm]	0.00
Vy	0.00 [cm2/m]	110.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

$N_d = 96.2 \times 1{,}50 = 144.3$ Tm
$M_d = 49{,}3 \times 1{,}50 = 73.9$ Tm

Dimensionamiento : Viga "E1VERT02"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Hx	My	Hz	Alpha
144.300				74.000		45.0

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	24.55	32.89	32.89
2 "AEH500"	-50.0	105.0	50.0	105.0	15.70	-	15.70
				Cuantía arm. 0.44 [o/o]		Suma	48.59

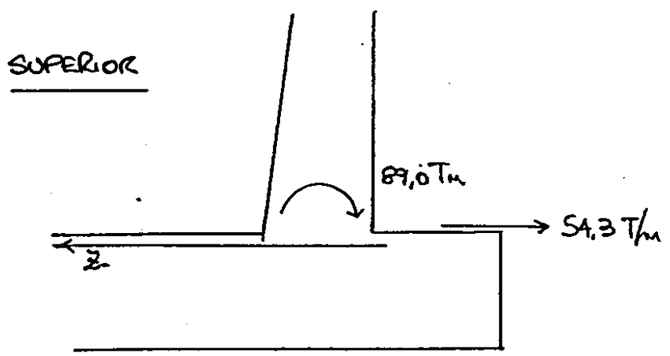
Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	110.00	-0.324	-42.119	"H250"
Armadura-Min	-50.00	105.00	0.168	352.725	"AEH500"
Hormigón-Max	50.00	0.00	10.492	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 106.71 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 3.29 cm Zona comprimida/Canto útil 0.03

ARMADURA DE ZAPATA

SUPERIOR



$$Z_d = \frac{89\ Tm \times 1,5}{0,9 \times 1,85 \times} + 54,3 \times 1,5 = 161,6\ Tm$$

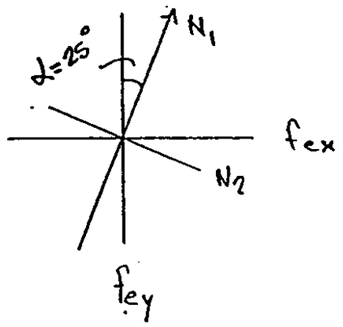
$$a_z = \frac{Z_d}{f_{yd}} = \frac{161,6\ T}{4,435\ T/cm^2} = 36,4\ cm^2 \qquad \underline{2\ capas\ \phi 25\,|0,20\ c/u}$$

INFERIOR

$$M_d = \left(42\ T/m^2 - 1,9 \times 2,5\ T/m^2\right) \times \frac{(2,0m)^2}{2} \times 1,50 = 111,75\ Tm$$

$$A_s = 13,78\ cm^2/m \qquad \underline{\phi 20\,|0,20}$$

EN ZONA ESVIADA



$$f_{e1} = 13,78\ cm^2/m$$

$$N_1 = 13,78 \times 4,435 = 61,1\ Ton/m$$

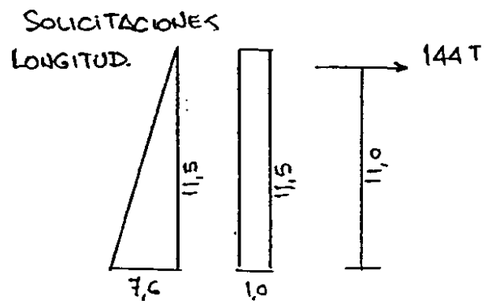
$$N_2 = 0$$

$$\frac{f_{ey}}{f_{e1}} = 1,21 \qquad \frac{f_{ex}}{f_{e1}} = 0,58$$

$$f_{ey} = 1,21 \times 13,78\ cm^2/m = 16,67\ cm^2/m = \phi 20\,|0,15$$

$$f_{ex} = 0,58 \times 13,78\ cm^2/m = 8,00\ cm^2/m = \phi 20\,|0,20$$

ARMADURA DE NUCLEO



Solicit

$$M_d = \left[\frac{7,6(11,5)^2}{6} \times 7,0 + \frac{1,0(11,5)^2}{2} \times 7,0 + 144 \times 11\right] \times 1,50$$

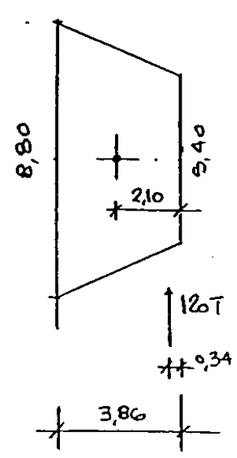
$$M_d = 4829\ Tm/m$$

SECC. DE CALCULO 880/540 x 386

$A_s = 292\ cm^2$

$\phi 25/0,15 \qquad 32,7 \times 8,8 = 288\ cm^2$.

SOLICITAC. TRANSVERSALES



7,18 x 3,86

$$\frac{A_T}{s} = \frac{A_\ell}{s} = \frac{1,5 \times 1,76 \times 120}{2 \times (6,9 \times 3,6) \times 4,2} = 1,5\ cm^2/m$$

$$M_d = 120 \times 9,5 \times 1,50 = 1710\ Tm.$$

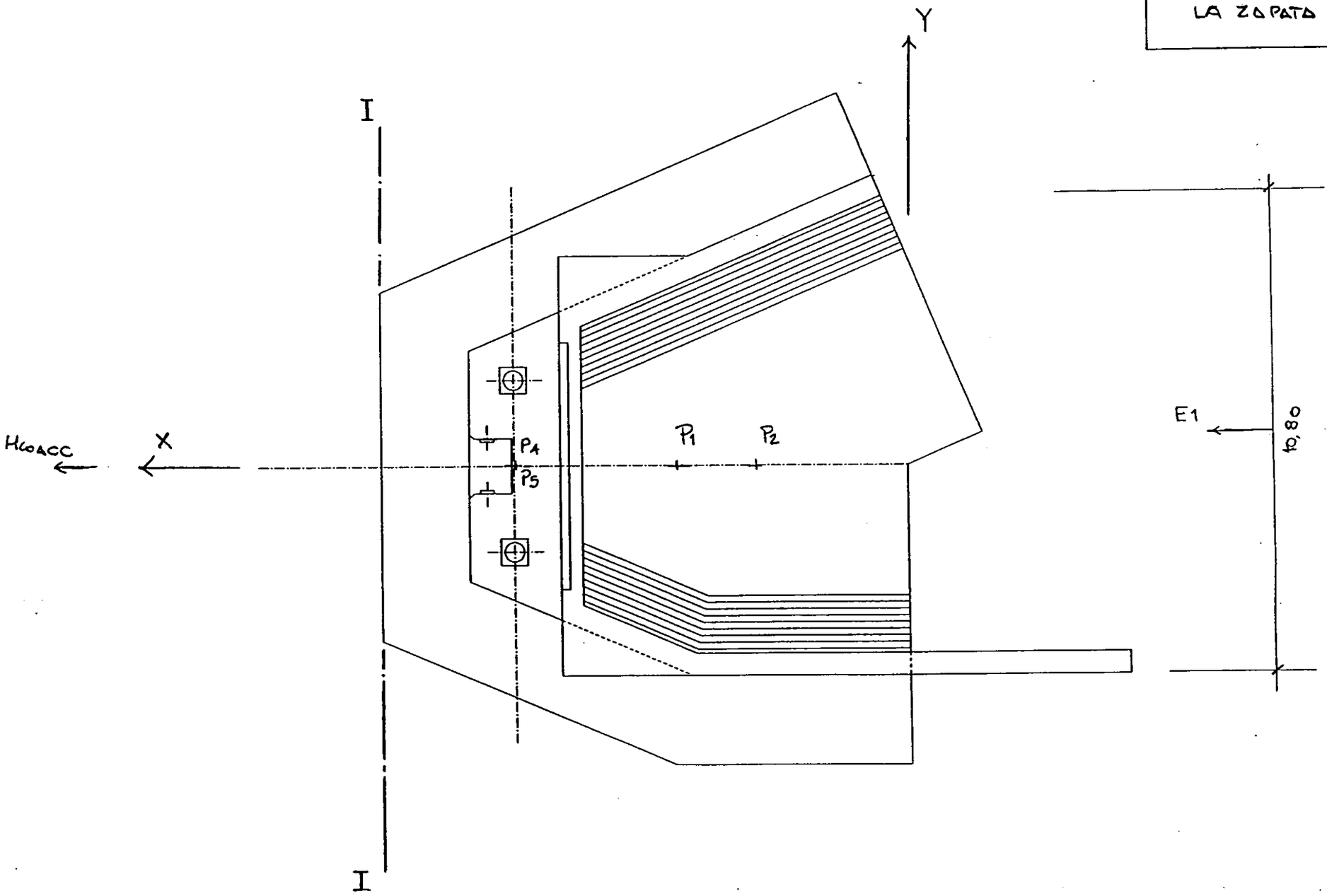
$A_s = 54,48\ cm^2$

$$a_s = \frac{54,48\ cm^2}{3,86\ m} = 14,1\ cm^2/m \qquad \underline{\phi 25\,|0,20}$$

E_1518.3

CALCULO ESTRIBO 2

CARGAS SOBRE LA ZAPATA



ESTADOS LIMITES DE EQUILIBRIO

CARGAS VERTICALES

	Permanentes ton.	Variables ton.	X m.	Y m.
P-1	715		5.31	0.00
P-2	2072	241	3.49	0.00
P-3	328		8.92	0.00
P-4	0		0.00	0.00
P-5	244	101	9.00	0.00
TOTAL =	3358	342		

CARGAS HORIZONTALES

		H coacc ton.	H frenado ton.			
H-5		8	0			
	Empuje de tierras					
E-1	0.5	9.834	14.9	10.80	791 ton.
	1.0	0.990	14.9	10.80	159 ton.
					951 ton.

SEGURIDAD AL DESLIZAMIENTO

En Construcción v_D máx = 1.35

Cargas Deslizantes	951 ton.
Cargas Resistentes	1938 ton.
v_D =	2.04

En Servicio sin Frenado v_D máx = 1.5

	8 ton.
	951 ton.
Cargas Deslizantes	958 ton.
Cargas Resistentes	2077 ton.
v_D =	2.17

En Servicio con Frenado v_D máx = 1.35

	8 ton.
	0 ton.
	951 ton.
Cargas Deslizantes	958 ton.
Cargas Resistentes	2077 ton.
v_D =	2.17

SEGURIDAD AL VOLCAMIENTO

Ancho de Zapata = 12.48 m.

	Permanentes Totales ton.	Ancho - x m.	mT.	Variables Totales ton.	Ancho - x m.	mT.
P-1	715	7.17	5126	0	7.17	0
P-2	2072	8.99	18620	241	8.99	2165
P-3	328	3.56	1166	0	3.56	0
P-4	0	12.48	0	0	12.48	0
P-5	244	3.48	849	101	3.48	351
TOTAL =	3358	7.67	25761	342	7.36	2517

En Servicio con Frenado v v,máx = 1.35

Momento de Vuelco

8	12.70	101
0	12.70	0
791	4.97	3930
159	7.45	1187
		5217 Tm.

Momento Resistente

3358	7.67	25761
342	7.36	2517
		28278 Tm.

v V = 5.42

SEGURIDAD AL HUNDIMIENTO

Area = 150.43 m2.
Inercia = 1725.16 m4.
Distancia fibra mas comprimida = 7.17 m.
Distancia fibra menos comprimida = 5.31 m.

	Ancho - x		
	Ton.	m.	Tm.
	3358	7.67	25761
	342	7.36	2517
V =	3700	7.64	28278 Tm.

Distancia de V respecto a I-I = 7.64

M tierras =	791	4.97	3930
	159	7.45	1187
			5117 Tm.

M frenado+coacción =	8	12.70	101
			101 Tm.

Esfuerzos sobre el centro de Gravedad de la zapata

V = 3700 Ton.
M v = -1735 mT.

M fren.+coacc = 101 mT.

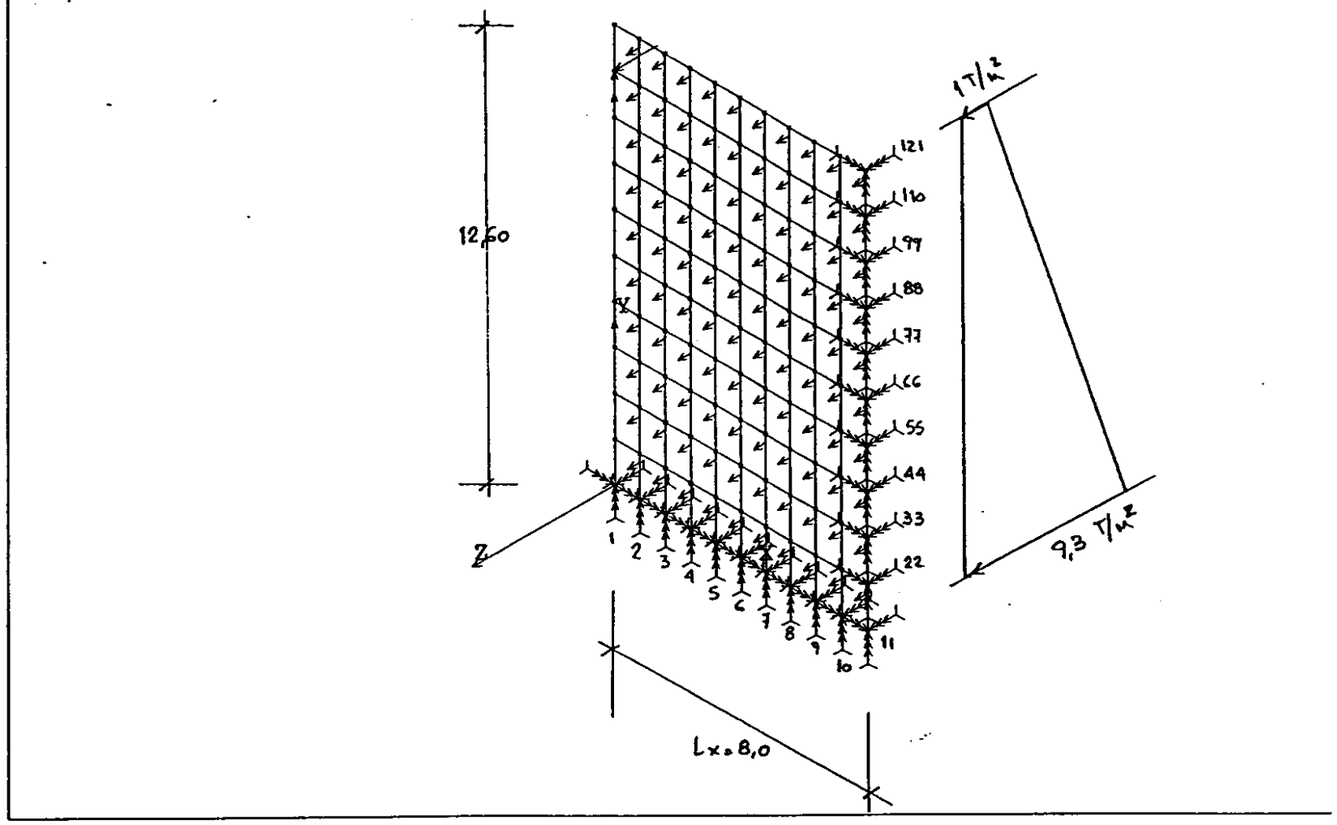
M tierras = 5117 mT.

σ máx = 39.1 T/m2.
σ med = 24.6 T/m2.
σ mín = 13.9 T/m2.

σ adm = 35.0 T/m2.
1.25 x σ adm = 43.8 T/m2.

E-1518.3
ESTRIBO 2

GeoStar 2.0 (64K Version) : muro2 - [Main]



SOLICITACIONES ARISTA HORIZONTAL

NODO	my Tm/m	vy T/m	Tracción nx T/m
1	-179.3	-70.6	66
2	-172.0	-68.2	66
3	-158.5	-59.7	66
4	-138.1	-50.0	66
5	-115.5	-41.2	66
6	-92.4	-32.9	
7	-69.6	-24.5	
8	-48.4	-16.2	
9	-30.2	-8.5	
10	-16.0	-3.4	

SOLICITACIONES ARISTA VERTICAL

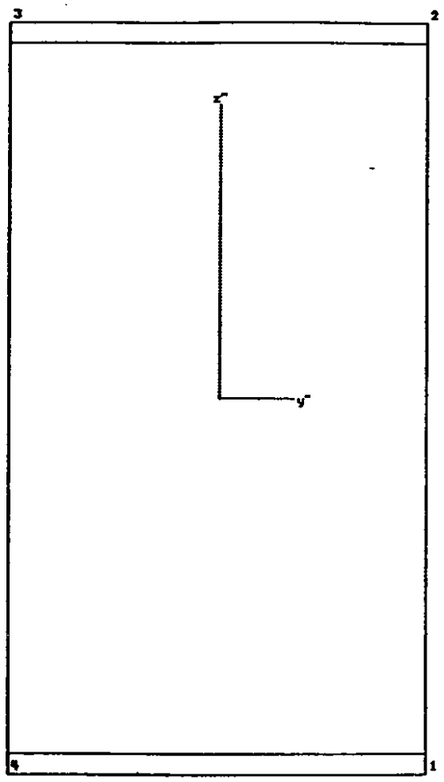
NODO	mx Tm/m	vx	Espesor m.	Empuje Coacción +frenado Ton	Empuje s/ muro frontal T/m	Tracción nx T/m
121	-23.8	-9.6	0.50	0.0		
110	-31.5	-15.3	0.63	0.0	11.9	11.9
99	-45.5	-20.5	0.76	0.0	17.3	17.3
88	-58.4	-25.9	0.89	0.0	22.7	22.7
77	-68.1	-30.2	1.02	0.0	28.1	28.1
66	-72.1	-32.2	1.15	0.0	33.5	33.5
55	-68.5	-30.7	1.28			
44	-56.9	-25.0	1.41			
33	-39.5	-15.6	1.54			
22	-21.4	-6.1	1.67			
11			1.80			

CALCULO DE LA TRACCIÓN SOBRE LOS NODOS 1 a 5

$$M = \frac{8,3\,(11,5)^2}{6} \times 10,8 + \frac{1,0\,(11,5)^2}{2} \times 10,8 + 8,0 \times 11,0 = 2778\ Tm$$

$$n_x = \frac{M}{2\,b\,z} = \frac{2778\ Tm}{2 \times 30m \times 7,0m} = \underline{66\ Ton/m}$$

Hstb. 1 : 15.0



Sección :"E2HOR01" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 180.00 cm

Características mecánicas de la sección:
Area : Ax= 1.800 [m2]
Momentos de inercia : Iy= 0.486000 [m4] Iz= 0.150000 [m4]
Inercia a torsión : Ix= 0.391651 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.900000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
Izq.	Iz	-0.500	-0.300000	0.167
dch.	Iz	0.500	0.300000	-0.167
abajo	Iy	-0.900	-0.539999	0.300
arriba	Iy	0.900	0.539999	-0.300

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	49.10	-50.00	5.00	50.00	5.00
2	AEH500	(2)	24.55	-50.00	175.00	50.00	175.00
	Total:		73.65	Cuantía de armadura: 0.409 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	176.00 [cm]	0.00
Vy	0.00 [cm2/m]	180.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

$M_d = 179,3 \times 1,50 = 268,95$ Tm.
$N_d = 66,0 \times 1,50 = 99,00$ Ton

Dimensionamiento : Viga "E2HOR01"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
99.000				268.950		45.0

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección 1.05
Factor necesario de minoración de la resistencia de la sección .. 1.00

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado (As-min)	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	49.10	-	49.10
2 "AEH500"	-50.0	175.0	50.0	175.0	24.55	-	24.55

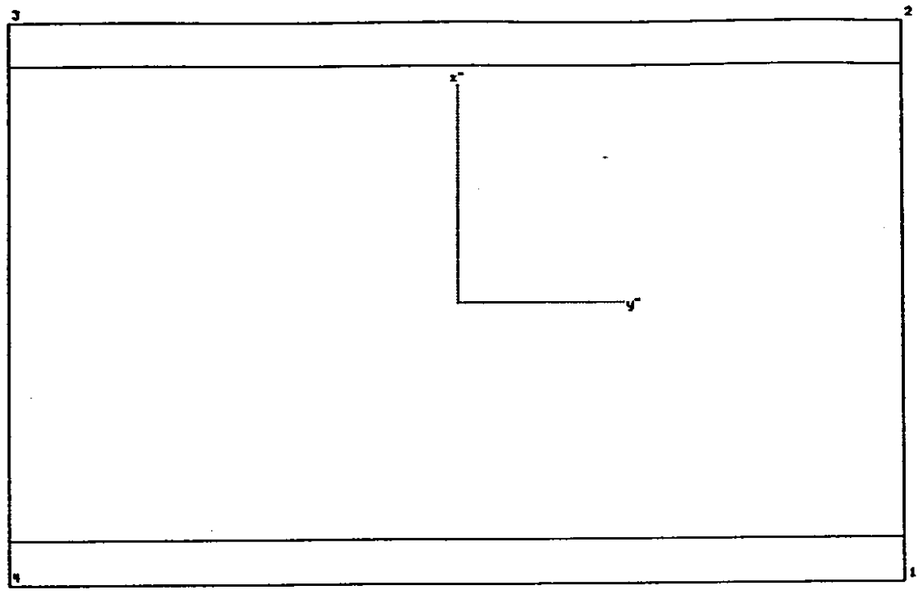
Cuantía arm. 0.41 [o/o] Suma 73.65

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	180.00	-0.927	-100.828	"H250"
Armadura-Min	-50.00	175.00	-0.615	-1290.670	"AEH500"
Hormigón-Max	50.00	0.00	10.312	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 165.16 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 14.84 cm Zona comprimida/Canto útil 0.08

Mstb. 1 : 7.0



Sección :"E2VERT01" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 63.00 cm

Características mecánicas de la sección:
Area : Ax= 0.630000 [m2]
Momentos de inercia : Iy= 0.020837 [m4] Iz= 0.052500 [m4]
Inercia a torsión : Ix= 0.050698 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.315000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.500	-0.105000	0.167
dch.	Iz	0.500	0.105000	-0.167
abajo	Iy	-0.315	-0.066150	0.105
arriba	Iy	0.315	0.066150	-0.105

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	24.55	-50.00	5.00	50.00	5.00
2	AEH500	(2)	15.70	-50.00	58.00	50.00	58.00
	Total:		40.25	Cuantía de armadura: 0.639 [o/o]			

Cód. dimensionamiento: (0) = As constante

Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	59.00 [cm]	0.00
Vy	0.00 [cm2/m]	63.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

$M_d = 31{,}50 \times 1{,}50 = 47{,}25$ Tm
$N_d = 11{,}90 \times 1{,}50 = 17{,}85$ Ton

Dimensionamiento : Viga "E2VERT01"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
17.850				47.250		45.0

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección 1.14
Factor necesario de minoración de la resistencia de la sección .. 1.00

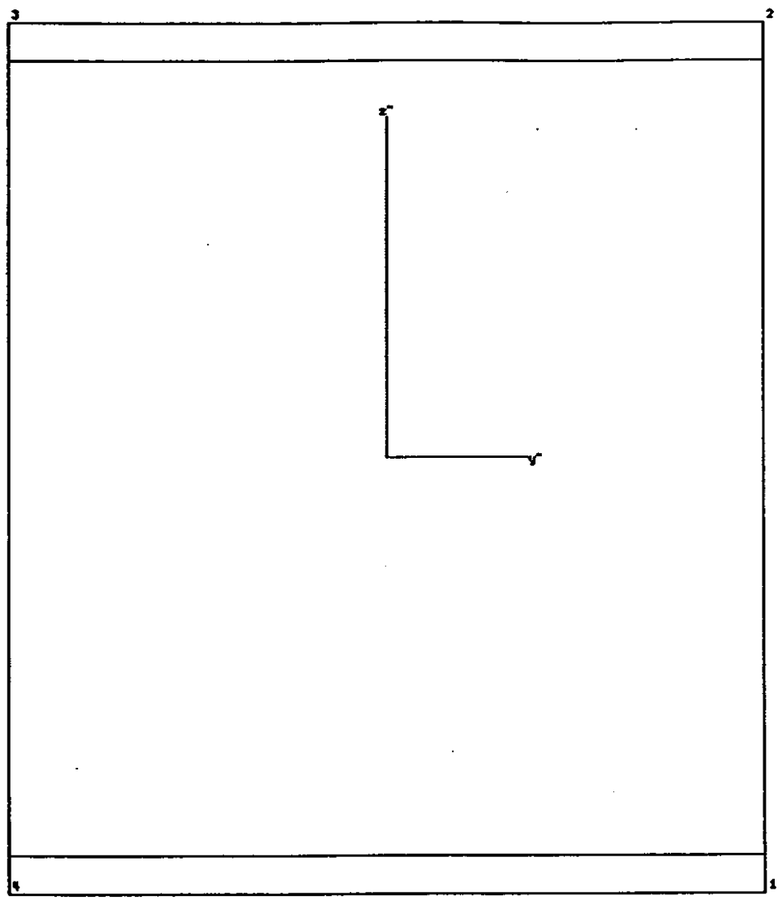
Armadura Longitudinal:		y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado (As-min)	dimens. [cm2]	As-nuevo [cm2]
1	"AEH500"	-50.0	5.0	50.0	5.0	24.55	-	24.55
2	"AEH500"	-50.0	58.0	50.0	58.0	15.70	-	15.70
					Cuantía arm. 0.64 [o/o]		Suma	40.25

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	63.00	-1.625	-136.632	"H250"
Armadura-Min	-50.00	58.00	-0.623	-1308.738	"AEH500"
Hormigón-Max	50.00	0.00	11.002	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 54.89 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 8.11 cm Zona comprimida/Canto útil 0.14

Mstb. 1 : 8.0



Sección :"E2VERT02" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"H250"

Ancho = 100.00 cm Canto = 115.00 cm

Características mecánicas de la sección:
Area : Ax= 1.150 [m2]
Momentos de inercia : Iy= 0.126739 [m4] Iz= 0.095833 [m4]
Inercia a torsión : Ix= 0.183244 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.575000 [m]

	1:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.500	-0.191667	0.167
dch.	Iz	0.500	0.191667	-0.167
abajo	Iy	-0.575	-0.220416	0.192
arriba	Iy	0.575	0.220416	-0.192

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	24.55	-50.00	5.00	50.00	5.00
2	AEH500	(2)	15.70	-50.00	110.00	50.00	110.00
	Total:		40.25	Cuantía de armadura: 0.350 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Dimens. a cortante (valores por defecto): (Acero"AEH500"/Hormigón"H250")

Cortante	Area mín.cercos	Ancho alma ideal	Canto útil	Incl.bielas
Vz	0.00 [cm2/m]	100.00 [cm]	111.00 [cm]	0.00
Vy	0.00 [cm2/m]	115.00 [cm]	96.00 [cm]	0.00

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

$M_d = 72{,}10 \cdot 1{,}50 = 108{,}15$ Tm
$N_d = 33{,}50 \cdot 1{,}50 = 50{,}25$ Ton

Dimensionamiento : Viga "E2VERT02"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
50.250				108.150		45.0

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. As [cm2]	As-nuevo [cm2]
1 "AEH500"	-50.0	5.0	50.0	5.0	24.55	28.70	28.70
2 "AEH500"	-50.0	110.0	50.0	110.0	15.70	-	15.70
				Cuantía arm. 0.39 [o/o]		Suma	44.40

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-50.00	115.00	-1.013	-107.081	"H250"
Armadura-Min	-50.00	110.00	-0.512	-1075.098	"AEH500"
Hormigón-Max	50.00	0.00	10.501	0.000	"H250"
Armadura-Max	50.00	5.00	10.000	4434.700	"AEH500"

Fibra neutra zn 104.89 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 10.11 cm Zona comprimida/Canto útil 0.09

CALCULO DE SECUENCIA DE MUROS . Datos.

Datos

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV
OBRA :	E-1518.3. Muros estribo 1

GESTION DE FICHEROS

Directorio de trabajo :	G:\MAZAXVIE-1518.3\ESTRIBO\MURO1

VALORES VARIABLES

GEOMETRIA MURO

	Sección inicial	Sección final	
C. Canto del muro en coronación (m) :	0.500	0.500	(1)
SI. Sobreespesor muro en intradós (m) :	0.000	0.000	(2)
P. Puntera zapata (m) :	1.800	0.800	(1)
Hz. Canto zapata (m) :	1.800	0.800	(1)
Ancho total de la zapata (m) :	8.600	4.000	(1)
H1-1. Dist. sección 1 a sup. zapata (m) :	2.750	2.000	(2)
Cota coronación :	240.280	230.360	(2)
Cota cimentación :	227.130	228.030	(1)

DEFINICION TERRENO

	Sección inicial X	Sección final X	Sección inicial Y	Sección final Y	
0. Coordenadas base trasdos (m) :	0.000	0.000	0.000	0.000	(2)
1. Coordenadas coronación trasdos (m) :	-1.182	-0.159	11.350	1.530	(2)
2. Coordenadas fin tramo 1 terreno (m) :	0.050	10.716	11.350	5.850	(2)
3. Coordenadas fin tramo 2 terreno (m) :	1.282	21.591	11.350	10.170	(2)
4. Coordenadas fin tramo 3 terreno (m) :	15.000	31.591	11.350	10.170	(2)

VALORES CONSTANTES

GEOMETRIA MURO

Pendiente trasdós :	9.600	
Longitud total muro (m) :	40.000	
Número de módulos :	4	
Secciones a verificar por módulo :	3	(Mínimo 2)
Longitud módulo (m) :	10.000	

CARGAS (sin mayorar)

Acciones permanentes (G)

Peso propio barrera coronación (T/m) :	0.000

Acciones permanentes de valor no constante (G*)

Fg. Carga horizontal sobre muro (T/m) :	0.000
Hfg. Posición Fg a inferior zapata (m) :	0.000

Acciones variables (Q)

SC1. Sobrecarga en tramo 1 (T/m) :	0.000
SC2. Sobrecarga en tramo 2 (T/m) :	0.000
SC3. Sobrecarga en tramo 3 (T/m) :	3.000
Fq. Carga horizontal sobre muro (T/m) :	0.000
Hfq. Posición Fq a inferior zapata (m) :	0.000

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Yo (coeficiente combinación variables) :	1.00

	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H - 250
Hormigón cimentación (T/m²) :	H - 250
Acero (T/²) :	AEH - 500

ARMADO

Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050

CARACTERISTICAS DEL TERRENO

g. Peso específico (T/m³) :	2.00
f. Angulo rozamiento interno (°) :	30.000
dmt. Angulo rozamiento muro-tierras (°) :	0.000
ftt. Angulo rozamiento tierras-tierras (°) :	10.000
m. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	35.000

(1) Es el valor que toma para los módulos extremos. El valor es constante dentro del módulo y varia linealmente de un módulo a otro.
(2) Es el valor que toma en los extremos del muro completo. El valor varia linealmente dentro de cada módulo.

CALCULO DE SECUENCIA DE MUROS . Resultados.

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV
OBRA :	E-1518.3. Muros estribo 1

	Módulo 1			Módulo 2			Módulo 3			Módulo 4		
	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3
GEOMETRIA SECCION												
C. Canto del muro en coronación (m) :	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
ST. Sobreespesor muro en trasdós (m) :	1.182	1.053	0.924	0.927	0.798	0.669	0.673	0.543	0.414	0.418	0.289	0.159
SI. Sobreespesor muro en intradós (m) :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
P. Puntera zapata (m) :	1.800	1.800	1.800	1.467	1.467	1.467	1.133	1.133	1.133	0.800	0.800	0.800
T. Talón zapata (m) :	5.118	5.247	5.376	4.173	4.302	4.431	3.227	3.357	3.486	2.282	2.411	2.541
H. Altura muro (m) :	11.350	10.110	8.870	8.903	7.663	6.423	6.457	5.217	3.977	4.010	2.770	1.530
Hz. Canto zapata (m) :	1.800	1.800	1.800	1.467	1.467	1.467	1.133	1.133	1.133	0.800	0.800	0.800
H1-1. Dist. sección 1 a sup. zapata (m) :	2.750	2.656	2.563	2.563	2.469	2.375	2.375	2.281	2.188	2.188	2.094	2.000
Cota cimentación :	227.130	227.130	227.130	227.430	227.430	227.430	227.730	227.730	227.730	228.030	228.030	228.030
TERRENO												
X0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	0.050	1.383	2.716	2.716	4.050	5.383	5.383	6.716	8.049	8.049	9.382	10.716
X2	1.282	3.821	6.359	6.359	8.898	11.436	11.436	13.975	16.514	16.514	19.052	21.591
X3	15.000	17.074	19.148	19.148	21.221	23.295	23.295	25.369	27.443	27.443	29.517	31.591
X4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Y0	11.350	10.663	9.975	9.975	9.288	8.600	8.600	7.913	7.225	7.225	6.538	5.850
Y1	11.350	11.203	11.055	11.055	10.908	10.760	10.760	10.613	10.465	10.465	10.318	10.170
Y2	11.350	11.203	11.055	11.055	10.908	10.760	10.760	10.613	10.465	10.465	10.318	10.170
Y3	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Y4												
Vale terreno												
COMPROBACIONES												
Coeficiente seguridad deslizamiento :	2.313	2.294	1.802	1.546	1.613	1.682	1.500	1.690	1.921	1.634	1.989	2.568
	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Coeficiente seguridad al vuelco :	4.874	4.879	3.574	2.699	3.168	3.709	2.797	3.773	5.036	3.514	5.358	9.306
	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Tensión máxima (T/m²) :	25.663	24.284	29.777	35.329	27.969	21.989	25.697	17.551	12.047	14.106	8.259	4.447
Tensión media (T/m²) :	25.645	23.651	21.647	20.847	18.720	16.557	15.637	13.320	11.055	10.095	7.764	5.502
Tensión cobaricentrica (T/m²) :	25.651	23.864	24.745	27.129	22.411	18.590	19.906	14.897	11.396	11.636	7.933	5.878
	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
ARMADO												
1. Inferior transversal cimentación (cm²/m) :	13.024	13.024	13.024	10.612	10.612	10.612	8.200	8.200	8.200	5.788	5.788	5.788
2. Superior transversal cimentación (cm²/m) :	35.775	33.516	36.433	35.701	28.669	22.724	20.414	13.765	9.123	7.730	5.788	5.788
3. Inferior longitudinal cimentación (cm²/m) :	13.024	13.024	13.024	10.612	10.612	10.612	8.200	8.200	8.200	5.788	5.788	5.788
4. Superior longitudinal cimentación (cm²/m) :	13.024	13.024	13.024	10.612	10.612	10.612	8.200	8.200	8.200	5.788	5.788	5.788
5. Perimetral cimentación (cm²/m) :	13.024	13.024	13.024	10.612	10.612	10.612	8.200	8.200	8.200	5.788	5.788	5.788
6a. Espera 6b (cm²/m) :	24.130	18.419	12.032	12.106	6.616	5.530	5.551	4.835	4.118	4.139	1.711	2.706
6b. Vertical trasdós con solape (cm²/m) :	24.130	18.419	12.032	12.106	6.616	5.530	5.551	4.835	4.118	4.139	1.711	2.706
7. Vertical trasdós sin solape (cm²/m) :	20.547	18.702	14.905	14.890	11.501	6.367	6.423	2.137	1.367	1.367	3.020	1.250
8a. Espera 8b (cm²/m) :	5.047	4.659	4.272	4.282	3.895	3.507	3.518	3.130	2.743	2.753	2.366	2.706
8b. Vertical intradós (cm²/m) :	5.047	4.659	4.272	4.282	3.895	3.507	3.518	3.130	2.743	2.753	2.366	2.706
9. Horquilla coronación (cm²/m) :												
10. Horizontal trasdós (cm²/m) :	17.944	16.567	15.189	15.226	13.848	12.470	12.507	11.130	9.752	9.789	8.411	7.033
11. Horizontal intradós (cm²/m) :	8.972	8.283	7.594	7.613	6.924	6.235	6.254	5.565	4.876	4.894	4.206	3.517
12. Montaje muro y cortante (cm²/m²) :	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500
13. Horquillas horizontales bordes (cm²/m) :	17.944	16.567	15.189	15.226	13.848	12.470	12.507	11.130	9.752	9.789	8.411	7.033

CALCULO DE SECUENCIA DE MUROS . Datos.

Datos

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV
OBRA :	E-1518.3. Muros estribo 2

GESTION DE FICHEROS

Directorio de trabajo :	G:\MAZAXV\E-1518.3\ESTRIBO\MURO2

VALORES VARIABLES

GEOMETRIA MURO

	Sección inicial	Sección final	
C. Canto del muro en coronación (m) :	0.500	0.500	(1)
Sl. Sobreespesor muro en intradós (m) :	0.000	0.000	(2)
P. Puntera zapata (m) :	1.900	0.800	(1)
Hz. Canto zapata (m) :	1.900	0.800	(1)
Ancho total de la zapata (m) :	10.250	4.750	(1)
H1-1. Dist. sección 1 a sup. zapata (m) :	3.000	1.750	(2)
Cota coronación :	241.741	230.990	(2)
Cota cimentación :	227.280	228.630	(1)

DEFINICION TERRENO

	Sección inicial X	Sección final X	Sección inicial Y	Sección final Y	
0. Coordenadas base trasdos (m) :	0.000	0.000	0.000	0.000	(2)
1. Coordenadas coronación trasdos (m) :	-1.308	-0.163	12.561	1.560	(2)
2. Coordenadas fin tramo 1 terreno (m) :	0.050	12.530	12.561	7.565	(2)
3. Coordenadas fin tramo 2 terreno (m) :	1.408	25.222	12.561	13.570	(2)
4. Coordenadas fin tramo 3 terreno (m) :	20.000	35.222	12.561	13.570	(2)

VALORES CONSTANTES

GEOMETRIA MURO

Pendiente trasdós :	9.600	
Longitud total muro (m) :	60.000	
Número de módulos :	6	
Secciones a verificar por módulo :	3	(Mínimo 2)
Longitud módulo (m) :	10.000	

CARGAS (sin mayorar)

Acciones permanentes (G)	
Peso propio barrera coronación (T/m) :	0.000
Acciones permanentes de valor no constante (G*)	
Fg. Carga horizontal sobre muro (T/m) :	0.000
Hfg. Posición Fg a inferior zapata (m) :	0.000
Acciones variables (Q)	
SC1. Sobrecarga en tramo 1 (T/m) :	0.000
SC2. Sobrecarga en tramo 2 (T/m) :	0.000
SC3. Sobrecarga en tramo 3 (T/m) :	3.000
Fq. Carga horizontal sobre muro (T/m) :	0.000
Hfq. Posición Fq a inferior zapata (m) :	0.000

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento :	1.500
Seguridad al vuelco :	1.800
Minoración acero :	1.150
Minoración hormigón :	1.500
Yo (coeficiente combinación variables) :	1.00

	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Terreno (pesopropio y empujes) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas.	0.00	1.500

CARACTERISTICAS MATERIALES

Peso específico hormigón (T/m³) :	2.500
Hormigón alzado (T/m²) :	H - 250
Hormigón cimentación (T/m²) :	H - 250
Acero (T/²) :	AEH - 500

ARMADO

Recubrimiento alzado (m) :	0.050
Recubrimiento cimentación (m) :	0.050

CARACTERISTICAS DEL TERRENO

g. Peso específico (T/m³) :	2.00
f. Angulo rozamiento interno (°) :	30.000
dmt. Angulo rozamiento muro-tierras (°) :	0.000
ftt. Angulo rozamiento tierras-tierras (°) :	11.000
m. Coeficiente rozamiento zapata-tierras :	0.580
Tensión admisible cimentación (T/m²) :	35.000

(1) Es el valor que toma para los módulos extremos. El valor es constante dentro del módulo y varía linealmente de un módulo a otro.
(2) Es el valor que toma en los extremos del muro completo. El valor varía linealmente dentro de cada módulo.

CALCULO DE SECUENCIA DE MUROS . Resultados.

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV
OBRA :	E-1518.3. Muros estribo 2

	Módulo 1			Módulo 2			Módulo 3			Módulo 4			Módulo 5			Módulo 6		
	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3	Sección 1	Sección 2	Sección 3
GEOMETRIA SECCION																		
C. Canto del muro en coronación (m) :	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
ST. Sobreespesor muro en trasdós (m) :	1.308	1.215	1.122	1.117	1.023	0.930	0.925	0.831	0.738	0.733	0.640	0.546	0.541	0.448	0.354	0.349	0.256	0.163
SI. Sobreespesor muro en intradós (m) :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
P. Puntera zapata (m) :	1.900	1.900	1.900	1.680	1.680	1.680	1.460	1.460	1.460	1.240	1.240	1.240	1.020	1.020	1.020	0.800	0.800	0.800
T. Talón zapata (m) :	6.542	6.635	6.728	5.853	5.947	6.040	5.165	5.259	5.352	4.477	4.570	4.664	3.789	3.882	3.976	3.101	3.194	3.288
H. Altura muro (m) :	12.561	11.665	10.769	10.719	9.823	8.927	8.877	7.981	7.086	7.035	6.140	5.244	5.194	4.298	3.402	3.352	2.456	1.560
Hz. Canto zapata (m) :	1.900	1.900	1.900	1.680	1.680	1.680	1.460	1.460	1.460	1.240	1.240	1.240	1.020	1.020	1.020	0.800	0.800	0.800
H1-1. Dist. sección 1 a sup. zapata (m) :	3.000	2.896	2.792	2.792	2.688	2.583	2.583	2.479	2.375	2.375	2.271	2.167	2.167	2.063	1.958	1.958	1.854	1.750
Cota cimentación :	227.280	227.280	227.280	227.550	227.550	227.550	227.820	227.820	227.820	228.090	228.090	228.090	228.360	228.360	228.360	228.630	228.630	228.630
TERRENO																		
X0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X1																		
X2	0.050	1.090	2.130	2.130	3.170	4.210	4.210	5.250	6.290	6.290	7.330	8.370	8.370	9.410	10.450	10.450	11.490	12.530
X3	1.408	3.393	5.377	5.377	7.362	9.346	9.346	11.331	13.315	13.315	15.299	17.284	17.284	19.268	21.253	21.253	23.237	25.222
X4	20.000	21.268	22.537	22.537	23.805	25.074	25.074	26.342	27.611	27.611	28.879	30.148	30.148	31.416	32.685	32.685	33.953	35.222
Y0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Y1																		
Y2	12.561	12.145	11.728	11.728	11.312	10.896	10.896	10.479	10.063	10.063	9.647	9.230	9.230	8.814	8.398	8.398	7.981	7.565
Y3	12.561	12.645	12.729	12.729	12.813	12.897	12.897	12.981	13.066	13.066	13.150	13.234	13.234	13.318	13.402	13.402	13.486	13.570
Y4	12.561	12.645	12.729	12.729	12.813	12.897	12.897	12.981	13.066	13.066	13.150	13.234	13.234	13.318	13.402	13.402	13.486	13.570
Vale terreno	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
COMPROBACIONES																		
Coeficiente seguridad deslizamiento :	2.573	2.533	2.382	2.151	1.738	1.727	1.598	1.574	1.594	1.500	1.546	1.665	1.524	1.654	1.821	1.672	1.903	2.217
	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Coeficiente seguridad al vuelco :	5.812	5.763	5.329	4.299	3.318	3.513	2.999	3.220	3.521	2.957	3.407	4.146	3.444	4.177	5.218	4.330	5.811	8.269
	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Tensión máxima (T/m²) :	25.270	23.631	24.958	30.305	35.329	31.652	34.535	30.264	26.003	28.532	23.187	18.017	19.535	14.883	11.014	11.534	7.802	4.977
Tensión media (T/m²) :	28.640	27.603	26.217	25.286	24.242	22.769	22.083	20.535	18.924	18.185	16.470	14.753	13.952	12.214	10.496	9.633	7.893	6.190
Tensión cobaricentrica (T/m²) :	29.809	28.993	26.643	27.078	28.603	26.172	27.195	24.386	21.620	22.441	19.061	15.927	16.100	13.173	10.672	10.311	7.924	6.623
	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
ARMADO																		
1. Inferior transversal cimentación (cm²/m) :	13.747	13.747	13.747	12.155	12.155	12.155	10.564	10.564	10.564	8.972	8.972	8.972	7.380	7.380	7.380	5.788	5.788	5.788
2. Superior transversal cimentación (cm²/m) :	42.061	43.900	42.667	42.925	52.837	47.798	47.065	41.594	35.766	34.744	27.895	20.974	19.759	14.642	10.361	9.168	5.795	5.788
3. Inferior longitudinal cimentación (cm²/m) :	13.747	13.747	13.747	12.155	12.155	12.155	10.564	10.564	10.564	8.972	8.972	8.972	7.380	7.380	7.380	5.788	5.788	5.788
4. Superior longitudinal cimentación (cm²/m) :	13.747	13.747	13.747	12.155	12.155	12.155	10.564	10.564	10.564	8.972	8.972	8.972	7.380	7.380	7.380	5.788	5.788	5.788
5. Perimetral cimentación (cm²/m) :	13.747	13.747	13.747	12.155	12.155	12.155	10.564	10.564	10.564	8.972	8.972	8.972	7.380	7.380	7.380	5.788	5.788	5.788
6a. Espera 6b (cm²/m) :	31.571	27.261	22.253	22.111	17.061	11.885	11.754	8.507	5.944	5.913	5.418	4.923	4.892	4.397	3.902	3.871	1.688	2.881
6b. Vertical trasdós con solape (cm²/m) :	31.571	27.261	22.253	22.111	17.061	11.885	11.754	8.507	5.944	5.913	5.418	4.923	4.892	4.397	3.902	3.871	1.688	2.881
7. Vertical trasdós sin solape (cm²/m) :	26.071	24.689	22.146	22.184	18.998	16.270	16.270	13.582	10.712	10.618	6.394	2.975	2.891	1.289	1.224	1.224	2.847	1.094
8a. Espera 8b (cm²/m) :	5.425	5.145	4.865	4.850	4.570	4.290	4.274	3.994	3.714	3.699	3.419	3.139	3.123	2.843	2.563	2.547	2.267	2.881
8b. Vertical intradós (cm²/m) :	5.425	5.145	4.865	4.850	4.570	4.290	4.274	3.994	3.714	3.699	3.419	3.139	3.123	2.843	2.563	2.547	2.267	2.881
9. Horquilla coronación (cm²/m) :																		
10. Horizontal trasdós (cm²/m) :	19.290	18.295	17.299	17.244	16.248	15.253	15.197	14.202	13.206	13.151	12.155	11.160	11.104	10.109	9.113	9.058	8.062	7.067
11. Horizontal intradós (cm²/m) :	9.645	9.147	8.650	8.622	8.124	7.626	7.599	7.101	6.603	6.575	6.078	5.580	5.552	5.054	4.557	4.529	4.031	3.533
12. Montaje muro y cortante (cm²/m²) :	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500
13. Horquillas horizontales bordes (cm²/m) :	19.290	18.295	17.299	17.244	16.248	15.253	15.197	14.202	13.206	13.151	12.155	11.160	11.104	10.109	9.113	9.058	8.062	7.067

PUENTE 1518.3

5º PROYECTO DE PRUEBA DE CARGA

PRUEBA DE CARGA

OBJETO DE LA PRUEBA

El objeto de la prueba es comprobar la respuesta estructural, frente a situaciones de carga estática, de manera tal que confrontando la respuesta real con la teórica, determinar la fiabilidad del comportamiento en servicio del puente.

Esta prueba de carga se realizará antes de la colocación del balasto, carriles, etc., mediante el empleo de camiones cargados con arena, y servirá para obtener una recepción provisional de la obra. Para la recepción definitiva de la estructura será necesario realizar otra prueba de carga con locomotoras, una vez colocada la infraestructura ferroviaria, que no es objeto del presente documento.

CARGA DE PRUEBA

La prueba se realizará empleando camiones, el la disposición que se adjunta a continuación, de tres ejes separados 3.825 y 1.36 m. con cargas por eje de 7.6, 13.7 y 13.7 T.

APARATOS DE MEDIDA Y MEDICIONES

Para la realización de las mediciones se colocarán flexímetros en el centro del vano (medidas f1) y apoyos (medidas f2). Los valores de los desplazamientos que se adjuntan son los descensos relativos esperados entre los puntos de los vanos y los fijos de los apoyos. Estos valores deben ser del orden de la magnitud del valor f1-f2 medido en obra.

La apreciación mínima de cualquiera de los flexímetros será del orden del 3% de los valores máximos esperados de las magnitudes a medir.

El rango de los aparatos deberá ser como mínimo superior en un 50% a los esperados de dicha magnitud.

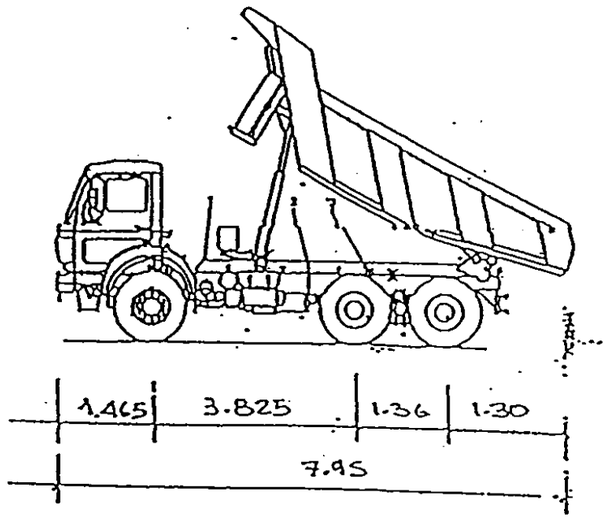
Las medidas se realizarán inmediatamente antes de la carga, inmediatamente después de su colocación y a los quince minutos de haberla retirado.

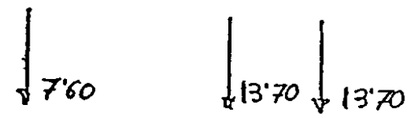
Durante la realización de la prueba se deberá anotar las condiciones climatológicas existentes a lo largo de la misma.

ANALISIS

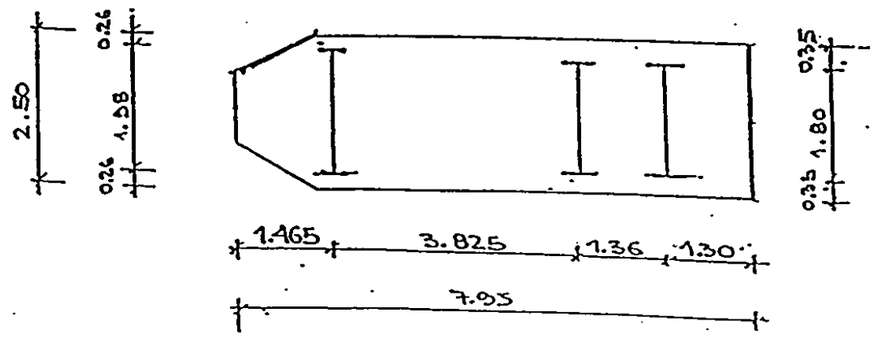
Para obtener las solicitaciones y desplazamientos verticales en los puntos a medir se procesó la estructura mediante el programa COSMOS/M. El modelo es el mismo usado en el cálculo del tablero. Los esfuerzos que se consiguen son del orden del 30 % de los obtenidos en la realización de una prueba de carga con locomotoras y la infraestructura ferroviaria colocada.

CAMION VOLQUETE DE 35 Ton.

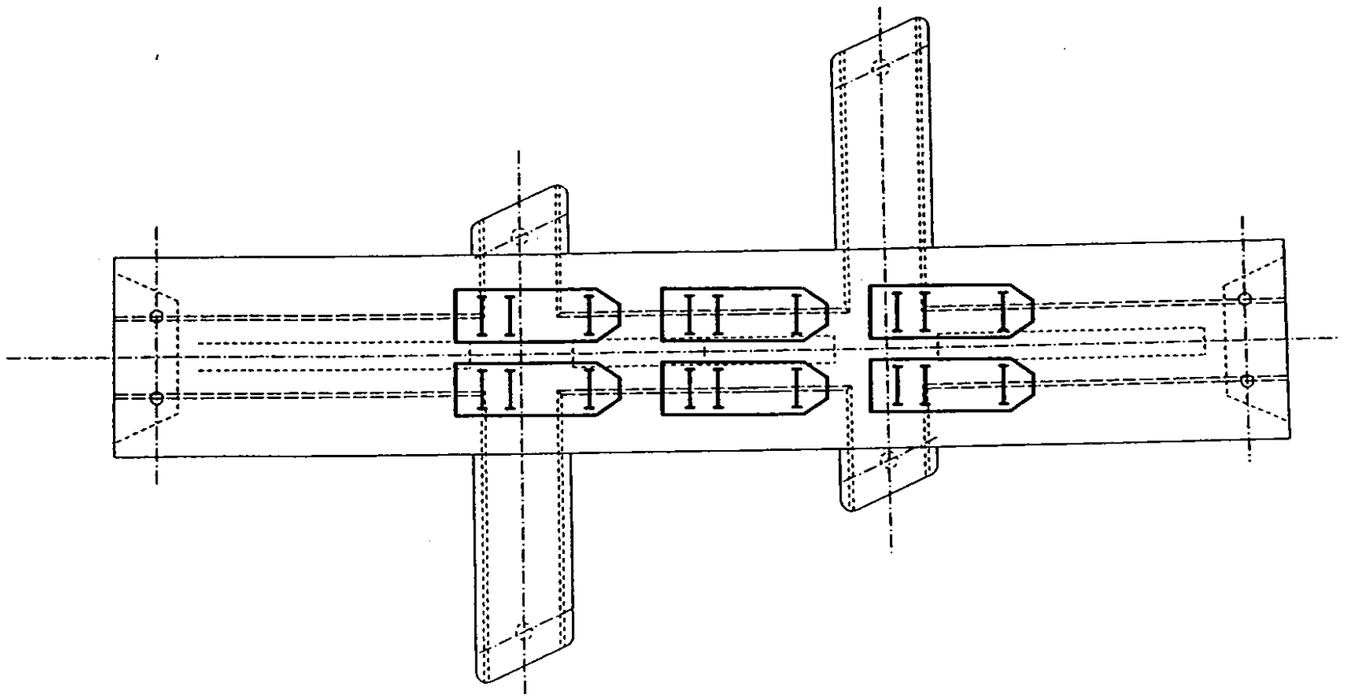




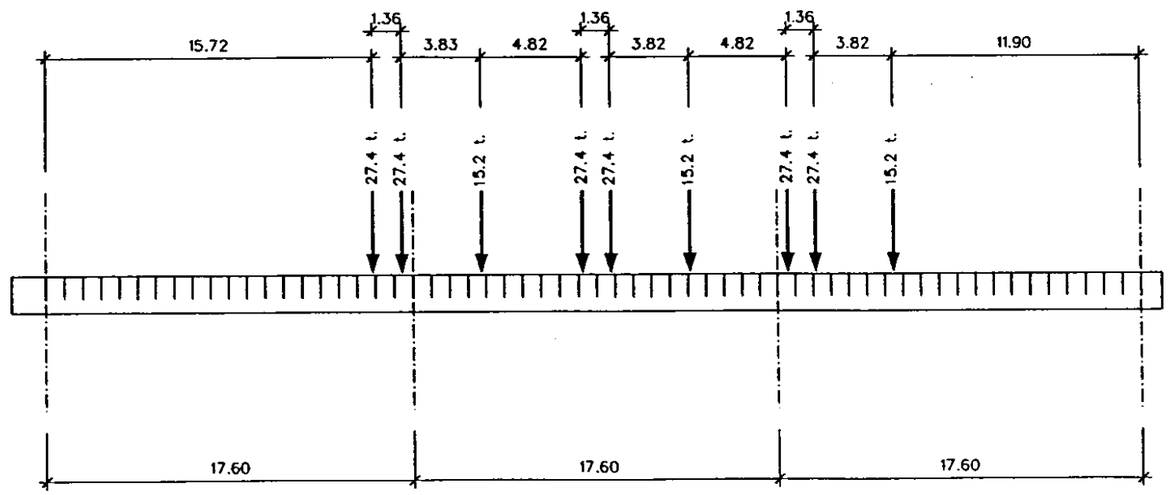
ALZADO



PLANTA



SITUACION EN PLANTA DE CAMIONES EN PRUEBA DE CARGA

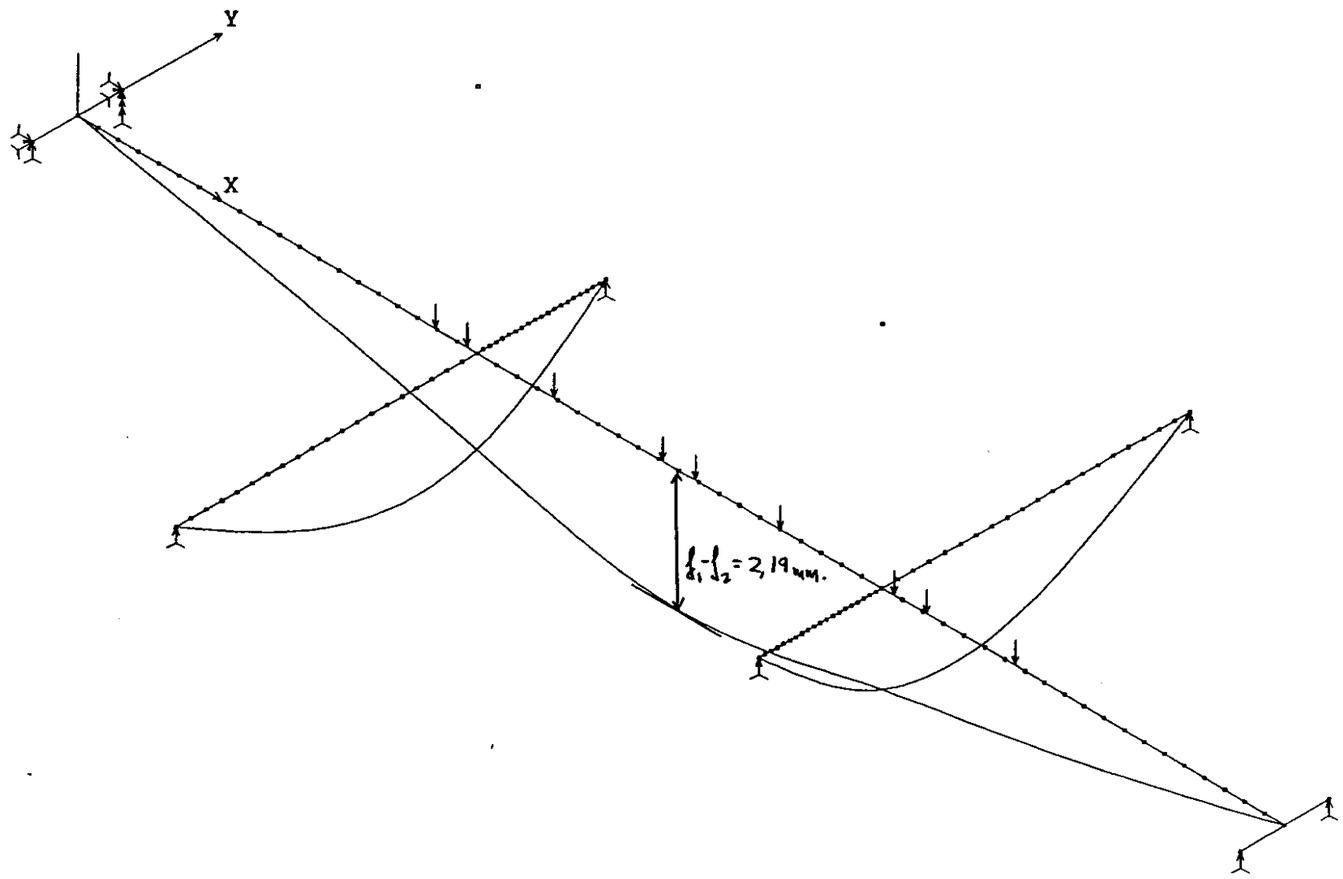


SITUACION EN ALZADO DE EJES DE CAMIONES

E-1518.3

DESPLAZAMIENTOS EN NODOS (mm.)

Node	UZ	Node	UZ	Node	UZ	Node	UZ
1	0.00	41	1.74	81	1.20	121	1.49
2	0.07	42	1.66	82	1.26	122	1.59
3	0.14	43	1.59	83	1.32	123	1.67
4	0.22	44	1.59	84	1.38	124	1.73
5	0.29	45	1.59	85	1.43	125	1.78
6	0.36	46	1.52	86	1.47	126	1.80
7	0.43	47	1.45	88	0.00	127	1.81
8	0.51	48	1.39	90	1.59	128	1.79
9	0.58	49	1.33	90	1.59	129	1.75
10	0.65	50	1.26	91	1.65	130	1.68
11	0.73	51	1.20	92	1.68	132	0.00
12	0.80	52	1.13	93	1.69	134	1.54
13	0.88	53	1.06	94	1.68	135	1.49
14	0.95	54	0.98	95	1.65	136	1.44
15	1.03	55	0.90	96	1.61	137	1.38
16	1.11	56	0.82	97	1.54	138	1.31
17	1.19	57	0.73	98	1.47	139	1.24
18	1.27	58	0.65	99	1.38	140	1.17
19	1.35	59	0.56	100	1.28	141	1.09
20	1.43	60	0.47	101	1.16	142	1.01
21	1.51	61	0.38	102	1.04	143	0.93
22	0.00	62	0.28	103	0.91	144	0.85
24	1.61	63	0.19	104	0.77	145	0.76
25	1.70	64	0.09	105	0.62	146	0.67
26	1.79	65	0.00	106	0.47	147	0.58
27	1.88	67	0.00	107	0.32	148	0.48
28	1.97	68	0.09	108	0.16	149	0.39
29	2.04	69	0.19	109	0.00	150	0.29
30	2.10	70	0.28	110	0.00	151	0.20
31	2.15	71	0.38	111	0.00	152	0.10
32	2.18	72	0.47	112	0.17	153	0.00
33	2.19	73	0.56	113	0.34	154	0.00
34	2.18	74	0.65	114	0.51	155	0.00
35	2.16	75	0.73	115	0.68	156	0.00
36	2.12	76	0.82	116	0.83	157	0.00
37	2.06	77	0.90	117	0.98		
38	1.99	78	0.98	118	1.13		
39	1.91	79	1.05	119	1.26		
40	1.83	80	1.13	120	1.38		



E - 1518.3

PRUEBA DE CARGA DINAMICA

El objeto de la prueba de carga dinámica es el de obtener el valor de los principales parámetros dinámicos de cálculo que presenta la estructura. Es el caso de las frecuencias propias de vibración libre.

La valoración del período o frecuencia de vibración vertical correspondiente al modo fundamental, tiene especial repercusión en el coeficiente de amplificación dinámico al paso de la sobrecarga, utilizado en el cálculo.

Para la obtención de estos parámetros es necesaria la excitación dinámica de la estructura. Esto se obtiene mediante el paso de un camión, a distintas velocidades, sobre un obstáculo colocado en el tablero. Las características del mismo serán las de un tablón de forma redondeada de 50cm por 300cm con un espesor de 6 cm.

Se utilizará un solo vehículo pudiendo ser un camión de 2 o 3 ejes con un peso total suficiente para provocar la respuesta de la estructura con la debida amplitud.

El ensayo consistirá en efectuar algunas pasadas a muy baja velocidad, e ir incrementando la velocidad en escalones de 10 km/h.

La instrumentación a disponer consistirá en anillos extensométricos, para la medida de flechas, para registrar los desplazamientos de cada vano y en dos acelerómetros piezoeléctricos, para la medida de vibraciones, colocados en una de los centros de vanos del puente, de manera de determinar las frecuencias principales de vibración vertical, que deberán coincidir con los valores calculados a continuación.

PUENTE E_1518.3

```
**                                **
**                                **
** CCCC  OOOO  SSSS  M   M OOOO SSSS  /M   M **
** C   O O S     MM MM O O S     / MM MM **
** C   O O SSSS  M M M M O O SSSS / M M M M **
** C   O O    S  M   M  O O    S/  M   M **
** CCCC  OOOO  SSSS  M   M OOOO SSSS/  M   M **
**                                **
**                                **
**            VERSION: 2.00       **
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**                                **
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Problem name: COEF-1
Date : 09/11/1998 Time: 18:24:23
Title :
Subtitle :

CONTROL INFORMATION
NUMBER OF LOAD CASES .....(NLCASE) = 1
SOLUTION MODE .....(MODEX) = 2
EQ. 0, STATIC ANALYSIS
EQ. 1, BUCKLING ANALYSIS
EQ. 2, DYNAMIC ANALYSIS
THERMAL LOADING FLAG .....(ITHERM) = 0
EQ. 0, NO THERMAL EFFECTS CONSIDERED
EQ. 1, ADD TEMPERATURE EFFECT
GRAVITY LOADING FLAG .....(IGRAV) = 0
EQ. 0, NO GRAVITY LOADING CONSIDERED
EQ. 1, ADD GRAVITY LOADING EFFECT
CENTRIFUGAL LOADING FLAG .....(ICNTRF) = 0
EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
IN-PLANE STIFFENING FLAG .....(INPLN) = 0
EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
EQ. 1, IN-PLANE EFFECTS CONSIDERED
SOFT SPRING ADDITION FLAG .....(ISOFT) = 0
EQ. 0, NO SOFT SPRING OPTION
EQ. 1, SOFT SPRING ADDED

SAVE DECOMPOSED STIFFNESS MATRIX FLAG ...(ISAVK) = 0
EQ. 0, DO NOT SAVE DECOMPOSED K
EQ. 1, SAVE DECOMPOSED K
FORM STIFFNESS MATRIX FLAG .....(IFORMK) = 0
EQ. 0, FORM STIFFNESS MATRIX
EQ. 1, USE EXISTING DECOMPOSED STIFFNESS MATRIX

SPIN SOFTENING FLAG .....(ISPIN) = 0
EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
INERTIA RELIEF FLAG .....(IFORMK) = 0
EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
RIGID CONNECTIONS FLAG .....(IRIGID) = 0
EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS & SHELLS
EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS & SHELLS

TOTAL SYSTEM DATA
NUMBER OF EQUATIONS .....(NEQ) = 854
NUMBER OF MATRIX ELEMENTS .....(NWK) = 15981
MAXIMUM HALF BANDWIDTH .....(MK) = 45
MEAN HALF BANDWIDTH .....(MM) = 18
NUMBER OF ELEMENTS.....(NUME) = 144
NUMBER OF NODAL POINTS.....(NUMNP)= 148
ADJUSTED BLOCK SIZE .....(MTBLK)= 15982
EXTRA MEMORY AVAILABLE (in 8-byte words) . . .(XMTBLK)= 4668394
NUMBER OF STIFFNESS BLOCKS..... (NBLK) = 1

MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE = .410959E+11 (436)
MINIMUM DIAGONAL STIFFNESS MATRIX VALUE = .849240E+07 (115)
1

| MASS MOMENT INFORMATION |

| MASS .160949E+03 | VOLUME .141594E+04 | WEIGHT .000000E+00 |

| MASS MOMENT OF INERTIA W.R.T. C.G. |

| IX .275429E+04 | IY .280939E+05 | IZ .308482E+05 |

| MASS PRODUCT OF INERTIA W.R.T. C.G. |

| PXY .212000E+04 | PXZ .000000E+00 | PYZ .000000E+00 |

| RADII OF GYRATION W.R.T. C.G. |

| RX .413677E+01 | RY .132118E+02 | RZ .138443E+02 |

| CENTER OF GRAVITY |

| CGx .263929E+02 | CGy .440733E-01 | CGz .000000E+00 |

| PRINCIPAL MASS MOMENT OF INERTIA |

| P1 .308482E+05 | P2 .282701E+05 | P3 .257815E+04 |

| PRINCIPAL RADII OF GYRATION |

| R1 .138443E+02 | R2 .132532E+02 | R3 .400231E+01 |

| PRINCIPAL AXES (DIRECTION COSINES IN ROWS W.R.T C.G) |

| N_11 .792439E+00 | N_12 -.609951E+00 | N_13 .000000E+00 |

| N_21 .828023E-01 | N_22 -.996566E+00 | N_23 .000000E+00 |

| N_31 .000000E+00 | N_32 .000000E+00 | N_33 -.739212E+00 |

Note: In the above table, WEIGHT is computed based on the user defined acceleration for the first active Load Case

SOLUTION PARAMETERS
NUMBER OF EIGENVALUES.....(NFR)= 2
MASS TYPE: 1-LUMPED,2-CONSISTENT....(MASS)= 1
MODE SHAPE PRINT FLAG.....(MPRNT)= 1
INTERMEDIATE SOLUTION PRINT FLAG ...(IFPR)= 0
STURM SEQUENCE CHECK FLAG.....(IFSS)= 0
MAXIMUM NUMBER OF ITERATIONS .....(ITMAX)= 16
FREQUENCY SHIFT FLAG .....(IFRSH)= 0
FREQUENCY SHIFT.....(FRSH)= .0000000E+00
CONVERGENCE TOLERANCE.....(RTOL)= .1000000E-04
COMPOSITE MODAL DAMPING CALC. FLAG . .(IMDC)= 0
MODAL ACCELERATION FLAG.....(IMAM)= 0

SUBSPACE ITERATION

ITERATION NUMBER 1
ITERATION NUMBER 2
ITERATION NUMBER 3
ITERATION NUMBER 4
ITERATION NUMBER 5
ITERATION NUMBER 6
ITERATION NUMBER 7
ITERATION NUMBER 8
ITERATION NUMBER 9
ITERATION NUMBER 10

CONVERGENCE REACHED FOR RTOL .1000E-04

FREQUENCY ANALYSIS
by
SUBSPACE ALGORITHM

FREQUENCY NUMBER	FREQUENCY (RAD/SEC)	FREQUENCY (CYCLES/SEC)	PERIOD (SECONDS)
1	.3523029E+02	.5607075E+01	.1783461E+00
2	.4033607E+02	.6419684E+01	.1557709E+00

MODE SHAPE NO. 1

NODE	X-DISPLACEMENT	Y-DISPLACEMENT	Z-DISPLACEMENT	X-ROTATION	Y-ROTATION	Z-ROTATION
1	-.1455559E-11	-.1615114E-11	.2446654E-05	-.1784428E-05	-.8817406E-02	-.2438088E-11
2	-.1204231E-10	-.1344863E-10	.7751614E-02	-.4931420E-03	-.8782798E-02	-.2370478E-10
3	-.2257305E-10	-.4201397E-10	.1544011E-01	-.9844993E-03	-.8679816E-02	-.4046620E-10
4	-.3491285E-10	-.8337943E-10	.2300235E-01	-.1475857E-02	-.8495362E-02	-.5279575E-10
5	-.4708507E-10	-.1336193E-09	.3037200E-01	-.1967215E-02	-.8242876E-02	-.6064168E-10
6	-.5902996E-10	-.1888080E-09	.3749143E-01	-.2458572E-02	-.7927713E-02	-.6405315E-10
7	-.7068862E-10	-.2450735E-09	.4430839E-01	-.2949929E-02	-.7556680E-02	-.6310307E-10
8	-.8200304E-10	-.2986187E-09	.5077721E-01	-.3441287E-02	-.7137987E-02	-.5788933E-10
9	-.9291641E-10	-.3457439E-09	.5686006E-01	-.3932644E-02	-.6681170E-02	-.4853429E-10
10	-.1033733E-09	-.3828668E-09	.6252806E-01	-.4424002E-02	-.6197031E-02	-.3518264E-10

11	-.1133197E-09	-.4065409E-09	.6776234E-01	-.4915359E-02	-.5697547E-02
.1799751E-10					
12	-.1227034E-09	-.4134696E-09	.7255507E-01	-.5406716E-02	-.5195791E-02
.2844892E-11					
13	-.1314742E-09	-.4005145E-09	.7691040E-01	-.5898075E-02	-.4705838E-02
.2716238E-10					
14	-.1395838E-09	-.3646973E-09	.8084522E-01	-.6389432E-02	-.4242686E-02
.5477477E-10					
15	-.1469862E-09	-.3031937E-09	.8439003E-01	-.6880789E-02	-.3822164E-02
.8551391E-10					
16	-.1536378E-09	-.2133181E-09	.8758959E-01	-.7372147E-02	-.3460846E-02
.1192346E-09					
17	-.1594973E-09	-.9249864E-10	.9050355E-01	-.7863505E-02	-.3175989E-02
.1558262E-09					
18	-.1645264E-09	.6175968E-10	.9320700E-01	-.8354862E-02	-.2985461E-02
.1952265E-09					
19	-.1686894E-09	.2519237E-09	.9579103E-01	-.8846219E-02	-.2907693E-02
.2374355E-09					
20	-.1713793E-09	.4804001E-09	.9836229E-01	-.9337577E-02	-.2957921E-02
.2823191E-09					
21	-.1731453E-09	.7497070E-09	.1010386E+00	-.9828934E-02	-.3149916E-02
.3302767E-09					
22	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
.0000000E+00					
24	-.1520864E-09	.1061674E-08	.1039003E+00	-.8886163E-02	-.3321855E-02
.3764360E-09					
25	-.1301265E-09	.1408266E-08	.1068318E+00	-.7943396E-02	-.3312514E-02
.4090697E-09					
26	-.1032185E-09	.1777899E-08	.1096778E+00	-.7000624E-02	-.3128450E-02
.4289016E-09					
27	-.7551674E-10	.2159550E-08	.1122936E+00	-.6057855E-02	-.2793221E-02
.4365195E-09					
28	-.4708341E-10	.2542849E-08	.1145560E+00	-.5115086E-02	-.2329098E-02
.4328071E-09					
29	-.1798325E-10	.2918275E-08	.1163617E+00	-.4172316E-02	-.1758839E-02
.4188172E-09					
30	.1171686E-10	.3277311E-08	.1176272E+00	-.3229543E-02	-.1105609E-02
.3957700E-09					
31	.4194757E-10	.3612580E-08	.1182901E+00	-.2286774E-02	-.3928902E-03
.3650473E-09					
32	.7263815E-10	.3917993E-08	.1183082E+00	-.1344002E-02	.3556528E-03
.3281825E-09					
33	.1037159E-09	.4188870E-08	.1176606E+00	-.4012328E-03	.1116279E-02
.2868490E-09					
34	.1351068E-09	.4422063E-08	.1163470E+00	.5415365E-03	.1865316E-02
.2428442E-09					
35	.1667359E-09	.4616052E-08	.1143879E+00	.1484308E-02	.2579287E-02
.1980737E-09					
36	.1985270E-09	.4771034E-08	.1118245E+00	.2427079E-02	.3235042E-02
.1545338E-09					
37	.2304033E-09	.4888999E-08	.1087180E+00	.3369849E-02	.3809883E-02
.1142936E-09					
38	.2622877E-09	.4973782E-08	.1051493E+00	.4312618E-02	.4281685E-02
.7947827E-10					
39	.2941028E-09	.5031107E-08	.1012187E+00	.5255387E-02	.4628992E-02
.5225345E-10					
40	.3257714E-09	.5068618E-08	.9704488E-01	.6198163E-02	.4831099E-02
.3481228E-10					
41	.3572162E-09	.5095895E-08	.9276442E-01	.7140930E-02	.4868112E-02
.2936578E-10					
42	.3835222E-09	.5124489E-08	.8852699E-01	.8083706E-02	.4732564E-02
.3819574E-10					
43	.4094642E-09	.5168042E-08	.8449035E-01	.9026473E-02	.4408635E-02
.6380402E-10					
46	.4234196E-09	.5242547E-08	.8077796E-01	.8575233E-02	.4050101E-02
.1015590E-09					
47	.4369034E-09	.5340199E-08	.7732699E-01	.8123992E-02	.3811580E-02
.1168613E-09					
48	.4522915E-09	.5442401E-08	.7404534E-01	.7672752E-02	.3664154E-02
.1123082E-09					
49	.4671152E-09	.5532739E-08	.7084959E-01	.7221506E-02	.3613790E-02
.9028998E-10					
50	.4813259E-09	.5596892E-08	.6766086E-01	.6770267E-02	.3645954E-02
.5320554E-10					
51	.4948781E-09	.5622673E-08	.6441258E-01	.6319023E-02	.3746749E-02
.3482856E-11					
52	.5077274E-09	.5600033E-08	.6105033E-01	.5867783E-02	.3902922E-02
.5643163E-10					
53	.5198322E-09	.5521080E-08	.5753089E-01	.5416540E-02	.4101887E-02
.1240959E-09					
54	.5311529E-09	.5380061E-08	.5382195E-01	.4965300E-02	.4331746E-02
.1970920E-09					
55	.5416525E-09	.5173327E-08	.4990123E-01	.4514056E-02	.4581330E-02
.2730545E-09					
56	.5512968E-09	.4899286E-08	.4575607E-01	.4062815E-02	.4840228E-02
.3496944E-09					
57	.5600541E-09	.4558308E-08	.4138253E-01	.3611575E-02	.5098845E-02
.4248311E-09					
58	.5678958E-09	.4152624E-08	.3678476E-01	.3160333E-02	.5348440E-02
.4964192E-09					
59	.5747961E-09	.3686202E-08	.3197421E-01	.2709091E-02	.5581169E-02
.5625760E-09					
60	.5807324E-09	.3164579E-08	.2696886E-01	.2257848E-02	.5790134E-02
.6216089E-09					
61	.5856852E-09	.2594692E-08	.2179227E-01	.1806606E-02	.5969420E-02
.6720399E-09					
62	.5896383E-09	.1984675E-08	.1647281E-01	.1355364E-02	.6114136E-02
.7126270E-09					
63	.5925785E-09	.1343647E-08	.1104267E-01	.9041233E-03	.6220443E-02
.7423834E-09					
64	.5941206E-09	.6815164E-09	.5539584E-02	.4528791E-03	.6280017E-02
.7604782E-09					
65	.5946352E-09	.8725379E-11	.1418073E-05	.1638742E-05	.6300076E-02
.7665673E-09					
67	-.1556631E-08	.0000000E+00	.0000000E+00	-.2216200E-01	-.3149917E-02
.2768000E-09					
68	-.1478992E-08	.3799892E-10	.6213494E-02	-.2213039E-01	-.3149917E-02
.2767682E-09					
69	-.1401376E-08	.7599001E-10	.1240925E-01	-.2203561E-01	-.3149917E-02
.2766120E-09					
70	-.1323835E-08	.1139655E-09	.1856956E-01	-.2187771E-01	-.3149917E-02
.2762130E-09					
71	-.1246453E-08	.1519179E-09	.2467675E-01	-.2165682E-01	-.3149917E-02
.2754585E-09					
72	-.1169346E-08	.1898393E-09	.3071316E-01	-.2137311E-01	-.3149917E-02
.2742419E-09					
73	-.1092656E-08	.2277218E-09	.3666121E-01	-.2102678E-01	-.3149917E-02
.2724625E-09					
74	-.1016556E-08	.2655580E-09	.4250336E-01	-.2061812E-01	-.3149917E-02
.2700251E-09					
75	-.9412422E-09	.3033399E-09	.4822217E-01	-.2014741E-01	-.3149917E-02
.2668408E-09					
76	-.8669360E-09	.3410599E-09	.5380029E-01	-.1961501E-01	-.3149917E-02
.2628261E-09					
77	-.7938816E-09	.3787104E-09	.5922046E-01	-.1902132E-01	-.3149917E-02
.2579036E-09					
78	-.7223436E-09	.4162836E-09	.6446556E-01	-.1836677E-01	-.3149917E-02
.2520012E-09					
79	-.6526066E-09	.4537718E-09	.6951858E-01	-.1765185E-01	-.3149917E-02
.2450528E-09					
80	-.5849725E-09	.4911675E-09	.7436266E-01	-.1687707E-01	-.3149917E-02
.2369974E-09					
81	-.5197597E-09	.5284629E-09	.7898108E-01	-.1604300E-01	-.3149917E-02
.2277798E-09					
82	-.4573013E-09	.5656505E-09	.8335729E-01	-.1515022E-01	-.3149917E-02
.2173498E-09					
83	-.3979440E-09	.6027227E-09	.8747493E-01	-.1419937E-01	-.3149917E-02
.2056624E-09					
84	-.3420460E-09	.6396719E-09	.9131778E-01	-.1319111E-01	-.3149917E-02
.1926776E-09					
85	-.2899764E-09	.6764907E-09	.9486984E-01	-.1212613E-01	-.3149917E-02
.1783603E-09					
86	-.2421133E-09	.7131714E-09	.9811530E-01	-.1100515E-01	-.3149917E-02
.1626798E-09					
88	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
.0000000E+00					
90	.1409657E-09	.7697689E-09	.1068555E+00	-.7693265E-02	-.3149917E-02
.6161056E-09					
91	.5344268E-09	.7889510E-09	.1112583E+00	-.5571579E-02	-.3149917E-02
.5694802E-09					
92	.8978413E-09	.8072296E-09	.1142601E+00	-.3475092E-02	-.3149917E-02
.5255927E-09					
93	.1233014E-08	.8245829E-09	.1158814E+00	-.1415405E-02	-.3149917E-02
.4844143E-09					
94	.1541750E-08	.8409904E-09	.1161505E+00	.5956411E-03	-.3149917E-02
.4459747E-09					
95	.1825890E-08	.8564324E-09	.1151038E+00	.2546116E-02	-.3149917E-02
.4103430E-09					
96	.2087326E-08	.8708908E-09	.1127853E+00	.4424121E-02	-.3149917E-02
.3776091E-09					
97	.2328017E-08	.8843482E-09	.1092472E+00	.6217939E-02	-.3149917E-02
.3478680E-09					
98	.2549977E-08	.8967888E-09	.1045490E+00	.7916147E-02	-.3149917E-02
.3212050E-09					
99	.2755272E-08	.9081977E-09	.9875812E-01	.9507748E-02	-.3149917E-02
.2976824E-09					
100	.2946000E-08	.9185613E-09	.9194867E-01	.1098228E-01	-.3149917E-02
.2773280E-09					
101	.3124261E-08	.9278674E-09	.8420173E-01	.1232995E-01	-.3149917E-02
.2601250E-09					
102	.3292128E-08	.9361048E-09	.7560457E-01	.1354168E-01	-.3149917E-02
.2460031E-09					
103	.3451607E-08	.9432639E-09	.6625028E-01	.1460925E-01	-.3149917E-02
.2348322E-09					
104	.3604595E-08	.9493360E-09	.5623701E-01	.1552538E-01	-.3149917E-02
.2264154E-09					
105	.3752837E-08	.9543139E-09	.4566749E-01	.1628375E-01	-.3149917E-02
.2204852E-09					
106	.3897874E-08	.9581918E-09	.3464828E-01	.1687913E-01	-.3149917E-02
.2167000E-09					
107	.4040996E-08	.9609650E-09	.2328901E-01	.1730739E-01	-.3149917E-02
.2146414E-09					
108	.4183190E-08	.9626303E-09	.1170170E-01	.1756555E-01	-.3149917E-02
.2138130E-09					
109	.4325085E-08	.9631856E-09	.0000000E+00	.1765180E-01	-.3149917E-02
.2136394E-09					
111	.1083321E-07	.0000000E+00	.0000000E+00	-.1510726E-01	.4408634E-02
.8849791E-09					
112	.1023631E-07	.2788900E-09	.1017271E-01	-.1503100E-01	.4408634E-02
.8848854E-09					
113	.9639582E-08	.5574642E-09	.2024264E-01	-.1480279E-01	.4408634E-02
.8844273E-09					
114	.9043380E-08	.8354094E-09	.3010785E-01	-.1442424E-01	.4408634E-02
.8832616E-09					
115	.8448292E-08	.1112411E-08	.3966778E-01	-.1389809E-01	.4408634E-02
.8810662E-09					
116	.7855120E-08	.1388156E-08	.4882404E-01	-.1322808E-01	.4408634E-02
.8775404E-09					
117	.7264852E-08	.1662332E-08	.5748120E-01	-.1241901E-01	.4408634E-02
.8724042E-09					
118	.6678666E-08	.1934631E-08	.6554730E-01	-.1147658E-01	.4408634E-02
.8653990E-09					
119	.6097903E-08	.2204744E-08	.7293462E-01	-.1040745E-01	.4408634E-02
.8562865E-09					
120	.5524059E-08	.2472366E-08	.7956014E-01	-.9219067E-02	.4408634E-02
.8448494E-09					
121	.4958768E-08	.2737196E-08	.8534618E-01	-.7919661E-02	.4408634E-02
.8308899E-09					
122	.4403795E-08	.2998933E-08	.9022080E-01	-.6518123E-02	.4408634E-02
.8142296E-09					

123	.3861016E-08	.3257282E-08	.9411829E-01	-.5023917E-02	.4408634E-02
.7947085E-09					
124	.3332408E-08	.3511952E-08	.9697947E-01	-.3446982E-02	.4408634E-02
.7721834E-09					
125	.2820044E-08	.3762654E-08	.9875199E-01	-.1797622E-02	.4408634E-02
.7465264E-09					
126	.2326074E-08	.4009106E-08	.9939055E-01	-.8638884E-04	.4408634E-02
.7176227E-09					
127	.1852724E-08	.4251028E-08	.9885702E-01	.1676034E-02	.4408634E-02
.6853680E-09					
128	.1402288E-08	.4488148E-08	.9712047E-01	.3478959E-02	.4408634E-02
.6496651E-09					
129	.9771220E-09	.4720198E-08	.9415717E-01	.5311819E-02	.4408634E-02
.6104204E-09					
130	.5796480E-09	.4946915E-08	.8995042E-01	.7164301E-02	.4408634E-02
.5675388E-09					
132	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
.0000000E+00					
134	.4685374E-09	.5186185E-08	.8195686E-01	.1001464E-01	.4408634E-02
.3778498E-09					
135	.5695098E-09	.5203417E-08	.7916675E-01	.1095573E-01	.4408634E-02
.3812883E-09					
136	.6713550E-09	.5219736E-08	.7613264E-01	.1184921E-01	.4408634E-02
.3844134E-09					
137	.7739909E-09	.5235137E-08	.7286724E-01	.1269457E-01	.4408634E-02
.3872347E-09					
138	.8773379E-09	.5249619E-08	.6938344E-01	.1349131E-01	.4408634E-02
.3897628E-09					
139	.9813196E-09	.5263178E-08	.6569421E-01	.1423897E-01	.4408634E-02
.3920089E-09					
140	.1085863E-08	.5275812E-08	.6181269E-01	.1493710E-01	.4408634E-02
.3939854E-09					
141	.1190897E-08	.5287520E-08	.5775211E-01	.1558527E-01	.4408634E-02
.3957053E-09					
142	.1296357E-08	.5298298E-08	.5352579E-01	.1618309E-01	.4408634E-02
.3971828E-09					
143	.1402178E-08	.5308146E-08	.4914719E-01	.1673020E-01	.4408634E-02
.3984328E-09					
144	.1508304E-08	.5317061E-08	.4462985E-01	.1722625E-01	.4408634E-02
.3994711E-09					
145	.1614680E-08	.5325041E-08	.3998739E-01	.1767093E-01	.4408634E-02
.4003147E-09					
146	.1721256E-08	.5332086E-08	.3523349E-01	.1806396E-01	.4408634E-02
.4009813E-09					
147	.1827988E-08	.5338195E-08	.3038196E-01	.1840510E-01	.4408634E-02
.4014896E-09					
148	.1934836E-08	.5343365E-08	.2544659E-01	.1869413E-01	.4408634E-02
.4018594E-09					
149	.2041767E-08	.5347596E-08	.2044131E-01	.1893086E-01	.4408634E-02
.4021114E-09					
150	.2148751E-08	.5350888E-08	.1538003E-01	.1911515E-01	.4408634E-02
.4022671E-09					
151	.2255766E-08	.5353240E-08	.1027672E-01	.1924686E-01	.4408634E-02
.4023491E-09					
152	.2362796E-08	.5354651E-08	.5145366E-02	.1932592E-01	.4408634E-02
.4023812E-09					
153	.2469831E-08	.5355122E-08	.0000000E+00	.1935228E-01	.4408634E-02
.4023877E-09					
154	.0000000E+00	.0000000E+00	.0000000E+00	-.9898275E-06	-.8817406E-02
.0000000E+00					
155	.2089441E-08	.0000000E+00	.0000000E+00	-.1910197E-05	.6300076E-02
.7665673E-09					
156	.0000000E+00	.0000000E+00	.0000000E+00	.2774255E-05	-.8817406E-02
.2338705E-11					
157	-.9001710E-09	.8725379E-11	.0000000E+00	.2714543E-06	.6300076E-02
.7665673E-09					

MODE SHAPE NO. 2

NODE	X-DISPLACEMENT	Y-DISPLACEMENT	Z-DISPLACEMENT	X-ROTATION	Y-ROTATION	Z-ROTATION
1	-.2278564E-10	-.2087774E-10	.6666562E-05	-.1658189E-05	-.1443227E-01	
.3232183E-10						
2	-.2363437E-09	-.1742269E-09	.1267940E-01	-.4582547E-03	-.1433797E-01	
.3064849E-09						
3	-.4492713E-09	-.5432087E-09	.2518670E-01	-.9148511E-03	-.1405688E-01	
.5224126E-09						
4	-.6998315E-09	-.1077003E-08	.3734875E-01	-.1371448E-02	-.1355169E-01	
.6810581E-09						
5	-.9485137E-09	-.1724879E-08	.4898201E-01	-.1828044E-02	-.1285670E-01	
.7817729E-09						
6	-.1194649E-08	-.2436125E-08	.5992420E-01	-.2284640E-02	-.1198327E-01	
.8252225E-09						
7	-.1437578E-08	-.3160762E-08	.7002442E-01	-.2741237E-02	-.1094572E-01	
.8123958E-09						
8	-.1676649E-08	-.3849825E-08	.7914554E-01	-.3197834E-02	-.9761130E-02	
.7446234E-09						
9	-.1911224E-08	-.4455671E-08	.8716664E-01	-.3654430E-02	-.8449129E-02	
.6235729E-09						
10	-.2140680E-08	-.4932266E-08	.9398505E-01	-.4111027E-02	-.7031587E-02	
.4512227E-09						
11	-.2364407E-08	-.5235432E-08	.9951826E-01	-.4567623E-02	-.5532328E-02	
.2298114E-09						
12	-.2581815E-08	-.5323055E-08	.1037054E+00	-.5024219E-02	-.3976804E-02	
.3823095E-10						
13	-.2792334E-08	-.5155208E-08	.1065088E+00	-.5480817E-02	-.2391734E-02	
.3503759E-09						
14	-.2995415E-08	-.4694197E-08	.1079143E+00	-.5937413E-02	-.8047744E-03	
.7041008E-09						
15	-.3190531E-08	-.3904494E-08	.1079329E+00	-.6394009E-02	.7558767E-03	
.1097021E-08						
16	-.3377182E-08	-.2752559E-08	.1066000E+00	-.6850606E-02	.2261837E-02	
.1527033E-08						
17	-.3554891E-08	-.1206524E-08	.1039764E+00	-.7307203E-02	.3684886E-02	
.1992469E-08						
18	-.3723212E-08	.7642685E-09	.1001471E+00	-.7763799E-02	.4997330E-02	
.2492279E-08						
19	-.3881727E-08	.3189894E-08	.9522139E-01	-.8220395E-02	.6172327E-02	
.3026210E-08						
20	-.4006325E-08	.6099457E-08	.8937042E-01	-.8676992E-02	.7098164E-02	
.3592337E-08						
21	-.4120430E-08	.9523267E-08	.8278018E-01	-.9133588E-02	.7848250E-02	
.4195485E-08						
22	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	
.0000000E+00						
24	-.3924426E-08	.1352359E-07	.7558676E-01	-.9256084E-02	.8498576E-02	
.4865860E-08						
25	-.3718163E-08	.1803492E-07	.6782910E-01	-.9378579E-02	.9127091E-02	
.5358105E-08						
26	-.3463557E-08	.2290465E-07	.5951125E-01	-.9501075E-02	.9767922E-02	
.5681684E-08						
27	-.3199888E-08	.2798730E-07	.5065600E-01	-.9623570E-02	.1034588E-01	
.5843720E-08						
28	-.2927847E-08	.3314554E-07	.4132520E-01	-.9746066E-02	.1084649E-01	
.5855583E-08						
29	-.2648151E-08	.3825307E-07	.3159243E-01	-.9868561E-02	.1125765E-01	
.5730932E-08						
30	-.2361541E-08	.4319663E-07	.2154077E-01	-.9991057E-02	.1156976E-01	
.5485713E-08						
31	-.2068783E-08	.4787791E-07	.1126073E-01	-.1011355E-01	.1177584E-01	
.5138109E-08						
32	-.1770658E-08	.5221562E-07	.8476436E-03	-.1023605E-01	.1187158E-01	
.4708429E-08						
33	-.1467966E-08	.5614721E-07	-.9600430E-02	-.1035854E-01	.1185539E-01	
.4218978E-08						
34	-.1161524E-08	.5963056E-07	-.1998532E-01	-.1048104E-01	.1172840E-01	
.3693872E-08						
35	-.8521568E-09	.6264552E-07	-.3021107E-01	-.1060353E-01	.1149453E-01	
.3158848E-08						
36	-.5407041E-09	.6519519E-07	-.4018630E-01	-.1072603E-01	.1116036E-	
.2641057E-08						
37	-.2280114E-09	.6730715E-07	-.4982660E-01	-.1084853E-01	.1073516E-01	
.2168845E-08						
38	.8507182E-10	.6903433E-07	-.5905692E-01	-.1097102E-01	.1023076E-01	
.1771548E-08						
39	.3976931E-09	.7045589E-07	-.6781369E-01	-.1109352E-01	.9661487E-02	
.1479306E-08						
40	.7090022E-09	.7167776E-07	-.7604704E-01	-.1121601E-01	.9044020E-02	
.1322905E-08						
41	.1018145E-08	.7283323E-07	-.8372261E-01	-.1133851E-01	.8397289E-02	
.1333663E-08						
42	.1276713E-08	.7408343E-07	-.9084835E-01	-.1146100E-01	.7798220E-02	
.1543809E-08						
43	.1531565E-08	.7561955E-07	-.9745257E-01	-.1158350E-01	.7216469E-02	
.1989901E-08						
46	.1670232E-08	.7760355E-07	-.1035216E+00	-.1100443E-01	.6540421E-02	
.2459613E-08						
47	.1804061E-08	.7984942E-07	-.1089038E+00	-.1042536E-01	.5660275E-02	
.2591703E-08						
48	.1956636E-08	.8207705E-07	-.1133909E+00	-.9846295E-02	.4508375E-02	
.2424254E-08						
49	.2103489E-08	.8403889E-07	-.1167915E+00	-.9267219E-02	.3195930E-02	
.1993515E-08						
50	.2244158E-08	.8551903E-07	-.1189775E+00	-.8688153E-02	.1753254E-02	
.1335675E-08						
51	.2378209E-08	.8633386E-07	-.1198481E+00	-.8109080E-02	.2113119E-03	
.4875960E-09						
52	.2505221E-08	.8633236E-07	-.1193295E+00	-.7530012E-02	-.1398454E-02	
.5133583E-09						
53	.2624799E-08	.8539650E-07	-.1173761E+00	-.6950942E-02	-.3044608E-02	
.1629706E-08						
54	.2736567E-08	.8344117E-07	-.1139695E+00	-.6371874E-02	-.4696006E-02	
.2824174E-08						
55	.2840176E-08	.8041377E-07	-.1091185E+00	-.5792801E-02	-.6322244E-02	
.4060159E-08						
56	.2935299E-08	.7629354E-07	-.1028583E+00	-.5213733E-02	-.7893953E-02	
.5302120E-08						
57	.3021638E-08	.7109027E-07	-.9524936E-01	-.4634665E-02	-.9383270E-02	
.6516112E-08						
58	.3098922E-08	.6484276E-07	-.8637561E-01	-.4055594E-02	-.1076415E-01	
.7670214E-08						
59	.3166906E-08	.5761688E-07	-.7634325E-01	-.3476524E-02	-.1201269E-01	
.8734983E-08						
60	.3225376E-08	.4950315E-07	-.6527835E-01	-.2897453E-02	-.1310750E-01	
.9683906E-08						
61	.3274147E-08	.4061397E-07	-.5332459E-01	-.2318383E-02	-.1402994E-01	
.1049379E-07						
62	.3313067E-08	.3108055E-07	-.4064075E-01	-.1739312E-02	-.1476443E-01	
.1114515E-07						
63	.3342011E-08	.2104959E-07	-.2739797E-01	-.1160244E-02	-.1529861E-01	
.1162244E-07						
64	.3357191E-08	.1068020E-07	-.1378996E-01	-.5811710E-03	-.1559593E-01	
.1191259E-07						
65	.3362256E-08	.1398860E-09	-.7052823E-05	-.2102967E-05	-.1569569E-01	
.1201021E-07						
67	-.3371831E-07	.0000000E+00	.0000000E+00	-.1763082E-01	.7848250E-02	
.5707050E-08						
68	-.3211751E-07	.4824476E-09	.4943389E-02	-.1760876E-01	.7848250E-02	
.5706652E-08						
69	-.3051702E-07	.9647995E-09	.9874402E-02	-.1754264E-01	.7848250E-02	
.5704698E-08						
70	-.2891747E-07	.1446961E-08	.1478068E-01	-.1743251E-01	.7848250E-02	
.5699706E-08						
71	-.2731990E-07	.1928839E-08	.1964993E-01	-.1727850E-01	.7848250E-02	
.5690269E-08						
72	-.2572576E-07	.2410338E-08	.2446984E-01	-.1708079E-01	.7848250E-02	
.5675055E-08						
73	-.2413685E-07	.2891362E-08	.2922819E-01	-.1683961E-01	.7848250E-02	
.5652805E-08						

74	-.2255531E-07	.3371819E-08	.3391282E-01	-.1655521E-01	.7848250E-02
.5622333E-08					
75	-.2098359E-07	.3851612E-08	.3851166E-01	-.1622794E-01	.7848250E-02
.5582528E-08					
76	-.1942448E-07	.4330647E-08	.4301272E-01	-.1585815E-01	.7848250E-02
.5532353E-08					
77	-.1788100E-07	.4808832E-08	.4740415E-01	-.1544626E-01	.7848250E-02
.5470841E-08					
78	-.1635648E-07	.5286071E-08	.5167419E-01	-.1499273E-01	.7848250E-02
.5397099E-08					
79	-.1485445E-07	.5762270E-08	.5581122E-01	-.1449806E-01	.7848250E-02
.5310304E-08					
80	-.1337869E-07	.6237337E-08	.5980380E-01	-.1396280E-01	.7848250E-02
.5209704E-08					
81	-.1193316E-07	.6711176E-08	.6364062E-01	-.1338754E-01	.7848250E-02
.5094615E-08					
82	-.1052202E-07	.7183697E-08	.6731054E-01	-.1277290E-01	.7848250E-02
.4964419E-08					
83	-.9149585E-08	.7654805E-08	.7080260E-01	-.1211955E-01	.7848250E-02
.4818567E-08					
84	-.7820314E-08	.8124407E-08	.7410605E-01	-.1142819E-01	.7848250E-02
.4656570E-08					
85	-.6538798E-08	.8592412E-08	.7721033E-01	-.1069956E-01	.7848250E-02
.4478003E-08					
86	-.5309737E-08	.9058727E-08	.8010509E-01	-.9934423E-02	.7848250E-02
.4282501E-08					
88	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
.0000000E+00					
90	-.1526943E-08	.9764553E-08	.8825420E-01	-.7350917E-02	.7848250E-02
.3625174E-08					
91	.6116940E-09	.9995090E-08	.9253892E-01	-.5553372E-02	.7848250E-02
.2824652E-08					
92	.2234959E-08	.1021462E-07	.9562849E-01	-.3753140E-02	.7848250E-02
.2072767E-08					
93	.3375081E-08	.1042291E-07	.9752530E-01	-.1962908E-02	.7848250E-02
.1369460E-08					
94	.4064495E-08	.1061973E-07	.9824033E-01	-.1957037E-03	.7848250E-02
.7153658E-09					
95	.4336213E-08	.1080487E-07	.9779322E-01	.1535277E-02	.7848250E-02
.1115421E-09					
96	.4224024E-08	.1097812E-07	.9621242E-01	.3216814E-02	.7848250E-02
-.4407696E-09					
97	.3762537E-08	.1113931E-07	.9353512E-01	.4835831E-02	.7848250E-02
-.9403702E-09					
98	.2987091E-08	.1128825E-07	.8980711E-01	.6379529E-02	.7848250E-02
-.1386300E-08					
99	.1933527E-08	.1142478E-07	.8508251E-01	.7835550E-02	.7848250E-02
-.1778026E-08					
100	.6378590E-09	.1154876E-07	.7942351E-01	.9192098E-02	.7848250E-02
-.2115595E-08					
101	-.8641661E-09	.1166005E-07	.7289988E-01	.1043808E-01	.7848250E-02
-.2399780E-08					
102	-.2537595E-08	.1175854E-07	.6558847E-01	.1156324E-01	.7848250E-02
-.2632200E-08					
103	-.4348839E-08	.1184411E-07	.5757270E-01	.1255822E-01	.7848250E-02
-.2815412E-08					
104	-.6266365E-08	.1191667E-07	.4894180E-01	.1341473E-01	.7848250E-02
-.2953004E-08					
105	-.8261365E-08	.1197615E-07	.3979018E-01	.1412558E-01	.7848250E-02
-.3049649E-08					
106	-.1030852E-07	.1202247E-07	.3021660E-01	.1468479E-01	.7848250E-02
-.3111161E-08					
107	-.1238675E-07	.1205560E-07	.2032340E-01	.1508764E-01	.7848250E-02
-.3144524E-08					
108	-.1448003E-07	.1207549E-07	.1021556E-01	.1533072E-01	.7848250E-02
-.3157914E-08					
109	-.1657812E-07	.1208212E-07	.0000000E+00	.1541198E-01	.7848250E-02
-.3160713E-08					
111	-.3024832E-08	.0000000E+00	.0000000E+00	.1852939E-01	.7216469E-02
-.6055318E-09					
112	-.3432989E-08	.4081107E-08	-.1247546E-01	.1842875E-01	.7216469E-02
-.6043135E-09					
113	-.3839014E-08	.8157587E-08	-.2481532E-01	.1812772E-01	.7216469E-02
-.5984892E-09					
114	-.4238399E-08	.1222485E-07	-.3688527E-01	.1762892E-01	.7216469E-02
-.5839874E-09					
115	-.4624068E-08	.1627830E-07	-.4855328E-01	.1693672E-01	.7216469E-02
-.5572687E-09					
116	-.4986731E-08	.2031332E-07	-.5969080E-01	.1605716E-01	.7216469E-02
-.5153209E-09					
117	-.5315250E-08	.2432538E-07	-.7017399E-01	.1499789E-01	.7216469E-02
-.4556492E-09					
118	-.5596970E-08	.2830993E-07	-.7988461E-01	.1376809E-01	.7216469E-02
-.3762623E-09					
119	-.5818056E-08	.3226246E-07	-.8871118E-01	.1237835E-01	.7216469E-02
-.2756502E-09					
120	-.5963812E-08	.3617850E-07	-.9654974E-01	.1084061E-01	.7216469E-02
-.1527576E-09					
121	-.6018973E-08	.4005363E-07	-.1033048E+00	.9167940E-02	.7216469E-02
-.6946585E-11					
122	-.5967971E-08	.4388347E-07	-.1088901E+00	.7374479E-02	.7216469E-02
.1620462E-09					
123	-.5795174E-08	.4766367E-07	-.1132292E+00	.5475219E-02	.7216469E-02
.3541636E-09					
124	-.5485076E-08	.5138997E-07	-.1162559E+00	.3485858E-02	.7216469E-02
.5690894E-09					
125	-.5022457E-08	.5505815E-07	-.1179150E+00	.1422618E-02	.7216469E-02
.8063193E-09					
126	-.4392474E-08	.5866406E-07	-.1181622E+00	-.6979546E-03	.7216469E-02
.1065243E-08					
127	-.3580708E-08	.6220362E-07	-.1169643E+00	-.2859173E-02	.7216469E-02
.1345232E-08					
128	-.2573142E-08	.6567283E-07	-.1142997E+00	-.5044421E-02	.7216469E-02
.1645743E-08					
129	-.1356065E-08	.6906777E-07	-.1101577E+00	-.7237353E-02	.7216469E-02
.1966425E-08					
130	.8409278E-10	.7238460E-07	-.1045384E+00	-.9422106E-02	.7216469E-02
.2307238E-08					
132	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00	.0000000E+00
.0000000E+00					
134	.2029494E-08	.7588533E-07	-.9424222E-01	-.1254702E-01	.7216469E-02
.1755247E-08					
135	.2504803E-08	.7613777E-07	-.9078143E-01	-.1346651E-01	.7216469E-02
.1817584E-08					
136	.2995966E-08	.7637682E-07	-.8708201E-01	-.1434115E-01	.7216469E-02
.1874471E-08					
137	.3501550E-08	.7660243E-07	-.8315599E-01	-.1517017E-01	.7216469E-02
.1926034E-08					
138	.4020156E-08	.7681456E-07	-.7901559E-01	-.1595285E-01	.7216469E-02
.1972416E-08					
139	.4550430E-08	.7701319E-07	-.7467324E-01	-.1668847E-01	.7216469E-02
.2013782E-08					
140	.5091060E-08	.7719827E-07	-.7014155E-01	-.1737636E-01	.7216469E-02
.2050315E-08					
141	.5640787E-08	.7736977E-07	-.6543330E-01	-.1801591E-01	.7216469E-02
.2082220E-08					
142	.6198411E-08	.7752766E-07	-.6056143E-01	-.1860652E-01	.7216469E-02
.2109722E-08					
143	.6762792E-08	.7767192E-07	-.5553901E-01	-.1914765E-01	.7216469E-02
.2133068E-08					
144	.7332858E-08	.7780251E-07	-.5037930E-01	-.1963880E-01	.7216469E-02
.2152525E-08					
145	.7907615E-08	.7791942E-07	-.4509565E-01	-.2007949E-01	.7216469E-02
.2168382E-08					
146	.8486146E-08	.7802262E-07	-.3970152E-01	-.2046933E-01	.7216469E-02
.2180952E-08					
147	.9067620E-08	.7811210E-07	-.3421051E-01	-.2080794E-01	.7216469E-02
.2190566E-08					
148	.9651298E-08	.7818784E-07	-.2863626E-01	-.2109501E-01	.7216469E-02
.2197581E-08					
149	.1023654E-07	.7824983E-07	-.2299255E-01	-.2133025E-01	.7216469E-02
.2202374E-08					
150	.1082280E-07	.7829805E-07	-.1729318E-01	-.2151345E-01	.7216469E-02
.2205344E-08					
151	.1140965E-07	.7833250E-07	-.1155203E-01	-.2164443E-01	.7216469E-02
.2206914E-08					
152	.1199679E-07	.7835318E-07	-.5782983E-02	-.2172307E-01	.7216469E-02
.2207528E-08					
153	.1258402E-07	.7836007E-07	.0000000E+00	-.2174930E-01	.7216469E-02
.2207654E-08					
154	.0000000E+00	.0000000E+00	.0000000E+00	-.4299030E-05	-.1443227E-01
.0000000E+00					
155	.2678216E-07	.0000000E+00	.0000000E+00	.6476732E-05	-.1569569E-01
-.1201021E-07					
156	.0000000E+00	.0000000E+00	.0000000E+00	.5957219E-05	-.1443227E-01
.3368833E-10					
157	-.2005765E-07	.1398860E-09	.0000000E+00	-.4373765E-05	-.1569569E-01
-.1201021E-07					

SOLUTION TIME LOG (sec)

INPUT PHASE	2
ASSEMBLAGE OF THE STIFFNESS MATRIX	1
ASSEMBLAGE OF THE MASS MATRIX	0
DECOMPOSITION OF THE STIFFNESS MATRIX	0
EIGENVALUE SOLUTION	1
OUTPUT PHASE	0
TOTAL SOLUTION TIME	4

4.2.6 Puente E-VN3-4.4

4.2.6 PUENTE EVN3-4.4

ÍNDICE

- MEMORIA
- ANEJO GEOTÉCNICO
- ANEJO DE CÁLCULO
- CARGAS ACTIVANTES Y GEOMETRÍA
- ARMADO DE PILOTES
- PLANOS

EVN3-4.4

MEMORIA

1.- ANTECEDENTES

El presente informe recoge las modificaciones que se van a realizar, sobre el proyecto original, en el subtramo XV de la L.A.V. Madrid-Barcelona-Frontera francesa, como consecuencia de la variación de la rasante de la V.A.N. de la Cartuja por parte de RENFE.

El proyecto original constaba de un *puente postesado de cuatro vanos* que cruzaba el canal y una carretera. Las cimentaciones de las tres pilas soporte del tablero así como las de los estribos eran superficiales.

2.- SOLUCIÓN PROYECTADA

La nueva solución consiste en un *puente isostático de dos vanos* salvados mediante vigas artesas prefabricadas. Las cimentaciones tanto de los estribos como de la pila se realizarán a través de pilotes de 1 m. de diámetro siguiendo la disposición que se indica en los planos contenidos en el presente informe.

Así mismo, será necesario rebajar la rasante de la carretera existente. Para acometer esta modificación se construirán sendos muros pantalla a ambos lados de la ubicación actual de la carretera, y en prolongación de la pila y del estribo 2, que permitirán realizar un vaciado de la zona dejando la carretera a la cota necesaria.

3.- METODOLOGÍA EMPLEADA EN EL CÁLCULO

- ***3.1 TABLERO***

El tablero, consitente en una viga artesa prefabricada, será realizado por PACADAR. La persona responsable del cálculo ha sido Manuel Aranda, perteneciente a dicha empresa.

- ***3.2 CIMENTACIONES***

Las cimentaciones serán pilotadas tanto en la pila como en los estribos; para su cálculo se ha empleado el método clásico descrito en el libro "Geotecnia y Cimientos" de José Antonio Jiménez Salas.

Los parámetros geotécnicos empleados en el cálculo han sido los incluidos en el estudio geotécnico que se adjunta:

- Grava y arena: ϕ=35 ; γ=2 T/m3 ; c=0 T/m2
- Limo y arena: ϕ=20 ; γ=1,6 T/m3 ; c=2 T/m2

El calculista ha sido Gonzalo Rodríguez perteneciente a la empresa NECSO ENTRECANALES CUBIERTAS.

- ***PILA Y ESTRIBOS***

Para el cálculo de la pila y los estribos se ha empleado los métodos habituales de Resistencia de Materiales, empleando para el armado el programa de la EH-91 basado en el diagrama de pilotes. La persona que ha realizado el cálculo ha sido Gonzalo Rodríguez de la empresa NECSO ENTRECANALES CUBIERTAS.

- ***MUROS PANTALLA***

Para el cálculo de los muros pantalla se han empleado las recomendaciones recogidas en el libro "Muros de contención y muros de sótano" de J.Calavera.

Los parámetros geotécnicos empleados en el cálculo han sido los incluidos en el estudio geotécnico que se adjunta:

- Grava y arena: ϕ=35 ; γ=2 T/m3 ; c=0 T/m2
- Limo y arena: ϕ=20 ; γ=1,6 T/m3 ; c=2 T/m2

El calculista ha sido Jorge del Río de la empresa NECSO ENTRECANALES CUBIERTAS.

Zaragoza, 25 de octubre de 2000

Gonzalo Rodríguez Heredia
OFICINA TECNICA NECSO

ANEJO GEOTÉCNICO

SGS Tecnos, S.A.

GINPROSA

G.I.F.

CARACTERIZACION GEOTÉCNICA PARA LA CONSTRUCION DE LA ESTRUCTURA E-VN3-4.4 SOBRE EL CANAL IMPERIAL DE ARAGÓN (ZARAGOZA).
OBRA: AVE, SUBTRAMO XV

INFORME Nº T-936

Cuarte de Huerva, (Zaragoza), Abril 2000

1.- *INTRODUCCION Y OBJETO*

Habida cuenta de los cambios experimentados en la cota de rasante de Estructura E-VN3-4.4, la UTE GIMPROSA-SGS TECNOS, encargada de la Asistencia Técnica de la obra, ha supervisado e inspeccionado la realización de un reconocimiento, para la construcción racional de la obra.

En el apartado siguiente, se redactan nuestros comentarios y recomendaciones, para el proyecto y dimensionamiento de la estructura soterrada.

2.- *PROYECTO DE ESTRUCTURA EVN3-4.4 SOTERRADA*

Basados en la caracterización geotécnica con sondeos complementarios (véase Anexo II), en la Estructura a construir sobre el Canal Imperial, correspondiente a las obras del AVE, Subtramo XV, se redactan las siguientes recomendaciones.

2.1.- *Carretera soterrada entre el vano P-1/E-2*

El soporte de Pila 1 y Estribo 2, se podrán construir desde la superficie topográfica actual mediante una cortina discontinua de pilotes o bien mediante muro pantalla.

Construida la estructura soporte, el vaciado hasta –5,0 m de profundidad se podrá efectuar al amparo del propio cierre ya construido.

Para el dimensionamiento y cálculo del cerramiento, se deberá evaluar el empuje activo "E_a" del trasdós de tierra a soportar, como así del empuje pasivo "E_p" de la reacción de equilibrio necesaria y proporciona por el empotramiento.

a) Empuje activo E_a:

En el sondeo efectuado en el Estribo E-2 aparece hasta 6,0 m de profundidad la capa de limo arcilloso algo yesífero con gravas.

Por ello, la capa del trasdós de 0,00 a 5,0 m a rebajar tanto de E-2 y P-1, se considera por razones prácticas con el mismo material.

- *Altura de empuje activo y muro mensula, $H_1 \simeq 5,0$ m*
- *Cohesión, $c_1 = 0,2$ kg/cm^2 = 2,0 T/m^2*
- *Angulo de rozamiento interno, $\varphi_1 = 20°$*
- *Coeficiente de empuje activo, $K_{a1} = 0,49$*

Nota: *Las fuerzas horizontales de frenado serán absorbidas por el empuje pasivo de esta capa con coeficiente $K_{p1} = 2,04$*

b) Empuje pasivo E_p:

- *Material: gravas y bolos englobados en arena (muy densa).*
- *Longitud, C_2 = o (nula)*
- *Angulo de rozamiento interno, $\varphi_2 = 40°$*
- *Coeficiente de empuje pasivo, K_{p2}=4,60*

2.2.- *Carga vertical de la superestructura*

Los pilotes de los apoyos P-1 y E-2, como así el E-1 deberán calcularse para absorber la carga vertical máxima de la estructura, con la capacidad de carga máxima o de hundimiento del pilote individual "Q_h" con sus componentes "Q_p" por punta y "Q_f" por rozamiento.

$Q_h = Q_p + Q_f$ (*)

Para el cálculo de Q_p, se recomiendan los siguientes parámetros resistentes en el seno de la capa granular (muy densa).

- *Resistencia por punta, $q_p = 120$ kg/cm^2 = 1.200 T/m^2*
- *Resistencia por fuste, $q_f = 1,0$ kg/cm^2 = 10 T/m^2*

Reemplazando en la anterior expresión (*)

$$Q_h = q_p A_p + q_f A_f$$

Siendo A_p *= área del pilote adoptado*
A_f *= área del empotramiento*

La carga de servicio "Q_s*" se obtiene afectando las componentes de carga de hundimiento por punta y fuste (*Q_p *y* Q_f*), por los coeficientes de seguridad respectivos* $\lambda_1 \simeq 1{,}5$ *y* $\lambda_2 \simeq 2{,}0$.

$$Q_s = \frac{Q_p}{\lambda_1} + \frac{Q_f}{\lambda_2}$$

Habida cuenta de la naturaleza granular de carácter incoherente (sin cohesión), se deberá utilizar pilotes del tipo entubado y hormigonado in situ con entubación recuperable. De esta forma se podrá garantizar la continuidad estructural del hormigonado en los pilotes.

Puntualmente, se podrá requerir el auxilio del trépano rompedor para fragmentar la grava y continuar la perforación hasta la máxima profundidad de proyecto

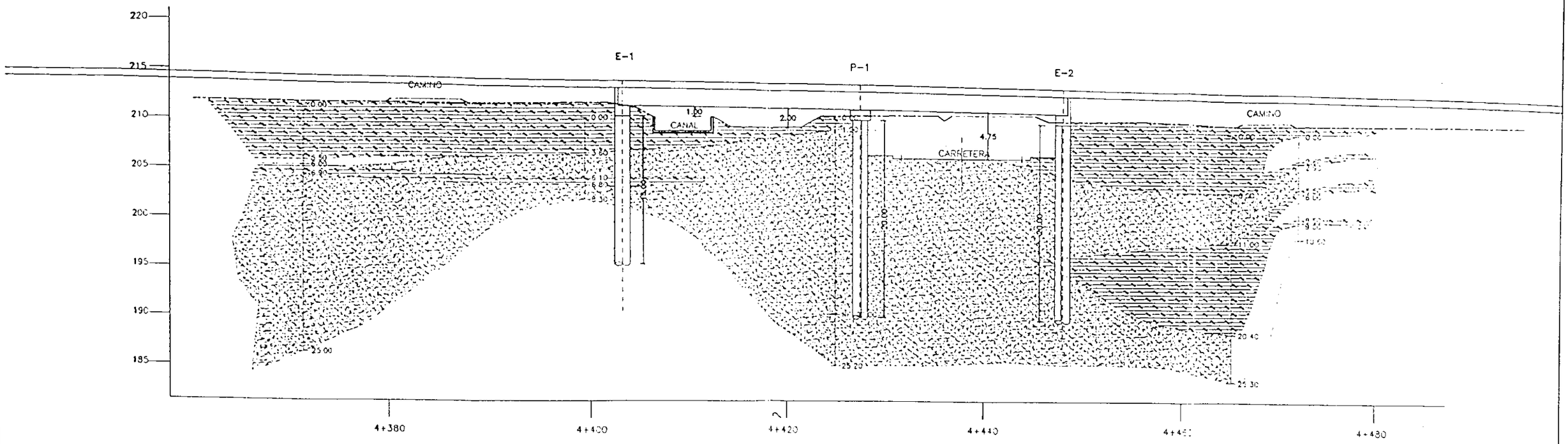
-----0-----0----

Este informe consta de 4 páginas ordenas y numeradas de la 1 a la 4 más anexos.

Zaragoza, 30 de Abril de 2000

Fdo.: Luis E. Tissera Bracamonte
Doctor Ingeniero de Caminos
Jefe del Dpto. de Estudios Geotécnicos

PERFIL ESTRATIGRÁFICO EN ESTRUCTURA SOBRE CANAL IMPERIAL



LEYENDA

- LIMO Y ARENA
- GRAVA Y ARENA
- YESO Y MARGA

neoso entrecanales cubiertas	LINEA DE ALTA VELOCIDAD MADRID-BARCELONA-FRONTERA FRANCESA TRAMO MADRID-ZARAGOZA SUBTRAMO XV. PLATAFORMA	ESCALA 1:400	PROYECTO BASE: DOCUMENTO, Nº DE PLANO, ARCHIVO:	GENERADOS EN OBRA: Nº DE PLANO, HOJA, ARCHIVO DE OBRA: D:\ZARA.\CARTUJA\30/03\GEOLO.DWG; REVISION Nº:, FECHA: 03/02/00, APROBACION:	DOCUMENTO EMO, CODIGO ENTRADA, ESTADO, VALIDO CONSTRUCCION, ANULA A, DE FECHA	TITULO DE PLANO: PERFIL ESTRATIGRAFICO EN ESTRUCTURA EVN3-4.4

ANEXO II

SONDEOS COMPLEMENTARIOS

PROYEX

Autovía de Logroño, Km. 11,4
50180 UTEBO (Zaragoza)
ESPAÑA (Spain)
Tel.: +34. 976 787 000
Fax: +34. 976 787 200

SONDEOS MECÁNICOS REALIZADOS EN ESTRUCTURA SOBRE EL CANAL IMPERIAL DE ARAGÓN. LAV MADRID-ZARAGOZA. SUBTRAMO XV.

PETICIONARIO: NECSO ENTRECANALES Y CUBIERTAS, S.A.

INFORME: ZS-6002-C
FECHA: 29 de Noviembre de 1999

ZS-6002-C-X

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PROYEX

ZS-6002-C-X

SUMARIO

1. ANTECEDENTES

2. TRABAJOS REALIZADOS

2.1. TRABAJOS DE CAMPO

ANEXOS

I Perfiles litológicos
II. Fotografías

Los resultados contenidos en el presente informe sólo afectan al material sometido a ensayo.
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EDITACIONES Empresa colaboradora Grupo 3 para control de vertidos. Laboratorio de Ensayos de Hormigón y sus componentes, acreditado por ENAC con el número 93/LE34. Laboratorio de Ensayo de Ventanas acreditado por ENAC con el número 93/LE 232. Acreditado por la D.G.A. por Resolución de 05.08.98, e inscrito en el Registro General de Laboratorios de Ensayos del Ministerio de Fomento con los nº 04003HA98, 04004AP98, 04005AS98, 04006SE98, 04007SV98 y 04008ST98 (B.O.E. 22.12.98).
MIEMBRO DE ASTM (American Society for Testing Materials). ENAC (Entidad Nacional de Acreditación).

NECSO ENTRECANALES Y CUBIERTAS, S.A.
AVDA. EUROPA 18 P.E. MORALEJA
28108 ALCOBENDAS MADRID

1. ANTECEDENTES

NECSO, adjudicataria de las obras de construcción del Subtramo XV de la Línea de Alta Velocidad entre Madrid y Zaragoza, encarga a PROYEX la realización de tres sondeos geotécnicos en la estructura de cruce de la traza con el Canal Imperial de Aragón (T.M. de Zaragoza).

Estos sondeos se han realizado sobre las pilas 2 y 3 y el estribo 1. La ubicación de los sondeos se realizó de forma conjunta por personal técnico de NECSO y de PROYEX, fijándose los ensayos in situ a realizar.

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MIEMBRO DE ASTM (American Society for Testing Materials) ENAC (Entidad Nacional de Acreditación)

PROYEX

2. TRABAJOS REALIZADOS

2.1. Trabajos de campo. Sondeos.

Los trabajos de campo se llevaron a cabo durante el mes de Octubre de 1999.

Se realizaron 3 sondeos, con un total de 75'3 metros perforados.

La perforación se llevó a cabo mediante rotación con extracción continua de testigo, con diámetros de perforación entre 86 y 113 mm.

Dada la naturaleza del terreno atravesado hubo que utilizar tubería de revestimiento para evitar el desmoronamiento de las paredes. La tubería se retiró una vez finalizado cada sondeo.

La extracción de muestras y testigos se realizó por medio de tomamuestras de pared delgada y baterías de pared sencilla y doble, con corona de Widia

Las muestras se colocaron en cajas adecuadas, debidamente etiquetadas, para su posterior traslado y estudio en el Laboratorio

Las obtenidas inalteradas se preservaron de toda pérdida de humedad, bien parafinádolas o plastificándolas.

En el Laboratorio se conservaron en la cámara húmeda hasta el momento de su apertura para estudio.

Con base a las muestras extraídas en los sondeos, se realizaron los perfiles litológicos correspondientes, que se recogen en los anexos.

Para conocer la capacidad portante de los diferentes niveles atravesados se realizaron, "in situ", ensayos de penetración dinámica.

En el siguiente cuadro se resumen las características de cada uno de los sondeos realizados

Sondeo Nº	*Longitud (m)*	*Nº de SPT*	*T.P.*	*P.V.C.*
ESTRIBO 1	25'0	6	-	--
PILA 2	25'0	6	-	24
PILA 3	25'3	5	-	--

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En el siguiente cuadro se recogen los valores de los ensayos SPT y los testigos parafinados que se han obtenido.

Sondeo Nº	*Prof. m*	*Muestra*	N_{15}	N_{15}	N_{15}	N_{SPT}	*Litología*
ESTRIBO 1	3'00-3'45	SPT	17	20	20	40	Limos
ESTRIBO 1	6'00-6'45	SPT	20	20	22	42	Limos arenosos
ESTRIBO 1	9'00-9'05	SPT	R/5	--	--	Rzo.	Gravas
ESTRIBO 1	12'00-12'03	SPT	R/3	--	--	Rzo.	Gravas
ESTRIBO 1	15'00-15'05	SPT	R/5	--	--	Rzo.	Gravas
ESTRIBO 1	20'40-20'50	SPT	R/10	--	--	Rzo.	Gravas
PILA 2	3'00-3'05	SPT	R/5	--	--	Rzo.	Gravas
PILA 2	6'00-6'04	SPT	R/4	--	--	Rzo	Gravas
PILA 2	9'00-9'01	SPT	R/1	--	--	Rzo.	Gravas
PILA 2	12'00-12'05	SPT	R/5	--	--	Rzo.	Gravas
PILA 2	15'00-15'05	SPT	R/5	--	--	Rzo.	Gravas
PILA 2	20'40-20'50	SPT	R/10	--	--	Rzo.	Gravas
PILA 3	3'00-3'45	SPT	6	12	19	31	Limos arcillosos
PILA 3	6'00-6'45	SPT	17	17	20	37	Gravas
PILA 3	12'00-12'05	SPT	R/5	--	--	Rzo.	Arenas
PILA 3	15'00-15'03	SPT	R/3	--	--	Rzo.	Arenas
PILA 3	19'80-19'87	SPT	R/7	--	--	Rzo.	Arenas

En la pila 2 se ha detectado agua en el terreno a una profundidad de 20 metros; en los otros dos sondeos no se ha apreciado agua durante la perforación.

Zaragoza, 29 de Noviembre de 1999

JOSE MANUEL BESCOS ROY
Licenciado en Ciencias Geológicas

CELEDONIO MELGUIZO BEJAR P.D.
Director del Dpto. de Geología y Geotecnia

Vº Bº. P.D.

Juan Carlos Fernández Garrido
Director Técnico de Obra Civil

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PROYEX

PERFILES LITOLOGICOS

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PROYEX

SONDEO Nº E-1	Localización : L.A.V. Subtramo XV. Estructura en Canal Imperial EVN3-4-4. Estribo 1.	Ref. : ZS-5611
	Peticionario: NECSO	Fecha: OCT/99

Prof. (m)	Sección	Naturaleza del terreno	Nivel Freático	Muestras	S.P.T. Prof (m)	S.P.T. N30 = N15 + N15
		Limos de color marrón claro con algún canto de grava disperso.			3.00	40=20+20
5.50		Gravas con matriz limosa y cantos de yeso				
6.00		Limos algo arenosos muy cementados			6.00	42=20+22
6.90		Gravas mixtas con abundantes cantos de yeso y matriz limosa. Muy densas y cementadas.			9.00	Rechazo
		Gravas mixtas con cantos de yeso y muy abundante matriz limosa			12.00	Rechazo
					15.00	Rechazo
16.90		Gravas finas y gravillas con matriz arenosa				
18.00		Gravas y bolos con matyriz arenosa.				
20 m						

Zaragoza, a 21 de Octubre de 1999
El Director del Departamento

PROYEX

SONDEO Nº E-1 (cont)	Localización : L.A.V. Subtramo XV. Estructura en Canal Imperial EVN3-4-4. Estribo 1.	Ref. : ZS-5611
	Peticionario: NECSO	Fecha: OCT/99

Prof. (m)	Sección	Naturaleza del terreno	Nivel Freático	Muestras	S.P.T. Prof (m)	S.P.T. N30 = N15 + N15
		Gravas y bolos con matriz arenosa.			20.4	Rechazo
25.00						

Zaragoza, a 21 de Octubre de 1999
El Director del Departamento

PROYEX

SONDEO Nº P-2	Localización : L.A.V. Subtramo XV. Estructura en Canal Imperial EVN3-4-4. Pila 2.	Ref. : ZS-5611
	Peticionario: NECSO	Fecha: OCT/99

Prof. (m)	Sección	Naturaleza del terreno	Nivel Freático	Muestras	S.P.T. Prof (m)	S.P.T. N30 = N15 + N15
1.20		Terreno vegetal de limos marrones con agún canto de grava				
3.00		Gravas mixtas con abundante matriz limosa			3.00	Rechazo
5.40		Gravas con abundante matriz arcillosa marrón. Aparecen cantos dispersos de yeso			6.00	Rechazo
6.60		Gravas de tamaño fino y gravillas con algún canto de silex			9.00	Rechazo
11.70		Gravas finas y arenas mixtas con matriz limosa de color blanquecino			12.00	Rechazo
14.40		Gravas mixtas con algún canto de silex y matriz limosa			15.00	Rechazo
16.60		Gravas con abundante matriz limo-arcillosa de color marrón. Presominan los cantos calcáreos				
18.00		Limos arenosos marrones con cantos de grava dispersos				
20.00		Gravas finas con abundante matriz limosa. Contiene cantos de yeso				

Zaragoza, a 21 de Octubre de 1999
El Director del Departamento

PROYEX

SONDEO Nº P- 2	Localización : L.A.V. Subtramo XV. Estructura en Canal Imperial EVN3-4-4. Pila 2.	Ref. : ZS-5611
	Peticionario: NECSO	Fecha: OCT/99

Prof. (m)	Sección	Naturaleza del terreno	Nivel Freático	Muestras	S.P.T. Prof (m)	S.P.T. N30 = N15 + N15
21.20		Gravas finas con abundante matriz limosa. Contiene cantos de yeso			20.40	Rechazo
22.20		Limos arcillosos de color marrón. Aluviales				
23.40		Limos arcillososo con abundates cantos de grava				
24.10		Gravas y arenas				
25.20		Arenas limosas con cantos de grava dispersos				

Zaragoza, a 21 de Octubre de 1999
El Director del Departamento

PROYEX

IQNet CERTIFIED QUALITY SYSTEM

AENOR ER Empresa Registrada ER-0604/2/99

SONDEO Nº P-3	Localización : L.A.V. Subtramo XV. Estructura en Canal Imperial EVN3-4-4. Pila 3.	Ref. : ZS-5611
	Peticionario: NECSO	Fecha: OCT/99

Prof. (m)	Sección	Naturaleza del terreno	Nivel Freático	Muestras	S.P.T. Prof (m)	S.P.T. N30 = N15 + N15
		Limos arcillosos algo yesíferos con cantos de grava dispersos			3.00	31=12+19
6.00		Gravas mixtas con abundante matriz limosa			6.00	37=17+20
7.20		Limos arenosos con gravillas yesíferas				
9.00		Nivel de cantos de calizas miocenas del páramo				
9.10		Limos arenosos con gravillas yesíferas				
11.00		Arenas de grano fino a medio algo limosas con restos vegetales			12.0	Rechazo
14.40		Arenas de grano medio con abundantes cantos de grava. Contiene algún canto de yeso				
15.00		Arenas finas limosas de color marrón			15.00	Rechazo
17.20		Arenas de grano medio a grueso				
20.00					19.80	Rechazo

Zaragoza, a 21 de Octubre de 1999
El Director del Departamento

PROYEX

IQNet CERTIFIED QUALITY SYSTEM

AENOR ER Empresa Registrada ER-0604/2/99

SONDEO Nº P- 3	Localización : L.A.V. Subtramo XV. Estructura en Canal Imperial EVN3-4-4. Pila 3.	Ref. : ZS-5611
	Peticionario: NECSO	Fecha: OCT/99

Prof. (m)	Sección	Naturaleza del terreno	Nivel Freático	Muestras	S.P.T. Prof (m)	S.P.T. N30 = N15 + N15
20.40		Arenas de grano medio a grueso				
		Gravas y arenas algo limosas				
25.30						

Zaragoza, a 21 de Octubre de 1999
El Director del Departamento

PROYEX

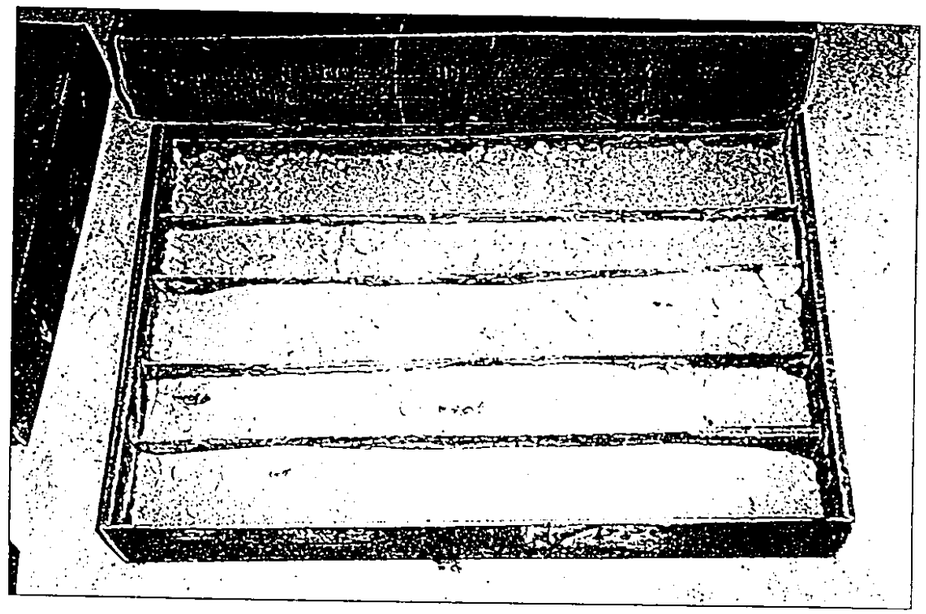
FOTOGRAFIAS

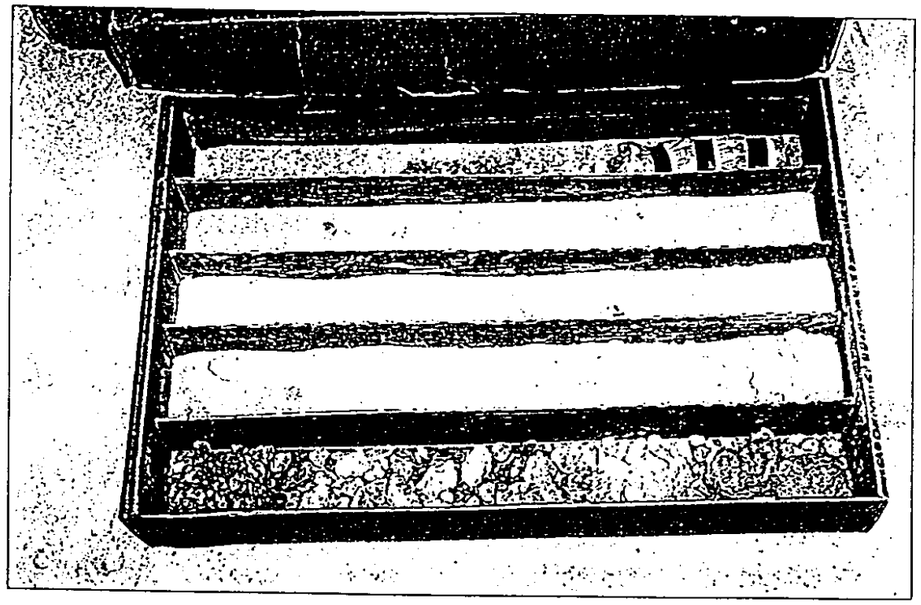
Los resultados contenidos en el presente informe sólo afectan al material sometido a ensayo
Este informe no podrá ser reproducido parcialmente sin la aprobación por escrito del laboratorio que lo emite

S Empresa colaboradora Grupo 3 para control de vertidos Laboratorio de Ensayos de Hormigón y sus componentes acreditado por ENAC con el número 93/LE341 Laboratorio de Ensayo de Ventanas acreditado por ENAC con el número 93/LE 232 Acreditado por la D G A por Resolución de 05 06 98, e inscrito en el Registro General de Laboratorios de Ensayos del Ministerio de Fomento con los nº 04303HA98 04004AP98 04005AS98 04006SE98, 04007SV98 y 04008ST98 (B O E 22 12 98)
MIEMBRO DE ASTM (American Society for Testing Materials) ENAC (Entidad Nacional de Acreditación

PROYEX

SONDEO ESTRIBO 1



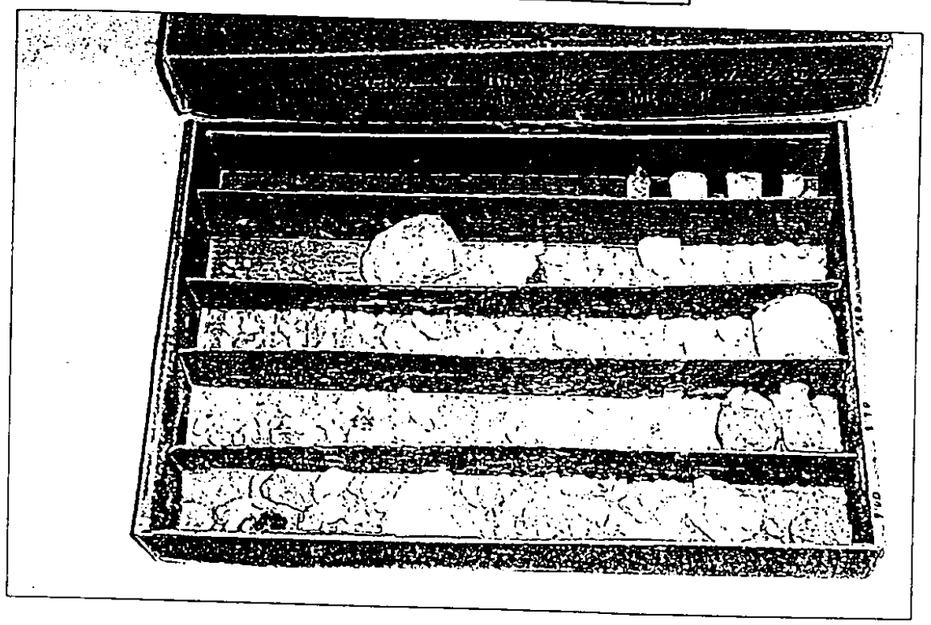


PROYEX

IQNet

AENOR ER Empresa Registrada ER-0504/2/99

SONDEO ESTRIBO 1



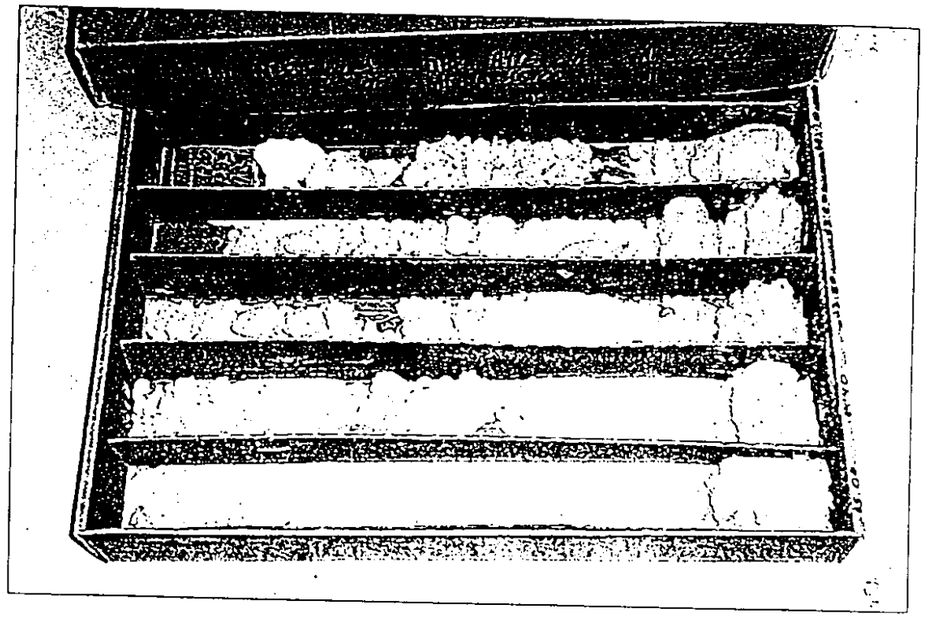


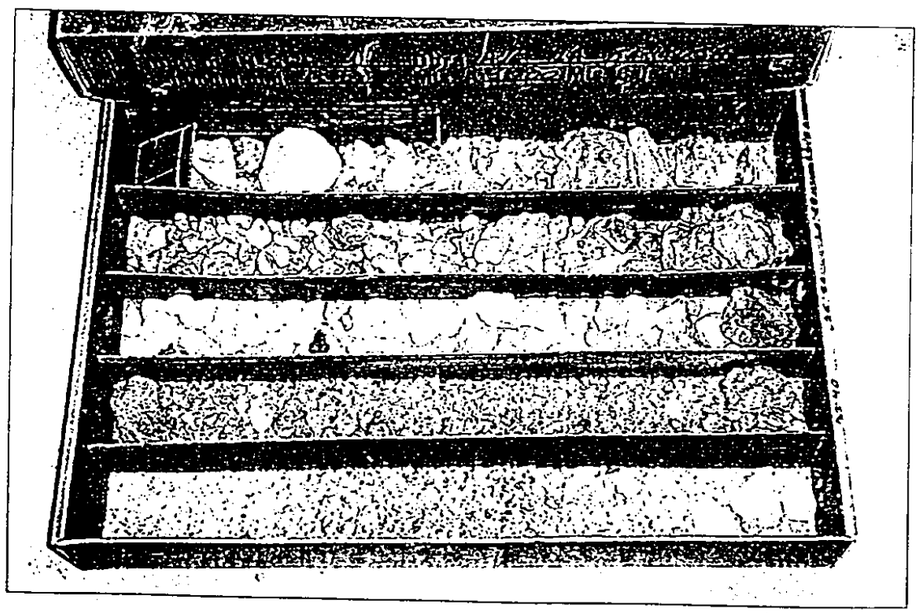
PROYEX

IQNet

AENOR ER Empresa Registrada ER-0504/2/99

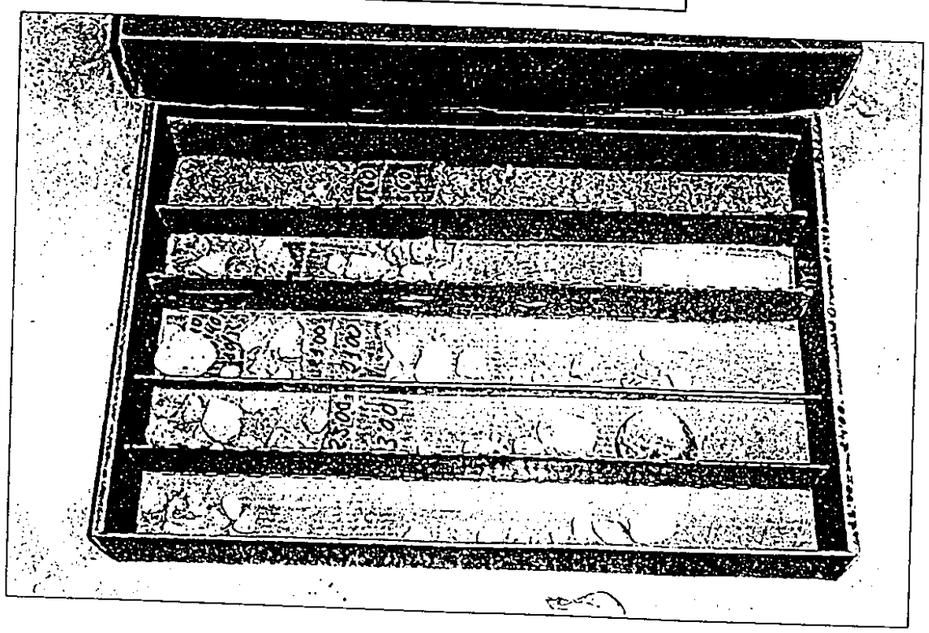
SONDEO ESTRIBO 1





PROYEX

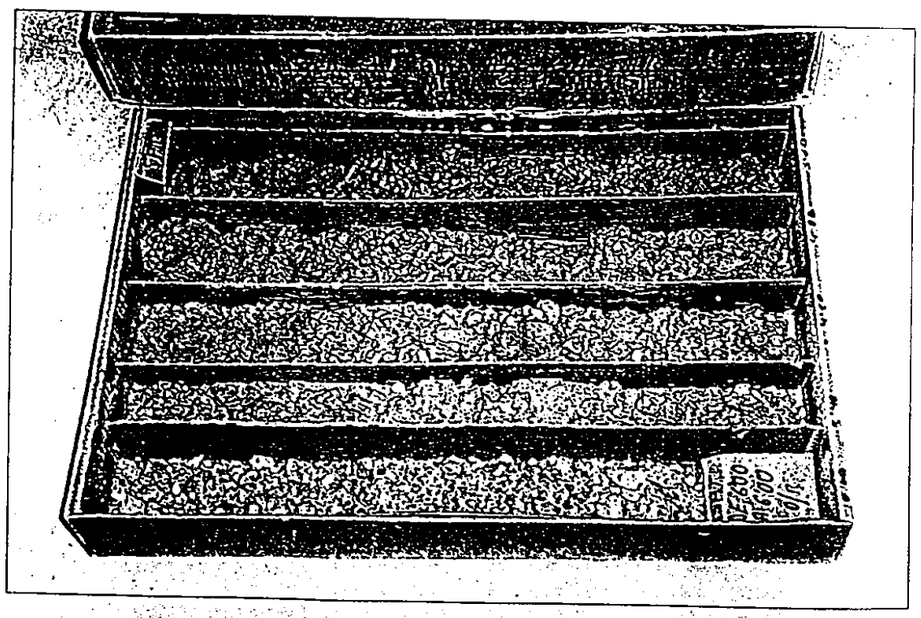
SONDEO ESTRIBO 1



PROYEX

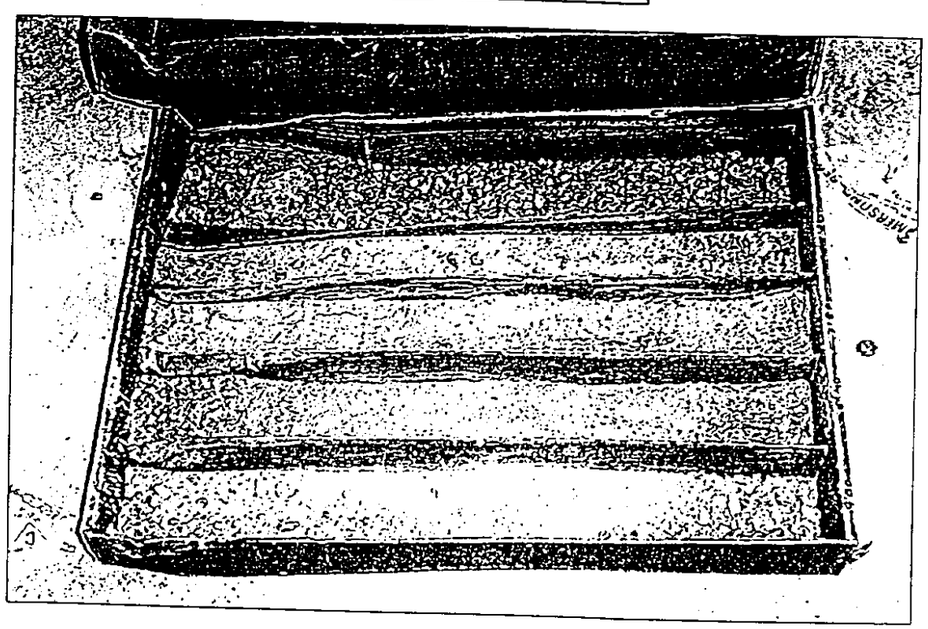
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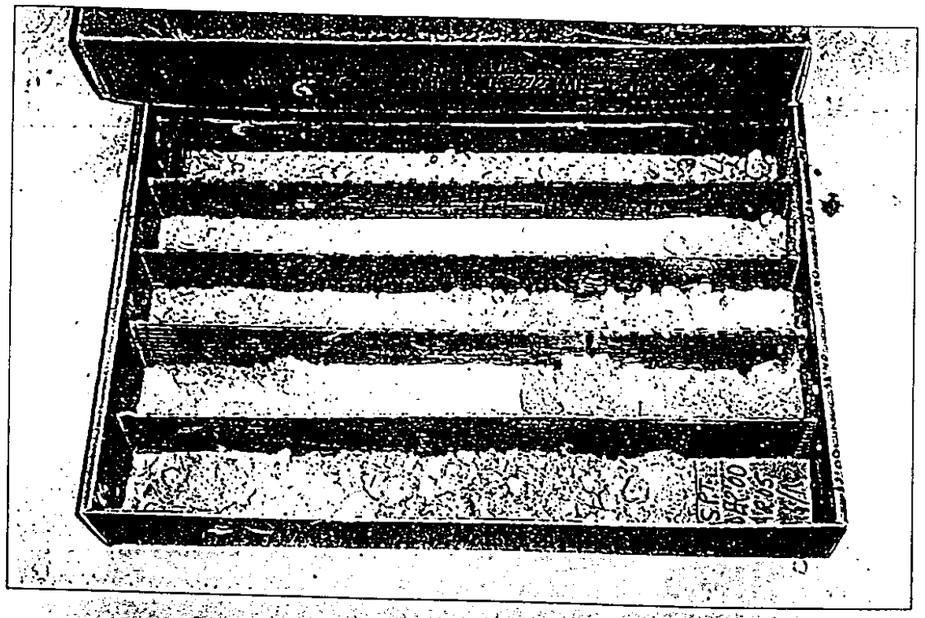




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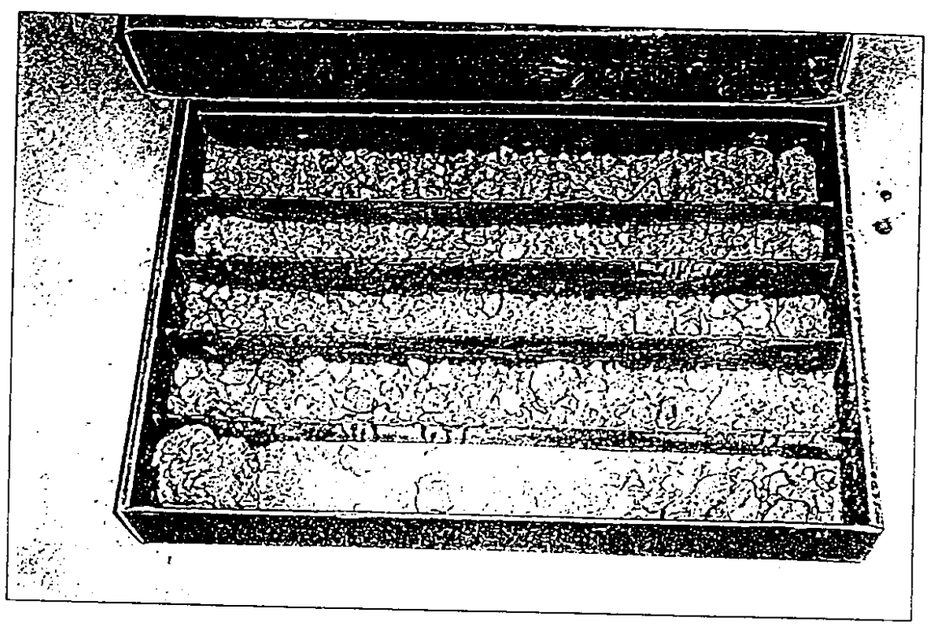
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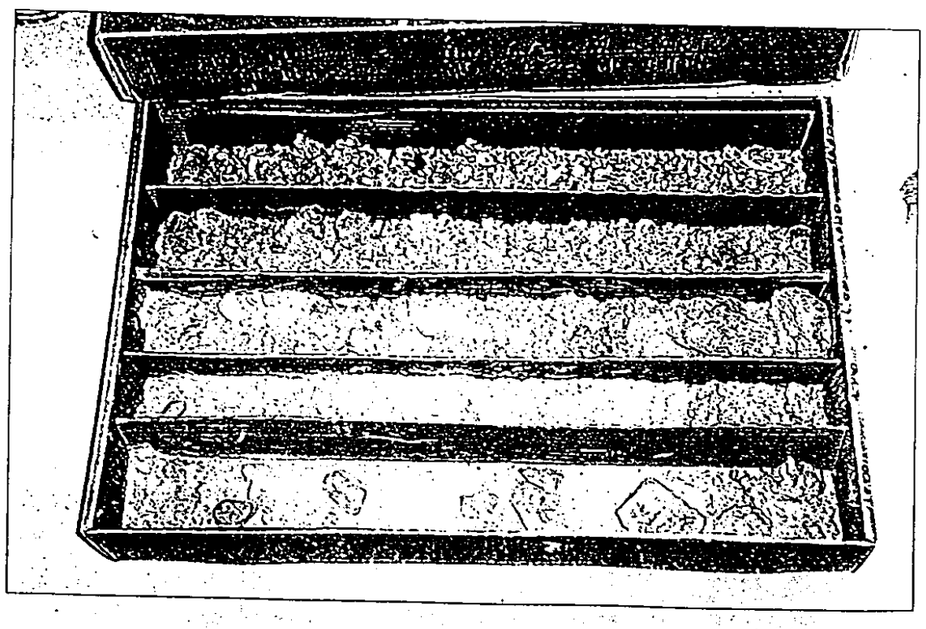




PROYEX

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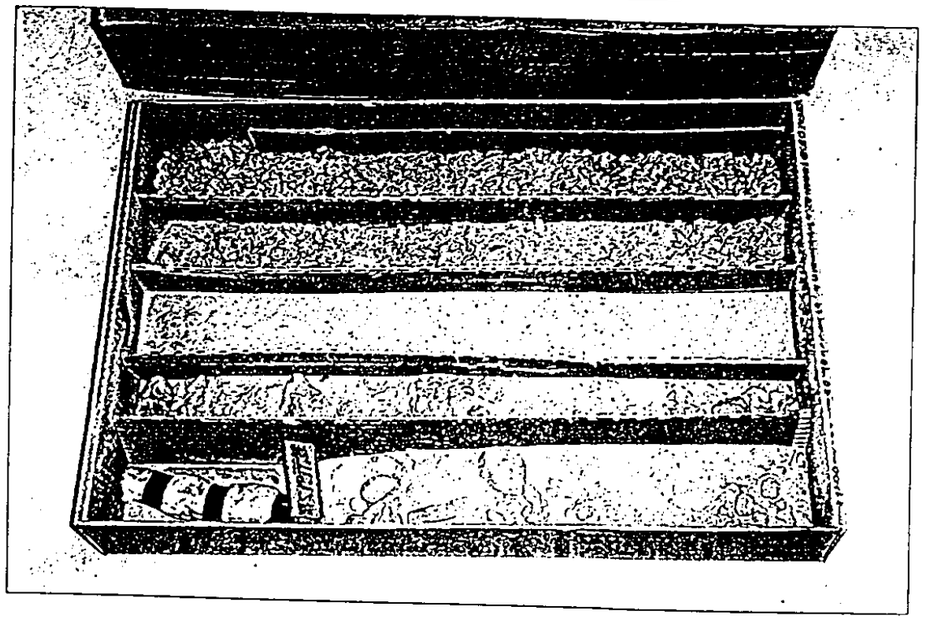


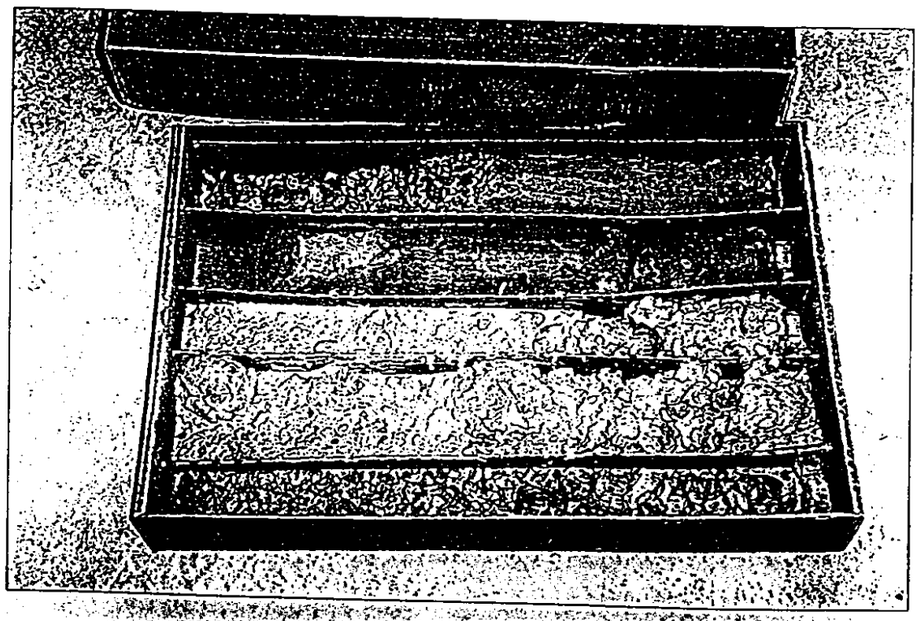


PROYEX

IQNet AENOR ER Empresa Registrada ER-0604/2/99

SONDEO PILA 2

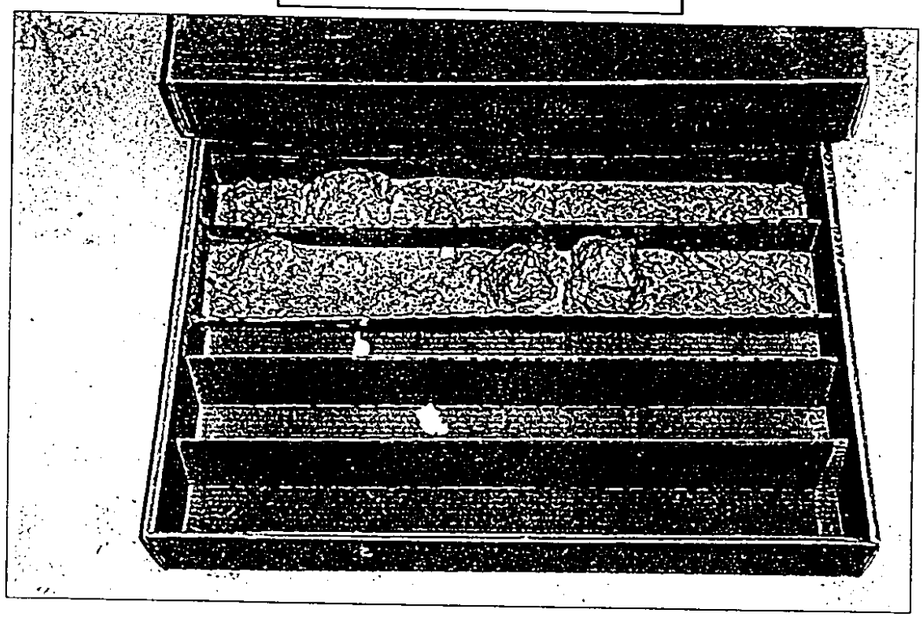




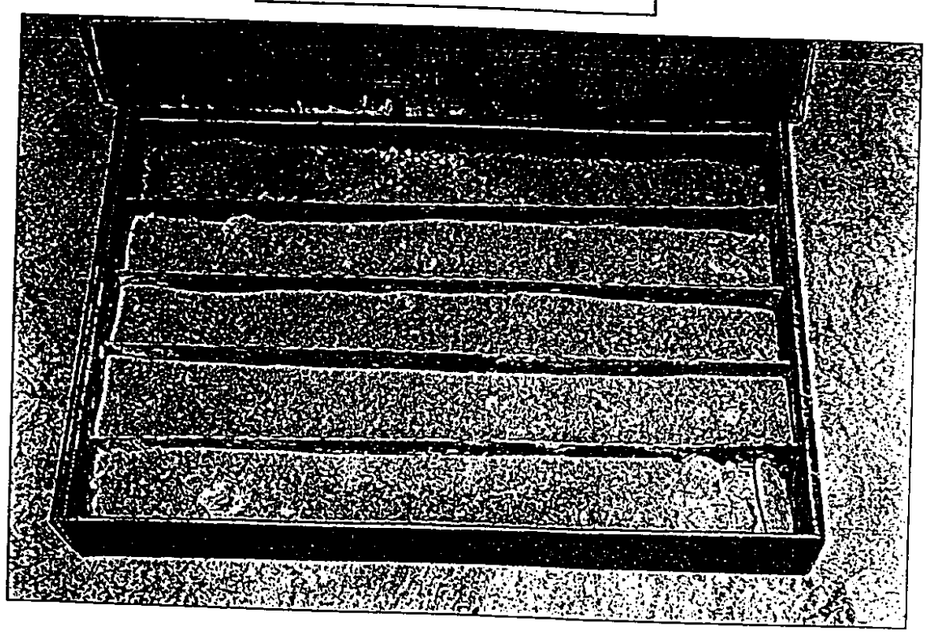
PROYEX

IQNet AENOR ER Empresa Registrada ER-0604/2/99

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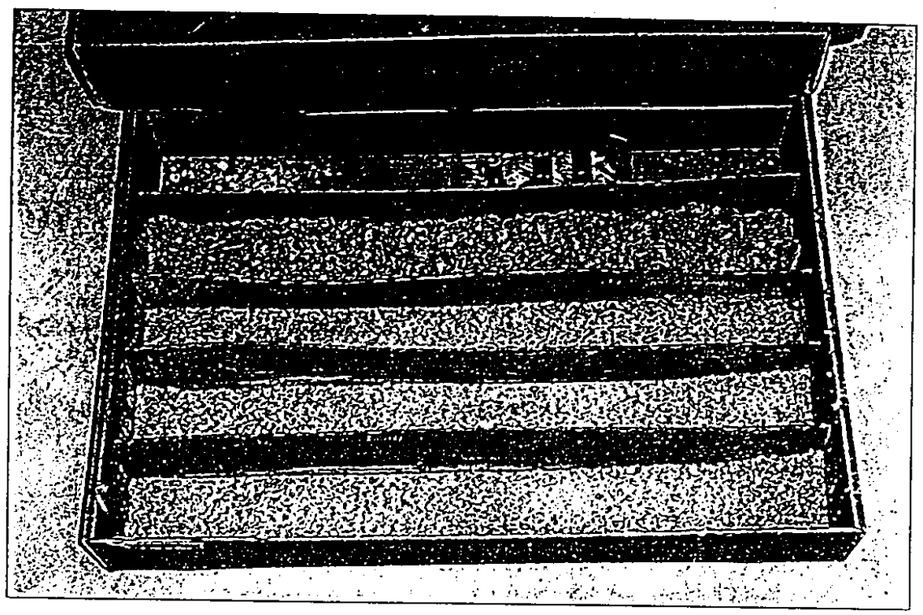


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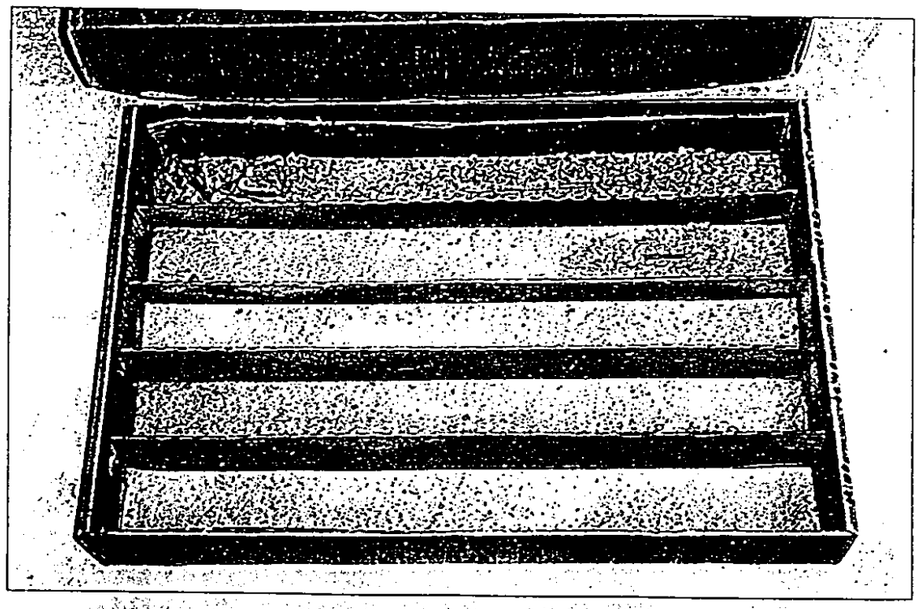


PROYEX

SONDEO PILA 3

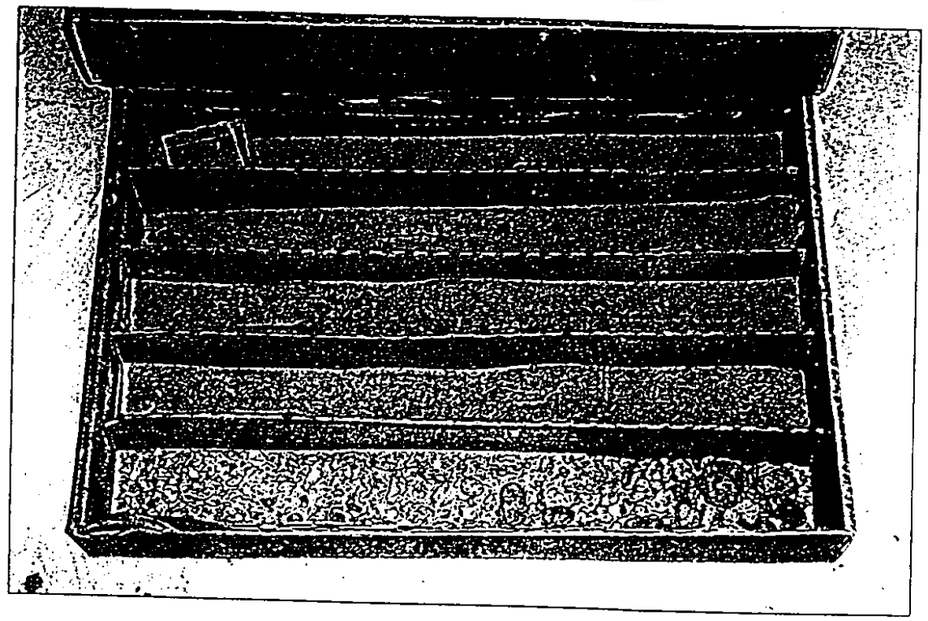






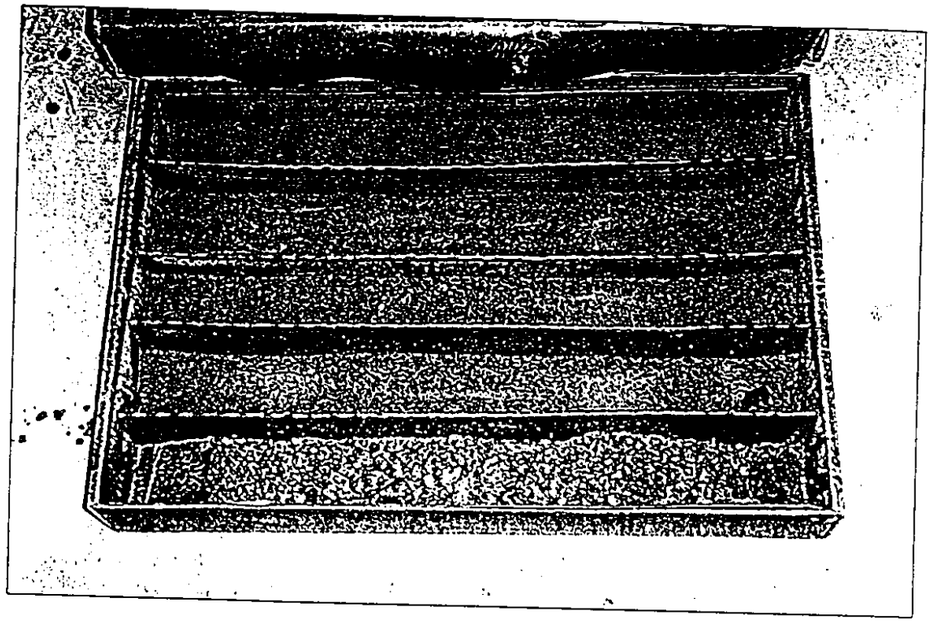
PROYEX

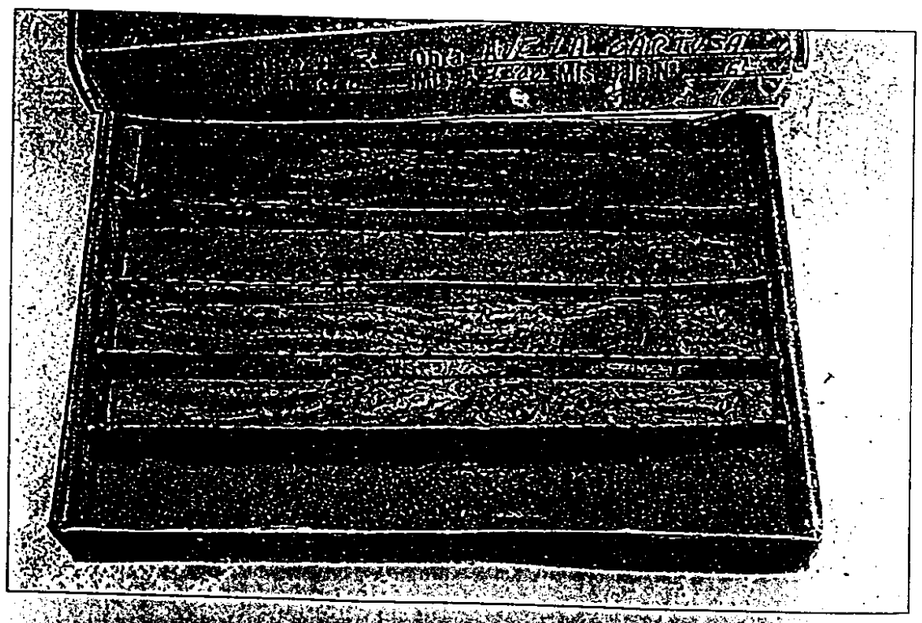
SONDEO PILA 3

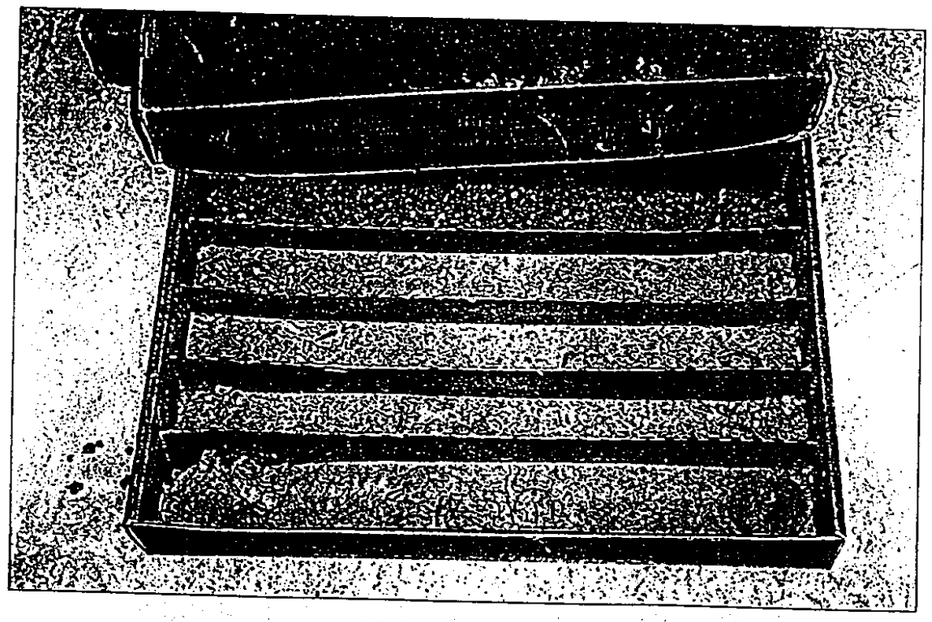


PROYEX

SONDEO PILA 3







ANEJO DE CÁLCULO

TABLERO

ESTUDIO: 24785 FECHA: 10-08-00
TITULO: EVN3-4.4 (PTE.DE F.C.)
SUBTRAMO:XV

ANEJO DE CALCULO DEL TABLERO DE VIGAS CAJON

VANO: 1° (V. LARGO)

1. DATOS GENERALES

1.1 Seccion transversal (Datos para el calculo)
Ancho total plataforma ..... 8.30 m.
Ancho de las aceras (sin trafico). 1.22 (Calc.izq)
1.92 (Calc.dch)

1.2 Seccion longitudinal
Tramo isostatico
Luz de calculo ..... 24.79 m.
Longitud de la viga ..... 26.29 m.

1.3 Planta
Esviaje ..... 145.70 °
Radio curvatura ..... ≈ 1330 m.

2. SOLUCION ADOPTADA

El tablero esta formado por vigas prefabricadas pretensadas sobre las que se vierte hormigon fabricado in situ para formar la losa de compresion
Tipo de viga CAJON-396.150.23.80
Canto de la viga ..... 1.50 m.
Canto de la losa ..... .29 m. (de cálculo)
Numero de vigas 1
Separacion entre vigas ..... 0.000 m.
Las caracteristicas de la viga figuran en el listado de resultados

3. ACCIONES A CONSIDERAR

Peso propio de la viga ..... 4198.03 Kg/m
Peso propio de la losa ..... 725.00 Kg/m2.
Carga muerta ..... * Kg/m2.
Carga adicional en bordes debida a aceras .. * Kg/m.
Sobrecarga ..... OM 25-675 o EC1.

4. CARACTERISTICAS DE LOS MATERIALES Y COEFICIENTES DE SEGURIDAD SEGUN EP.-93

4.1 Hormigon de la viga
Resistencia caracteristica a los 28 dias .....>= 550 Kgr/cm2
Nivel de control intenso (prefabricacion) .....= 1.4

4.2 Hormigon de la losa
Resistencia caracteristica a los 28 dias .....>= 250 Kgr/cm2
Nivel de control normal (fabricacion in situ)...= 1.5

4.3 Acero de pretensado en viga
Tension de rotura .....>= 19000 Kgr/cm2
Limite elastico al 0.2 .....>= 17100 Kgr/cm2
Nivel de control intenso (prefabricacion) .....= 1.1

4.4 Acero pasivo en viga
Limite elastico .....>= 5100 Kgr/cm2
Nivel de control intenso (prefabricacion) .....= 1.1

4.5 Acero pasivo en la losa
Limite elastico .....>= 5100 Kgr/cm2
Nivel de control normal (fabricacion in situ)...= 1.15

4.6 Acciones
Nivel de control de ejecucion intenso. Daños medios= 1.50

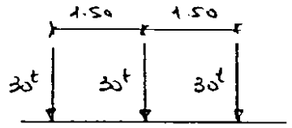
PACADAR	ESTUDIO: 24785	OBRA: SUBTRAMO: XV. "EVN3-4.4"	FECHA:
			HOJA: 2

PUENTES DE FFCC IPF-75 / EC-1

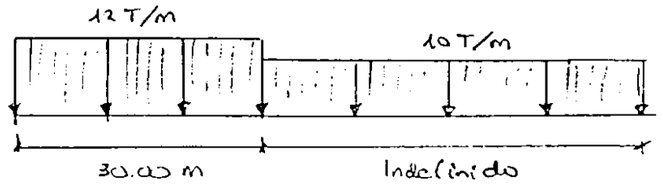
1. SOBRECARGA VERTICAL

— IPF-75 (Vía RENFE)

TREN TIPO A



TREN TIPO B



— COEFICIENTE DE IMPACTO

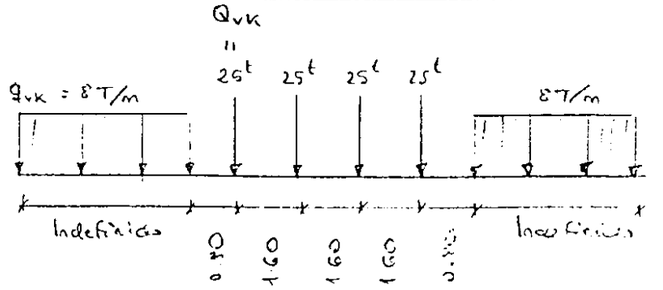
$L \leq 6$ m $I = 0{,}33 \times V$ (%) V = velocidad tren km h⁻¹ (≤ 200 km h⁻¹)

$L > 6$ m $I = 114\sqrt{L} \,/\, 3{,}10 - 1{,}76\sqrt{L} + L$

— RIPADO ± 30 cm (en el sentido más desfavorable)

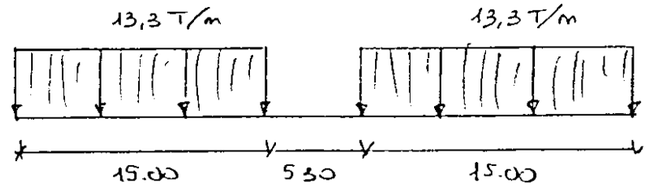
— EC-1

MODELO 71



PACADAR	ESTUDIO:	OBRA:	FECHA:
			HOJA: 3

MODELO SW0



— COEFICIENTE DE IMPACTO

Vías con mantenimiento cuidadoso (AVE)

$\phi_2 = 1{,}44 \,/\, \sqrt{L\phi - 0{,}2} + 0{,}82$ (✓) $L\phi$ = Long (m)

Vías con mantenimiento normal (RENFE)

$\phi_3 = 2{,}16 \,/\, \sqrt{L\phi - 92} + 0{,}73$ (✓)

— RIPADO $e = r/18$ < 1.668/18 = 0.093 m ; 1.435/18 = 0,080 m

¡Sólo en modelo 71!

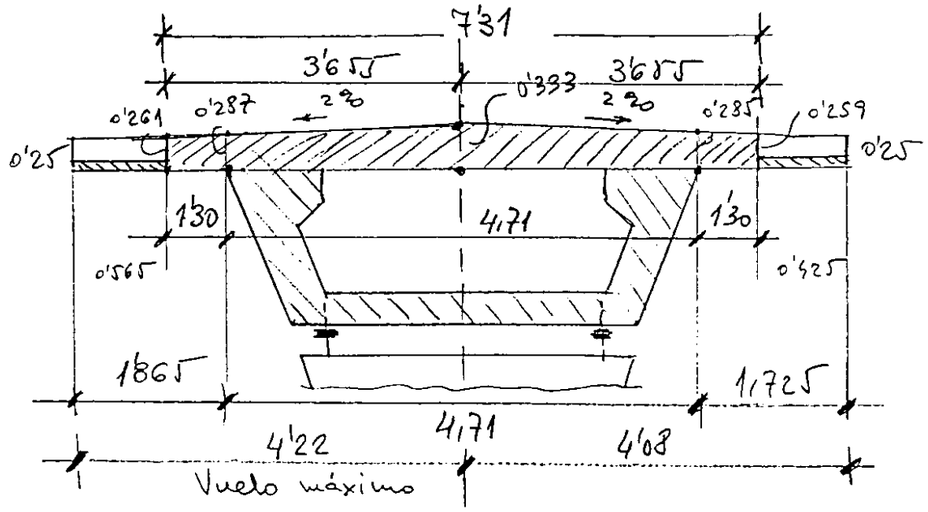
SOBRECARGA EN PASEOS: 400 kp/m² (IPF-75 / EC-1)

Para este tipo de pte. (biapoyado y con luces de menos de 50 m), tomamos el tren tipo "B" de la IPF-75 (VIA RENFE) que es el más desfavorable.

Así mismo tomamos las cargas muertas que figuran en proyecto.

FASES DE HORMIGONADO DE LA LOSA.-

- FASE: 1ª - Los 7'31 m. centrales de la losa



- Peso viga = ——— 419803 kg

- Peso losa 1ª fase:

$$2500 \times \left[\left(\frac{0'261+0'333}{2}\right) \times 3'65 + \left(\frac{0'259+0'333}{2}\right) \times 3'65\right] = 541991 \text{ kg}$$

$$Pp(V+1) = 961794 \text{ kg}$$

- Cargas Permanente -

- Peso losa restante = ——— 63130 kg/m

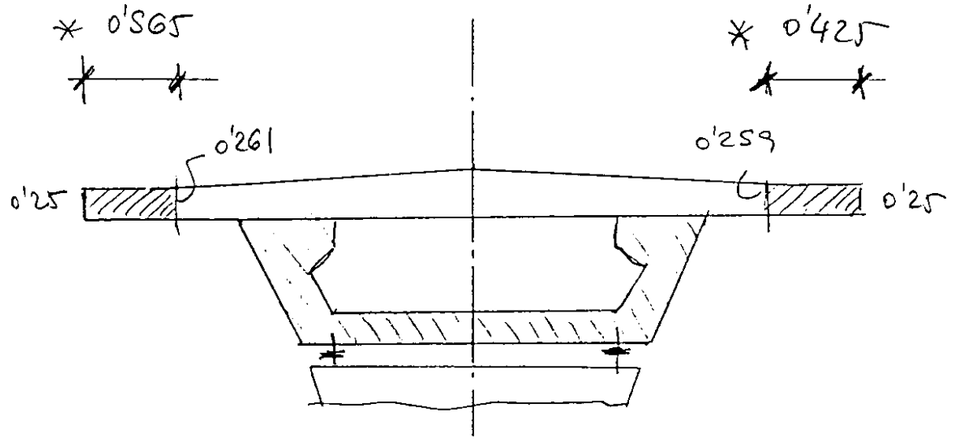
- Cargas muertas -- (Tomamos del proyecto)
  - Traviesas + Carriles = 640 kg/m
  - Balasto = ——— 7200 "
  - Cables + Conductos = 300 "
  - Barreras = ——— 1.500 "
  - Sobc. pasos = ——— 1.560 "

11.200 kg/m ——— 11.200 kg

c. perma = 11.831'30 kg/m

- FASE: 2ª - Los * m. laterales de la losa.

Teorico



P. losa 2ª fase.-

$$-2500 \times \left[\left(\frac{0'25+0'261}{2}\right) \times 0'565 + \left(\frac{0'259+0'25}{2}\right) \times 0'425\right] =$$

$$= 63130 \text{ kg/m}$$

- Lc = 24'79 m $\alpha = 145'71°$
- LT = 26'29 m

Sobrecarga := 12.000 kg/ml (en vía) + 1570 kg/ml (Sobrec. paseos)

Largo. $C_i^l = \frac{114 \times \sqrt{24,79}}{3'10 - 1,176 \times \sqrt{24,79} + 24,79} \Rightarrow C_i^l = 1'296$

Corto. $C_i^c = \frac{114 \times \sqrt{20,59}}{3'10 - 1,76 \times \sqrt{20,59} + 20,59} \Rightarrow C_i^c = 1'329$

— Vano largo —

$$\eta = \frac{1}{8} \times \left(4198'03 + 5419'91 + 63130 + 11200 + \left(12000 \times 1'296\right)\right) \times 24,79^2 = 2.842.361'72 \text{ mk}$$

(21.449'24; 15.552,00)

$Q = \frac{1}{2} \times 37.001'24 \times 24,79 = 458.630'37$ kg.

— Vano corto —

$$\eta = \frac{1}{8} \times \left(21.449'24 + \left(12000 \times 1'329\right)\right) \times 20'59^2 = 1.981.811 \text{ mk} <$$

(15.948'00)

$Q = \frac{1}{2} \times 37.397'24 \times 20,59 = 385.004'59$ kg <

Dimensiona el vano largo al dar momento y cortante máximos.

$-L_C = 24'79$ m $\Rightarrow -L_T = 26'29$ m.

$q_{total} = 21.449'24 + 15.552 = 37.001'25$ kg/ml

TORSORES —

— Torsor c. muertas.

Tomamos una excentricidad media de

$4'08 - 3'80 = 0'28$ m
$4'15 - 3'80 = 0'35$ m
$\Big\} e_i = 0'31$ m

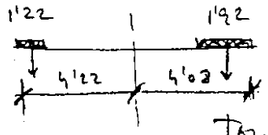
T_1 —

Balasto = $7.200 \times 0'31 =$ ——— 2232'00 mk
Traviesa + Carril = $640 \times (0'31 + 0'30) =$ ——— 39040
Guarda balasto = $(2500 \times 0'20 \times 0'40 \times 0'31) =$ ——— 62'00
Losa $\left(2500 \times (4'22 - 4'08) \times 0'26\right) \times \left(4'22 - \frac{0'14}{2}\right) =$ ——— 37765

$T_1 = 3.062'05$ mk

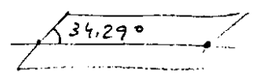
— Torsor concomitante con sobrecarga.

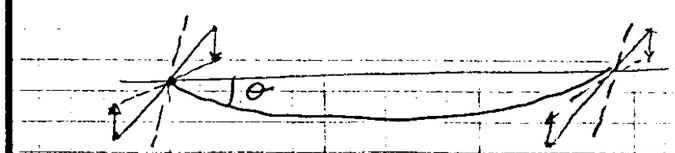
Sobrc. paseos = $400 \times 1,22 \times \left(4'22 - \frac{1'22}{2}\right) =$ 1761'68 mk
$- 400 \times 1'92 \times \left(4'08 - \frac{1,92}{2}\right) =$ $-2.396'16$ mk
—



Torno Sobrec. en un paseo = $T_2 = 1.761'68$ mk
Sobrec. en vía .. $12000 \times 1'296 \times (0'30 + 0'31) \Rightarrow T_3 = 9.486,72$ mk

— Torsor debido al esviaje —

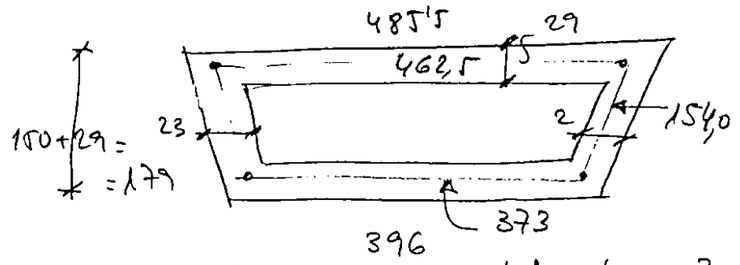




$q_t = 21.449'24 + (12000 \times 1'296) = 37.001,24$ Kg

Características mecánicas a torsión.-

$$J = \frac{4 \times A_0^2}{\oint \frac{ds}{t}} =$$



$$A_0^2 = \left[\left(\frac{4'625 + 3,73}{2}\right) \times 1'54\right]^2 = 41'388 \ m^2 \quad \begin{cases} A = 6'433 \ m^2 \\ M = 11,435 \ m \end{cases}$$

$$\oint \frac{ds}{t} = \frac{3,73}{0,21} + 2 \times \left(\frac{1'54}{0,23}\right) + \frac{4'625}{0'29} = 47'10 \ m.$$

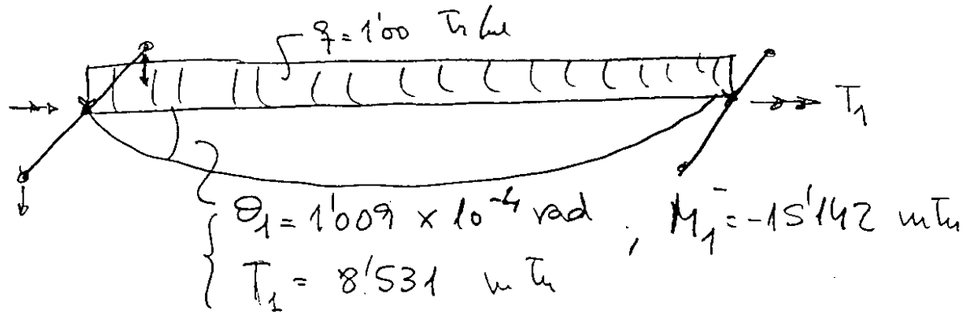
$$J = \frac{4 \times 41'388}{47,10} = 3'515 \ m^4 \ / 10 \text{ (por fisuración a torsión)} = \underline{\underline{0'3515}} \ m^4$$

Luego $\theta_t = \theta_f \times \operatorname{cotg} \beta = 0'005 \times \operatorname{cotg} 34'29° = \underline{\underline{0'007}}$ rad

$$G = \frac{E}{2 \times (1 + \mu_{0,2})} = \frac{19000\sqrt{450}}{2'4} \times 10 = 1.679.378'60 \ T_n/m^2$$

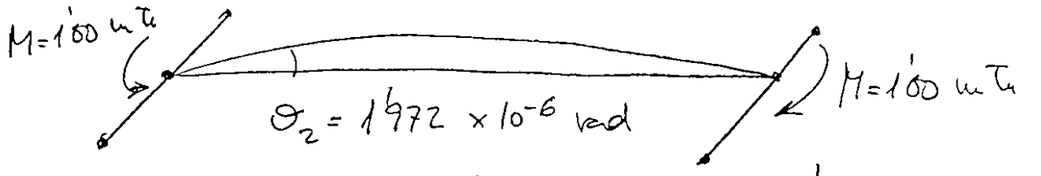
Datos para programa "SAP."

Del programa SAP para $q = 1'00$ Tn/m.



$\theta_1 = 1'009 \times 10^{-4}$ rad , $M_1^- = -15'142$ mTn

$T_1 = 8'531$ mTn



Como valor del momento torsor de compatibilidad (esviaje), se tomará el mayor de los siguientes valores:

$t = 0$:

Σ giros pret + c.perm + sobrec. $\Rightarrow \theta_0$

$t = \infty$:

$(\Sigma$ giros pret + c.perm.$) \times (1 + \varphi_\infty) \Rightarrow \theta_\infty$

Torsor a $t = 0$.-

$$T_0 = T_1 \times \theta_0 / \theta_1$$

Torsor a $t = \infty$.-

$$T_\infty = T_1 \times \theta_\infty / \theta_1$$

Obtención de dichos giros

Carga	θ_0	θ_∞
(A) pretens.	$-0'0037$	$-0'0074$
(B) p.p.v	$+0'0004$	$+0'0008$
(C) perman.	$+0'0017$	$+0'0052$
(D) sobrec	$+0'0016$	0 (0'0016)
	0 rad	$-0'0014$ rad
		$+0'0016$ (sobrec)
		$+0'0002$

(A) $\theta_0 = \left(\frac{112 \times 12.500 \times 1'4 \times (104'41 - 7'4)}{100.000}\right) \times 1'972 \times 10^{-6} = -0'0037$ rad (97'01)

$\theta_\infty = 0'0037 \times (1+1)_{\varphi_\infty} = -0'0074$ rad

(B) $\theta_0 = 4'198 \times 1'009 \times 10^{-4} = 0'0004$ rad

$\theta_\infty = 0'0004 \times 2 = 0'0008$ rad

(C) $\theta_0 = 17'25 \times 1'009 \times 10^{-4} = 0'0017$ rad

$\theta_\infty = 0'0017 \times 3 = 0'0052$ rad

(D) $\theta_0 = 15'552 \times 1'009 \times 10^{-4} = 0'0016$ rad

$\theta_\infty = 0'0016$ rad

Dado que $\theta_\infty > \theta_0$

Luego $T_4 = T_\infty = 8'531 \times \frac{-0'0014}{1'009 \times 10^{-4}} =$

$T_4 = 118'37$ m·t

Para t_∞ con sobrecarga

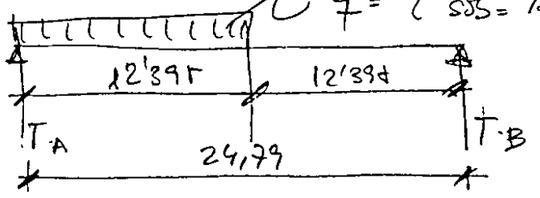
$T_5 = 8'531 \frac{\times 0'0002}{1'009 \times 10^{-4}} = 16'91$ m·t

Luego el torsor total concomitante con el cortante máximo, es

$T_5 = \underline{16,91}$ m·t

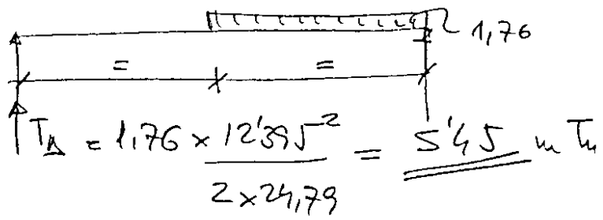
Torsor en el centro de la luz — $(M_{t(1/2)})$

$q = \begin{cases} sp = * \text{ mTn/ml} \\ SCS = 12 \times 1{,}296 \times 0{,}61 = 9{,}49 \text{ mTn/ml} \end{cases}$



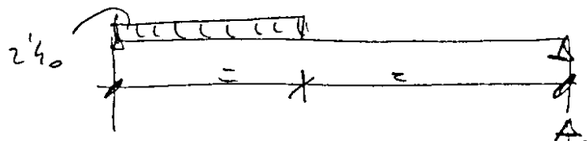
* — Sobrec. paseo 1'22 m.

$0{,}400 \times 1'22 \times \left(4'22 - \frac{1'22}{2}\right) = 1{,}76 \text{ mTn/ml}$



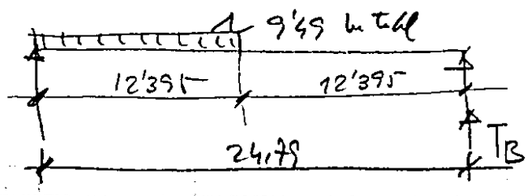
* — Sobre paseo 1'92 m. —

$2'40 \times 1'92 \times \left(4'08 - \frac{1'92}{2}\right) = 2'40 \text{ mTn/ml}$



— Sobrec. en vía —

$12 \times 1'296 \times 0'61 = 9'49 \text{ mTn/ml}$



Torsor en el centro = 5'45 + 7'44 + 29'39 = **42'28 mTn.**

Cargas virtuales para entrada datos en programa "TENSCAT".-

— Cargas a flexión y corte —

- $P_{(p+1)} = 96'794$ Kn/ml
- $P_{sc} = 11'831'30$ Kn/ml
- $P_{sob} = 12000 \times 1'296 = 15'552'00$ Kn/ml

— Torsores —

- $M_{t(0)} = (T_1 + T_2 + T_3) \times \frac{L}{1/2} + T_5 =$

$= \left(3'06 + \underset{14,31}{1'76} + 9{,}49\right) \times \frac{24{,}79}{2} + 16'91 =$

$= 194'28$ mTn

- $M_{t(1/4)} = \frac{177'37}{2} + 16'91 = 105'60$ mTn

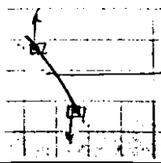
- $M_{t(1/2)} = 42'28 + 16'91 = 59'19$ mTn

— $x_1 = 2'45$ m
— $x_2 = 4{,}10$ m.

Torsor c. permanente + pasos = $(3'06 + 1'76) \times \frac{24{,}79}{2} = 59'75$ mTn.

Torsor sobrec vía = $9'49 \times \frac{24{,}79}{2} = 117'63$ mTn.

Torsor debido al esviaje



— C. permon = $8'531 \times \frac{0'0017}{1'009 \times 10^{-4}} = 143'73$ mTn

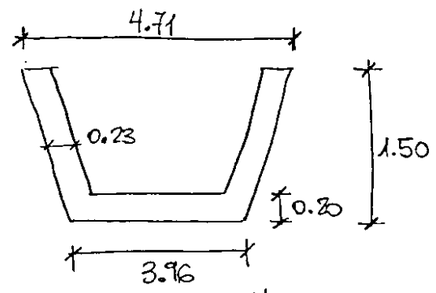
— Sobrecarga = $8'531 \times \frac{0'0016}{1'009 \times 10^{-4}} = 135'28$ mTn

COMPROBACIÓN DE TORSORES EN SERVICIO

$L_c = 24.79$ m

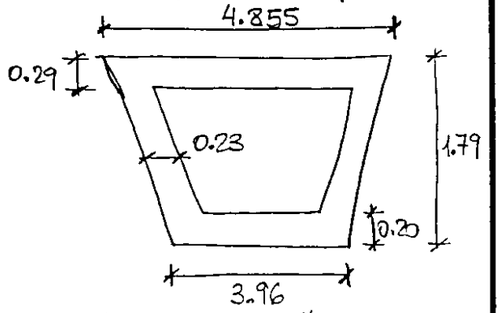
• Sección de cálculo

Sección simple



$I_T = 0.00215$ m⁴

Sección compuesta



$I_T = 0.3515$ m⁴

• Cargas actuantes

- Torsores de equilibrio

Carga permanente	:	3.062 mt/ml ⇒	37.95 mT.
Sobrecarga	:	1.762 mT/ml ⇒	21.84 mT.
Tren	:	9.49 mT/ml ⇒	117.63 mT.

- Torsores de compatibilidad

pretensado + peso propio viga + losa 1ª fase	=	− 0.602 mTon
Resto de carga permanente	=	143.73 mTon
Sobrecarga	=	135.28 mTon
Diferido pretensado + peso propio viga + losa 1ª fase	=	−279.01 mTon
Diferido resto de carga permanente	=	295.92 mTon

• Control de tensiones en las armaduras de las vigas

① - Torsores que entran en sección abierta:

$T_1 = -0.602$ mTon

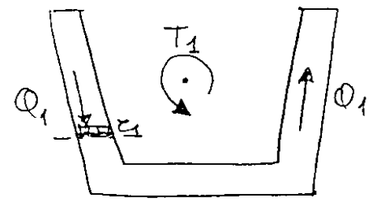
② - Torsores a t_∞ que entran en sección compuesta:

$T_2 = 37.95 + 21.84 + 117.63 + 143.73 + 135.28 = 456.43$ mTon

③ - Torsores diferidos a t_∞:

$T_3 = -279.01 + 295.92 = 16.91$ mTon.

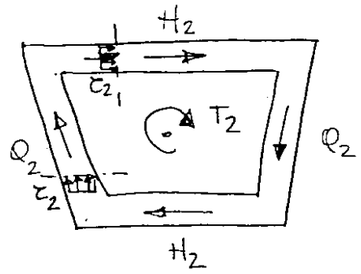
①



$Q_1 = \frac{T_1}{4.10} = -0.147$ Ton

$\tau_1 = \frac{-0.147}{0.23} = -0.638$ Ton/m

②



$\tau_2 = \frac{T_2}{2A_e} = \frac{456.43}{2 \times 6.454}$

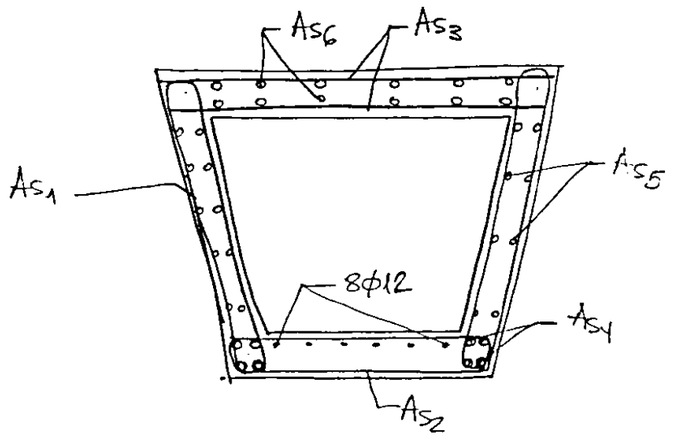
$\tau_2 = 35.36$ Ton/m

③

$\tau_3 = \frac{T_3}{2A_e} = \frac{16.91}{2 \times 6.454}$

$\tau_2 = 1.31$ Ton/m

dupo las armaduras necesarias para controlar fisuración serían :



$As_{1nec} = \frac{-0.638+35.36+1.31}{20000} \times 10^4 = 18.02\ cm^2/ml$ (por alma)

$As_{2nec} = \frac{35.36+1.31}{20000} \times 10^4 = 18.34\ cm^2/ml$

$As_{3nec} = 18.34\ cm^2/ml$

$As_{4disp} \Rightarrow \Rightarrow V_4 = (35.36+1.31) \times \frac{3.96-0.23}{2} = 68.39$ Tou

$As_{5disp} \Rightarrow \Rightarrow V_5 = (35.36+1.31) \times 1.545 = 56.66$ Tou

$V_6 = (35.36+1.31) \times (4.855-0.23) = 169.60$ Tou

$As_{6nec} = \frac{169.60 \times 10^3}{2000} = 84.80\ cm^2$

$As_{6nec} = \frac{84.80}{4.80} = 17.67\ cm^2/ml$

En centro de vano sólo vamos a tener tensores de compatibilidad :

T= 295.92 ton

$\gamma = \frac{295.92}{2 \times 6.454} = 22.93$ Tou/m

$As_{1nec} = \frac{22.93}{20000} \times 10^4 = 11.46\ cm^2/ml$ (por alma)

$As_{2nec} = \frac{22.93}{20000} \times 10^4 = 11.46\ cm^2/ml$

$As_{3nec} = 11.46\ cm^2/ml$

$V_4 = 22.93 \times \frac{3.96-0.23}{2} = 42.76$ Tou

$V_5 = 22.93 \times 1.545 = 35.43$ Tou

$V_6 = 22.93 \times (4.855-0.23) = 106.05$ Tou

Del cálculo general de la viga ya teníamos dispuestos:

• Apoyo

Armadura transversal torsión = 5.83 cm²/ml

Armadura longitudinal en la

base = 5.52 cm²/ml

Armadura longitudinal almas = 5.28 cm²/ml

Armadura longitudinal superior = 5.28 cm²/ml

• Centro de vano

Armadura transversal torsión = 1.87 cm²/ml

Armadura longitudinal base = 1.77 cm²/ml

Armadura longitudinal almas = 1.69 cm²/ml

Armadura longitudinal superior = 1.69 cm²/ml

Luego necesitamos un incremento de armadura debido a la torsión:

	Apoyo	Centro vano
ΔA_{s1}	12.19 cm²/ml	9.59 cm²/ml
ΔA_{s2}	12.51 cm²/ml	9.59 cm²/ml
ΔA_{s4}	24.35 cm²	18.23 cm²
ΔA_{s5}	20.17 cm²	15.10 cm²

X(m)	As_{1nec} (cm²/ml)	As_{2nec} (cm²/ml)	As_{1disp}	As_{2disp}
0.0	61.445	64.09	2φ20c 12.5 (100.53)	φ20+φ16c 12.5
1.0	44.32	60.0	2φ20c 12.5 (100.53)	φ20+φ16c 12.5
2.0	38.99	55.98	2φ20c 12.5 (100.53)	φ20+φ16c 12.5
3.0	35.91	49.50	2φ20c 12.5 (100.53)	φ20+φ16c 12.5
4.0	28.99	45.60	φ20+φ16c 20 (51.53)	φ20+φ16c 20
5.0	25.91	41.76	2φ16c 20 (40.22)	φ20+φ16c 20
6.0	27.66	37.99	2φ16c 20 (40.22)	φ20+φ16c 20
7.0	25.48	34.44	2φ16c 20 (40.22)	φ20+φ16c 20
8.0	23.38	31.0	φ16+φ10c 20 (27.96)	2φ16c 20
9.0	21.12	27.61	φ16+φ10c 20 (27.96)	2φ16c 20
10.0	18.50	24.29	φ16+φ10c 20 (27.96)	2φ16c 20
11.0	15.91	21.03	2φ10c 20 (15.70)	φ16+φ10c 20
12.0	13.39	17.83	2φ10c 20 (15.70)	φ16+φ10c 20

Luego tenemos suficiente armadura transversal en la viga para controlar la fisuración por el torsor de servicio.

Veamos la armadura longitudinal:

Armadura longitudinal de ala inferior ⇒ apoyo $\frac{68.39 \times 10^3}{2000} = 34.20\ cm^2$

Armadura longitudinal de alma ⇒ apoyo $\frac{56.66 \times 10^3}{2000} = 28.33 cm^2$

Armadura longitudinal de ala inferior ⇒ otro vano $\frac{42.76 \times 10^3}{2000} = 21.38\ cm^2$

Armadura longitudinal de alma ⇒ otro vano $\frac{35.43 \times 10^3}{2000} = 17.72\ cm^2$

Vamos a disponer la siguiente armadura:

Armadura longitudinal superior: $\frac{13}{2}\phi 20 + 3\phi 25 \Rightarrow 35.15\ cm^2$

Armadura longitudinal de alma: $4\phi 25 + 8\phi 12 \Rightarrow 28.69\ cm^2$.

- Armadura a disponer en losa además de la del cálculo general

- Armadura transversal inferior = 9.20 cm²/ml
- Armadura transversal superior = 9.20 cm²/ml

Esta armadura sería necesaria sólo en los 4.90 m centrales del tablero (centrados con el cajón) más la longitud de anclaje

- Armadura longitudinal inferior = 8.84 cm²/ml
- Armadura longitudinal superior = 8.84 cm²/ml

Esta armadura sólo es necesaria en los 4.90 m centrales del tablero (centrados con el cajón)

ESTUDIO: 24785

DATOS DE LA VIGA CAJON-396.150.23.80(465)

FICHERO:CAJONES5

DATOS DE FORMA

BASES EXTERIORES	396.00	406.50	76.10	47.50	47.50	101.50	107.06
BASES INTERIORES	0.00	0.00	330.40	364.80	399.90	356.10	363.94
ALTURAS	21.00	0.00	11.60	70.20	20.40	26.80	

Y	YG	A	In	Ws	Wi	E	Ks
150.00	52.95	16792.13	43607313.84	449343.44	823505.68	47.50	.28

DATOS PRETENSADO

Asi	Ei	Ass	Es	Ki	Asl	Eil	As2	Ei2
156.800	8.171	11.200	7.900	.500	92.400	6.164	126.000	7.133

DATOS MATERIALES

Fcd	R	Fyv	Fyl	Fr0	Frr	Ret	Flu	Rel	Nm	Ns	Cs	Nu
392.86	.67	4636.36	4434.78	14800.00	15545.45	.25	2.00	4.00	11.80	5.90	1.50	0.00

CARACTERISTICAS HOMOGENEIZADAS

Yg0	A0	I0	Yg0p	A0p	I0p	Ygs	As	Is	Ygm	Am	Im
53.42	16576.59	43086068.35	49.54	18558.99	47634301.68	51.37	17567.79	45426077.33	49.54	18558.99	47634301.68

CALCULO GENERAL DE VIGAS

DATOS TABLERO

ANCH	DVEI	DVED	L	LTE	LMED	NVG	ACEI	ACED	LOS	ELI	ELS	BRAS	PAS10	AINT0
8.30	4.22	4.08	24.79	26.29	26.29	1.00	1.22	1.92	29.00	8.00	2.50	67.06	5.16	59477.88

CM	PAC	DPAC	TRL	PE	LAP	CPAR	APOY	NAPO	BEI	BED
0	0.00	0.00	-99.00	5000.00	0.00	0.00	0.00	0.00	145.70	145.70

OPCIONES

OPCIR	OPMAN	OPTV	OPCOR	OPAL	OPD1	OPDF	OPNEO
0.00	0.00	0.00	0.00	-2.00	0.00	0.00	-1.00

NEOPRENO

BNP	DNP	TNP	GNP	CHNP	G	TEMP	SNEO
50.00	50.00	5.20	4.08	.30	10.00	30.00	326.00

ESTUDIO: 24785

RESUMEN DE RESULTADOS PARA ENLACE CON TENSCAJ

Valores caracteristicos (Kg/m,mTn.)

VIGAS EXTERIORES

TIPO DE CARGA	CARGAS VIRTUALES Flexion	Corte
Peso propio	9617.940	9617.940
Permanentes	11831.300	11831.300
Sobrecarg.I	15552.000	15552.000
Sobrecarg.II	0.000	0.000
Torsor apoyo	194.280	194.280
Torsor L/4	105.600	105.600
Torsor L/2	59.190	59.190

CARGAS PESIMAS EN EXTREMOS

Solo validas a efectos del calculo de neoprenos

Valores caracteristicos aproximados (Tn,mTn.)

EXTERIOR	Reaccion	Torsor
Rperm.....	283.023	0.000
Rmax.....	488.231	194.280
Rmin.....	283.023	59.190
T.Rmax.....	488.231	194.280
T.Rmin.....	488.231	194.280

CALCULO DE LA ESTABILIDAD

RESULTADOS
(T,mT)

MOMENTOS VOLCADORES:

	Pesos	Momentos
LOSA.....	49.55	64.17
ACERA.....	0.00	0.00
CARGA MUERTA.....	0.00	0.00
SOBRECARGA UNIFORME.	128.07	165.85
CARRO.....	0.00	0.00
FUERZA HORIZONTAL...	16.81	24.25

MOMENTOS ESTABILIZADORES:

	Pesos	Momentos
LOSA.....	109.25	311.90
ACERA.....	0.00	0.00
CARGA MUERTA.....	0.00	0.00
VIGA.....	120.37	196.20

Coef. mayoracion acciones permanentes.....=1.154
Coef. minoracion acciones permanentes.....= .900
Coef. mayoracion sobrecargas.....=1.500

MOMENTO VOLCADOR MAYORADO.....Mv= 359.19 mT.
MOMENTO ESTABILIZADOR MINORADO...Me= 457.29 mT.

SE CUMPLE QUE Me>Mv , LUEGO HAY ESTABILIDAD.

ELECCION VIGA PESIMA A FLEXION

SECCIONES COMPUESTAS

	SEFIC.	YGC	AC	IC	YGCMC	ACMC	ICMC	YGCSC	ACSC	ICSC
VIGAS EXTERIORES.	735.69	104.41	31171.93	140999924.5	99.73	32938.79	155718450.9	102.29	31947.59	147635023.3

MOMENTOS FLECTORES CON LAS CARGAS EQUIVALENTES DE CADA VIGA Y L=24.79

VIGA	SCAJ	SDER	SIZQ	S	MP	MM	MSOB	TINF
EXTERIORES	471.00	172.50	186.50	830.00	738831.04	908856.951194673.73		-14.98

CALCULO VIGA PESIMA A FLEXION

DATOS DE LUCES Y CARGAS DE CALCULO

PP	PCM	PSOB	F	B	Lc	Cs
9617.94	11831.30	15552.00	0.00	1.50	24.79	1.50

DATOS DE ESFUERZOS

MP	ML	MCM	MS
322484.59	416346.45	908856.951194673.	

SECCIONES COMPUESTAS

SEFIC.	YGC	AC	IC	YGCMC	ACMC	ICMC	YGCSC	ACSC	ICSC
735.69	104.41	31171.93	140999924.5	99.73	32938.79	155718450.9	102.29	31947.59	147635023.3

PERDIDAS PRETENSADO

DT3	FRI	DTS	DT4	DT5	DT6	FRF
1037.29	13762.71	0.00	450.00	883.25	443.37	11460.00

TENSIONES

	PARCIALES				ACUMULADAS			
	SL	IL	SV	IV	SL	IL	SV	IV
PRET INIC	0.00	0.00	-48.76	243.60	0.00	0.00	-48.76	243.60
PRET FIN	0.00	0.00	-40.60	202.84	0.00	0.00	-40.60	202.84
PPROP.VIGA	0.00	0.00	68.01	-33.54	0.00	0.00	27.41	169.30
PPROP.LOSA	0.00	0.00	87.81	-43.30	0.00	0.00	115.22	126.00
CAR.MUERTA	46.27	29.34	29.34	-58.21	46.27	29.34	144.56	67.80
SOBRECARGA	62.07	38.61	38.61	-82.77	108.34	67.95	183.17	-14.98

FISURACION C2 COMPROBADA

CALCULO A ROTURA

MOMENTO DE ROTURA 4212704.19

MOMENTO NECESARIO 4263542.58

REFUERZO 2D 25 EN 8.29 m

ELECCION VIGA PESIMA A CORTANTE

SECCIONES COMPUESTAS

	SEFIC.	YGC	AC	IC	YGCMC	ACMC	ICMC	YGCSC	ACSC	ICSC
VIGAS EXTERIORES.	830.00	107.77	33015.31	147413488.9	103.16	34782.17	163171739.8	105.68	33790.97	154508948.4

ESFUERZOS CORTANTES CON LAS CARGAS EQUIVALENTES DE CADA VIGA Y L=24.79

VIGA	SCAJ	SDER	SIZQ	S	QP	QM	QSOB	VRD
EXTERIORES	471.00	172.50	186.50	830.00	119214.37	146648.96	192767.04	687945.55

CALCULO VIGA PESIMA A CORTANTE

DATOS VIGA SECCION SIMPLE Y COMPUESTA (cm)

Y	YG	A	I	E	OP	SEF	LOS	R	YC	YGC	AC	IC
150.00	52.95	16792.13	43607313.84	47.50	0.00	830.00	29.00	.67	179.00	107.77	33015.31	147413488.87

PRETENSADO Y MATERIALES (kg y cm)

FI	FS	EI	ES	FCD	FYD
1796928.00	128352.00	8.17	7.90	392.86	4200.00

DATOS LUCES Y CARGAS (kg y m)

PP	PCM	PSOB	F	B	LCAL	CS	OPAL
9617.94	11831.30	15552.00	0.00	1.50	24.79	1.50	-2.0

DATOS ALAS

KS	KI	BRAS	HSUP/2	V
.278	.500	67.060	20.150	47.200

ENFUNDADOS

F1	EI1	X1	F2	EI2	X2
1058904.00	6.16	3.25	1443960.00	7.13	1.65

RESULTADOS ESFUERZOS

X	MPP	MSB	QPP	QSB	MTOR	VRD	VU1	TUD	TU1	COEF	ZONA	TRAS
0.00	0.0	0.0	119214.4	339416.0	194280	687945.6	967580.0	291420.0	2383596.1	.83	AB	31.60
1.00	114405.4	318262.0	109596.4	312346.4	179971	632914.2	874603.0	269956.5	2100427.3	.85	AB	29.08
2.00	219192.9	595470.8	99978.5	285904.1	165662	578823.9	834939.6	248493.0	2164835.6	.81	AB	26.62
3.00	314362.4	833508.4	90360.5	260089.2	151353	525674.6	801748.9	227029.5	2164835.6	.76	C	24.22
4.00	399913.9	1034256.8	80742.6	234901.6	137044	473466.3	762541.4	205566.0	2164835.6	.72	AB	21.87
5.00	475847.6	1199598.1	71124.7	210341.4	122735	422199.1	728295.6	184102.5	2164835.6	.66	AB	19.58
6.00	542163.3	1331414.4	61506.7	186408.5	108426	371872.8	711014.5	162639.0	2164835.6	.60	C	17.36
7.00	598861.0	1431587.7	51888.8	163103.0	99590	322487.6	697009.4	149385.7	2164835.6	.53	C	15.19
8.00	645940.9	1502000.0	42270.8	140424.8	92102	274043.5	685855.9	138153.0	2164835.6	.46	C	13.07
9.00	683402.7	1544533.4	32652.9	118374.0	84613	226540.3	677237.7	126920.2	2164835.6	.39	C	11.02
10.00	711246.7	1561069.9	23035.0	96950.5	77125	179978.2	670925.7	115687.4	2164835.6	.32	C	9.03
11.00	729472.7	1553491.6	13417.0	76154.4	69636	134357.1	666761.9	104454.7	2164835.6	.25	C	7.09
12.00	738080.7	1523680.6	3799.1	55985.6	62148	89677.0	664649.4	93221.9	2164835.6	.18	C	5.21
5.40	503526.0	1256242.2	67277.5	200692.9	117011	401955.6	720957.6	175517.1	2164835.6	.64	C	18.69
3.21	333126.0	878695.7	88340.8	254747.7	148348	514632.8	795540.8	222522.2	2164835.6	.75	C	23.72
4.86	465795.9	1178511.6	72471.2	213742.0	124738	429319.8	743471.7	187107.4	2164835.6	.66	C	19.90

RESULTADOS ESFUERZOS LOCALES

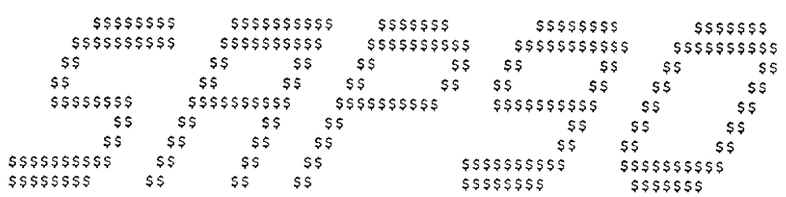
- En ala superior .....: Md= 693.42 m*kgr/m. Asup= .34 cm2. Ainf= 0.00 cm2.
- En alma :Hacia el exterior..: Md= 1565.06 m*kgr/m. Aint= 1.63 cm2. Aext= 0.00 cm2.

RESULTADOS ARMADO

X	Asup	Ainf	Alos	Acor	Ator	Alts	Alta	Alti	Aras
0.00	9.87	45.75	21.60	92.85	5.83	5.52	5.28	5.28	69.93
1.00	6.23	42.09	12.98	53.45	5.40	5.12	4.89	4.89	64.36
2.00	4.75	38.50	9.70	43.65	4.97	4.71	4.51	4.51	58.91
3.00	3.80	34.96	8.27	42.74	4.54	4.30	4.12	4.12	53.59
4.00	3.18	31.49	6.45	29.75	4.11	3.90	3.73	3.73	48.40
5.00	2.65	28.08	5.43	24.46	3.68	3.49	3.34	3.34	43.34
6.00	2.55	24.73	5.93	28.79	3.26	3.08	2.95	2.95	38.41
7.00	2.15	21.45	5.19	24.97	2.99	2.83	2.71	2.71	21.74
8.00	1.75	18.23	4.47	21.22	2.77	2.62	2.50	2.50	18.42
9.00	1.35	15.07	3.77	17.16	2.54	2.41	2.30	2.30	15.38
10.00	.95	11.97	3.08	12.35	2.32	2.19	2.10	2.10	12.44
11.00	.56	8.94	2.42	7.64	2.09	1.98	1.89	1.89	12.44
12.00	.16	5.96	1.78	3.03	1.87	1.77	1.69	1.69	12.44
5.40	2.78	26.73	6.38	31.12	3.51	3.33	3.18	3.18	41.35
3.21	3.66	34.23	8.10	41.27	4.45	4.22	4.03	4.03	52.49
4.86	3.00	28.55	6.80	33.04	3.75	3.55	3.39	3.39	44.04

ARMADURA MINIMA ALMA 12.44

CALCULOS A TORSOR SOLO VALIDOS EN SECCION CERRADA.



STRUCTURAL ANALYSIS PROGRAMS

VERSION 5.40

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VANO: 1 (LARGO)

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

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	.000
2	24.790	.000	.000
3	-2.893	1.980	.000
4	2.893	-1.980	.000
5	21.890	1.980	.000
6	27.680	-1.980	.000

R E S T R A I N T D A T A

JOINT	RX	RY	RZ	RXX	RYY	RZZ
3	1	1	1	0	0	1
4	0	0	1	0	0	0
5	0	0	1	0	0	0
6	0	0	1	0	0	0

F R A M E C O N T R O L D A T A

NUMBER OF MEMBER SECTION PROPERTIES 2
NUMBER OF SPAN LOADING PATTERNS 1
NUMBER OF MEMBER FORCE OUTPUT STATIONS 3

LOAD COND	GRAVITATIONAL MULTIPLIERS X	Y	Z	TEMPERATURE MULTIPLIERS	PRESTRESS MULTIPLIERS
1	.000	.000	.000	.000	.000
2	.000	.000	.000	.000	.000

OBSOLETE VERSION OF PROPERTY FILE "AISC.DAT ", FILE NOT USED

S E C T I O N P R O P E R T Y D A T A

PROP ID	AREA	TORSIONAL INERTIA	MOMENTS OF INERTIA I33	I22	SHEAR AREAS A2	A3
1	.326E+01	.35150E+00	.10000E+01	.15590E+01	.000E+00	.000E+00
2	.100E+03	.10000E+03	.10000E+03	.10000E+03	.000E+00	.000E+00

M A T E R I A L P R O P E R T Y D A T A

PROP ID	MODULUS OF ELASTICITY	SHEAR MODULUS	WEIGHT PER UNIT LEN	MASS PER UNIT LEN	THERMAL EXPANSION
1	.4456E+07	.1679E+07	.0000E+00	.0000E+00	.0000E+00
2	.4031E+07	.1679E+07	.0000E+00	.0000E+00	.0000E+00

S P A N L O A D I N G D A T A

UNIFORM LOAD DATA

PATTERN ID	1-DIR	2-DIR	3-DIR	X-DIR	Y-DIR	Z-DIR
1	.0000	.0000	.0000	.0000	.0000	-1.0000

FRAME ELEMENT DATA

ELT ID	JOINT END-I	JOINT END-J	LOCAL-AXIS N1	LOCAL-AXIS N2	PROPERTY-ID END-I	PROPERTY-ID END-J	VAR	REL CODES	REF TEMP	ELEMENT LENGTH
1	1	2	1	0	1	1	1	000000	.00	24.79
2	4	1	1	0	2	2	1	000000	.00	3.32
3	1	3	1	0	2	2	1	000000	.00	3.32
4	6	2	1	0	2	2	1	000000	.00	3.32
5	2	5	1	0	2	2	1	000000	.00	3.33

BEAM SPAN LOADING PATTERNS

ELT ID	LOAD 1	LOAD 2
1	1	0

T O T A L W E I G H T S A N D M A S S E S

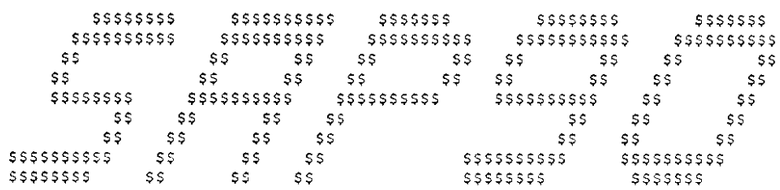
PROP	WEIGHT	MASS
1	.0000	.0000
2	.0000	.0000
TOTAL	.0000	.0000

J O I N T L O A D S

JOINT	LOAD	FX	FY	FZ	MX	MY	MZ
1	2	.000E+00	.000E+00	.000E+00	.000E+00	-.100E+01	.000E+00
2	2	.000E+00	.000E+00	.000E+00	.000E+00	.100E+01	.000E+00

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	EVN3.SAP
SOLUTION ERRORS AND WARNINGS	EVN3.ERR
EQUATION NUMBERING	EVN3.EQN
DISPLACEMENTS AND REACTIONS	EVN3.SOL
FRAME ELEMENT FORCES	EVN3.F3F



STRUCTURAL ANALYSIS PROGRAMS

VERSION 5.40

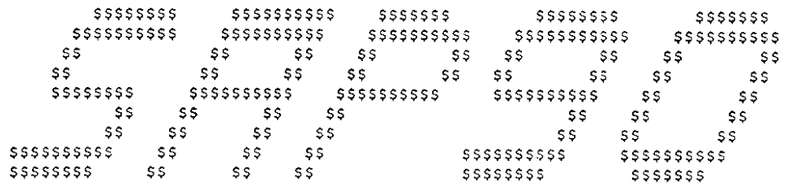
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F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
1								
	1	.000			.000			8.531
		.000	.000	.000		12.392	-15.142	
		12.395	.000	.000		-.003	61.640	
		24.790	.000	.000		-12.398	-15.214	
		24.790			.000			8.531
	2	.000			.000			-.167
		.000	.000	.000		.000	-.704	
		12.395	.000	.000		.000	-.704	
		24.790	.000	.000		.000	-.704	
		24.790			.000			-.167
2								
	1	.000			.000			.000
		.000	.000	.000		8.813	.000	
		1.660	.000	.000		8.813	14.632	
		3.321	.000	.000		8.813	29.265	
		3.321			.000			.000
	2	.000			.000			.000
		.000	.000	.000		-.051	.000	
		1.660	.000	.000		-.051	-.085	
		3.321	.000	.000		-.051	-.170	
		3.321			.000			.000
3								
	1	.000			.000			.000
		.000	.000	.000		-3.579	11.885	
		1.660	.000	.000		-3.579	5.942	
		3.321	.000	.000		-3.579	.000	
		3.321			.000			.000
	2	.000			.000			.000
		.000	.000	.000		-.051	.170	
		1.660	.000	.000		-.051	.085	
		3.321	.000	.000		-.051	.000	
		3.321			.000			.000
4								
	1	.000			.000			.000
		.000	.000	.000		3.582	.000	
		1.659	.000	.000		3.582	5.942	
		3.318	.000	.000		3.582	11.885	
		3.318			.000			.000
	2	.000			.000			.000
		.000	.000	.000		.051	.000	
		1.659	.000	.000		.051	.085	
		3.318	.000	.000		.051	.170	

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.318			.000			.000
5								
	1	.000			.000			.000
		.000	.000	.000		-8.816	29.328	
		1.663	.000	.000		-8.816	14.664	
		3.327	.000	.000		-8.816	.000	
		3.327			.000			.000
	2	.000			.000			.000
		.000	.000	.000		.051	-.170	
		1.663	.000	.000		.051	-.085	
		3.327	.000	.000		.051	.000	
		3.327			.000			.000



STRUCTURAL ANALYSIS PROGRAMS

VERSION 5.40

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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"

g_1

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
1	.0000E+00	.0000E+00	-.1876E-06	-.1791E-03	.1009E-03	.0000E+00
2	.0000E+00	.0000E+00	.3162E-06	.1792E-03	-.1009E-03	.0000E+00
3	.0000E+00	.0000E+00	.0000E+00	-.1791E-03	.1010E-03	.0000E+00
4	.0000E+00	.0000E+00	.0000E+00	-.1792E-03	.1008E-03	.0000E+00
5	.0000E+00	.0000E+00	.0000E+00	.1792E-03	-.1008E-03	.0000E+00
6	.0000E+00	.0000E+00	.0000E+00	.1792E-03	-.1010E-03	.0000E+00

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	.0000E+00	.0000E+00	.0000E+00	.3498E-05	-.1972E-05	.0000E+00
2	.0000E+00	.0000E+00	-.9855E-08	-.3502E-05	.1972E-05	.0000E+00
3	.0000E+00	.0000E+00	.0000E+00	.3499E-05	-.1971E-05	.0000E+00
4	.0000E+00	.0000E+00	.0000E+00	.3499E-05	-.1971E-05	.0000E+00
5	.0000E+00	.0000E+00	.0000E+00	-.3502E-05	.1972E-05	.0000E+00
6	.0000E+00	.0000E+00	.0000E+00	-.3502E-05	.1972E-05	.0000E+00

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(Z)	M(X)	M(Y)
1	-.3279E-11	.5896E-11	-.4777E-11
2	.0000E+00	-.3840E-11	.1067E-10
3	3.5790	.0000	.0000
4	8.8130	.0000	.0000
5	8.8160	.0000	.0000
6	3.5820	.0000	.0000
TOTAL	.2479E+02	-.7261E-11	.4533E-11

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 2 - FORCES "F" AND MOMENTS "M"

JOINT	F(Z)	M(X)	M(Y)
1	.0000	.0000	-1.0000
2	.0000	.0000	1.0000
3	.0511	.0000	.0000
4	-.0511	.0000	.0000
5	-.0511	.0000	.0000
6	.0511	.0000	.0000
TOTAL	-.5684E-13	.1414E-12	-.1401E-12

ESTUDIO: 24785 FECHA: 17-08-00
TITULO: EVN3-4.4 (PTE.DE F.C.)
SUBTRAMO:XV

ANEJO DE CALCULO DEL TABLERO DE VIGAS CAJON

1. DATOS GENERALES

VANO: 2º (V. CORTO)

1.1 Seccion transversal (Datos para el calculo)

Ancho total plataforma	8.30 m.
Ancho de las aceras (sin trafico).	1.22 (Calc.izq)
	1.92 (Calc.dch)

1.2 Seccion longitudinal

Tramo isostatico	
Luz de calculo	20.59 m.
Longitud de la viga	22.04 m.

1.3 Planta

Esviaje	144.67 °
Radio curvatura	≃ 1330 m.

2. SOLUCION ADOPTADA

El tablero esta formado por vigas prefabricadas pretensadas sobre las que se vierte hormigon fabricado in situ para formar la losa de compresion

Tipo de viga	CAJON-396.150.23.80
Canto de la viga	1.50 m.
Canto de la losa	.29 m. (de cálculo)
Numero de vigas	1
Separacion entre vigas	0.000 m.

Las caracteristicas de la viga figuran en el listado de resultados

3. ACCIONES A CONSIDERAR

Peso propio de la viga	4198.03 Kg/m
Peso propio de la losa	725.00 Kg/m2.
Carga muerta	* Kg/m2.
Carga adicional en bordes debida a aceras	* Kg/m.
Sobrecarga	OM: 25-6.75 ó EC1

4. CARACTERISTICAS DE LOS MATERIALES Y COEFICIENTES DE SEGURIDAD SEGUN EP.-93

4.1 Hormigon de la viga

Resistencia caracteristica a los 28 dias	>= 550 Kgr/cm2
Nivel de control intenso (prefabricacion)	= 1.4

4.2 Hormigon de la losa

Resistencia caracteristica a los 28 dias	>= 250 Kgr/cm2
Nivel de control normal (fabricacion in situ)	= 1.5

4.3 Acero de pretensado en viga

Tension de rotura	>= 19000 Kgr/cm2
Limite elastico al 0.2	>= 17100 Kgr/cm2
Nivel de control intenso (prefabricacion)	= 1.1

4.4 Acero pasivo en viga

Limite elastico	>= 5100 Kgr/cm2
Nivel de control intenso (prefabricacion)	= 1.1

4.5 Acero pasivo en la losa

Limite elastico	>= 5100 Kgr/cm2
Nivel de control normal (fabricacion in situ)	= 1.15

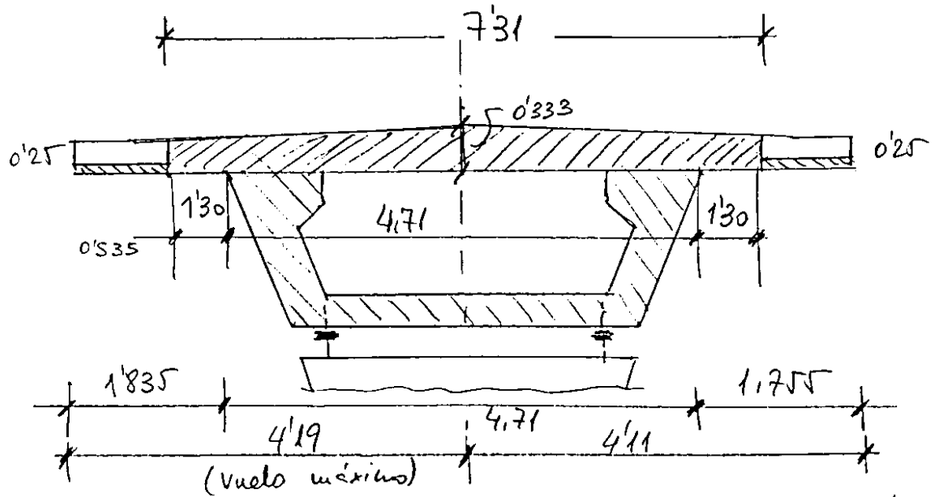
4.6 Acciones

Nivel de control de ejecucion intenso. Daños medios= 1.50

PACADAR	ESTUDIO:	OBRA:	FECHA:
			HOJA: 52

FASES DE HORMIGONADO DE LA LOSA.-

- FASE: 1ª.- Los 7'31 m. centrales de la losa



- Peso vpk. = ——— 4198'03 Kg
- Peso losa 1ª fase: ——— 5419'91 "

Pp(VT) = — 9617'94 "

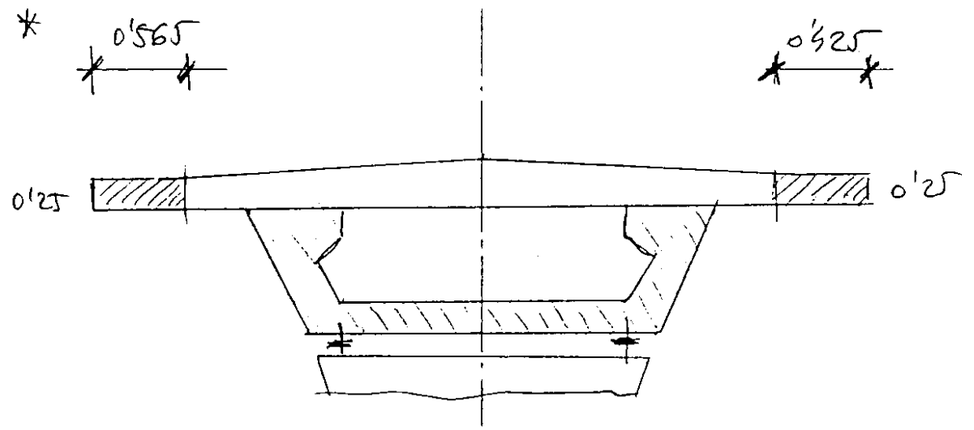
- C. Permanente.-
  - Peso resto losa = ——— 6313'0 Kg
  - C. muerta. = ——— 11.200.
    + sob. pasos.

c.perm = 11.831'30 Kg

- Sobrecarga.- 12000 × 1'329. 15.948 Kg

PACADAR	ESTUDIO:	OBRA:	FECHA:
			HOJA: 53

- FASE: 2ª.- Los * m. laterales de la losa.



- Peso losa 2ª fase = ——— 6313'0 Kg

- Lc = 20'59 m. α = 144'67°
- LT = 22'04 m

TORSORES ..

- Torsa c. inicial.

Tomando una excentricidad media de

$4'11 - 3'80 = 0'31$ m
$4'19 - 3'80 = 0'39$ m } $e_m = 0'35$ m.

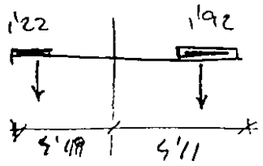
T_1 ..

Balasto $= 7.200 \times 0'35 =$ ——— 2520'00 mKg.
Traviesa + Carril $= 650 \times (0'35 + 0'30) =$ ——— 416'00 "
Guardabalasto $= 2500 \times 0'20 \times 0'50 \times 0'35 =$ —— 70'00 "
Losa:
$\left[2500 \times [4'19 - 4'11] \times 0'26\right] \times \left(4'19 - \frac{0'68}{2}\right) =$ —— 215'80

$T_1 = 3.221'80$ mKg

- Torsa concomitante con sobrecarga..

Sobrec. pasos $= 400 \times 1'22 \times \left(4'19 - \frac{1'22}{2}\right) = 1.747'04$
$= 400 \times 1'92 \times \left(4'11 - \frac{1'92}{2}\right) = -2419'20$

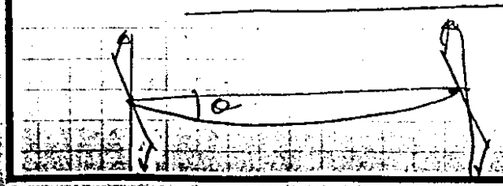


Tomamos sobrec. en un paseo

$T_2 = 1.747'04$ mK

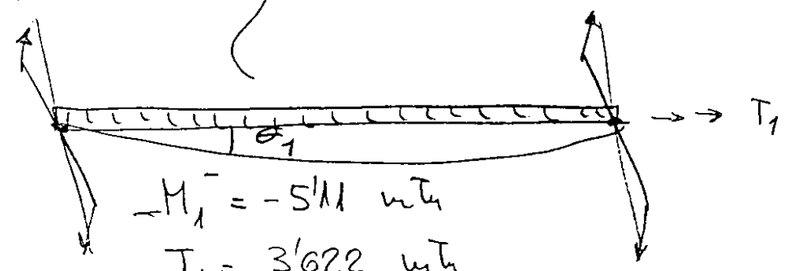
Sobrec. en vía.. $12000 \times 1'329 \times (0'35 + 0'30) = 10.366'20$

- Torsa debido al esviaje.



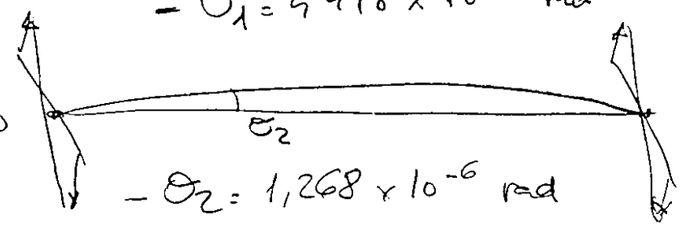
De los resultados del "SAP" tenemos..

Pare $q = 1'00$ Tn/ml



$-M_1^- = -5'11$ mTn
$-T_1 = 3'622$ mTn
$-\theta_1 = 4'478 \times 10^{-5}$ rad

Pare
$H = 1'00$ mTn



$-\theta_2 = 1,268 \times 10^{-6}$ rad

Obtención de los giros..

Carga	θ_o	θ_∞
(A) Pretensado	$-0'00186$	$-0'00371$
(B) P. propio vía	$+0'00019$	$+0'00038$
(C) C. permanen	$+0'00077$	$+0'00232$
(D) Sobrecarga.	$+0'00071$	0
	$\varepsilon = -0'00019$ rad	$-0'00101$ rad $+0'00071 = -0'00030$.

(A).. $\theta_o = \left(\frac{86 \times 12.500 \times 1'5 \times (104'24 - 7'00)}{100.000}\right) \times 1'268 \times 10^{-6} =$
$= -0'00186$ rad

$\theta_\infty = 0'00186 \times (1+1) = -0'00371$ rad

(B).. $\theta_o = 4'198 \times 4'478 \times 10^{-5} = 0'00019$ rad

$\theta_\infty = 0'00019 \times 2 = 0'00038$

(c) .. $\theta_0 = 17'25 \times 4'478 \times 10^{-5} = +0'00077$ rad

$\theta_\infty = 0'00077 \times 3 = 0'00232$

(d) .. $\theta_0 = 15'948 \times 4'478 \times 10^{-5} = +0'00071$

$\theta_\infty = +0'00071$

Como $\theta_\infty > \theta_0$

Luego $T_4 = T_\infty = 3'622 \times \frac{-0'00101}{4'478 \times 10^{-5}} = 81'69$ mt

$T_4 = 81'69$ mt

Para t_∞ con sobrecarga.

$T_S = 3'622 \times \frac{0'0003}{4'478 \times 10^{-5}} = 24'27$ mt

Luego el Torsor concomitante con la sobrecarga es

$T_S = \underline{\underline{24'27}}$ mt

- Torsores desglosados. -

- C. perma + pasos = $\left(3'22 + 1,75\right) \times \frac{20'59}{2} = 51,17$ mt.

- Sobrec. vía = $1.0,37 \times \frac{20'59}{2} = 106'76$ mt

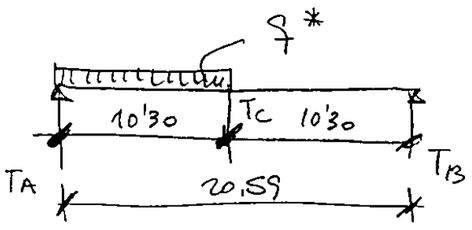
- Debido al esviaje



- C. perman = $3'622 \times \frac{0'00077}{4,478 \times 10^{-5}} = 62'28$ mt

- Sobrecarga = $3'622 \times \frac{0'00071}{4,478 \times 10^{-5}} = 57'43$ mt

- Torsor en el centro de la luz.- ($Mt_{L/2}$)



* Sobrec. paseo 1'22 m.

$q = 1{,}747$ mTn/ml

$T_A = 1'747 \times \frac{10'295^2}{2 \times 20{,}59} = \underline{4'50}$ mTn

$q = 0'40 \times 1'22 \times \left(4'19 - \frac{1'22}{2}\right) = 1{,}747$ mTn/ml

Sobrec. paseo 1'92.-

$q = 0{,}40 \times 1'92 \times \left(4'11 - \frac{1'92}{2}\right) = 2'419$ mTn/ml

$T_B = 2'419 \times \frac{10'295^2}{2 \times 20{,}59} = \underline{6'23}$ mTn

Sobre en vía.-

$12 \times 1'329 \times 0'65 = 10'366$ mTn/ml

$T_B = 10'366 \times \frac{10'295^2}{2 \times 20{,}59} = \underline{26'68}$ mTn

Luego en el centro tendremos

$T_c = Mt_{L/2} = 4'50 + 6'23 + 26'68 = \underline{37'41}$ mTn

Cargas virtuales para entrante datos en programa "TENSAJ".

- Cargas a flexión y Corte.-

- $pp_{(V+I)} = \underline{9.617'94}$ kg/ml
- $p_{am} = \underline{11.831'30}$ kg/ml
- $p_{SS} = 12.000 \times 1'329 = \underline{15.948'00}$ kg/ml

- Torsores -

- $Mt_{(0)} = \left(3'22 + 1'75 + 10'37\right) \times \frac{20'59}{2} + 24'27 = \underline{182'20}$ mTn (157'93)
- $Mt_{(L/4)} = \frac{157'93}{2} + 24'27 = \underline{103'23}$ mTn
- $Mt_{(L/2)} = 37'41 + 24'27 = \underline{61'68}$ mTn

- $x_1 = 2'15$ m
- $x_2 = 4'95$ m

ESTUDIO: 24785

DATOS DE LA VIGA CAJON-396.150.23.80(465)

DATOS DE FORMA

BASES EXTERIORES	396.00	406.50	76.10	47.50	47.50	101.50	107.06
BASES INTERIORES	0.00	0.00	330.40	364.80	399.90	356.10	363.94
ALTURAS	21.00	0.00	11.60	70.20	20.40	26.80	

Y	YG	A	In	Ws	Wi	E	Ks
150.00	52.95	16792.13	43607313.84	449343.44	823505.68	47.50	.28

DATOS PRETENSADO

Asi	Ei	Ass	Es	Ki	Asl	Eil	As2	Ei2
120.400	7.009	5.600	5.500	.500	64.400	5.000	92.400	6.164

DATOS MATERIALES

Fcd	R	Fyv	Fyl	Fr0	Frr	Ret	Flu	Rel	Nm	Ns	Cs	Nu
392.86	.67	4636.36	4434.78	14800.00	15545.45	.25	2.00	4.00	11.80	5.90	1.50	0.00

CARACTERISTICAS HOMOGENEIZADAS

Yg0	A0	I0	YgOp	AOp	IOp	Ygs	As	Is	Ygm	Am	Im
53.34	16630.48	43218532.38	50.04	18117.28	46620001.55	51.62	17373.88	44966501.61	50.04	18117.28	46620001.55

CALCULO GENERAL DE VIGAS

DATOS TABLERO

ANCH	DVEI	DVED	L	LTE	LMED	NVG	ACEI	ACED	LOS	ELI	ELS	BRAS	PAS10	AINT0
8.30	4.19	4.11	20.59	22.04	22.04	1.00	1.22	1.92	29.00	8.00	2.50	67.06	5.16	64064.00

CM	PACI	PACD	DPAC	TRL	PE	LAP	CPAR	APOY	NAPO	BEI	BED
0	0.00	0.00	0.00	-50.00	5000.00	0.00	0.00	0.00	0.00	144.67	144.67

OPCIONES

NEOPRENO

OPCIR	OPMAN	OPTV	OPCOR	OPAL	OPD1	OPDF	OPNEO	BNP	DNP	TNP	GNP	CHNP	G	TEMP	SNEO
0.00	0.00	0.00	0.00	-2.00	0.00	-1.00	-1.00	50.00	50.00	5.20	4.08	.30	10.00	30.00	326.00

DATOS DIBUJO

LM	LTRAN	LPARR	LMIN	PEND	CU	ESV1	ESV2	NMAC
0.00	0.0	12.0	2.0	0.0	0.0	144.7	144.7	0.0

ENTI	ENTD	DAPI	DAPD	APOYOI	APOYOD	ANI	AND	DVII	DVDI	DVIS	DVID	ALFA	PTR	VGST
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1

LTRAM	LTOTAL	LCALC.
0.00	0.00	0.00

RESUMEN DE RESULTADOS PARA ENLACE CON TENSCAJ

Valores caracteristicos (Kg/m,mTn.)

VIGAS EXTERIORES

TIPO DE CARGA	CARGAS VIRTUALES Flexion	Corte
Peso propio	9617.940	9617.940
Permanentes	11831.300	11831.300
Sobrecarg.I	15948.000	15948.000
Sobrecarg.II	0.000	0.000
Torsor apoyo	182.200	182.200
Torsor L/4	103.230	103.230
Torsor L/2	61.680	61.680

CARGAS PESIMAS EN EXTREMOS

Solo validas a efectos del calculo de neoprenos

Valores caracteristicos aproximados (Tn,mTn.)

EXTERIOR	Reaccion	Torsor
Rperm.....	237.443	0.000
Rmax.....	413.987	182.200
Rmin.....	237.443	61.680
T.Rmax.....	413.987	182.200
T.Rmin.....	413.987	182.200

CALCULO DE LA ESTABILIDAD

RESULTADOS
(T,mT)

MOMENTOS VOLCADORES:

	Pesos	Momentos
LOSA.....	41.09	52.60
ACERA.....	0.00	0.00
CARGA MUERTA.....	0.00	0.00
SOBRECARGA UNIFORME.	108.90	139.40
CARRO.....	0.00	0.00
FUERZA HORIZONTAL...	14.10	20.34

MOMENTOS ESTABILIZADORES:

	Pesos	Momentos
LOSA.....	92.14	264.43
ACERA.....	0.00	0.00
CARGA MUERTA.....	0.00	0.00
VIGA.....	102.52	167.12

Coef. mayoracion acciones permanentes.....=1.154
Coef. minoracion acciones permanentes.....= .900
Coef. mayoracion sobrecargas.....=1.500

MOMENTO VOLCADOR MAYORADO.....Mv= 300.29 mT.
MOMENTO ESTABILIZADOR MINORADO...Me= 388.39 mT.

SE CUMPLE QUE Me>Mv , LUEGO HAY ESTABILIDAD.

ELECCION VIGA PESIMA A FLEXION

SECCIONES COMPUESTAS

	SEFIC.	YGC	AC	IC	YGCMC	ACMC	ICMC	YGCSC	ACSC	ICSC
VIGAS EXTERIORES.	731.07	104.24	31081.65	140666653.2	100.51	32406.79	152282188.6	102.56	31663.39	145874670.5

MOMENTOS FLECTORES CON LAS CARGAS EQUIVALENTES DE CADA VIGA Y L=20.59

VIGA	SCAJ	SDER	SIZQ	S	MP	MM	MSOB	TINF
EXTERIORES	471.00	175.50	183.50	830.00	509688.42	626982.14	845140.54	2.99

CALCULO VIGA PESIMA A FLEXION

DATOS DE LUCES Y CARGAS DE CALCULO

PP	PCM	PSOB	F	B	Lc	Cs
9617.94	11831.30	15948.00	0.00	1.50	20.59	1.50

DATOS DE ESFUERZOS

MP	ML	MCM	MS
222468.54	287219.88	626982.14	845141.

SECCIONES COMPUESTAS

SEFIC.	YGC	AC	IC	YGCMC	ACMC	ICMC	YGCSC	ACSC	ICSC
731.07	104.24	31081.65	140666653.2	100.51	32406.79	152282188.6	102.56	31663.39	145874670.5

PERDIDAS PRETENSADO

DT3	FRI	DTS	DT4	DT5	DT6	FRF
815.73	13984.27	0.00	450.00	778.70	461.07	11460.00

TENSIONES

	PARCIALES				ACUMULADAS			
	SL	IL	SV	IV	SL	IL	SV	IV
PRET INIC	0.00	0.00	-52.55	193.42	0.00	0.00	-52.55	193.42
PRET FIN	0.00	0.00	-43.07	158.51	0.00	0.00	-43.07	158.51
PPROP.VIGA	0.00	0.00	47.70	-23.88	0.00	0.00	4.64	134.63
PPROP.LOSA	0.00	0.00	61.58	-30.83	0.00	0.00	66.22	103.80
CAR.MUERTA	32.32	20.38	20.38	-41.38	32.32	20.38	86.60	62.42
SOBRECARGA	44.29	27.48	27.48	-59.42	76.60	47.86	114.08	2.99

FISURACION C2 COMPROBADA

CALCULO A ROTURA

MOMENTO DE ROTURA	3296646.69
MOMENTO NECESARIO	2972716.66

ELECCION VIGA PESIMA A CORTANTE

SECCIONES COMPUESTAS

	SEFIC.	YGC	AC	IC	YGCMC	ACMC	ICMC	YGCSC	ACSC	ICSC
VIGAS EXTERIORES.	830.00	107.77	33015.31	147413488.9	104.11	34340.46	159889677.3	106.13	33597.06	153001436.6

ESFUERZOS CORTANTES CON LAS CARGAS EQUIVALENTES DE CADA VIGA Y L=20.59

VIGA	SCAJ	SDER	SIZQ	S	QP	QM	QSOB	VRD
EXTERIORES	471.00	175.50	163.50	830.00	99016.69	121803.23	164184.66	577506.86

CALCULO VIGA PESIMA A CORTANTE

DATOS VIGA SECCION SIMPLE Y COMPUESTA (cm)

Y	YG	A	I	E	OP	SEF	LOS	R	YC	YGC	AC	IC
150.00	52.95	16792.13	43607313.84	47.50	0.00	830.00	29.00	.67	179.00	107.77	33015.31	147413488.87

PRETENSADO Y MATERIALES (kg y cm)

FI	FS	EI	ES	FCD	FYD
1379784.00	64176.00	7.01	5.50	392.86	4200.00

DATOS LUCES Y CARGAS (kg y m)

PP	PCM	PSOB	F	B	LCAL	CS	OPAI
9617.94	11831.30	15948.00	0.00	1.50	20.59	1.50	-2.0

DATOS ALAS

KS	KI	BRAS	HSUP/2	V
.278	.500	67.060	20.150	47.200

ENFUNDADOS

F1	EI1	X1	F2	EI2	X2
738024.00	5.00	2.95	1058904.00	6.16	2.80

RESULTADOS ESFUERZOS

X	MPP	MSB	QPP	QSB	MTOR	VRD	VU1	TUD	TU1	COEF	ZONA	TRAS
0.00	0.0	0.0	99016.7	285987.9	182200	577506.9	974096.4	273300.0	2567386.4	.70	AB	26.63
1.00	94207.7	264511.5	89398.8	258595.9	166859	521991.9	921819.7	250287.9	2368452.7	.67	AB	24.08
2.00	178797.5	487619.4	79780.8	231978.4	151517	467638.8	887846.7	227275.7	2280738.3	.63	AB	21.60
3.00	253769.3	671647.3	70162.9	206135.5	136176	414447.5	845728.7	204263.6	2331758.1	.58	AB	19.19
4.00	319123.2	818918.8	60544.9	181067.1	120834	362418.0	821804.1	181251.4	2331758.1	.52	AB	16.86
5.00	374859.2	931757.6	50927.0	156773.3	105493	311550.4	802397.1	158239.3	2331758.1	.46	C	14.60
6.00	420977.2	1012487.4	41309.1	133254.0	96349	261844.6	776688.0	144523.1	2331758.1	.40	C	12.41
7.00	457477.3	1063431.9	31691.1	110509.3	88277	213300.6	765187.6	132415.3	2331758.1	.34	C	10.29
8.00	484359.5	1086914.5	22073.2	88539.1	80205	165918.4	756863.8	120307.4	2331758.1	.27	C	8.24
9.00	501623.7	1085259.1	12455.2	67343.5	72133	119698.1	751489.6	108199.6	2331758.1	.21	C	6.27
10.00	509269.9	1060789.3	2837.3	46922.4	64061	74639.6	748928.1	96091.8	2331758.1	.14	C	4.37
4.10	325129.7	831713.8	59583.1	178602.9	119300	357279.0	819668.6	178950.2	2331758.1	.51	C	16.63
2.91	247415.7	656624.5	71028.5	208429.6	137556	419187.2	860859.8	206334.7	2213992.7	.58	C	19.41
5.71	408593.2	992245.1	44098.3	139994.9	98690	276139.7	791084.4	148034.4	2331758.1	.41	C	13.03

RESULTADOS ESFUERZOS LOCALES

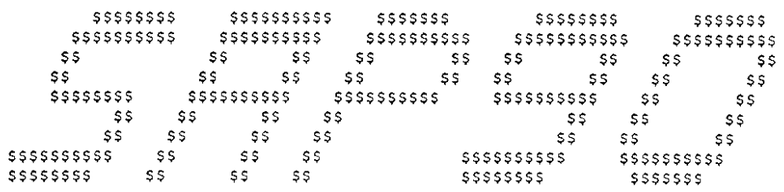
- En ala superior .....: Md= 693.42 m*kgr/m. Asup= .34 cm2. Ainf= 0.00 cm2.
- En alma :Hacia el exterior..: Md= 1548.95 m*kgr/m. Aint= 1.62 cm2. Aext= 0.00 cm2.

RESULTADOS ARMADO

X	Asup	Ainf	Alos	Acor	Acor	Alts	Alta	Alti	Aras
0.00	8.20	38.41	18.20	75.35	5.08	4.81	4.60	4.60	58.93
1.00	5.70	34.72	11.30	47.85	4.65	4.40	4.21	4.21	53.28
2.00	4.24	31.10	8.43	37.87	4.22	4.00	3.83	3.83	47.80
3.00	3.42	27.56	6.69	29.99	3.80	3.59	3.44	3.44	42.47
4.00	2.69	24.10	5.45	23.91	3.37	3.19	3.05	3.05	37.31
5.00	2.12	20.72	4.99	25.37	2.94	2.78	2.66	2.66	23.60
6.00	1.71	17.41	4.24	20.42	2.69	2.54	2.43	2.43	19.68
7.00	1.31	14.19	3.52	15.65	2.46	2.33	2.23	2.23	16.08
8.00	.91	11.03	2.82	10.79	2.24	2.12	2.03	2.03	12.44
9.00	.52	7.96	2.14	6.05	2.01	1.90	1.82	1.82	12.44
10.00	.12	4.96	1.49	1.43	1.79	1.69	1.62	1.62	12.44
4.10	2.63	23.76	5.68	30.25	3.33	3.15	3.01	3.01	36.80
2.91	3.38	27.88	6.82	38.37	3.83	3.63	3.47	3.47	42.95
5.71	1.83	18.37	4.45	21.93	2.75	2.61	2.49	2.49	20.70

ARMADURA MINIMA ALMA 12.44

CALCULOS A TORSOR SOLO VALIDOS EN SECCION CERRADA.



STRUCTURAL ANALYSIS PROGRAMS

VERSION 5.40

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VERSO-2 (V. GORDO)

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

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	.000
2	20.590	.000	.000
3	-2.793	1.980	.000
4	2.793	-1.980	.000
5	17.797	1.980	.000
6	23.383	-1.980	.000

R E S T R A I N T D A T A

JOINT	RX	RY	RZ	RXX	RYY	RZZ
3	1	1	1	0	0	1
4	0	0	1	0	0	0
5	0	0	1	0	0	0
6	0	0	1	0	0	0

F R A M E C O N T R O L D A T A

NUMBER OF MEMBER SECTION PROPERTIES 2
NUMBER OF SPAN LOADING PATTERNS 1
NUMBER OF MEMBER FORCE OUTPUT STATIONS 3

LOAD COND	GRAVITATIONAL MULTIPLIERS X	Y	Z	TEMPERATURE MULTIPLIERS	PRESTRESS MULTIPLIERS
1	.000	.000	.000	.000	.000
2	.000	.000	.000	.000	.000

OBSOLETE VERSION OF PROPERTY FILE "AISC.DAT ", FILE NOT USED

S E C T I O N P R O P E R T Y D A T A

PROP ID	AREA	TORSIONAL INERTIA	MOMENTS OF INERTIA I33	I22	SHEAR AREAS A2	A3
1	.326E+01	.35150E+00	.10000E+01	.15590E+01	.000E+00	.000E+00
2	.100E+03	.10000E+03	.10000E+03	.10000E+03	.000E+00	.000E+00

M A T E R I A L P R O P E R T Y D A T A

PROP ID	MODULUS OF ELASTICITY	SHEAR MODULUS	WEIGHT PER UNIT LEN	MASS PER UNIT LEN	THERMAL EXPANSION
1	.4456E+07	.1679E+07	.0000E+00	.0000E+00	.0000E+00
2	.4031E+07	.1679E+07	.0000E+00	.0000E+00	.0000E+00

S P A N L O A D I N G D A T A

UNIFORM LOAD DATA

PATTERN ID	1-DIR	2-DIR	3-DIR	X-DIR	Y-DIR	Z-DIR
1	.0000	.0000	.0000	.0000	.0000	-1.0000

F R A M E E L E M E N T D A T A

ELT ID	JOINT END-I	JOINT END-J	LOCAL-AXIS N1	LOCAL-AXIS N2	PROPERTY-ID END-I	PROPERTY-ID END-J	VAR	REL CODES	REF TEMP	ELEMENT LENGTH
1	1	2	1	0	1	1	1	000000	.00	20.59
2	4	1	1	0	2	2	1	000000	.00	3.42
3	1	3	1	0	2	2	1	000000	.00	3.42
4	6	2	1	0	2	2	1	000000	.00	3.42
5	2	5	1	0	2	2	1	000000	.00	3.42

B E A M S P A N L O A D I N G P A T T E R N S

ELT ID	LOAD 1	LOAD 2
1	1	0

T O T A L W E I G H T S A N D M A S S E S

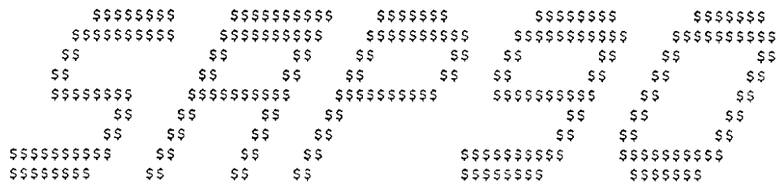
PROP	WEIGHT	MASS
1	.0000	.0000
2	.0000	.0000
TOTAL	.0000	.0000

J O I N T L O A D S

JOINT	LOAD	FX	FY	FZ	MX	MY	MZ
1	2	.000E+00	.000E+00	.000E+00	.000E+00	-.100E+01	.000E+00
2	2	.000E+00	.000E+00	.000E+00	.000E+00	.100E+01	.000E+00

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	evn3b.SAP
SOLUTION ERRORS AND WARNINGS	evn3b.ERR
EQUATION NUMBERING	evn3b.EQN
DISPLACEMENTS AND REACTIONS	evn3b.SOL
FRAME ELEMENT FORCES	evn3b.F3F



STRUCTURAL ANALYSIS PROGRAMS

VERSION 5.40

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F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
1								
	1	.000			.000			3.622
		.000	.000	.000		10.295	-5.110	
		10.295	.000	.000		.000	47.884	
		20.590	.000	.000		-10.295	-5.110	
		20.590			.000			3.622
	2	.000			.000			-.103
		.000	.000	.000		.000	-.855	
		10.295	.000	.000		.000	-.855	
		20.590	.000	.000		.000	-.855	
		20.590			.000			-.103
2								
	1	.000			.000			.000
		.000	.000	.000		6.062	.000	
		1.712	.000	.000		6.062	10.378	
		3.424	.000	.000		6.062	20.756	
		3.424			.000			.000
	2	.000			.000			.000
		.000	.000	.000		-.026	.000	
		1.712	.000	.000		-.026	-.044	
		3.424	.000	.000		-.026	-.089	
		3.424			.000			.000
3								
	1	.000			.000			.000
		.000	.000	.000		-4.233	14.493	
		1.712	.000	.000		-4.233	7.247	
		3.424	.000	.000		-4.233	.000	
		3.424			.000			.000
	2	.000			.000			.000
		.000	.000	.000		-.026	.089	
		1.712	.000	.000		-.026	.044	
		3.424	.000	.000		-.026	.000	
		3.424			.000			.000
4								
	1	.000			.000			.000
		.000	.000	.000		4.233	.000	
		1.712	.000	.000		4.233	7.247	
		3.424	.000	.000		4.233	14.493	
		3.424			.000			.000
	2	.000			.000			.000
		.000	.000	.000		.026	.000	
		1.712	.000	.000		.026	.044	
		3.424	.000	.000		.026	.089	

F R A M E E L E M E N T F O R C E S

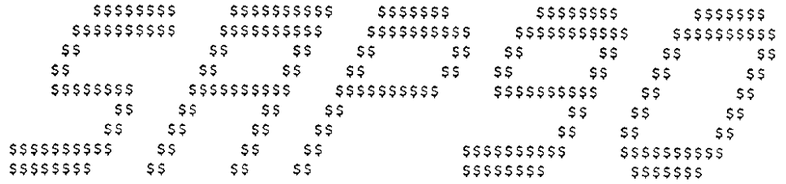
ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.424			.000			.000
5								
	1	.000			.000			.000
		.000	.000	.000		-6.062	20.756	
		1.712	.000	.000		-6.062	10.378	
		3.424	.000	.000		-6.062	.000	
		3.424			.000			.000
	2	.000			.000			.000
		.000	.000	.000		.026	-.089	
		1.712	.000	.000		.026	-.044	
		3.424	.000	.000		.026	.000	
		3.424			.000			.000

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"

θ_1

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
1	.0000E+00	.0000E+00	-.1709E-06	-.6317E-04	.4478E-04	.0000E+00
2	.0000E+00	.0000E+00	-.1709E-06	.6317E-04	-.4478E-04	.0000E+00
3	.0000E+00	.0000E+00	.0000E+00	-.6313E-04	.4483E-04	.0000E+00
4	.0000E+00	.0000E+00	.0000E+00	-.6322E-04	.4471E-04	.0000E+00
5	.0000E+00	.0000E+00	.0000E+00	.6322E-04	-.4471E-04	.0000E+00
6	.0000E+00	.0000E+00	.0000E+00	.6313E-04	-.4483E-04	.0000E+00



STRUCTURAL ANALYSIS PROGRAMS

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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	.0000E+00	.0000E+00	.0000E+00	.1788E-05	-.1268E-05	.0000E+00
2	.0000E+00	.0000E+00	.0000E+00	-.1788E-05	.1268E-05	.0000E+00
3	.0000E+00	.0000E+00	.0000E+00	.1788E-05	-.1267E-05	.0000E+00
4	.0000E+00	.0000E+00	.0000E+00	.1788E-05	-.1267E-05	.0000E+00
5	.0000E+00	.0000E+00	.0000E+00	-.1788E-05	.1267E-05	.0000E+00
6	.0000E+00	.0000E+00	.0000E+00	-.1788E-05	.1267E-05	.0000E+00

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(Z)	M(X)	M(Y)
1	.0000E+00	.1656E-11	-.6953E-11
2	-.2112E-11	-.5830E-11	.1727E-11
3	4.2329	.0000	.0000
4	6.0621	.0000	.0000
5	6.0621	.0000	.0000
6	4.2329	.0000	.0000
TOTAL	.2059E+02	-.5024E-11	-.4472E-11

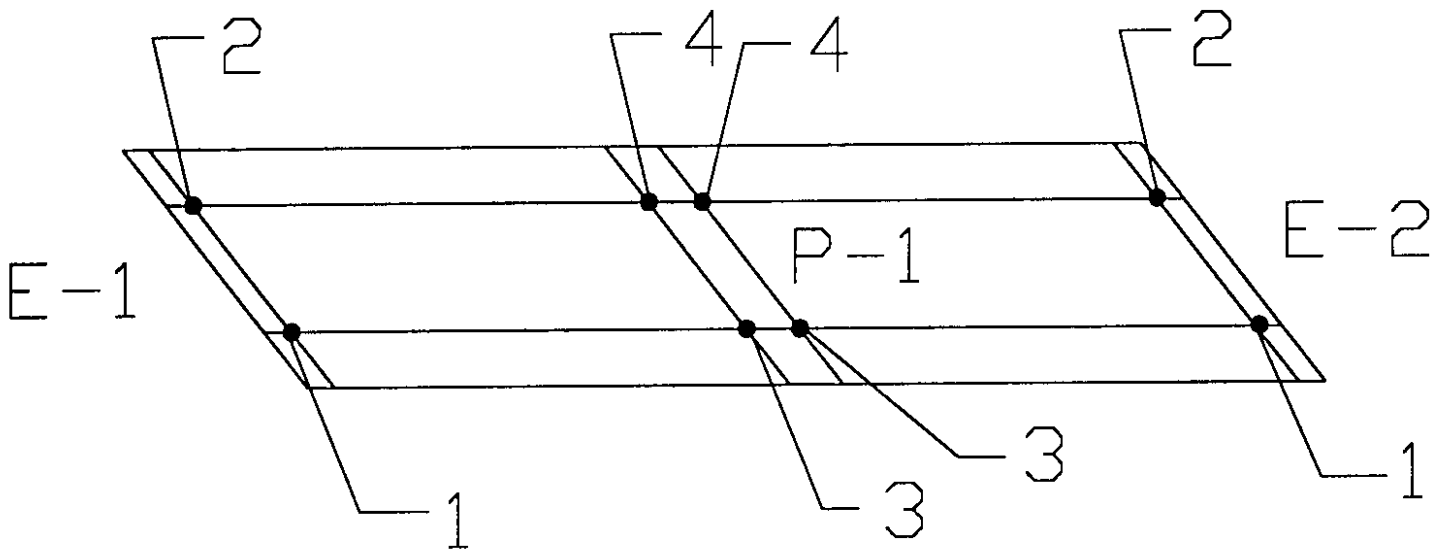
R E A C T I O N S A N D A P P L I E D F O R C E S

LOAD CONDITION 2 - FORCES "F" AND MOMENTS "M"

JOINT	F(Z)	M(X)	M(Y)
1	.0000	.0000	-1.0000
2	.0000	.0000	1.0000
3	.0259	.0000	.0000
4	-.0259	.0000	.0000
5	-.0259	.0000	.0000
6	.0259	.0000	.0000
TOTAL	-.8527E-13	-.9018E-13	-.1311E-12

PUBLICA

CARGAS ACTUANTES Y GEOMETRÍA



1:APOYO FIJO
2:APOYO UNIDIRECCIONAL TRANSVERSAL
3:APOYO UNIDIRECCIONAL LONGITUDINAL
4:APOYO MULTIDIRECCIONAL

ESFUERZOS EN APOYOS "POT" ("EVN3-4,4").-

F.longitud. mínima
F.transver. mínima
} R.max * 0,04 = 15,68 Tn/apoyo

TIPO APOYO		REACCION VERTICAL R.máx.	REACCION VERTICAL R.min.	FUERZA LONGITUDINAL	FUERZA TRANSVERSAL	Giro mínimo φ	DESPLAZAMIENTO μ
		Tn/apoyo	Tn/apoyo	Tn/apoyo	Tn/apoyo	(radia.)	(cm.)
○ =	Fijo	392,10	38,14	18,26	15,68	0,0030	0
⊕ =	Multidirecc.	392,10	38,14	15,68	15,68	0,0030	2,00
⊖ =	Unidir. Longit.	392,10	38,14	15,68	15,68	0,0030	2,00
⊕ =	Unidir.Transver	392,10	38,14	18,26	15,68	0,0030	0

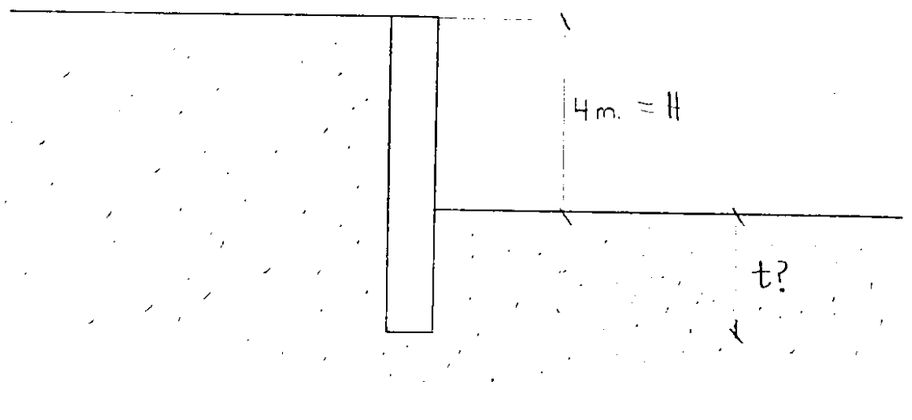
SE RECUERDA QUE DEBIDO A LA PENDIENTE LONGITUDINAL DEL PTE. (1,60 %), EL APOYO DEBERA LLEVAR ALGUN DISPOSITIBO QUE RECOJA DICHA PENDIENTE (COMO CHAPA EN FORMA DE CUÑA,ETC.).

PILOTAJE COMO PANTALLA

A) Calculo pilotaje como muro-pantalla (Proceso constructivo)

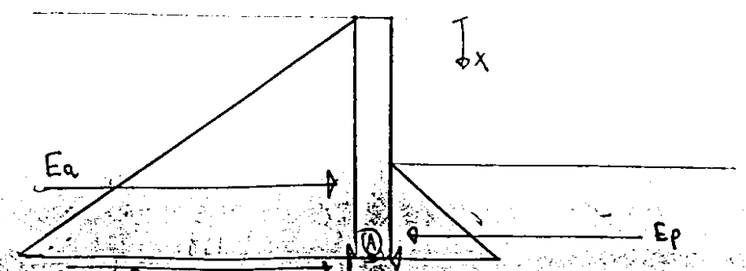
* A-1) PILA 1

Se trata de una pantalla en voladizo puro (Base empotrada)



Todo el terreno es grava y arena: $\gamma = 2\ T/m^3$, $\Phi = 35°$, $c = 0$

$$\begin{cases} K_a = tg^2(45 - \Phi/2) = tg^2(45 - \frac{35}{2}) = 0'271 \\ K_p = tg^2(45 + \Phi/2) = tg^2(45 + \frac{35}{2}) = 3'69 \end{cases} \Rightarrow \begin{cases} K_a = 0'271 \\ K_p = 3'69 \end{cases}$$



Para calcular la longitud estricta aplicamos equilibrio fuerzas:

$$\left.\begin{array}{l}\Sigma F_A = 0 \\ \Sigma M_A = 0\end{array}\right\} \Rightarrow \left\{\begin{array}{l}\Sigma F = 0 \Rightarrow \boxed{R + Ea = Ep} \quad (1) \\ \Sigma M = 0 \Rightarrow \dfrac{Ea\,(H+t)}{3} = Ep\left(\dfrac{t}{3}\right) \Rightarrow \boxed{Ea\cdot(H+t) = Ep\cdot t} \quad (2)\end{array}\right.$$

Para calcular Ep y Ea, desarrollo el cilindro:

$$L = \frac{\pi D}{2} = \frac{\pi \cdot 1}{2} = 1'571\ m.$$

$$\left.\begin{array}{l}Ea = \frac{1}{2}\,\gamma\,(H+t)^2\,Ka\cdot 1'571 \\ Ep = \frac{1}{2}\,\gamma\,t^2\,Kp\cdot 1'571\end{array}\right| \begin{array}{l}\Rightarrow Ea = \frac{1}{2}\cdot 2\cdot (4+t)^2\cdot 0'271\cdot 1'571 = 0'426\,(4+t)^2 \\ \Rightarrow Ep = \frac{1}{2}\cdot 2\cdot t^2\cdot 3'69\cdot 1'571 = 5'797\,t^2\end{array}$$

$$\Rightarrow \boxed{\left\{\begin{array}{l}Ea = 0'426\,(4+t)^2 \\ Ep = 5'797\,t^2\end{array}\right.}$$

Entrando en la ecuación (2):

$$0'426\,(4+t)^3 = 5'797\cdot t^3 \Rightarrow$$

$$0'426\,t^3 + 5'112\,t^2 + 20'448\,t + 64 = 5'797\,t^3$$

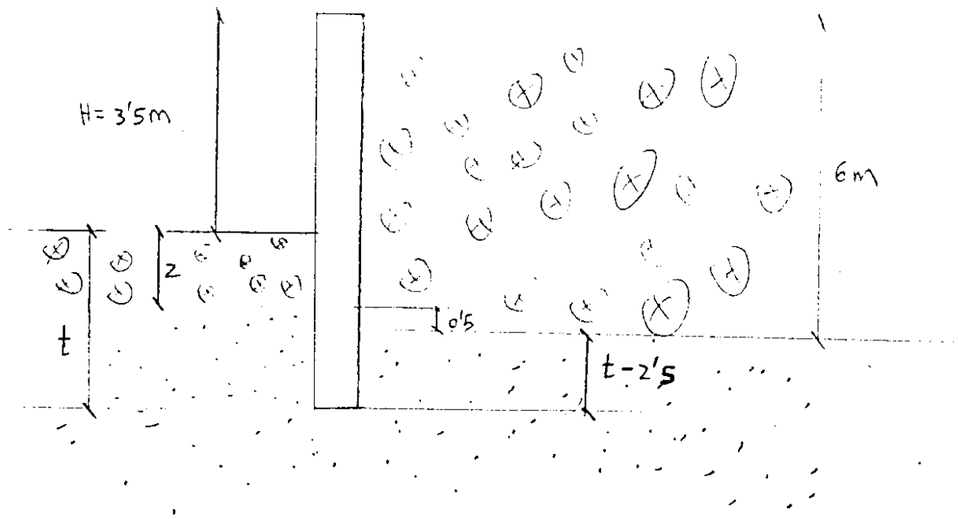
$$\Rightarrow 5'371\,t^3 - 5'112\,t^2 - 20'448\,t - 64 = 0$$

$$\Rightarrow t = 3'26\ m.$$

La longitud estricta necesaria es: 3'3 m. (en la pila)

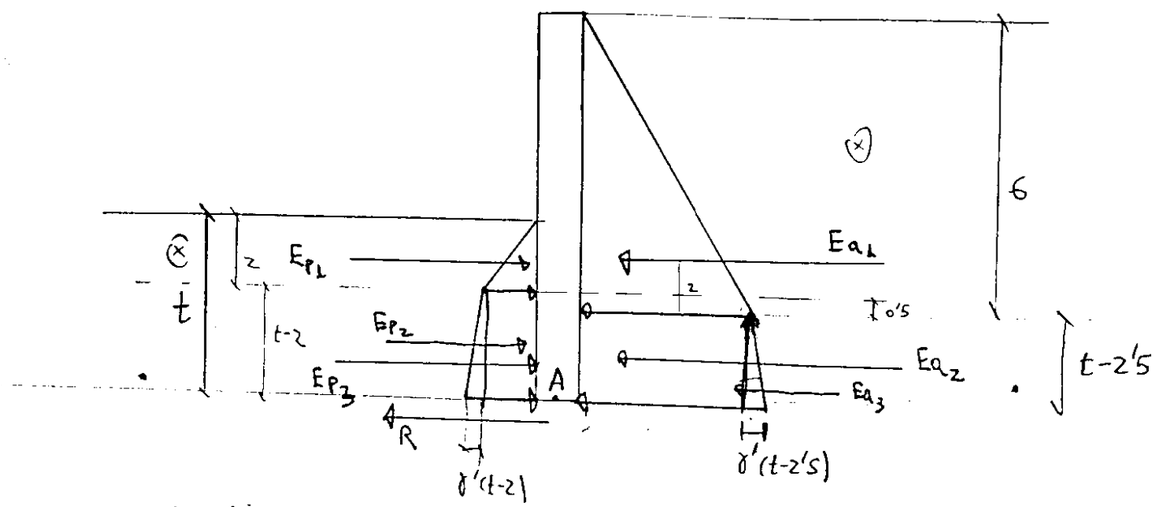
$$\boxed{t = 3'3\ m.}$$

* A-2) ESTRIBO 2



⊗ Limo y arena $\left\{\begin{array}{l}\gamma = 1'6\ T/m^3 \\ c = 2\ T/m^2 \\ \Phi = 20^\circ\end{array}\right.$ $\Rightarrow \left\{\begin{array}{l}Ka = tg^2\left(45 - \frac{20}{2}\right) = 0'49 \\ Kp = tg^2\left(45 + \frac{20}{2}\right) = 2'04\end{array}\right.$

∴ Grava y arena $\left\{\begin{array}{l}\gamma' = 2\ T/m^3 \\ c' = 0\ T/m^2 \\ \Phi' = 35^\circ\end{array}\right.$ $\Rightarrow \left\{\begin{array}{l}Ka' = tg^2\left(45 - \frac{35}{2}\right) = 0'271 \\ Kp' = tg^2\left(45 + \frac{35}{2}\right) = 3'69\end{array}\right.$



Para calcular la longitud estricta se aplica equilibrio fuerzas:

$$\left.\begin{array}{l}\Sigma F_H = 0 \\ \Sigma M_A = 0\end{array}\right\} \Rightarrow \left\{\begin{array}{l}\Sigma F = 0 \Rightarrow \boxed{E_{a_1} + E_{a_2} + E_{a_3} + R = E_{p_1} + E_{p_2} + E_{p_3}} \quad (1) \\ \Sigma M_A = 0 \Rightarrow \boxed{\begin{array}{l} E_{a_1}(2 + t - 2'5) + E_{a_2}\dfrac{(t-2'5)}{2} + E_{a_3}\dfrac{(t-2'5)}{3} = \\ = E_{p_1}\left(\dfrac{2}{3} + t - 2\right) + E_{p_2}\dfrac{(t-2)}{2} + E_{p_3}\dfrac{(t-2)}{3}\end{array}} \quad (2)\end{array}\right.$$

$$E_{a_1} = \frac{1}{2}\cdot\left(\gamma \cdot 6 \cdot K_a - 2c\sqrt{K_a}\right)\cdot 6 = \frac{1}{2}\left(1'6 \cdot 6 \cdot 0'49 - 2 \cdot 2 \cdot \sqrt{0'49}\right)\cdot 6 = 5'712$$

$$E_{a_2} = \left[\gamma \cdot 6 \cdot K_a - 2c\sqrt{K_a}\right]\cdot(t-2'5) = \left(1'6 \cdot 6 \cdot 0'49 - 2 \cdot 2 \cdot \sqrt{0'49}\right)(t-2'5) = 1'904\,(t-2'5)$$

$$E_{a_3} = \frac{1}{2}\gamma'(t-2'5)^2 K'_a = \frac{1}{2}\cdot 2 \cdot (t-2'5)^2 \cdot 0'271 = 0'271\,(t-2'5)^2$$

$$\boxed{E_{a_1} = 5'712 \;;\; E_{a_2} = 1'904\,(t-2'5) \;;\; E_{a_3} = 0'271\,(t-2'5)^2}$$

$$E_{p_1} = \frac{1}{2}\left(\gamma \cdot 2 \cdot K_p - 2c\sqrt{K_p}\right)\cdot 2 = \frac{1}{2}\left(1'6 \cdot 2 \cdot 2'04 - 2 \cdot 2\sqrt{2'04}\right)\cdot 2 = 0'815$$

$$E_{p_2} = \left[\gamma \cdot 2 \cdot K_p - 2c\sqrt{K_p}\right](t-2) = \left(1'6 \cdot 2 \cdot 2'04 - 4\sqrt{2'04}\right)(t-2) = 0'815(t-2)$$

$$E_{p_3} = \frac{1}{2}\gamma'(t-2)^2 K'_p = \frac{1}{2}\cdot 2 \cdot (t-2)^2 \cdot 3'69 = 3'69\,(t-2)^2$$

$$\boxed{E_{p_1} = 0'815 \;;\; E_{p_2} = 0'815\,(t-2) \;;\; E_{p_3} = 3'69\,(t-2)^2}$$

$$5'712\,(t-0'5) + \frac{1'904\,(t-2'5)^2}{2} + \frac{0'271\,(t-2'5)^3}{3} =$$

$$= 0'815\left(t - \frac{4}{3}\right) + 0'815\frac{(t-2)^2}{2} + \frac{3'69\,(t-2)^3}{3}$$

$$\Rightarrow \boxed{\begin{array}{l} 5'712\,t - 2'856 + 0'952\,t^2 + 5'95 - 4'76\,t + 0'09\,t^3 - 0'6775\,t^2 + 1'694\,t - 1'41 = \\ = 0'815\,t - 1'086 + 0'40775\,t^2 + 1'63 - 1'63\,t + 1'23\,t^3 - 7'38\,t^2 + 14'76\,t - 9'84\end{array}}$$

$$0'09\,t^3 + 0'2745\,t^2 + 2'646\,t + 1'684 = 1'23\,t^3 - 6'9725\,t^2 + 13'945\,t - 9'296$$

$$\boxed{1'14\,t^3 - 7'247\,t^2 + 11'299\,t - 10'98 = 0} \Rightarrow \boxed{t = 4'68\ \text{m}}$$

La longitud estricta es $t = 4'68$ m.

PILOTAJE EN SERVICIO

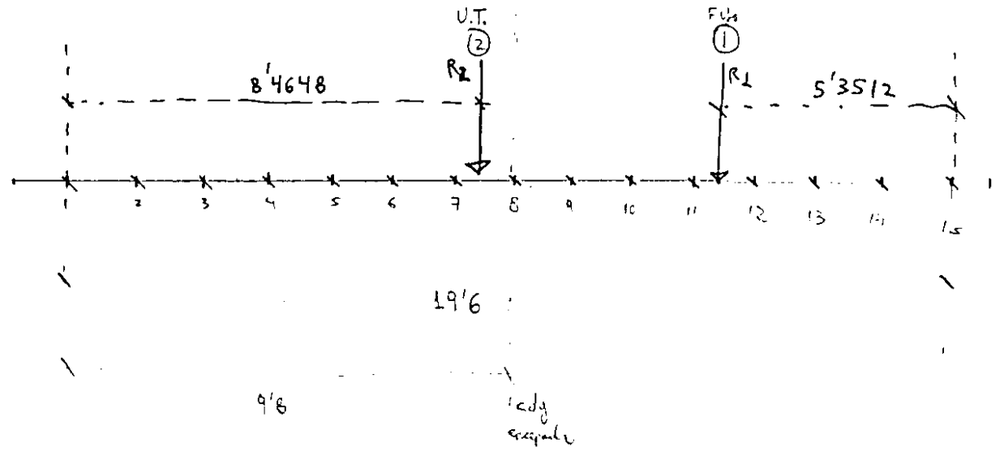
B) Calculo del pilotaje en servicio

⊛ B-1) ESTRIBO 1

El estribo 1 tiene 15 pilotes

1.- ESFUERZOS ACTUANTES (sobre cdg cimentación)

a) Debido al tablero



Fuerzas verticales
$\begin{cases} R_1 = 1'6 \times 392'1 = 627'36\ t. \\ M_{R_1} = 627'36 \times 4'4488 = 2791\ mt \end{cases}$
$\begin{cases} R_2 = 1'6 \times 392'1 = 627'36\ t \\ M_{R_2} = 627'36 \times 1'3352 = 837'66\ mt \end{cases}$
⇒
$R_T = 1254'72\ t$
$M_{R_T} = 1953'34\ mt$

Horizontal longitudinal
$R_{H_L} = 1'6 \times 2 \times 18'26 = 58'44\ t$ ⇒ el momento NO afecta a los pilotes pues el eje ≡ eje pilotes

Horizontal transversal
$R_{HT} = 1'6 \times 2 \times 15'68 = 50'18\ t$
$M_{HT} = 50'18 \times 1'5 = 75'27\ mt$

6) Delzado al PP encepado

$M_T = (0'65 \times 1'95 + 1'5^2) \times 21'352 \times 2'5 = 187'77\ t \Rightarrow R_{V_4} = 300'44\ t$

2.- CALCULO DE LA CARGA VERTICAL SOBRE CADA PILOTE

RESUMEN TOTAL ACCIONES	$R_V = 1555'16\ t$
	$R_{HL} = 58'44\ t$
	$R_{HT} = 50'18 \Rightarrow M_{HT} = 2028'61\ mt$

$$P = \frac{1555'16}{15} + \frac{2028'61 \times 9'8}{2 \times (1'4^2 + 2'8^2 + 4'2^2 + 5'6^2 + 7^2 + 8'4^2 + 9'8^2)} = 139'91\ t$$

$P = 139'91\ t$

3.- CALCULO CARGA HORIZONTAL SOBRE CADA PILOTE

$$H_i = \frac{\sqrt{58'44^2 + 50'16^2}}{15} = 5'14\ t$$

$L_{Boussinesq} = 3'33\ m.$

$$H = 58'44 \times \left(\frac{3'33}{2}\right) = 97'31$$

$$\Delta P = \frac{97'31 \times 9'8}{2 \times (1'4^2 + \ldots + 9'8^2)} = 1'74 \Rightarrow \boxed{P = 141'65\ t}$$

4.- CALCULO DE LA CARGA DE HUNDIMIENTO

$$L = \frac{8'33\,(R - 0'5)\,(L_i - 5)}{141'65} \Rightarrow L_i = 11'44\ m.$$

$$\Rightarrow \boxed{L_i = 11'50\ m.}$$

B-2) ESTRIBO 2

El estribo 2 tiene 15 pilotes

1.- ESFUERZOS ACTUANTES

a) Debido al tablero

$R_r = 2 \times 392'10 = 784'2\ t \xrightarrow{\gamma=1'6} R_{rd} = 1254'72\ t$

$R_{max,H_{long}} = 18'26 \times 2 = 36'52\ t \xrightarrow{\gamma=1'6} R_{H,L} = 58'44\ t$

$R_{max,H_{trans}} = 15'68 \times 2 = 31'36\ t \xrightarrow{\gamma=1'6} R_{H,T} = 50'18\ t$

$M_{H,L} = 58'44 \times 5 = 292'20\ t$

$M_{H,T} = 50'18 \times 5 = 250'90\ t$

b) Debido al PP del encepado

$R_r = (0'65 \times 1'95 + 1'5^2) \times 21'352 \times 2'5 = 187'77\ t \xrightarrow{\gamma=1'6} R_{rd} = 300'44\ t$

c) Debido a las tierras

$R_H = \frac{1}{2}\left(1'6 \times 3'5 \times 0'49 - 2 \cdot 2 \cdot \cancel{\sqrt{0'49}}\right) \cdot 3'5 \cdot 21'352 \cdot \frac{\pi}{2} = 161'06\ t$ (Despreciar cohesión)

$\Rightarrow R_{H,d} = 257'70\ t$

$M = 257'70 \times \left(\frac{3'5}{3}\right) = 300'65\ mt$

RESUMEN TOTAL ACCIONES	$R_r = 1555'16\ t$ $R_{HL} = 316'14\ t \Rightarrow M_L =$ NO INFLUYE $R_{HT} = 50'18\ t \Rightarrow M_{HT} = 250'90\ t$

2.- CARGA VERTICAL SOBRE CADA PILOTE

$$P = \frac{1555'16}{15} + \frac{250'90 \times 9'5}{2 \times (1'4^2 + 2'8^2 + 4'2^2 + 5'6^2 + 7^2 + 8'4^2 + 9'8^2)} = 108'16\ t$$

3.- CALCULO CARGA HORIZONTAL SOBRE CADA PILOTE

$$H_i = \frac{\sqrt{316'14^2 + 50'18^2}}{15} = 21'34\ T/\text{pilote}$$

ΔP

La unica fuerza horizontal que produce variacion de axil es la que está sobre el eje x (316'14)

Para calcular la longitud de voladizo se emplea la teoria de BOUSSINESQ:

$$L' = 1'2 \times L \times \sqrt[4]{\frac{2.10^5 \cdot 1/4 \cdot \pi \cdot (50)^4}{500/3}} = 3'33\ m.$$

$$M = 316'14 \times \frac{3'33}{2} = 526'38\ mt$$

$$\Delta P_{max} = \frac{526'38 \times 9'8}{2_x (1'4^2_1 + \dots + 9'8^2)} = 9'40\ t$$

$$\boxed{P_{max} = 117'56\ t}$$

4.- CALCULO DE LA CARGA DE HUNDIMIENTO

$$1 = \frac{8'33\ (R - 0'5)(L_i - 2'5)}{117'56} \Rightarrow L_i = 7'84\ m$$

$$\Rightarrow \boxed{L_i = 8\ m}$$

(8) B-3) PILA 1

la pila 1 tiene 11 pilotes

1.- ESFUERZOS ACTUANTES (sobre cdg plano cimentación)

a) Debido al tablero (4 neoprenos)

$R_{max,V} = 4 \times 392'10 = 1568'4 \Rightarrow$ (1'6) $\quad R_{Vd} = 1568'4 \times 1'6 = 2509'44\ t$

$R_{max,H_{long}} = 18'26 \times 2 + 15'68 \times 2 = 67'88 \Rightarrow R_{H_{long},d} = 1'6 \times 67'88 = 108'61\ t$

$R_{max,H_{trans}} = 15'68 \times 4 = 62'72 \quad \Rightarrow R_{H_{trans},d} = 1'6 \times 62'72 = 100'36\ t$

$M_{H_L} = 108'61 \times 5'5 = 597'36\ mt$

$M_{H_T} = 100'36 \times 5'5 = 551'98\ mt$

Esfuerzos de calculo (debido al tablero)	$R_{Vd} = 2509'44\ t$
	$R_{H,L} = 108'61\ t \Rightarrow M_{H,L} = 597'36\ mt$
	$R_{H,T} = 100'36\ t \Rightarrow M_{H,T} = 551'98\ mt$

b) Debido al PP del encepado

$R_V = 2 \times 15 \times 1'5 \times 2'5 = 112'5\ t \Rightarrow R_{Vd} = 180\ t.$

c) Debido a las tierras

$R_H = \frac{1}{2}(2.4.4).15.\frac{1}{2}.\pi.0'27 = 102'17 \Rightarrow R_{Hd} = 163'48\ t$

$M_t = 217'97\ mt$

RESUMEN TOTAL ACCIONES	$R_{vol} = 2689'44$ t. $R_{HL} = 272'09 \Rightarrow M_{HL} =$ NO INFLUYE $R_{HT} = 100'36 \Rightarrow M_{HT} = 551'48$ mt

2.- CARGA VERTICAL SOBRE CADA PILOTE

$$P = \frac{2689'44}{11} + \frac{551'48 \times 7}{2 \times (1'4^2 + 2'8^2 + 4'2^2 + 5'6^2 + 7^2)} = 262'42\ t$$

3.- CALCULO CARGA HORIZONTAL SOBRE CADA PILOTE

$$H_i = \frac{\sqrt{272'09^2 + 100'36^2}}{11} = 26'37\ t.$$

$\boxed{\Delta P}$

La unica fuerza horizontal que produce variacion de axil es la que esta sobre el eje x

Para calcular la longitud de voladizo se emplea la teoria de Boussinesq

$$L' = 1'2 \cdot f \cdot \sqrt[4]{\frac{E_p I_p}{E_t/3}} = 1'2 \cdot 1 \cdot \sqrt[4]{\frac{2 \cdot 10^5 \cdot \frac{1}{4} \cdot \pi (50)^4}{500/3}} = 3'33\ m.$$

$$M = 272'09 \cdot \left(\frac{3'33}{2}\right) = 453'03$$

$$\Delta P = \frac{453'03 \cdot 7}{2 \times (1'4^2 + \dots + 7^2)} = 14'71\ t$$

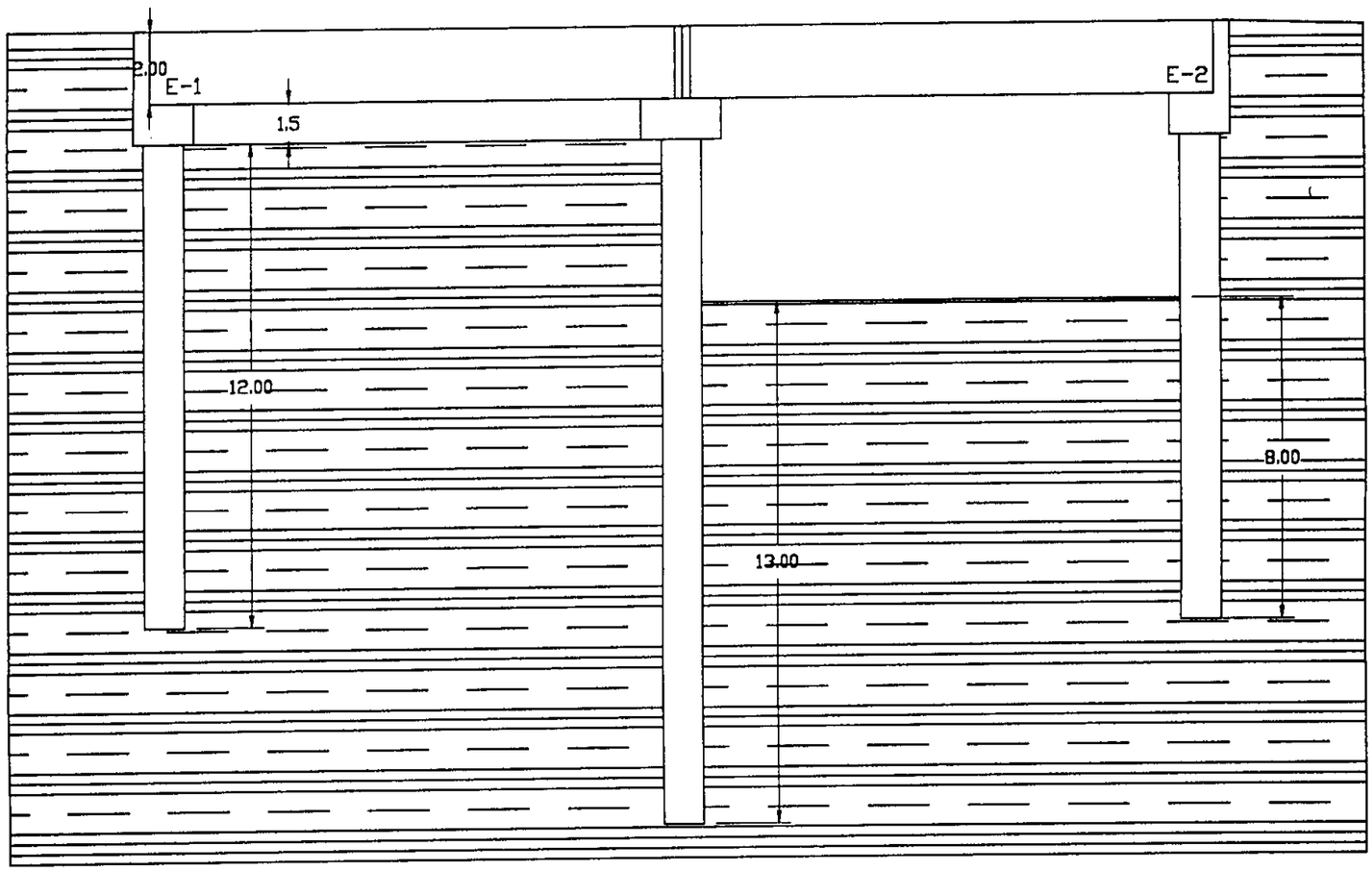
$$\Rightarrow \boxed{P_{max} = 277'13\ t}$$

4.- CALCULO DE LA CARGA DE HUNDIMIENTO

$$1 = \frac{\frac{10}{1'2} \cdot 33 \cdot (R - cs)\ L_i}{277'13} \Rightarrow L_i = 12'66\ m$$

$\boxed{L_i = 13\ m}$

ESQUEMA DE EMPOTRAMIENTO DEL PILOTAJE



necso entrecanales cubiertas	LINEA DE ALTA VELOCIDAD MADRID–BARCELONA–FRONTERA FRANCESA TRAMO MADRID–ZARAGOZA SUBTRAMO XV. PLATAFORMA	ESCALA	PROYECTO_BASE DOCUMENTO Nº DE PLANO ARCHIVO:	GENERADOS_EN_OBRA Nº DE PLANO HOJA ARCHIVO DE OBRA:	REVISION Nº: FECHA: APROBACION:	TITULO DE PLANO

ARMADO DE PILOTES

A) Pila L

A-1 Trabajando como pantalla

$x \in (0,4)$ ⇒ $M^{cig} = \frac{1}{2} \cdot 2 \cdot 4^2 \cdot 0'27t \cdot 1'57t \cdot \frac{4}{3} = 9'1\ mT$

$x \in (4,12)$ ⇒ $M^{cig} = \frac{1}{2} \cdot 2 \cdot x^2 \cdot 0'27t \cdot 1'57t \cdot \frac{x}{3} - \frac{1}{2} 2 (x-4)^2 \cdot 3'69 \frac{(x-4)}{3}$

$$\Rightarrow \boxed{M_f(x) = 0'142 x^3 - 1'23 (x-4)^3}$$

$M_{max} \Rightarrow Q(x) = 0 \Rightarrow Q(x) = \frac{dM}{dx} = 0'426 x^2 - 3'69 (x-4)^2 = 0 \Rightarrow$

$x = 6'06\ m \Rightarrow M = 20'85\ mT$ $\overset{\beta=1'6}{\Rightarrow}$ $\boxed{M_d = 33'36\ mT}$

$Q_{max} = \frac{dQ(x)}{dx} = 0 \Rightarrow 0'852x - 7'38(x-4) \Rightarrow x = 4'52 \Rightarrow Q_{max} = 7'71$

$\overset{\gamma=1'6}{\Rightarrow}$ $\boxed{Q_d = 12'34\ t}$

Para el dimensionamiento $\begin{cases} M_d = 33'36\ mt \\ V_d = 12'34\ t \end{cases}$

A-2 Trabajando como pilote

El pilote se dimensionará con el axil menor y con el mayor momento:

$N_{tab,min} = 4 \times 38'14 = 152'56\ t$

$R_{HL} = 67'88\ t \Rightarrow M_{HL} = 373'34\ mt$

$R_{HT} = 62'72 \Rightarrow M_{HT} = 344'96\ mt$

$N_{pp} = 112'5$

$P_{Hiperest} = 102'17$

$I'_{LT} = 136'28\ mA$

$\Rightarrow$ $\begin{cases} R_r = 265'06\ t \\ R_{HL} = 170'05 \Rightarrow M_{HL} = 509'53\ mt \\ R_{HT} = 62'72 \Rightarrow M_{HT} = 344'96 \end{cases}$

$P_{min,pilote} = \frac{265'06}{11} + \frac{344'96 \times 7}{2 \times (1'4^2 + 2'8^2 + 4'2^2 + 5'6^2 + 7^2)} = 35'29$

$P = -14'71$

$\Rightarrow$ $\boxed{P = 20'59\ t}$

$L' = 3'33$

$H_i = 26'37$ $\Rightarrow$ $M = \frac{m \cdot H_i \cdot (l+L')}{2} = \frac{1.26'37 \cdot (3'33+4)}{2} = 96'65\ mA$

$\Rightarrow$ Para el dimensionado $\begin{cases} P_d = 20'59 \\ M_d = 154'64\ mT \end{cases}$

luego la hipótesis pésima es como pilote ?

Aplicando el programa de la EH con 14 ϕ :

14 ϕ 32 (75'2 cm²)

Calculo cercos

$V_{cu} = 5 \cdot \sqrt{250} \cdot 1 \cdot 0'9 = 71'57$ t

$V_{u1} = 12'34$ t

} no hacen falta

Cuantía mínima $\geq \phi 16$ a 0'25 m

14 ϕ 32
C ϕ 16 a 0'25 m.

B) Estribo 2

B-1 Trabajando como muro pantalla

$x \in (0,4)$: $M^{q/g} = \frac{1}{2}\left[16.4.0'49 - 2.2.\sqrt{0'49}\right].4.1'571.\frac{1}{3} = 1'41$ mt

$x \in (4,12)$: $M^{q/g} = \frac{1}{2}\left[1'6.6.0'49 - 4\sqrt{0'49}\right].6.1'571.\left(x-\frac{12}{3}\right) +$

$+ \left(1'6.6.0'49 - 4\sqrt{0'49}\right)(x-6)^2.1'571.\frac{1}{2} +$

$+ \frac{1}{2}\left[2(x-6)^2.0'7.1'5.1'571.\frac{(x-6)}{3}\right] - \frac{1}{2}\left[1'6.2.2'04 - 4\sqrt{2'04}\right].2.1'571.(x-6)^2.\frac{(x-6)}{3}$

$- \left[1'6.2.2.04 - 4\sqrt{2'04}\right].\frac{(x-6)^2}{2} - \frac{1}{2}.2.\frac{(x-6)^3}{3}.3'61$

q/g

$M = 9(x-4) + 1'5(x-6)^2 + 0'15(x-6)^3 - 1'28\left(x-\frac{16}{3}\right) - 0'41(x-6)^2 - 1'23(x-6)^3$

$Q(M) = \frac{dM}{dx} = 9 + 3(x-6) + 0'45(x-6)^2 - 1'28x - 0'82(x-6) - 3'69(x-6)^2$

$Q(x) = -3'24x^2 + 39'78x - 120'72 \Rightarrow M_{max} = 6'79$

$M_{max} = 24'3$ mt

$Q_{max} = -6'48x + 39'78 \Rightarrow x = 6'14 \Rightarrow Q_{max} = 1'4$ t

Para el dimensionamiento ($\gamma = 1'6$) $\Rightarrow$ | $M_d = 38'9$ mt
$V_{d1} = 2'24$ t |
| --- |

B-2 Trabajando como pilote

$$\begin{cases} N_{min} = 2 \times 38'14 + 187'77 = 264'05\ t \\ M_{HT} = 156'8\ m\cdot t \end{cases}$$

$$P = \frac{264'05}{15} + \frac{156'8 \times 9'8}{2 \times (1'4^2 + \dots + 9'8^2)} = 20'41\ t$$

$$P_{min} = 20'41 - 9'40 = 11\ t$$

$L' = 3'33$

$H_i = 21'34$

$$M = \frac{1 \cdot 21'34 \cdot (3'33+4)}{2} = 78'22 \Rightarrow M_d = 125'14\ m\cdot t$$

Para el dimensionamiento: $\begin{cases} N = 11 \\ M_d = 125'14\ m\cdot t \end{cases}$

Aplicando el programa de la EH: 14 Φ25 (51'6 cm²)
cercos: Φ16 a 0'25 m

14 Φ25
cΦ16 a 0'25 m

c) ESTRIBO 1

$$\begin{cases} N = 2 \times 38'14 + 187'77 = 264'05\ t \\ M_{HT} = 1352'41 \end{cases}$$

$$P = \frac{264'05}{15} + \frac{1352'41 \cdot 9'8}{2 \times (1'4^2 + \dots + 9'8^2)} = 41'75\ t$$

$P_{min} = 41'75 - 1'74 = 40'02\ t$

$L' = 3'33$

$H_i = 5'14\ t$

$$M = \frac{1 \cdot 5'14 \cdot (3'33+4)}{2} = 18'84\ m\cdot t \Rightarrow M_d = 30'15\ m\cdot t$$

$$\begin{cases} N_d = 40'02\ t \\ M_d = 30'15\ m\cdot t \end{cases}$$

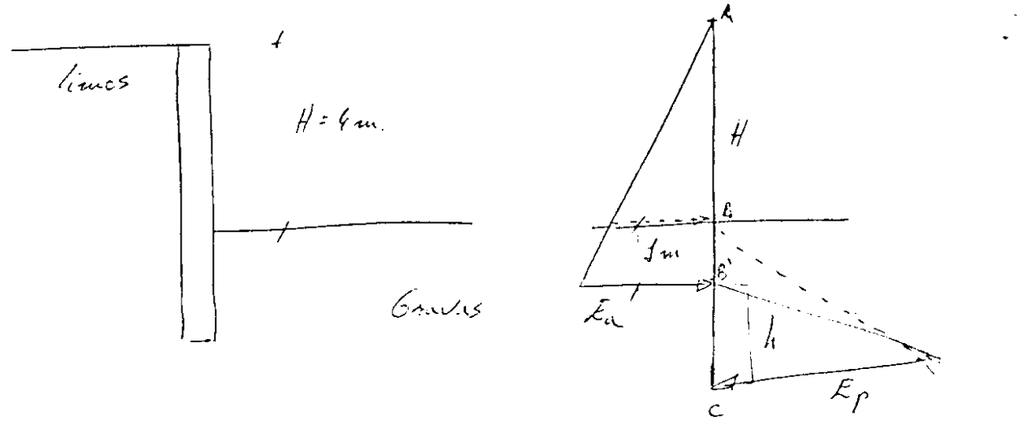
Aplicando el programa de la EH: 14 Φ25 (51'6 cm²)
cercos Φ16 a 0'25 m.

14 Φ25
cΦ16 a 0'25 m

CALCULO DE MUROS PANTALLA

Cálculo crítico de pantallas EVN3-4.4

Como primera aproximación utilizamos el siguiente modelo:



Se considera que el primer metro bajo la excavación no moviliza el empuje pasivo sino que actúa como activo.

Si utilizamos las ecuaciones $\Sigma F_H = 0$ y $\Sigma M_{B'} = 0$ obtenemos diferentes h.

a) $\Sigma f_H = 0 \Rightarrow E_a = E_p$

$$K_{a_1} \frac{1}{2} \gamma_1 (H+1)^2 = \frac{1}{2} \gamma_2 h^2 K_{p_2} \quad , \quad h = \sqrt{\frac{\gamma_1}{\gamma_2} \frac{K_{a1}}{K_{p2}} (H+1)^2}$$

$$h = \sqrt{\frac{1.6}{2.0} \frac{0.49}{4.6} (4+1)^2} = 1.46 \text{ .}$$

Longitud empotramiento = $1.46 + 1m \simeq 2.5 m$.

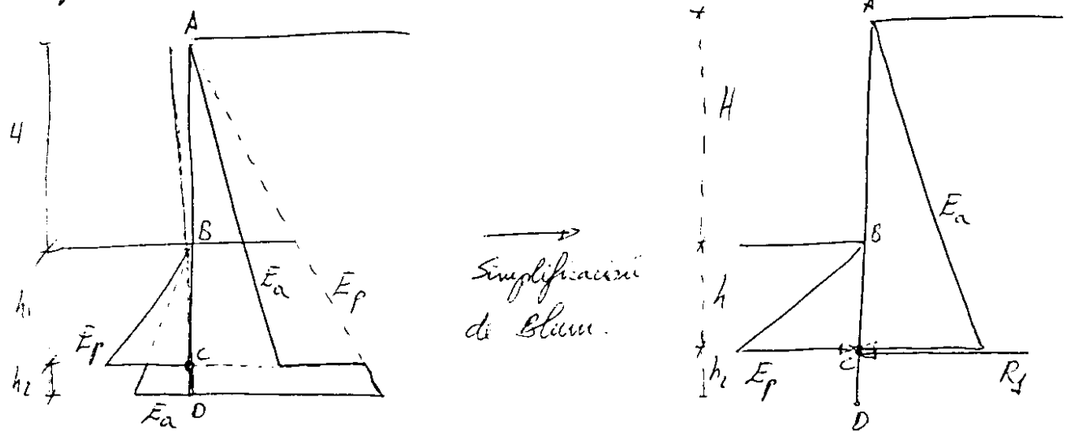
b) $\Sigma M_{B'} = 0 \quad \left[K_{a_1} \frac{1}{2} \gamma_1 (H+1)^2 \times \right] (H+1) \times \frac{1}{3} = \frac{1}{2} \gamma_2 h^2 K_{p_2} \times \frac{2}{3} h$

$$0.49 \frac{1}{2} 1.6 \times \frac{(H+1)^3}{3} = \frac{1}{2} 2 \cdot h^3 \times 4.6 \times \frac{2}{3} \text{ ;}$$

$$h = \sqrt[3]{\frac{16.3}{3.07}} = 1.74$$

long. de empotramiento = 1.74 + 1m = 2.74 → 3 m

Si utilizamos la simplificación de Blum tendríamos el siguiente modelo:



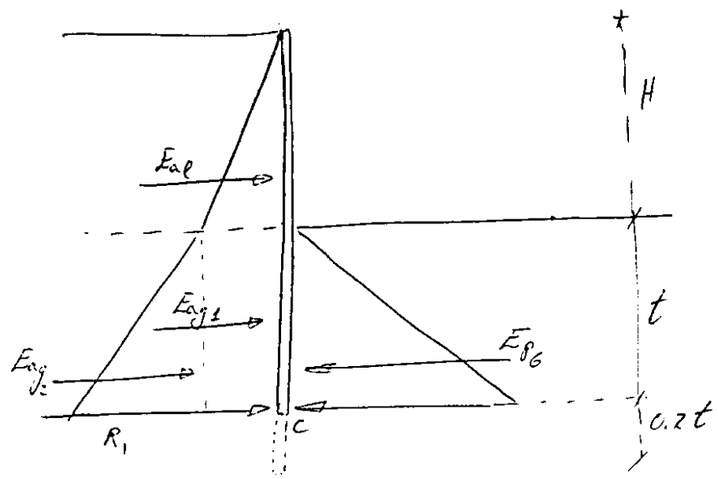
$h_1 = 0.2h$

Blum parte de la hipótesis de que el momento de todas las fuerzas respecto al centro de rotación G, punto de giro de la pantalla, es nulo. Supone además, una fuerza R_1 aplicada en G que sería el contrarempuje. Para que esta fuerza se desarrolle basta tomar $h_1 = 0.2h$.

Se tiene entonces,

1) $\Sigma F_H = 0 \quad E_{a\,limos} + E_{a\,gravas1} + E_{a\,gravas2} + R = E_{p\,gravas}$

2) $\Sigma M = 0$



Limos $\gamma_1 = 1.6\ T/m^3$
$c_1 = 0.2\ kg/cm^2$
$\varphi_1 = 20°$
$k_{a1} = 0.49$

Gravas $\gamma_2 = 2.0\ T/m^3$
$c_2 = 0$
$\varphi_2 = 40°$
$k_p = 4.60 \quad k_a = 0.22$

Utilizando la ecuación $\Sigma M_c = 0$ e introduciendo la seguridad en los cálculos dividiendo el E_p por 2 (según la recomendación del libro "muros de contención y muros de sótano" de J. Calavera) tendríamos:

$$\frac{1}{2}\,1.6\times4\times4\times0.49\times\left[\frac{4}{3}+t\right] + 1.6\times4\times0.49\times t\times\frac{t}{2} + \frac{1}{2}\,2\times0.22\,t^2\times\frac{t}{3} = \left[\frac{1}{2}\,2t\times4.6\times t\right)\times\frac{t}{3}\Big]\times\frac{1}{2}$$

(seguridad)

$$0.7t^3 - 1.57t^2 - 6.27t - 8.37 = 0$$

$$t = 4.7\ m \quad (\rightarrow R_1 = 24.9\ T/m)$$

long. empotramiento = $t + 0.2t = 5.64 \rightarrow 6\ m$

Habría un factor de seguridad mayor, derivado de no haber considerado la cohesión de la 1ª capa de limos, que reduciría el E_{a_1}.

Dada la peculiaridad de la ubicación de la pantalla, junto al Canal Imperial, comprobamos que en el supuesto de una rotura de éste, la longitud de empotramiento soporta la presión hidrostática.

Suponiendo una carga de agua en los 4 metros de los limos y sin dividir E_p por 2 se tiene:

$$\underbrace{k_{a_1}\frac{1}{2}\gamma_1 H^2}_{E_{a_1}}\times\left(\frac{H}{3}+t\right)+\underbrace{\frac{1}{2}\gamma_{agua}H^2}_{E_{agua}}\times\left(\frac{4}{3}+t\right)+$$

$$+\underbrace{\gamma_1 \times k_{a_1}\times H\times t}_{E_{ag_1}}\times\frac{t}{2}+\underbrace{\frac{1}{2}k_{a_2}\gamma_2 t^2}_{E_{ag_2}}\times\frac{t}{3}=$$

$$=\frac{1}{2}\gamma_1 k_{p_2}\times t\times\frac{t}{3}$$

$$1.46t^3-1.57t^2-14.77t-19=0$$

$$t=4.2\ m\longrightarrow(1+0.2)t=5.04$$

Al estar la pantalla empotrada 6 m, existe un factor de seguridad con respecto a esta circunstancia.

Para una $H=3\ m$ tendríamos:

$$\frac{1}{2}1.6\times3\times3\times0.49\left(\frac{3}{3}+t\right)+1.6\times3\times0.49\times t\times\frac{t}{2}+$$

$$+\frac{1}{2}2\times0.22\,t^2\frac{t}{3}=\left[\frac{1}{2}2t\times4.6\times t\times\frac{t}{3}\right]\times\frac{1}{2}$$

$$3.53+3.53t+1.18t^2+0.07t^3=0.77t^3$$

$$0.7t^3-1.18t^2-3.53t-3.53=0$$

$$t=3.52\longrightarrow(1+0.2)t=4.2\longrightarrow\underline{4.5\ m}$$

Para una $H=2\ m$:

$$\frac{1}{2}1.6\times2\times2\times0.49\left(\frac{2}{3}+t\right)+1.6\times2\times0.49\times t\times\frac{t}{2}+$$

$$+\frac{1}{2}2\times0.22\,t^2\frac{t}{3}=\left[\frac{1}{2}2t\times4.6\times t\times\frac{t}{3}\right]\times\frac{1}{2}$$

$$1.04+1.57t+0.78t^2+0.07t^3=0.77t^3$$

$$0.7t^3-0.78t^2-1.57t-1.04=0$$

$$t=2.3\longrightarrow(1+0.2)t=2.76\longrightarrow\underline{3\ m}$$

Resumiendo:

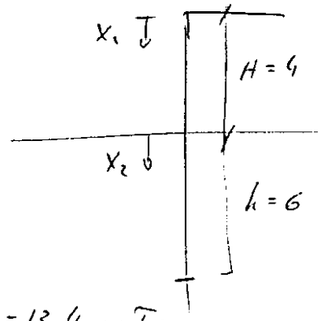
Empotramiento

6	4
4.5	3
3	2

H

Armado para H = 4 m y longitud de empotramiento de 6 m

- ley de Momentos flectores:



a) $X_1 \in (0,4)$

$$M = \frac{1}{2}(1.6 X^2 0.99)\frac{X}{3} = 0.131 X^3$$

$$M_{max} = 8.4 \quad (X=4) \qquad M_d = 1.6 \times 8.4 = 13.4 \text{ mT/m}$$

b) $X_2 \in (0,4.7)$

$$M(X) = -0.7 X^3 + 1.57 X^2 + 6.27 X + 8.37$$

$$\frac{dM(x)}{dx} = Q(x) = 0 = -2.1 X^2 + 3.14 X + 6.27$$

$$X = 2.6$$

$$M_{X=2.6} = 23 \text{ mT/m} \qquad M_d = 36.8^{?} = 37 \text{ mT/m}.$$

- ley de Cortantes:

a) $X \in (0,4)$

$$Q(x) = \frac{dM(x)}{dx} = 0.4 X^2 \qquad Q_{max} = 6.3 \text{ T/m}$$

$$Q_d = 6.3 \times 1.6 = 10.1 \text{ T/m}.$$

b) $X \in (0,4.7)$

$$Q(x) = -2.1 X^2 + 3.14 X + 6.27 \qquad X = 4.7 \rightarrow Q(4.7) = 25.4 \text{ T}$$

$$\frac{dQ}{dx} = 0 = -4.2 X + 3.14 \qquad X = 0.7 \qquad Q(0.7) = 7.4 \text{ T}$$

A la profundidad de 4.7 m, aparece el contraempuje R_1 de valor 26.9 T/m que hace que el cortante sea prácticamente nulo (lo mismo ocurre con el momento flector).

Armado de la pantalla:

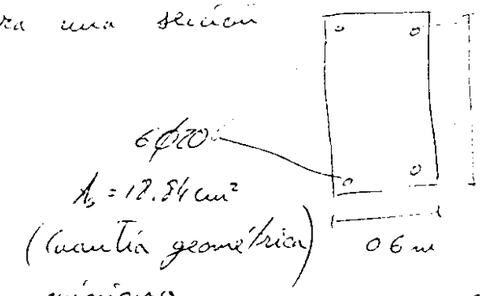
- A flexión:

Aplicando el programa de la EH-91:

$M_d = 13.4 \text{ mT/m}$ $\quad x \in (0,4)$

$M_d = 37 \text{ mT/m}$ $\quad x \in (4,10)$

Para una sección



$6\phi 12$ (6.78 cm^2)

$6\phi 20$

$A_s = 18.84 \text{ cm}^2$ (cuantía geométrica mínima)

$6\phi 20$ / $6\phi 12$ $\Rightarrow M_u = 43.5 \text{ mT/m}$

Reparto $5\phi 12$ por m y cara.

- Cortante: $Q_d = 10.1 \text{ T/m}$

$Q_d = 25.4 \text{ T/m}$

$$V_{u1} = 0.3 \times \frac{250}{1.5} \times 100 \times 50 = 250 \text{ T/m}$$

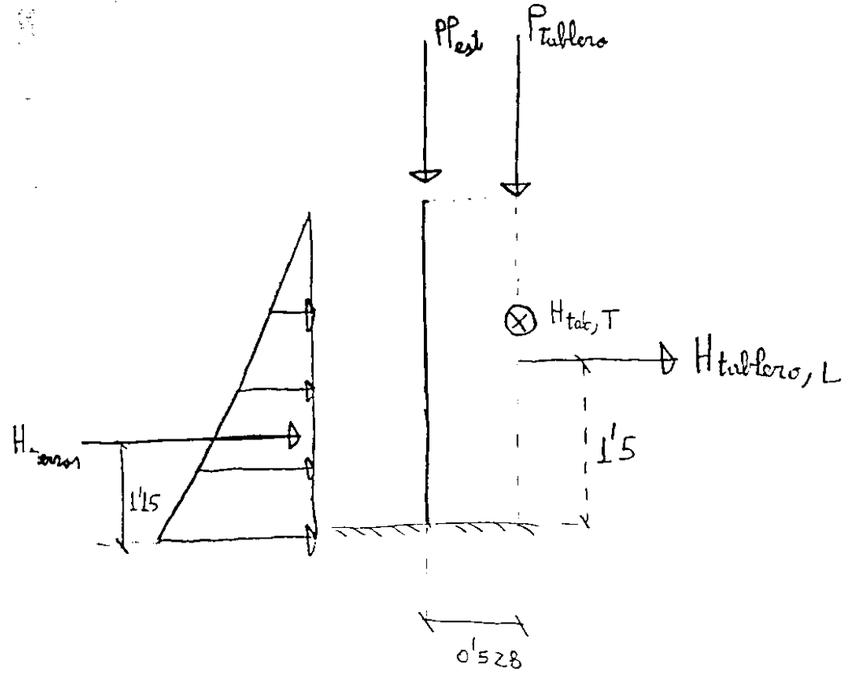
$$V_{u2} = V_{su} + V_{cu}$$

$$V_{cu} = 0.5\sqrt{f_{cd}} \times b \times d = 0.5\sqrt{\frac{250}{1.5}} \times 100 \times 50 = 32 \text{ T/m}$$

$$Q_d < V_{u1} \; ; \; Q_d < V_{u2}$$

CÁLCULO DE ESTRIBOS

1- ESQUEMA DE CALCULO DE LOS ESTRIBOS



a) PRIMERA POSIBILIDAD ⇒ N_{max} tablero

la sección crítica es la del empotramiento ⇒

$$\begin{cases} P_{tablero} = 2 \times 392'1 = 784'2\ T \underset{\delta=1'6}{\Rightarrow} P_{tab,d} = 1254'72\ T. \\ P_{PP} = (0'65 \times 1'95 + 1'5^2) \times 1'5 \times 2'5 = 131'91 \underset{\delta=1'6}{\Rightarrow} P_{PP} = 211'05\ T \end{cases}$$

$$\rightarrow N_{d,max} = 1465'77$$

$H_{tablero,L} = 2 \times (18'26) = 36'52\ T. \underset{\delta=1'6}{\Rightarrow} H_{L,d} = 58'44\ T.$

$H_{tablero,T} = 2 \times (15'68) = 31'36\ T. \underset{\delta=1'6}{\Rightarrow} H_{T,d} = 50'18\ T$

$H_{tierras} = \frac{1}{2}(2.3'45.0'33).3'45.15 = 58'92\ T. \overset{\gamma=1'6}{\Rightarrow} H_{L2,d} = 94'28\ T.$

⇒ Resumen axiles y cortantes
- $N_d = 1465'77\ T.$
- $Q_{L,d} = 152'72\ T.$
- $Q_{T,d} = 50'18\ T.$

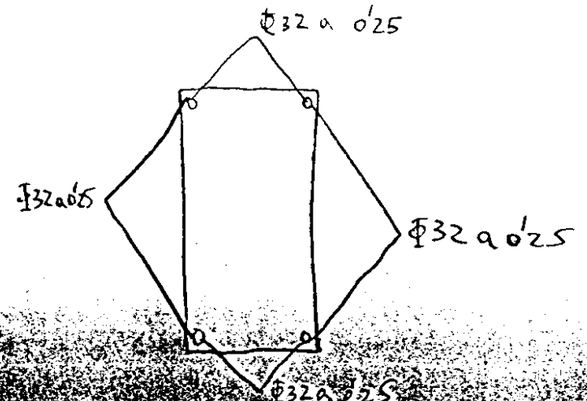
$M_{max,L,d} = 1254'72 \times 0'528 + 58'44 \times 1'5 + 94'28 \times 1'15 = 858'58\ mT$

$M_{max,T,d} = 50'18 \times 1'5 = 75'27$

⇒ Resumen flectores
- $M_{L,d} = 858'58\ mT$
- $M_{T,d} = 75'27\ mT$

a-1 Dimensionamiento a flexión

⇒ Se dimensiona por cuantía mínima ⇒ Φ32 a 0'25m. [Aplicando el programa de la EH]



a-2 Dimensionamiento a cortante

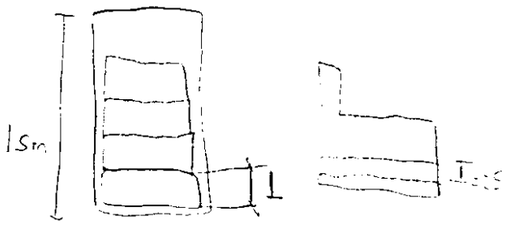
$V_{cu} = 5.\sqrt{\frac{250}{1'5}}.15.1'42 = 1374'91\ T$

$V_{cu} > V_{rd} \Rightarrow$ No hace falta

Mínimos ⇒ $A_d \geq \frac{0'02.\left(\frac{2500}{1'5}\right).1}{4'44} = 7'51\ cm^2/m$

$\frac{2.1'13}{S} = 7'51 \Rightarrow S = 30cm$

⇒ 1C Φ12 a 0'25m.



b) SEGUNDA POSIBILIDAD ⇒ Mínimo tablero

$P_{tablero} = 2 \times 38'14 = 76'28\ T \overset{\gamma=1'6}{\Rightarrow} P_{tab,d} = 122'05$

$P_{PP,d} = 211'05$

$N_d = 333'10\ T.$

$H_{tab,L,d} = 58'44\ T$

$H_{tab,T,d} = 50'18\ T$

$H_{tierra} = 94'28\ T$

Resumen axiles y cortantes	
	$N_d = 333'10\ T$
	$Q_{L,d} = 152'72\ T$
	$Q_{T,d} = 50'18\ T$

$\hat{M}_{max,L,d} = 122'05 \times 0'528 + 58'44 \times 1'5 + 94'28 \times 1'15 = 260'53\ mT$

$\hat{M}_{max,T,d} = 75'27\ mT$

Resumen flectores	
	$M_{L,d} = 260'53\ mT$
	$M_{T,d} = 75'27\ mT$

b-1 Dimensionamiento a flexion

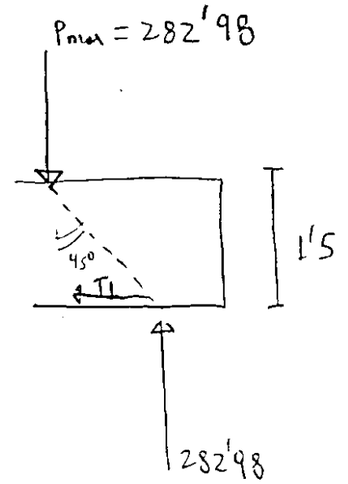
⇒ Se dimensiona por cuantia geometrica maxima ⇒ $\phi 32$ a 0'25m

b-2 Dimensionamiento a cortante

Idem caso a-2).

c) ARMADO INFERIOR DEL ENCEPADO DEBIDO AL PILOTAJE

c-1 Compresion



$T_L = 282'98$

$T_L = f_{yd} \cdot A_s \Rightarrow A_s = \dfrac{282'98}{\left(\frac{5'1}{1'15}\right)} = 63'81\ cm^2$

⇒ $A_s = 63'81\ cm^2$ ⇒ 2 capas | $1\phi 32$ a 0'20 / $1\phi 25$ a 0'20

c-2 Cortante

No haría falta armar a cortante ⇒ Se ponen mínimos

$2c\phi 16$ a 0'25m

d) ARMADO DEL ENCEPADO COMO ZAPATA (armadura superior e inferior)

$$\sigma_{calc} = \frac{N}{A} + \frac{M}{I}y = \frac{1465'77}{1'5 \times 1'5} + \frac{858'58}{\frac{1}{12}1'5 \times 1'5^3} = 268'67\ T/m^2$$

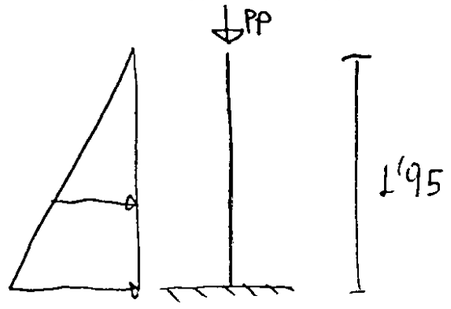
$$L_{cal} = 0'85 + 0'15 \times 0'65 = 0'95$$

$$M = 268'67 \cdot 0'95 \times 1'5 \times \frac{(0'95)^2}{2} = 1727'64\ T.m$$

⇉ Programa EH ⇉ $\phi 25$ a $0'15$ ⇉ Inferior

$\phi 25$ a $0'20$ ⇉ Superior

e) ARMADO DEL ESPALDÍN



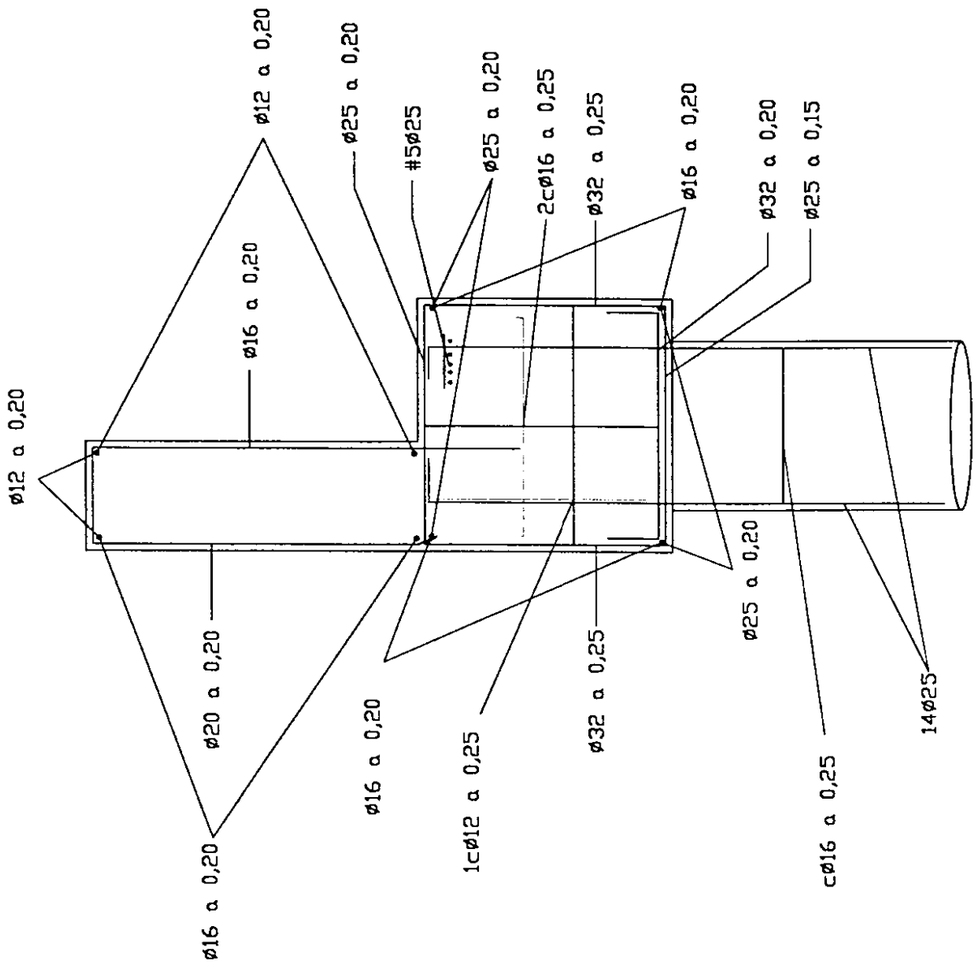
$$H_{terreno} = \frac{1}{2}\left[2 \cdot 1'95 \cdot 0'33\right] \cdot 1'95 \cdot 1'5 = 18'83\ T. \Rightarrow H_d = 30'12\ T$$

$$M_d = 19'58\ m.T$$

$$N_d = 0'65 \times 1'95 \times 1'5 \times 2'5 \times 1'6 = 76'05\ T$$

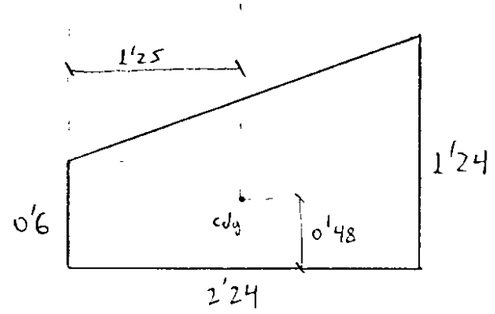
⇉ Aplicando el programa de la EH ⇉ Arm. traseros $\phi 20$ a $0'20$

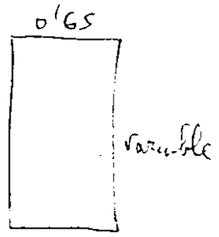
Arm. delanteros $\phi 16$ a $0'20$



CALCULO ONEDAS ESTRIBOS

Calculo el aleron crítico y extiendo el armado al otro.



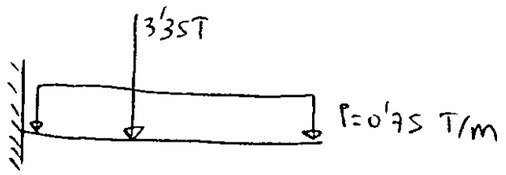


Se trata de una ménsula corta (de menos variable)



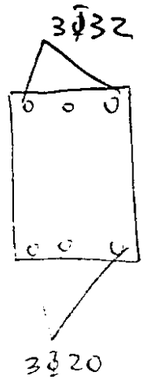
a) Calculo de momentos superior e inferior

Carga vertical: * PP
* Barandillas



$$Md = 1'6 \cdot \left[(3'35 \times 0'99) + 0'75 \times 2'24 \times \frac{2'24}{2} \right] = 8'32 \text{ T.m}$$

Aplicando el programa de la EH:



b) Calculo pormenorizado interior y exterior

Carga Tierras

SC hipótesis 0'3'5 T/m²

$K_a = 0'333$

$E_T = \frac{1}{2}(1'24 \cdot 2 \times 1'24 \times 0'333) \times 2'24 = 1'15\ t \Rightarrow E_{T,d} = 1'84\ t$

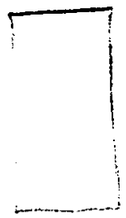
$M_{ET} = 1'84 \times 0'99 = 1'83\ mT$

$E_{sc} = 0'333 \times 3'5 \times 1'24 \times 2'24 = 3'24\ t \Rightarrow E_{sc,d} = 5'2\ t$

$M_{sc,d} = 5'83\ mt$

$\Rightarrow \begin{cases} Md = 7'66\ mt \\ V_{dl} = 7'04\ t \end{cases}$

Aplicando el programa de la EH:



ϕ20 c 0'20 (alterno)

ϕ16 a 0'20 (alterno)

- Cortante

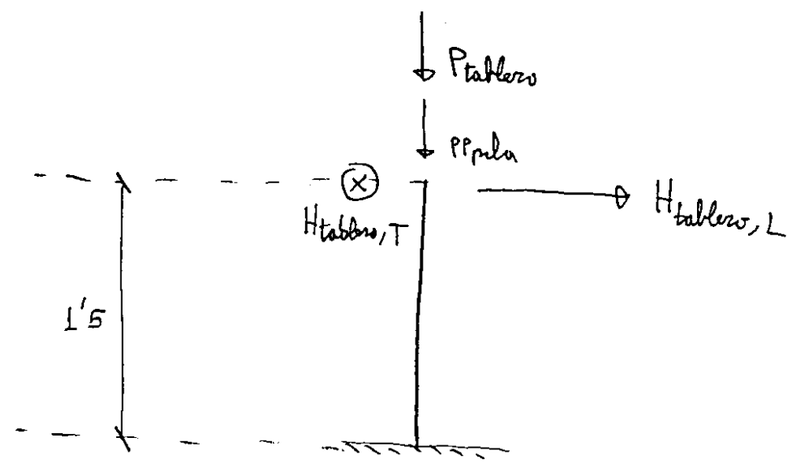
$V_{cu} = 5 \times \sqrt{250} \times 1'24 \times 0'59 = 57'83\ t$

$V_d > V_{cu} \Rightarrow$ No requiere armadura a cortante

Mínimos: $A_d \geq \frac{0'02 \times \frac{2500}{1'5} \cdot 1}{4'2} = 7'93\ cm^2/m \Rightarrow$ 1 C ϕ16 a 0'20 m.

CALCULO PILA

1- ESQUEMA DE CALCULO DE LA PILA



a) N max tablero

$$\begin{cases} P_{tablero} = 2\times 392'10 + 2\times 392'10 = 1568'4\ t \\ P_{PP} = (2\times 11\times 1'5\times 2'5) = 82'5\ t \end{cases}$$

$\Rightarrow$ ($\delta = 1'6$) $P_{tab,d} = 2509'44\ t$

$\Rightarrow$ ($\delta = 1'6$) $P_{PP} = 132\ t$

$\Rightarrow N d_{max} = 2641'44\ t$

$H_{tab,L} = 15'68\times 4 = 62'72 \Rightarrow \begin{cases} H_{tab,L,d} = 100'36\ t \\ M_{L,d} = 160'58\ mt \end{cases}$

$H_{tab,t} = 15'68\times 4 = 62'72 \Rightarrow \begin{cases} H_{tab,t,d} = 100'36\ t \\ M_{T,d} = 160'58\ m\ t \end{cases}$

Resumen

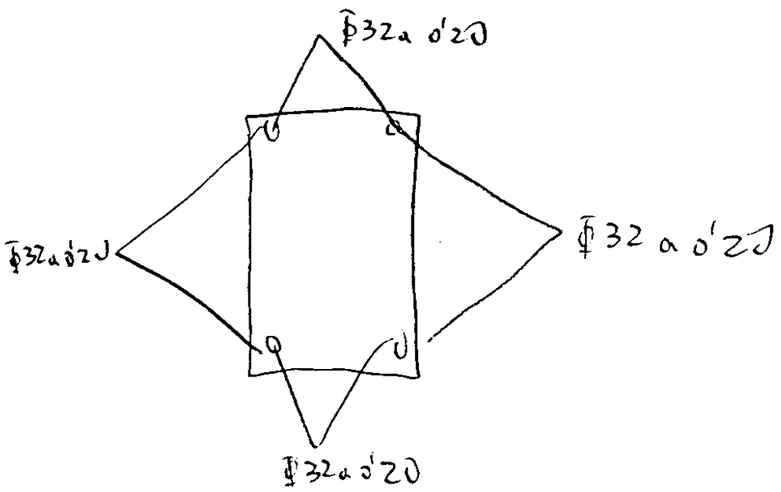
$N = 2641'44\ t$

$H_L = 100'36\ t \Rightarrow M = 160'58\ mt$

$H_T = 100'36\ t \Rightarrow M = 160'58\ mt$

a-1 Dimensionamiento a flexion

- se dimensiona por cuantia minima aplicando el programa de la EH



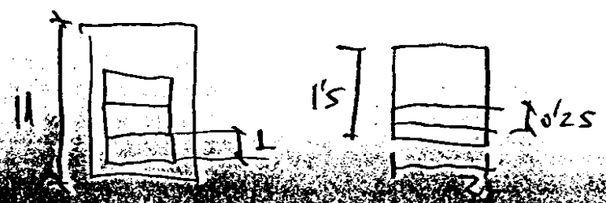
a-2 Dimensionamiento a cortante

$$V_{cu} = 5\sqrt{\frac{250}{1'5}} \times 11 \times 1'42 = 1008'27\ t$$

$V_{cu} > V_{rd} \Rightarrow$ No hace falta armado a cortante

$$A_\alpha \geq \frac{0'02 \cdot \left(\frac{2500}{1'5}\right) \cdot 1}{4'44} = 7'51\ cm^2/m$$

$\perp$ c Φ12 a o'25 m



b) Nivel inferior

$P_{tablero} = 38'14 \times 4 = 152'56\ t \Rightarrow P_{tab,d} = 244'10\ t$

$P_{pp,d} = 132\ t$

⇒ **Resumen**

- $N = 376'1\ t$
- $H_L = 100'36\ t \Rightarrow M = 160'58\ mt$
- $H_T = 100'36\ t \Rightarrow M = 160'58\ mt$

b-1 Dimensionamiento a flexion

Φ32 a o'20

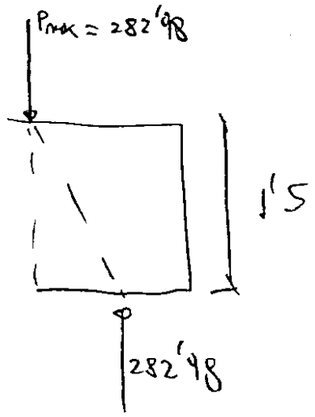
b-2 Armadura a cortante

idem

No presenta la pila problemas de pandeo al tener un β de pandeo despreciable.

5) ARMADO ENFERFOR. DEL ENCEPADO DEBIDO AL PILOTAJE

C-1 Compresión



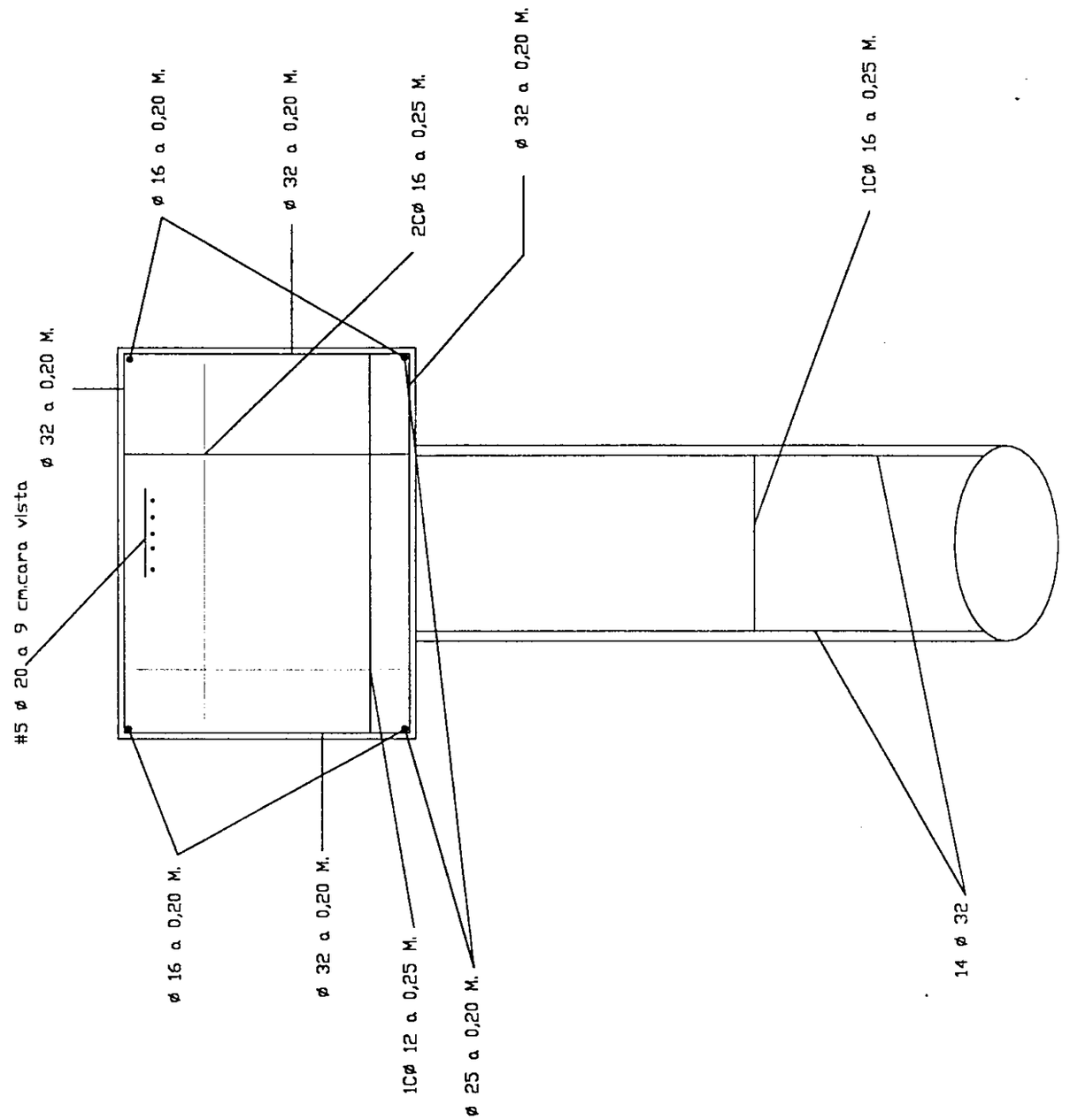
$T_1 = 282'98\ t$

$T_1 = f_{yd} \cdot A_S \Rightarrow A_S = \frac{282'98}{\left(\frac{5'1}{1'15}\right)} = 63'81\ cm^2$

$\Rightarrow$ 2 Capas { 1Φ32 a 0'20 ; 1Φ25 a 0'20

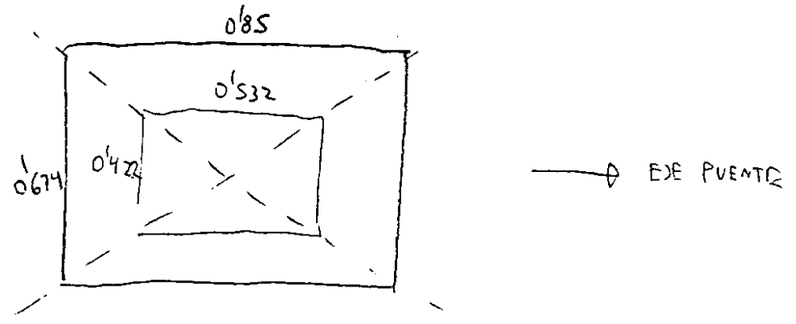
C2 Cortante

Mínimos $\rightarrow$ 2CΦ16 a 0'25m



CARGAS CONCENTRADAS EN MACIZOS

1.- CARGAS CONCENTRADAS EN MACIZOS



$a_1 = 0'422$

$a = 0'674$

$b_1 = 0'532$

$b = 0'85$

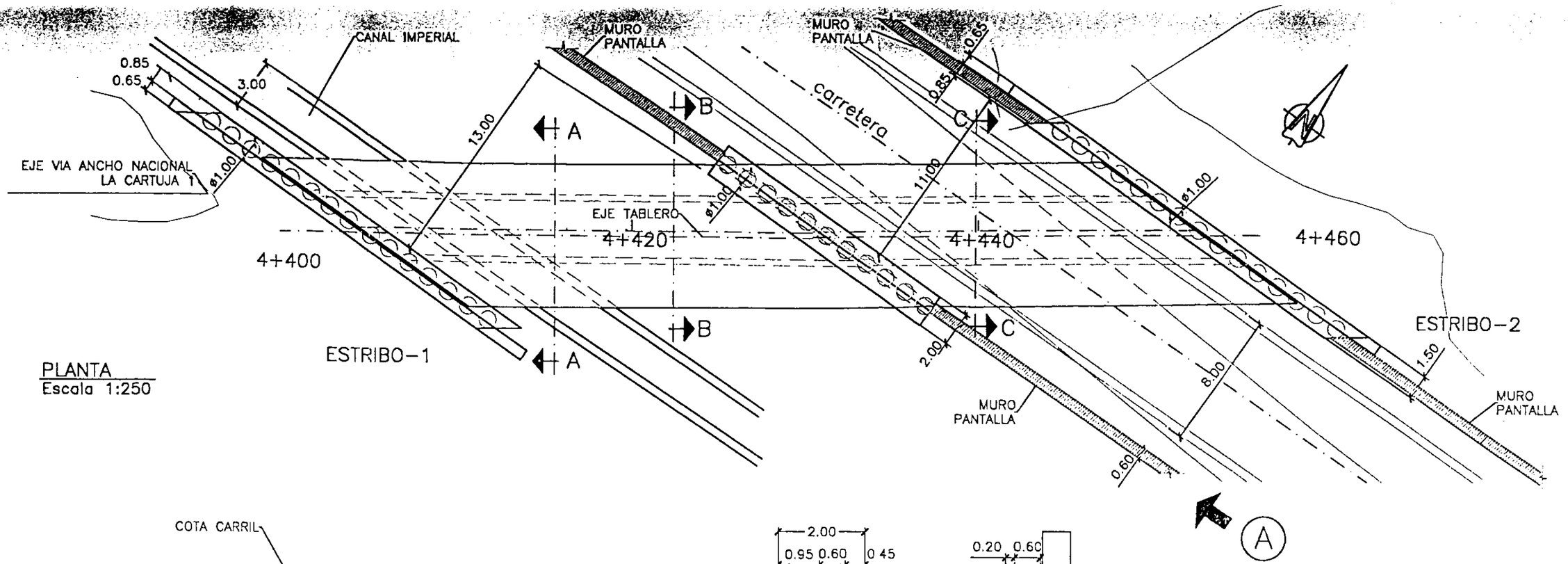
$N_{max} = 392'10\ t$

$A_{sa} = 0'3 \cdot 392'1 \cdot 10^3 \left(\frac{67'4 - 42'2}{100} \right) \cdot \frac{1}{4434'783} = 6'7\ cm^2$

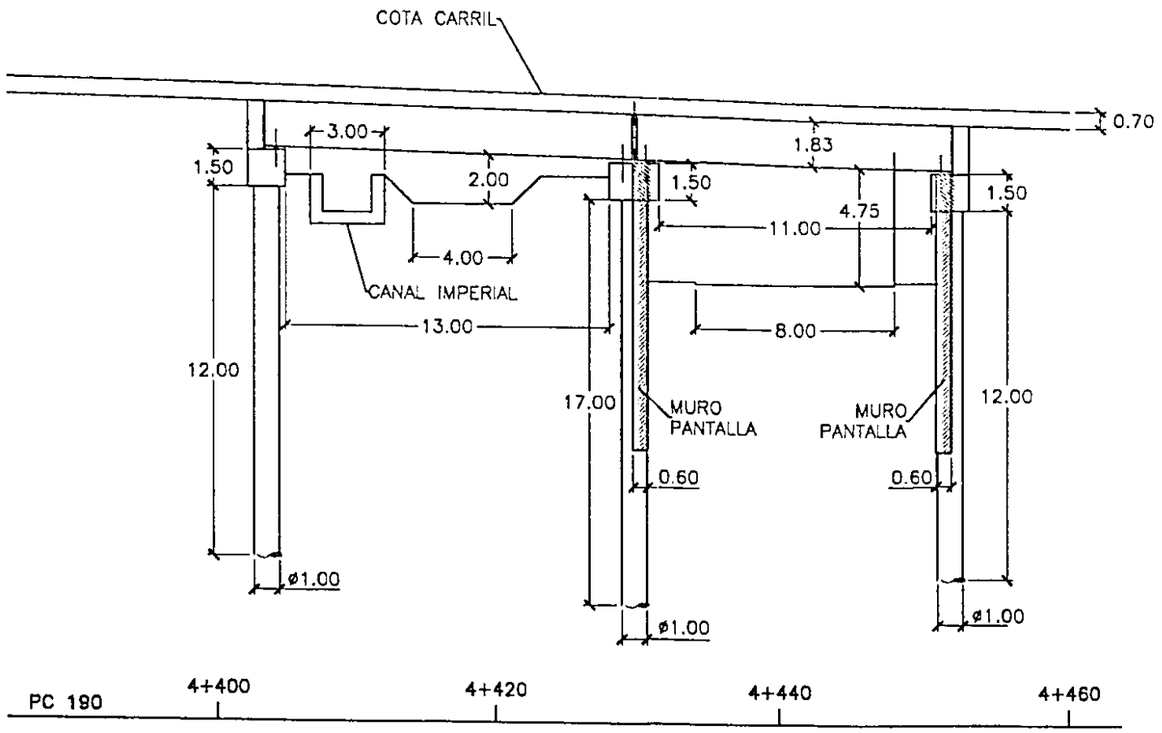
$A_{sb} = 0'3 \cdot 392'1 \cdot 10^3 \left(\frac{85 - 53'2}{100} \right) \cdot \frac{1}{4434'783} = 8'43\ cm^2$

5 Φ 20 a 9 cm

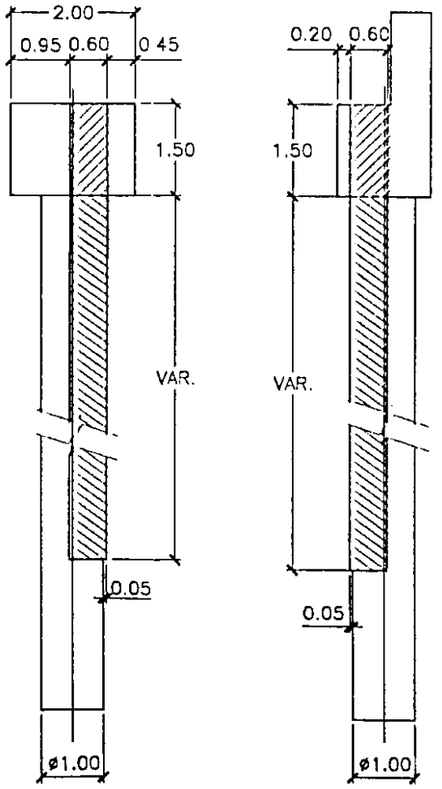
PLANOS



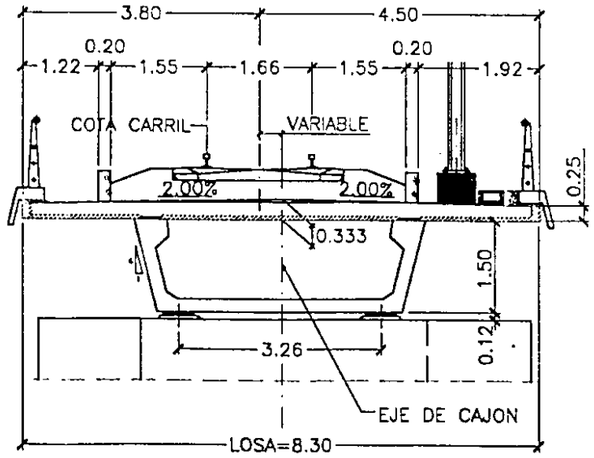
PLANTA
Escala 1:250



ALZADO POR "A"
Escala 1:250

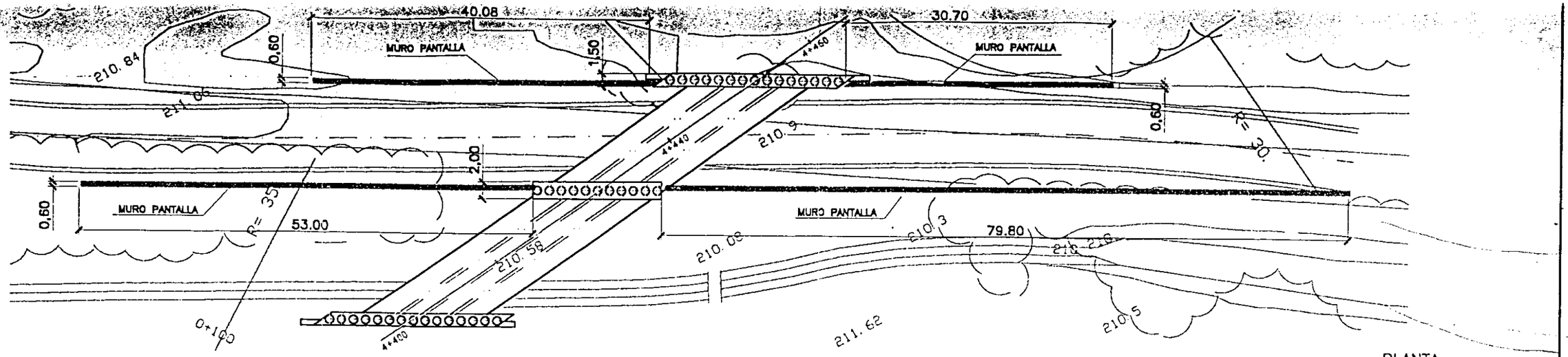


DETALLE MURO PANTALLA
Escala 1:100



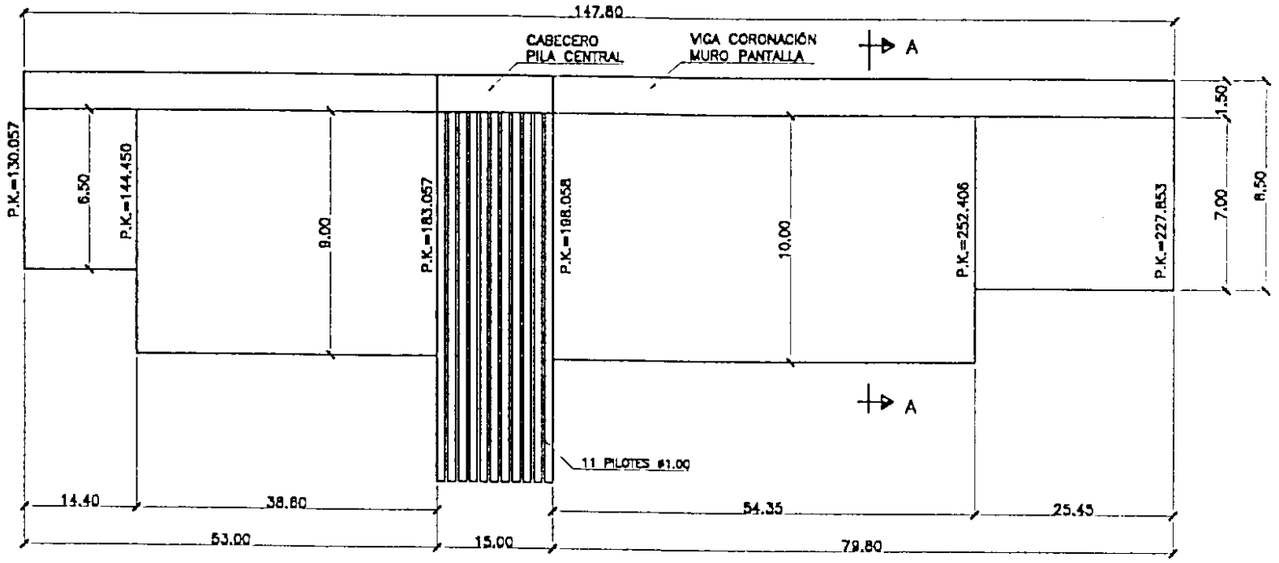
SECCION B-B
Escala 1:100

LINEA DE ALTA VELOCIDAD MADRID-BARCELONA-FRONTERA FRANCESA TRAMO MADRID-ZARAGOZA SUBTRAMO XV. PLATAFORMA	ESCALA: LAS INDICADAS	PROYECTO BASE: DOCUMENTO DOC. 2; Nº DE PLANO 2.9.7 HOJA 1 DE; ARCHIVO: EVN34401.DWG	GENERADOS EN OBRA: Nº DE PLANO 2.9.7; HOJA 1 DE; ARCHIVO DE OBRA: D:\ZARA\E-VN3-4-4\VIEW\E-9-7-1.DWG	REVISION Nº: 1; FECHA: 25/10/00; APROBACION:	DOCUMENTO TIPO: PLANO; CODIGO ENTRADA: 2.9.7/1; ESTADO: VIGENTE; VALIDO CONSTRUCCION: SI; ANULA A: PROYECTO; DE FECHA: FEBRERO-00	TITULO DE PLANO: PUENTES E-VN3-4.4 PLANTA, ALZADO Y SECCIÓN

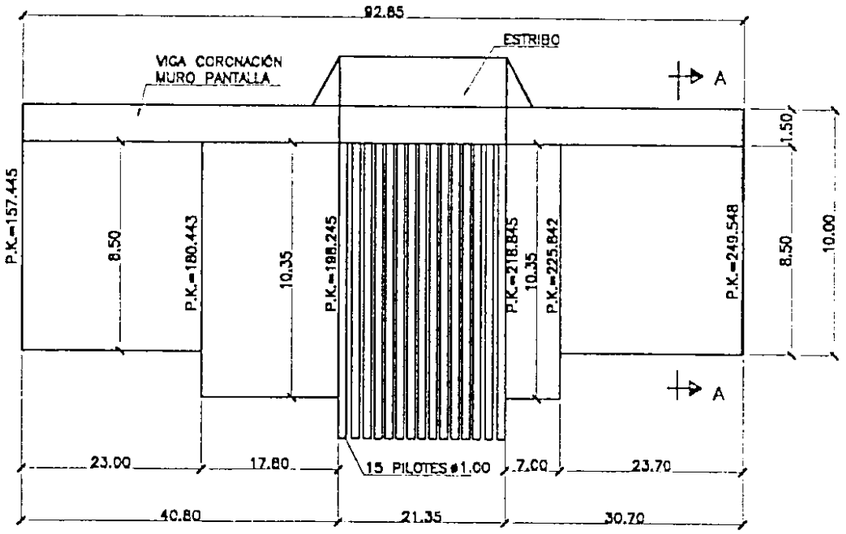


PLANTA
ESCALA 1/500

MURO PANTALLA DERECHO Escala H 1:400 V 1:125

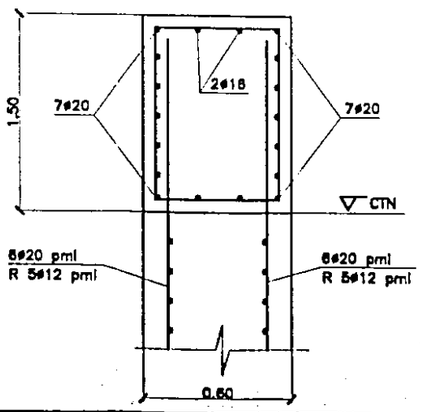


MURO PANTALLA IZQUIERDO Escala H 1:400 V 1:125

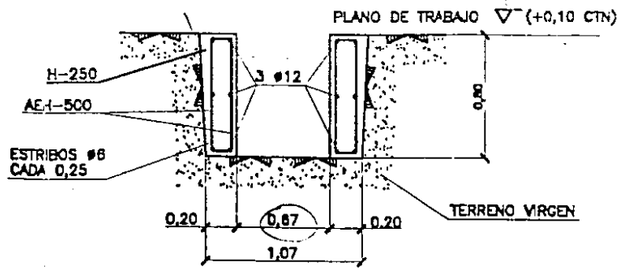


VIGA DE CORONACION
MURO PANTALLA

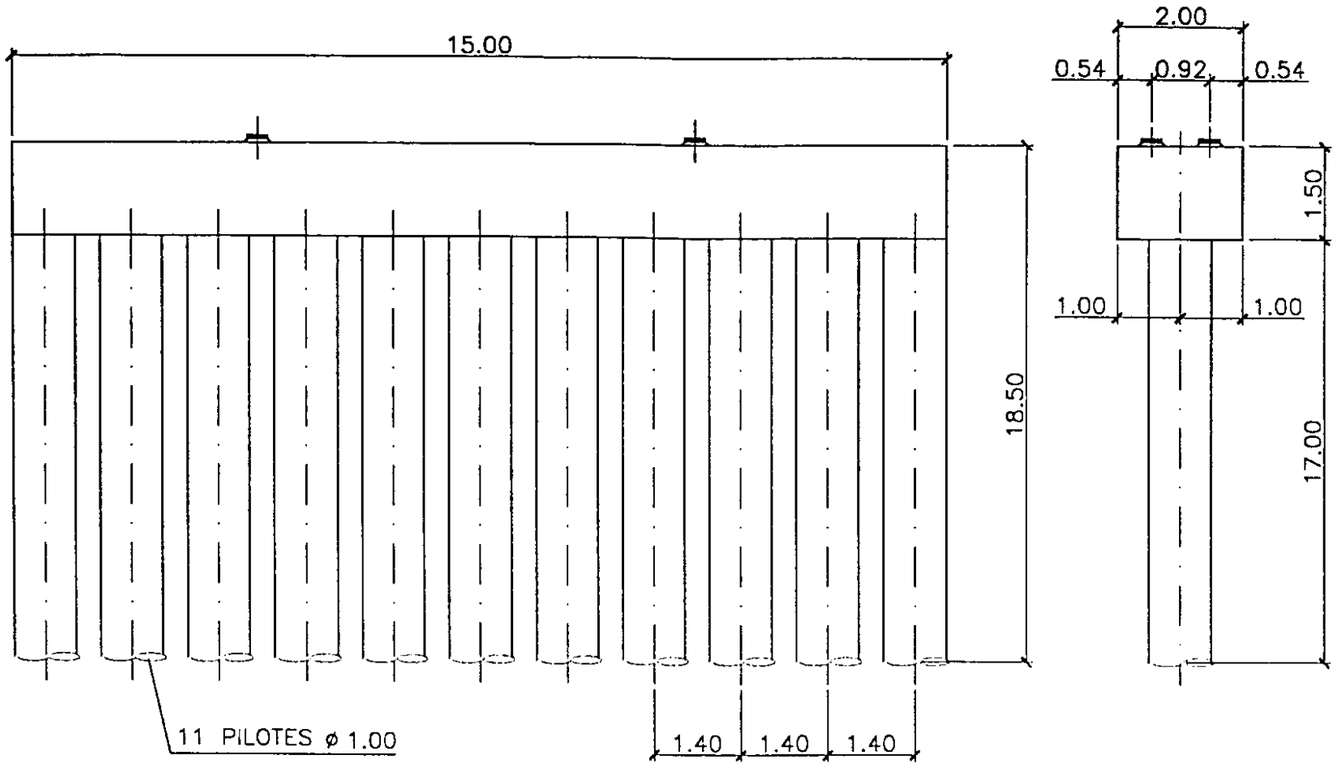
SECCION A-A
ESCALA 1/25

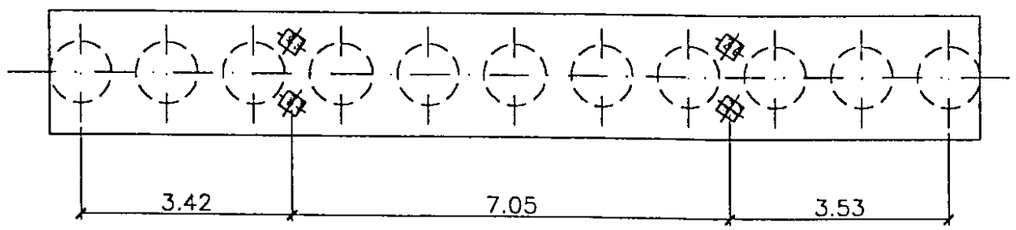


DETALLE MURETES-GUIA
ESCALA 1/40

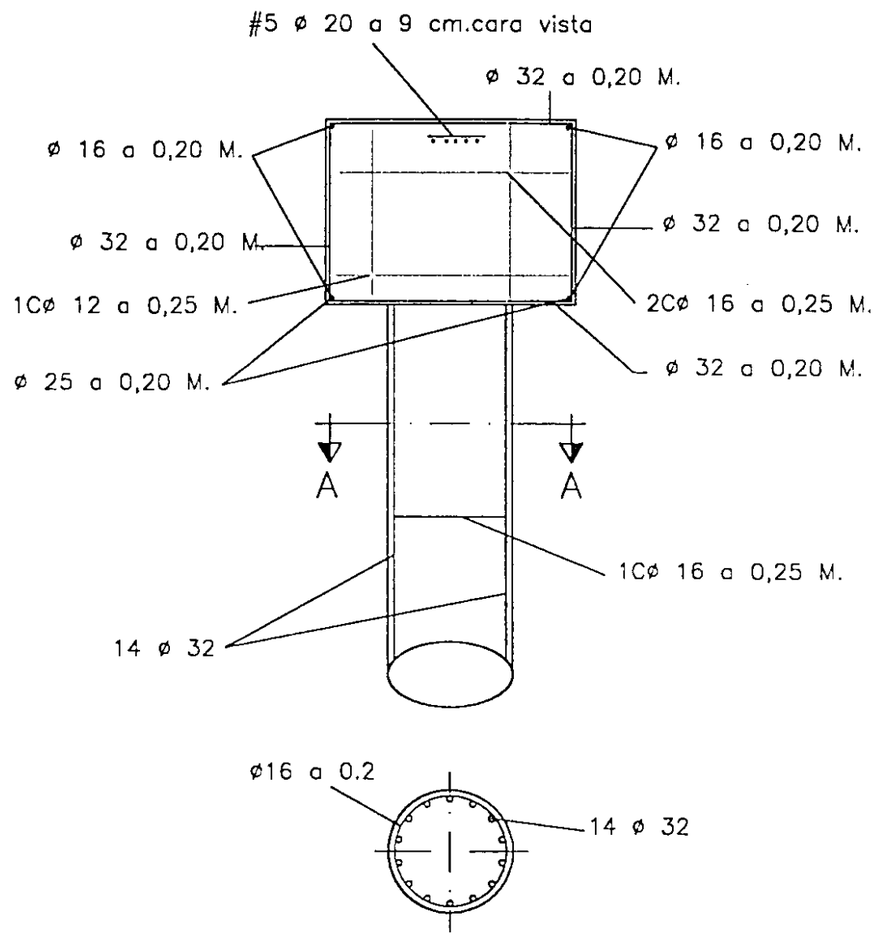


LINEA DE ALTA VELOCIDAD MADRID-BARCELONA-FRONTERA FRANCESA. TRAMO MADRID-ZARAGOZA. SUBTRAMO XV. PLATAFORMA	ESCALA: LAS INDICADAS	PROYECTO BASE: DOCUMENTO DOC. 2; Nº DE PLANO 2.9.7 HOJA 2 DE; ARCHIVO: EVN3440 2.DWG	GENERADOS EN OBRA: Nº DE PLANO 2.9.7; HOJA 2 DE; ARCHIVO DE OBRA: D:\ZARA\E-VN3-4-4\REV1\E-9-7-2.DWG; REVISION Nº: 1; FECHA: 26/10/00; APROBACION:	DOCUMENTO TIPO; CODIGO ENTRADA 2.9.7/1; ESTADO; VALIDO CONSTRUCCION; ANULA A; DE FECHA FEBRERO-00	TITULO DE PLANO: PUENTES E-VN3-4.4 MUROS PANTALLA





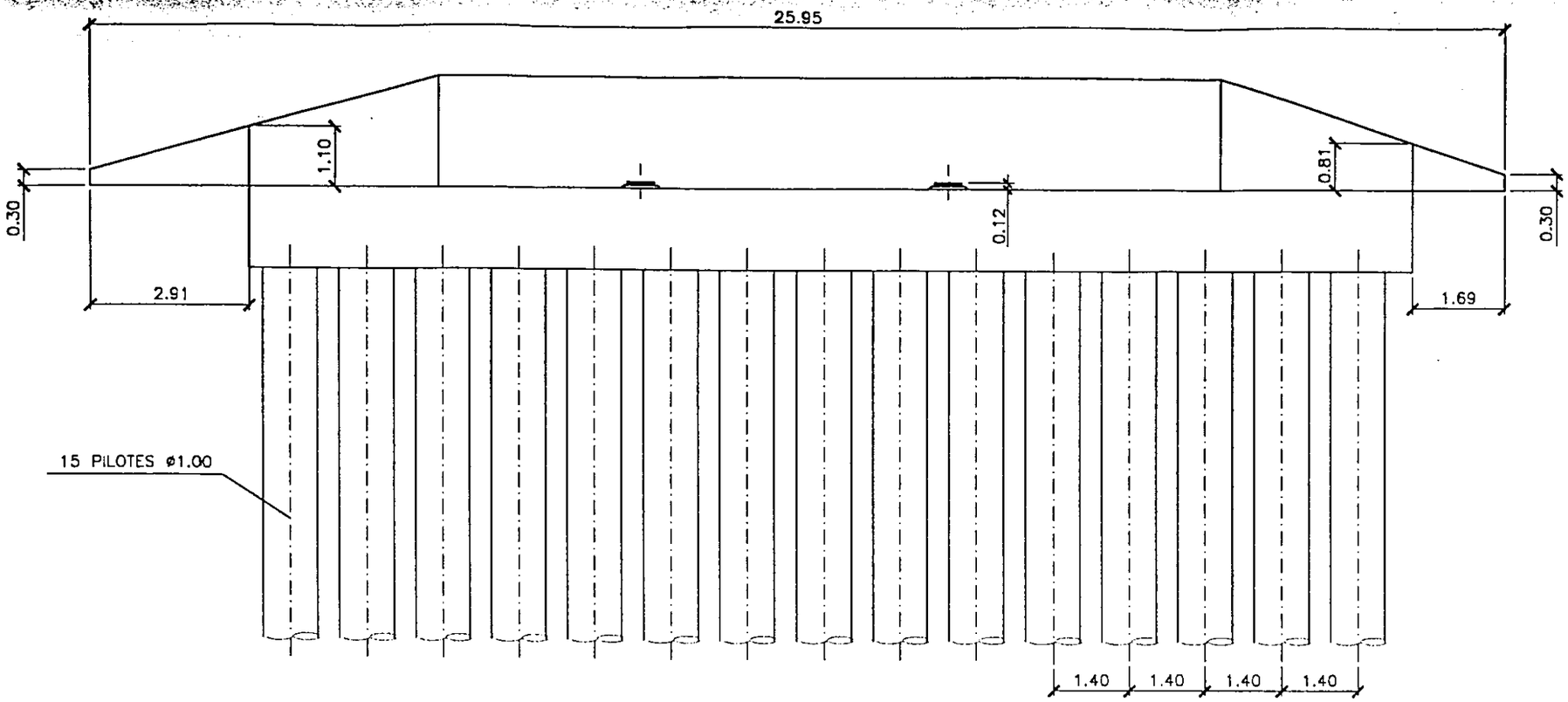
ESCALA 1/100

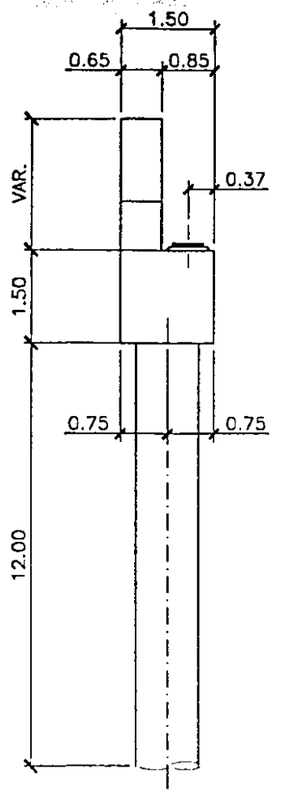


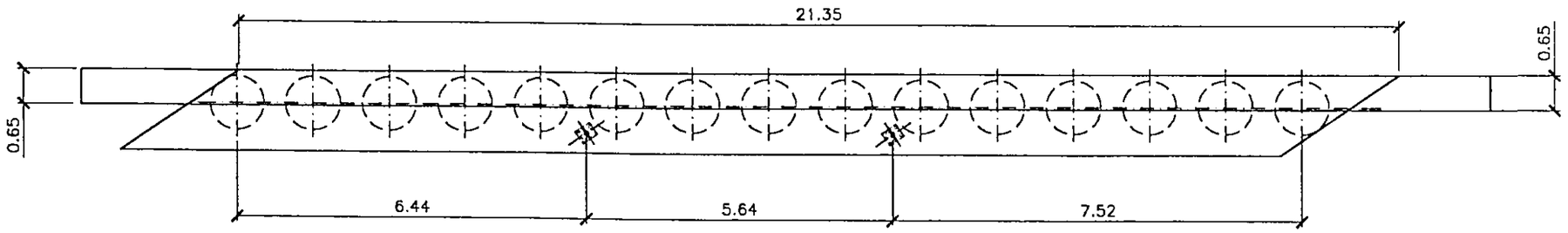
SECCION A–A

ESCALA 1/50

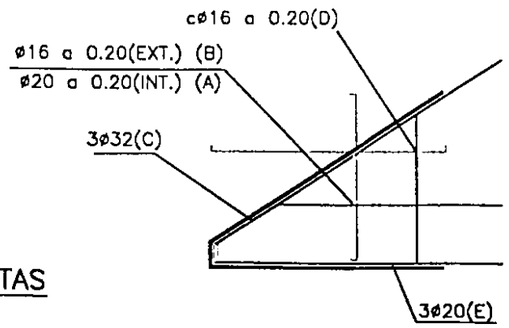
LINEA DE ALTA VELOCIDAD MADRID–BARCELONA–FRONTERA FRANCESA TRAMO MADRID–ZARAGOZA SUBTRAMO XV. PLATAFORMA	ESCALA: LAS INDICADAS	PROYECTO BASE: DOCUMENTO DOC. 2; Nº DE PLANO 2.9.7 HOJA 7 DE; ARCHIVO: EVN34407.DWG	GENERADOS EN OBRA: Nº DE PLANO 2.9.7; HOJA 7 DE; ARCHIVO DE OBRA: D:\ZARA_\E-VN3-4-4\REV1\E-9-7-7.DWG	REVISION Nº: 1; FECHA: 27/10/00; APROBACION:	DOCUMENTO TIPO PLANO; CODIGO ENTRADA E.6.8/7; ESTADO VIGENTE; VALIDO CONSTRUCCION SI; ANULA A PROYECTO; DE FECHA FEBRERO-00	TITULO DE PLANO: PUENTES E-VN3-4.4 PILA.DEFINICION GEOMETRICA-ARMADURA



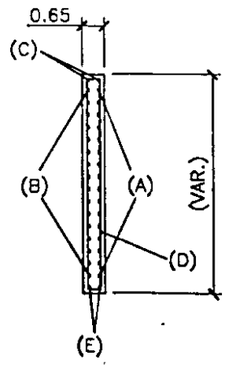


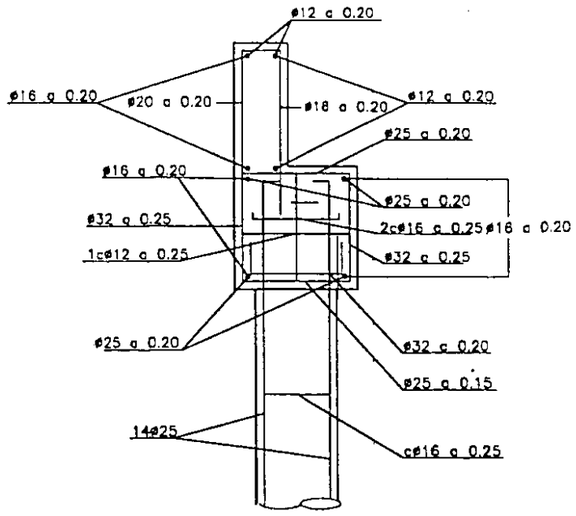


SECCION A-A
ESCALA 1/100



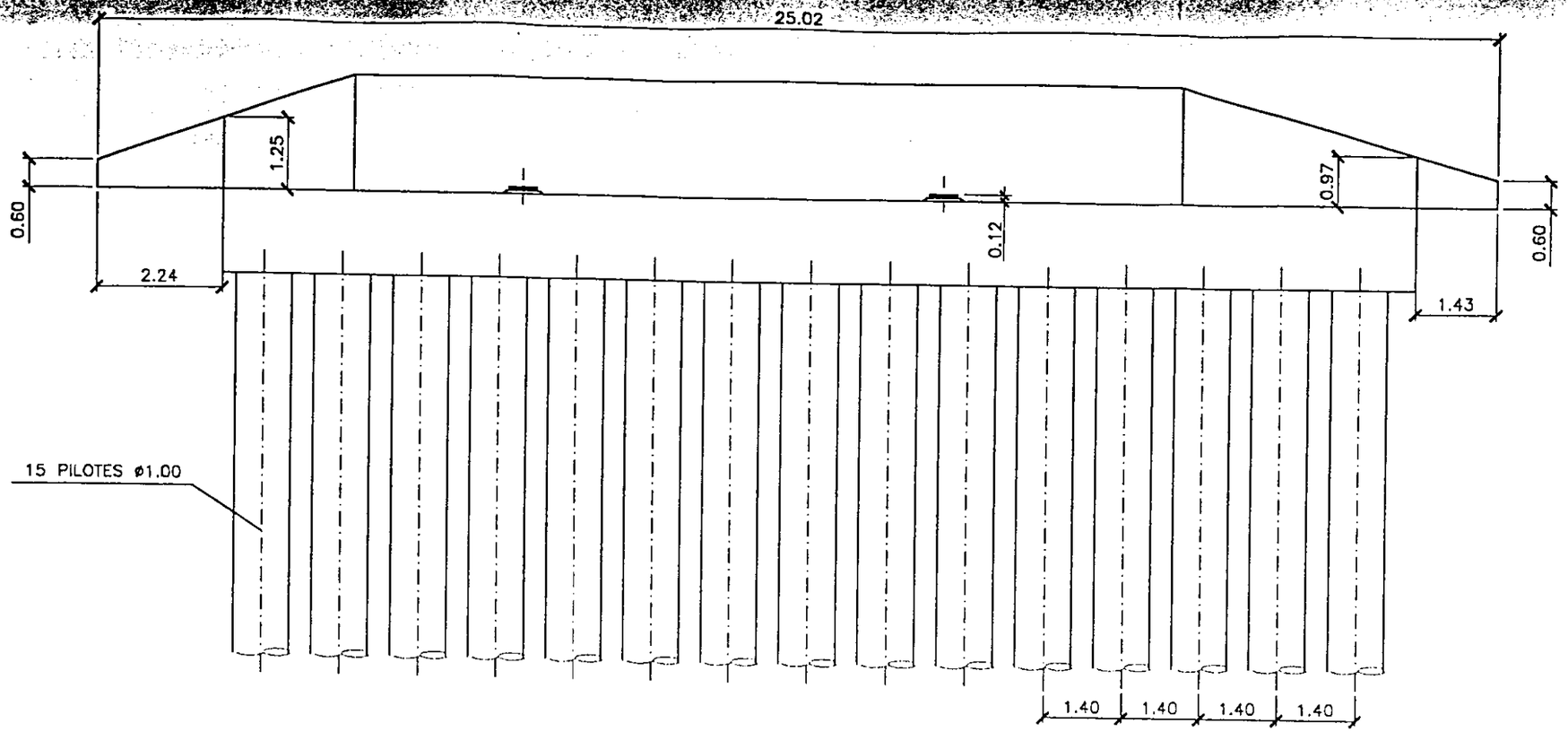
ARMADURA ALETAS
ESCALA 1/75

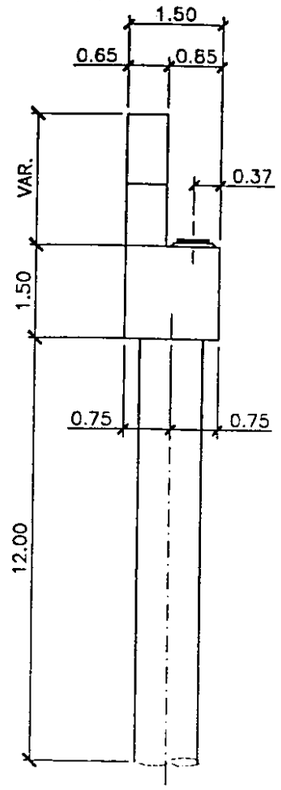


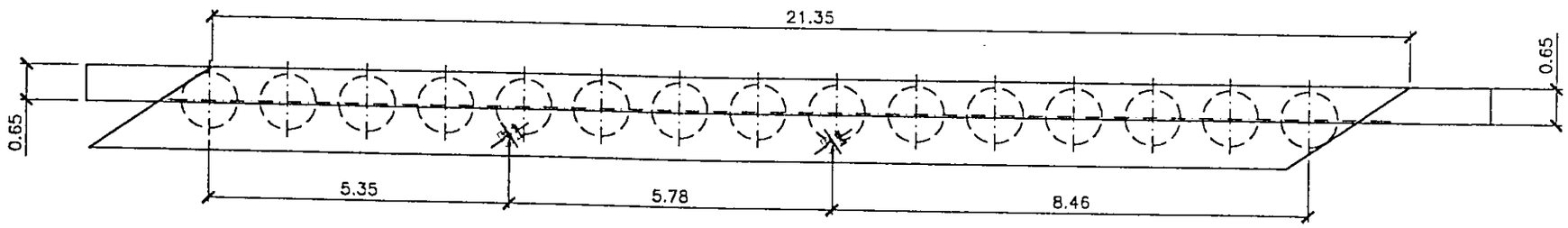


ARMADURA ESTRIBO
ESCALA 1/75

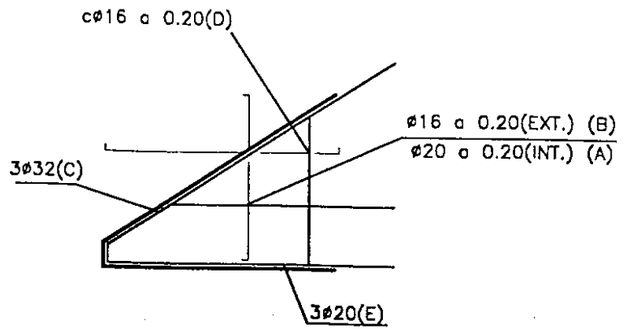
LINEA DE ALTA VELOCIDAD MADRID-BARCELONA-FRONTERA FRANCESA TRAMO MADRID-ZARAGOZA SUBTRAMO IV. PLATAFORMA	ESCALA: LAS INDICADAS	PROYECTO BASE: DOCUMENTO: DOC. 2; Nº DE PLANO: 2.9.7 HOJA 13 DE; ARCHIVO: EVN3404.DWG	GENERADOS EN OBRA: Nº DE PLANO: 2.9.7; HOJA 13 DE; ARCHIVO DE OBRA: D:\VAL\E-VN3-4-4\REV1\2-9-7-8.DWG	REVISION Nº: 1; FECHA: 25/10/00; APROBACION:	DOCUMENTO TIPO: PLANO; ESTADO: VIGENTE; VALIDO CONSTRUCCION: SI; ANULA A: PROYECTO; DE FECHA: FEBRERO-00	TITULO DE PLANO: PUENTES E-VN3-4.4 ESTRIBO-2. DEF. GEOMETRICA-ARMADURA



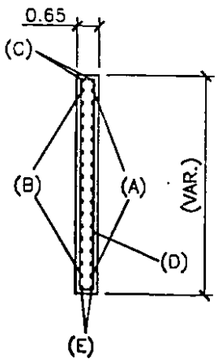


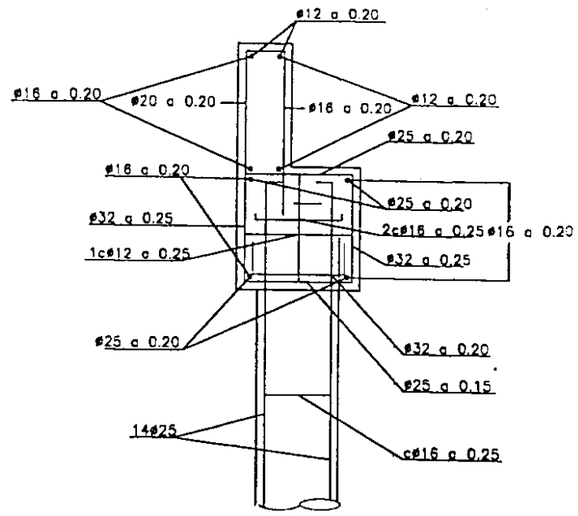


SECCION A-A
ESCALA 1/100



ARMADURA ALETAS
ESCALA 1/75





ARMADURA ESTRIBO
ESCALA 1/75

LINEA DE ALTA VELOCIDAD
MADRID-BARCELONA-FRONTERA FRANCESA
TRAMO MADRID-ZARAGOZA
SUBTRAMO XV. PLATAFORMA

ESCALA
LAS INDICADAS

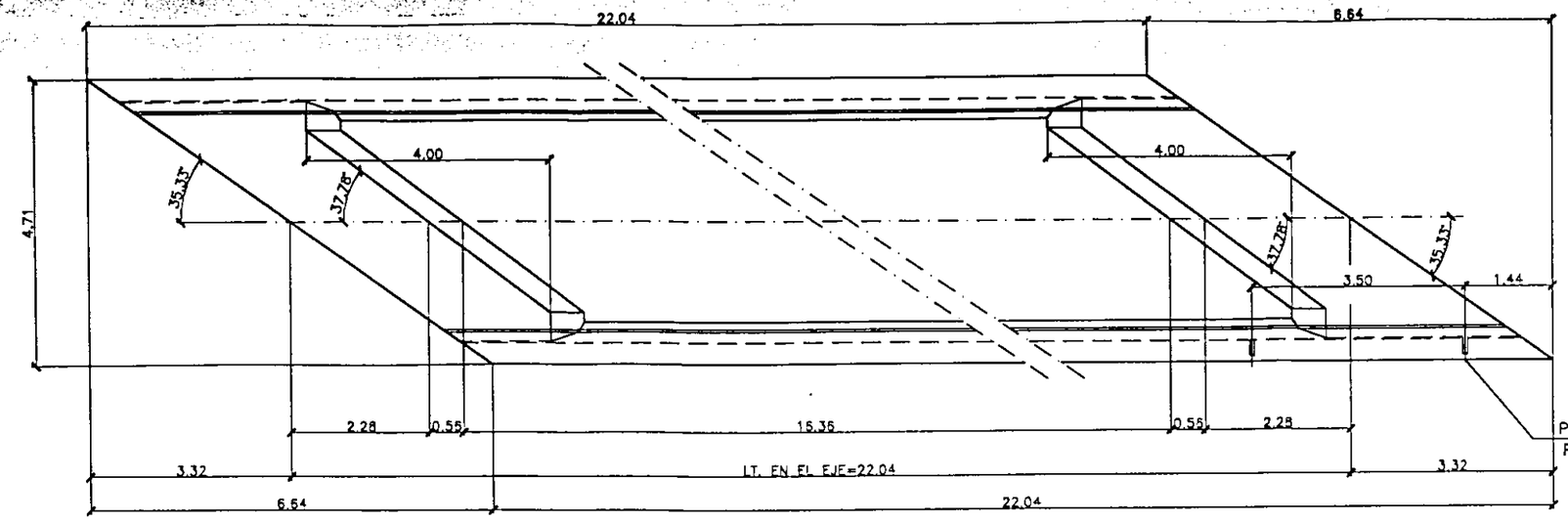
PROYECTO BASE
DOCUMENTO DOC. 2
Nº DE PLANO 2.8.7 HOJA 12 DE
ARCHIVO: EVN34404.DWG

GENERADOS EN OBRA
Nº DE PLANO 2.8.7
HOJA 12 DE
ARCHIVO DE OBRA: D:\VARI\E-VN3-4-4\VEVI\2-8-7-8.DWG

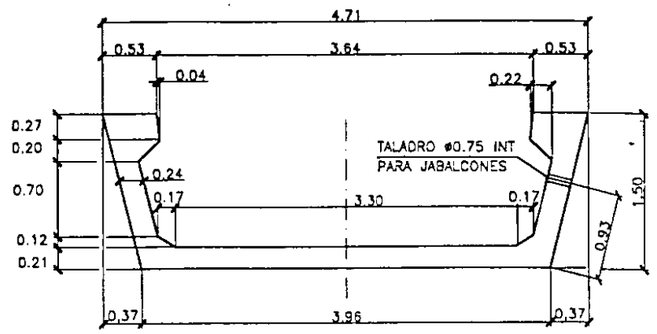
REVISION Nº: 1
FECHA: 25/10/00
APROBACION:

DOCUMENTO TIPO PLANO
CODIGO ENTRADA 2.8.7/11
ESTADO VIGENTE
VALIDO CONSTRUCCION SI
ANULA A
DE FECHA PROYECTO
PERIODO-SS

TITULO DE PLANO
PUENTES
E-VN3-4.4
ESTRIBO-1. DEF. GEOMETRICA.- ARMADURA



PLANTA
ESCALA 1/50



SECCION TRANSVERSAL
ESCALA 1/30

SECCION LONGITUDINAL
(Cotas en cm.)

CERCOS ALA SUPERIOR
HORQUILLAS ALMA
LONG. ZONAS ARMADO
SUSP P.ext 4 d 30
PRETENSADO SUPERIOR

D12a12.5		D10a20	D10a20	D5a20
2Ø20a12.5		2D16a20	D20a20	2Ø12a20
455		100	300	250
400	100	802		
4TD 0.6"				

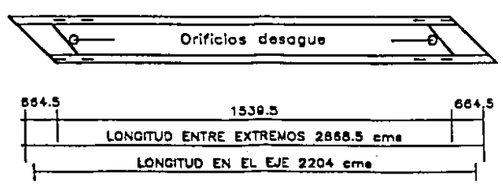
4Ø25 4Ø25 2Ø10 4D10 4D10 2D10 2D10 2D10 2D10 2D10 2D10 2Ø10 13D16
4D10 4D10 Retalles
3Ø 20 EN LOS 1200 cm. EXTREMOS EN EL ANGULO AGUDO + 3Ø 20 EN LOS 400 cm. EXTREMOS EN EL ANGULO OBTUSO

25
150
85

CERCOS ALA INFERIOR
PRETENSADO INFERIOR
LONG ZONAS PRETENSADO
LONGITUDES DE MOLDES EN EJE

2D16a12.5		Ø20+Ø16a20	2D16a20	D16+D10a20
48TD 0.6"		66TD 0.6"	88TD 0.6"	
290		280	532	
228	56	818		

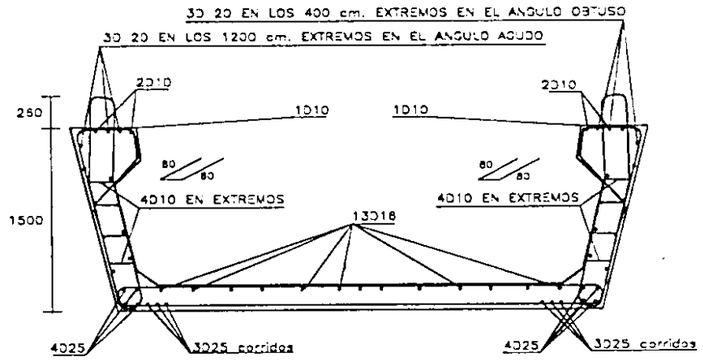
PLANTA ESQUEMATICA



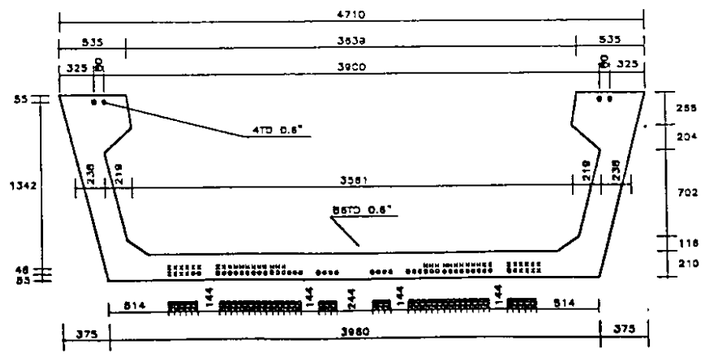
VUELO MAXIMO TRANSPORTE 2.50 M. METROS

CARACTERISTICAS MATERIALES/COEFICIENTES SEGURIDAD SEGUN NORMAS EP93 Y EH91			
MATERIAL	CALIDAD-kg/cm2	CONTROL	CF.SEG
Hormigon	Fck=550	Intenso	Cc=1.4
Acero pasivo	Fyk=5100	Intenso	Cs=1.1
Acero Pretensado	Fmaxk=19000 Fpy=17100	Intenso	Cs=1.1
Acciones	Danos medios	Intenso	Cf=1.50

SEC.TRANSVERSAL:ARMADURA PASIVA
(Cotas en mm)
Armadura de piel 8 D10 por alma y 13 D16 en la base (Todos los hierros no indicados)

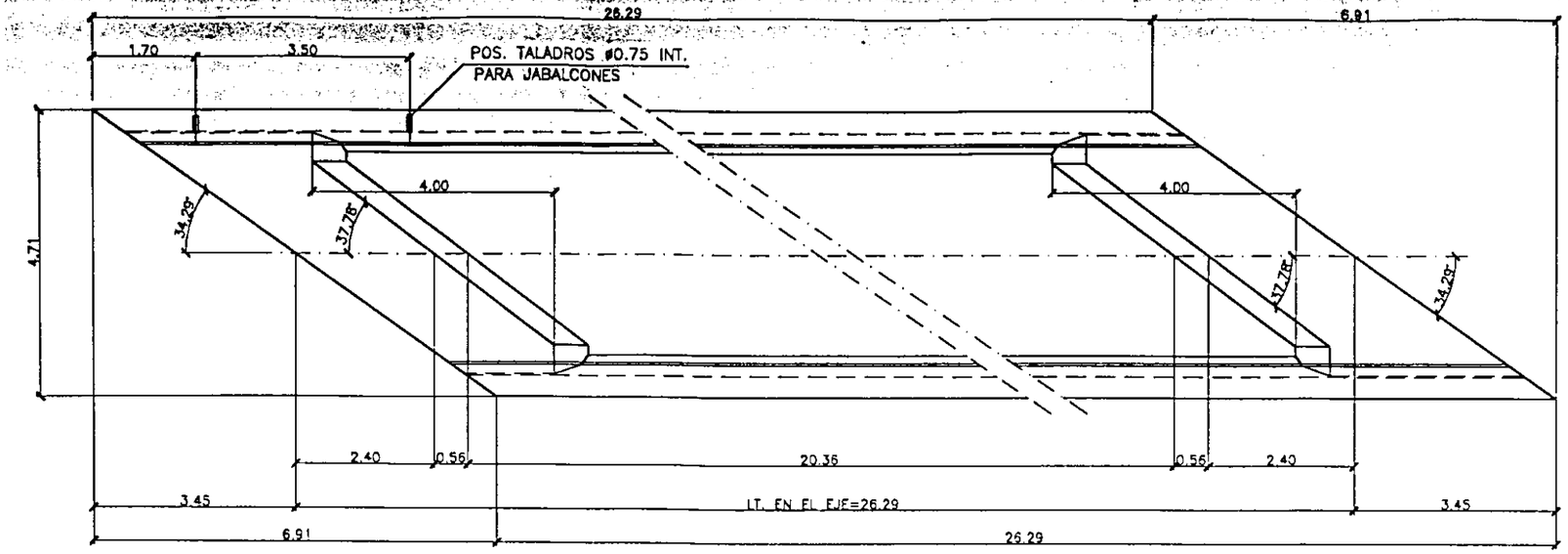


SEC.TRANSVERSAL:FORVA Y PRETENSADO
(Cotas en mm)

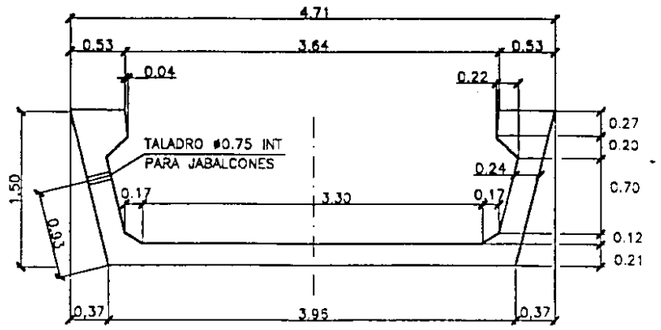


20 Torones X enfundados 290 cms por extremo
20 Torones H enfundados 570 cms por extremo

LINEA DE ALTA VELOCIDAD MADRID-BARCELONA-FRONTERA FRANCESA TRAMO MADRID-ZARAGOZA SUBTRAMO XV. PLATAFORMA	ESCALA LAS INDICADAS	PROYECTO BASE DOCUMENTO Nº DOC. 2 Nº DE PLANO 2.9.7 HOJA 14 DE ARCHIVO: EVN3404.DWG	GENERADOS EN OBRA Nº DE PLANO 2.9.7 HOJA 14 DE ARCHIVO DE OBRA:	REVISION Nº: 1 FECHA: 29/09/00 APROBACION:	DOCUMENTO TIPO 2.9.7/4 CODIGO ENTRADA ESTADO VALIDO CONSTRUCCION HOJA A CONSTRUCCION DE FECHA	TITULO DE PLANO PUENTES E-VN3-4.4 VIGA TIPO "J2". DEFINICION GEOMETRICA Y ARMADURAS

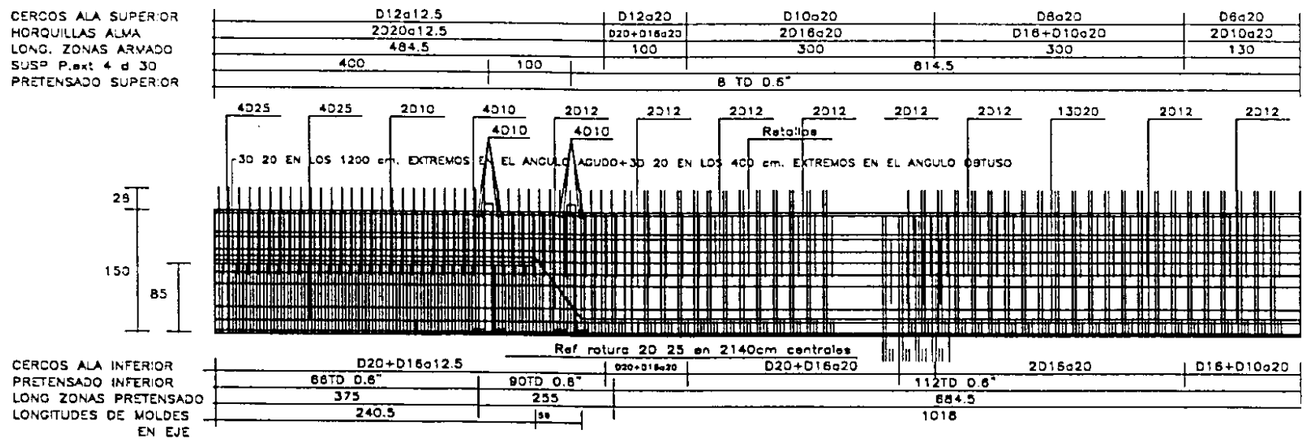


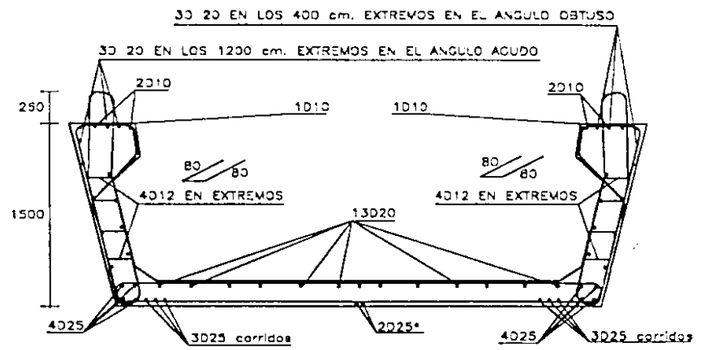
PLANTA
ESCALA 1/50



SECCION TRANSVERSAL
ESCALA 1/30

SECCION LONGITUDINAL (Cotas en cm)

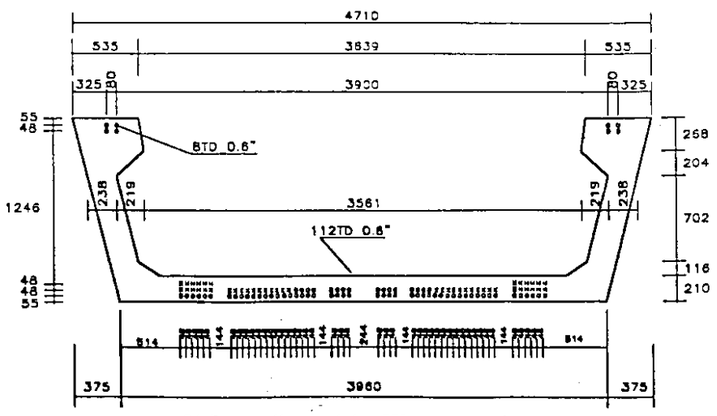




*:Refuerzo rotura solo en 2140 cms centrales

SEC.TRANSVERSAL:ARMADURA PASIVA: (Cotas en mm)
Armadura de piel 8D12 por alma y 13D20 en la base (Todos los hierros no indicados)

SEC.TRANSVERSAL:FORMA Y PRETENSADO: (Cotas en mm)

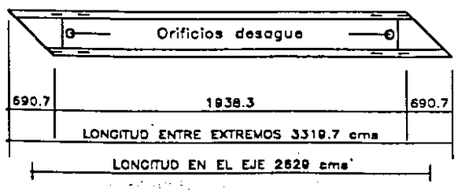


24 Torones X enfundados 375 cms por extremo
22 Torones H enfundados 630 cms por extremo

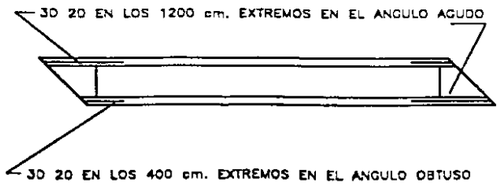
VUELO MAXIMO TRANSPORTE 2.50 M. METROS

CARACTERISTICAS MATERIALES/COEFICIENTES SEGURIDAD SEGUN NORMAS EP93 Y EH91			
MATERIAL	CALIDAD-kg/cm2	CONTROL	CF.SEG
Hormigon	Fck=550	Intenso	Cc=1.4
Acero pasivo	Fyk=5100	Intenso	Cs=1.1
Acero Pretensado	Fmaxk=19000 Fpy=17100	Intenso	Cs=1.1
Acciones	- Danos medios	Intenso	Cf=1.60

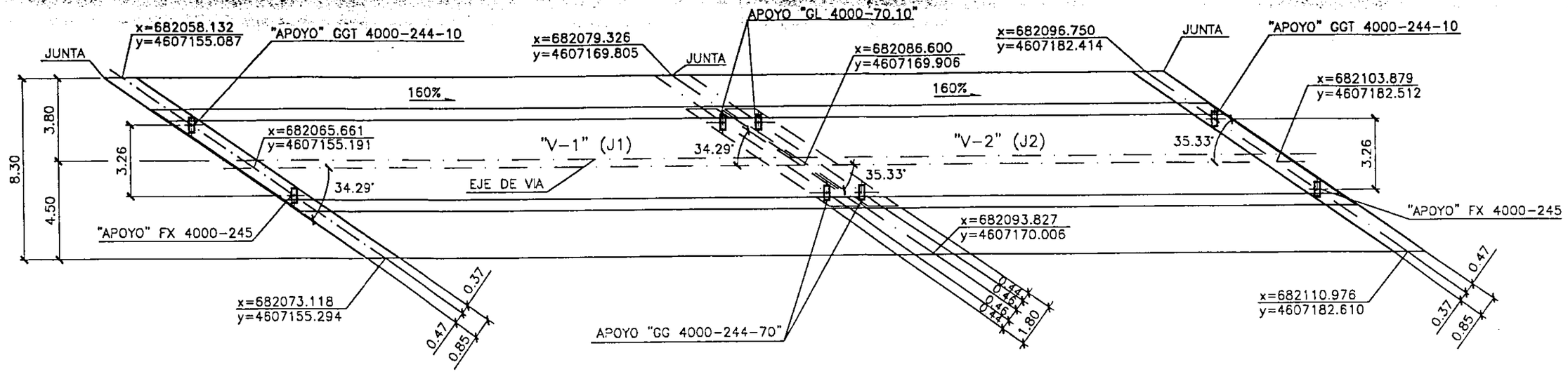
PLANTA ESQUEMATICA



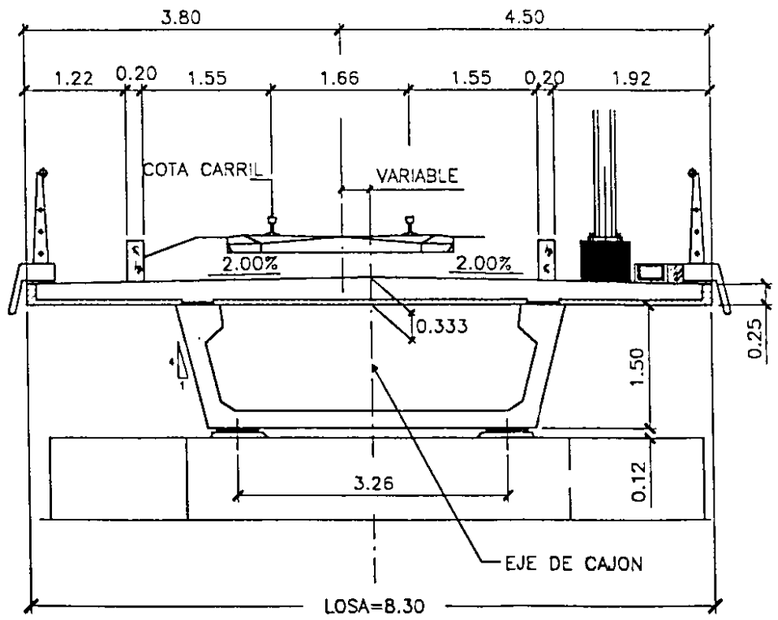
PLANTA ESQUEMATICA
ARMADURA DE REFUERZO EN ALA SUPERIOR EN EXTREMOS



LINEA DE ALTA VELOCIDAD MADRID-BARCELONA-FRONTERA FRANCESA TRAMO MADRID-ZARAGOZA SUBTRAMO DIV. PLATAFORMA	ESCALA LAS INDICADAS	PROYECTO BASE DOCUMENTO DOC. 2 Nº DE PLANO 2.9.7 HOJA 3 DE ARCHIVO: EVN34403.DWG	GENERADOS EN OBRA Nº DE PLANO 2.9.7 HOJA 3 DE ARCHIVO DE OBRA: R:\VAL\E-VN3-4-4\DEV\E-9-7_S.DWG	REVISION Nº: 1 FECHA: 29/09/00 APROBACION:	DOCUMENTO TIPO 2.8.3/3 CODIGO ENTRADA ESTADO VIGENTE VALIDO CONSTRUCCION SI ANULA A PROYECTO DE FECHA	TITULO DE PLANO PUENTES E-VN3-4.4 VIGA TIPO "J1". DEFINICION GEOMETRICA Y ARMADURA



PLANTA
Escala 1/100



SECCION TRANSVERSAL
Escala 1/75

	VIGAS		LONGITUD	LUZ	APOYO DORSAL		APOYO FRONTAL	
	MARCA DE FABRICA	POSICION	TOTAL EN EL EJE	DE CALCULO	X	Y	X	Y
VANO-1	J1	V-1	26.29	24.79	682062.756	4607155.151	682083.039	4607169.397
					682068.541	4607155.231	682088.824	4607169.477
VANO-2	J2	V-2	22.04	20.59	682084.424	4607170.336	682101.054	4607182.473
					682090.060	4607170.414	682106.691	4607182.551

LINEA DE ALTA VELOCIDAD MADRID-BARCELONA-FRONTERA FRANCESA
TRAMO MADRID-ZARAGOZA
SUBTRAMO XV. PLATAFORMA

ESCALA: LAS INDICADAS

PROYECTO BASE
DOCUMENTO DOC. 2
Nº DE PLANO 2.9.7 HOJA X DE
ARCHIVO: EVN344.DWG

GENERADOS EN OBRA
Nº DE PLANO 2.9.7
HOJA 10 DE
ARCHIVO DE OBRA: D:\OBRA\E-VN3-4-4\REV1\2-9-7-P.DWG

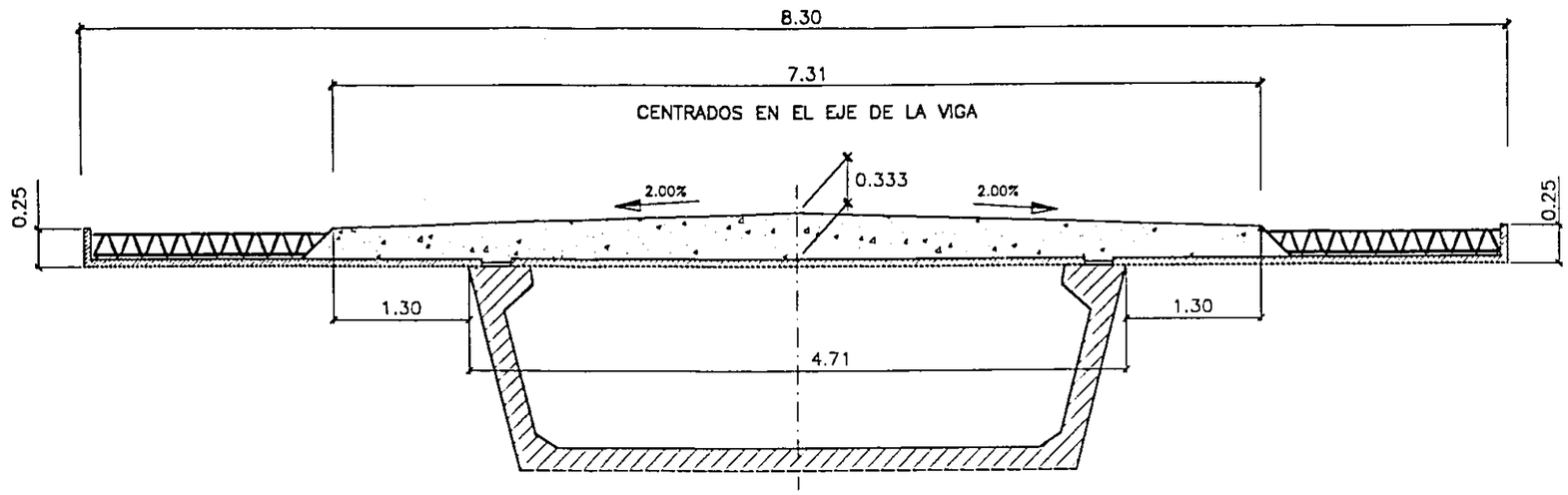
REVISION Nº: 1
FECHA: 03/01/00
APROBACION:

DOCUMENTO TIPO: PLANO
CODIGO ENTRADA: 2.9.7/P → 10
ESTADO: VIGENTE
VALIDO CONSTRUCCION: SI
ANULA A: PROYECTO
DE FECHA: FEBRERO-99

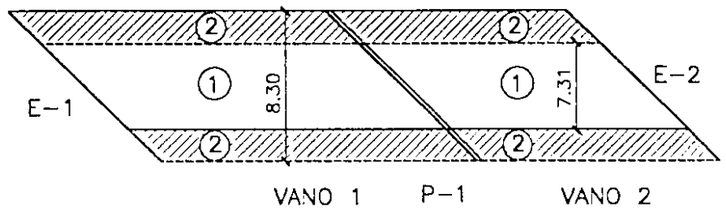
TITULO DE PLANO
PUENTES
E-VN3-4.4
PLANTA REPLANTEO DE VIGAS

10

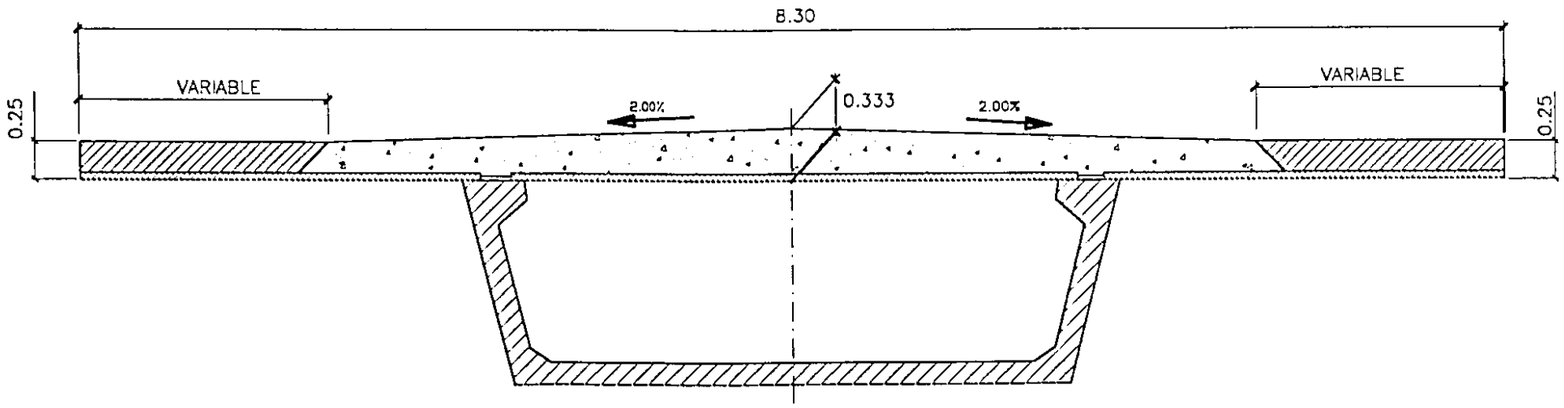
FASE ① DE HORMIGONADO



PLANTA ESQUEMATICA



FASE ② DE HORMIGONADO



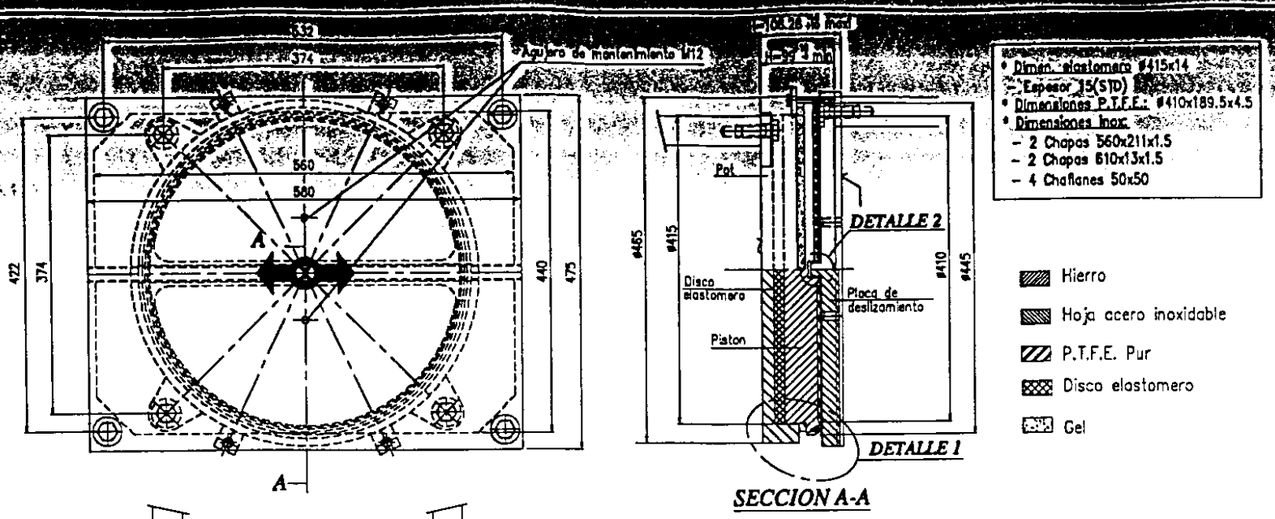
FASES DE HORMIGONADO

1ª FASE.– HORMIGONAR LOS 7.31 m. CENTRALES, (ZONAS MARCADAS CON ①)

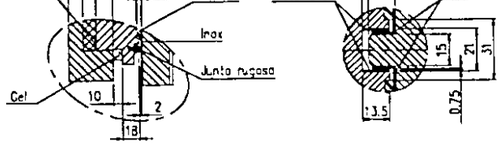
2ª FASE.– HORMIGONAR LOS VUELOS DE LA LOSA, (ZONAS MARCADAS CON ②)

NOTA MUY IMPORTANTE.–

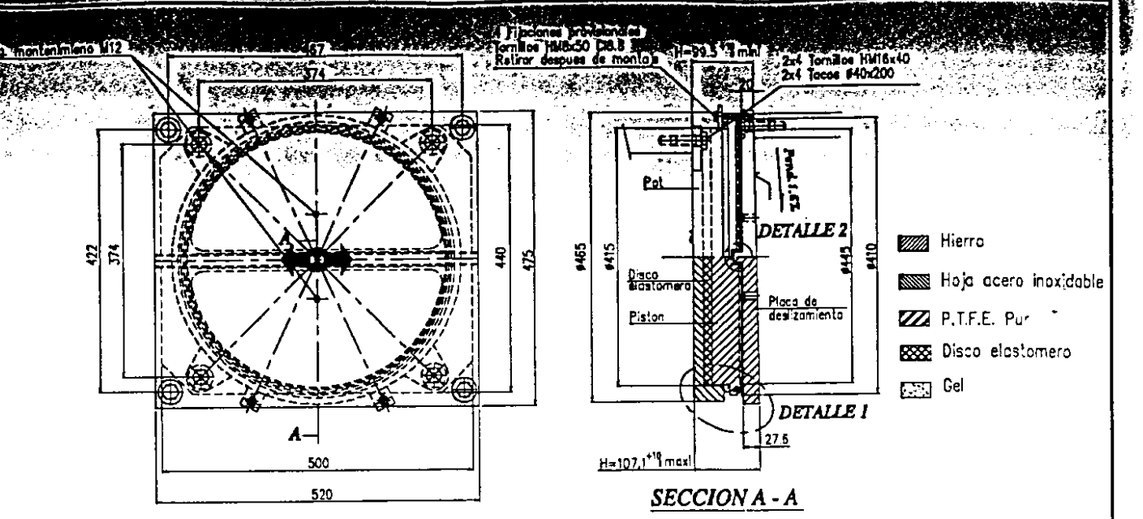
– PARA HORMIGONAR LAS ZONAS MARCADAS CON ② SERA NECESARIO QUE EL HORMIGON DE LAS LOSAS DE LA ZONA ADYACENTE ① HAYA ALCANZADO AL MENOS EL 80% DE LA RESISTENCIA CARACTERISTICA DE PROYECTO (80% DE fck= 250 Kp/cm2) Y CORROBORADO POR LA DIRECCION FACULTATIVA.

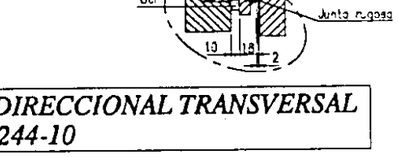


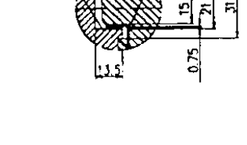
- Dimen. elastomero ø415x14
  - Espesor : 15(STD)
- Dimensiones P.T.F.E.: ø410x189.5x4.5
- Dimensiones Inox:
  - 2 Chapas 560x211x1.5
  - 2 Chapas 610x13x1.5
  - 4 Chaflanes 50x50



POT UNIDIRECCIONAL LONGITUDINAL GG 4000-244-70

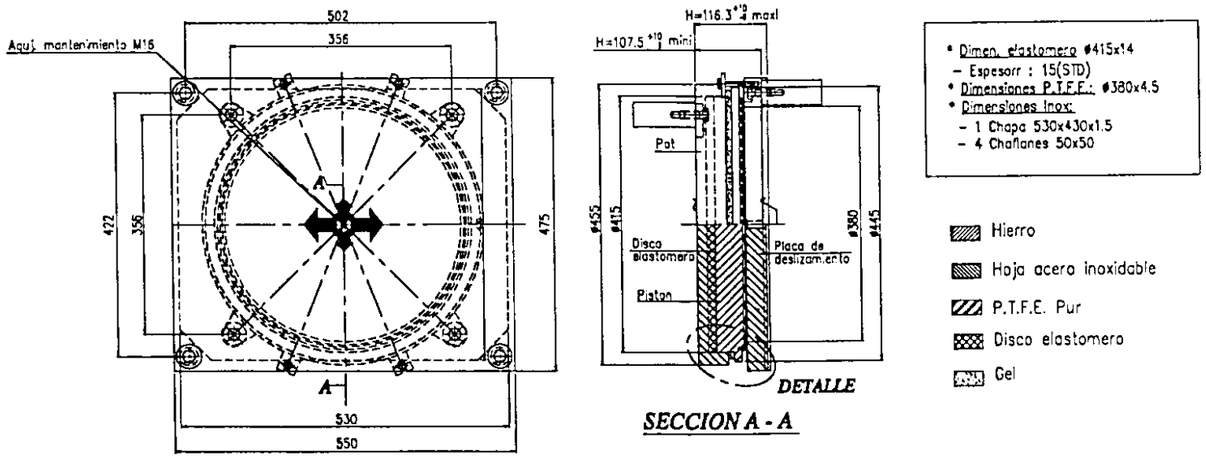




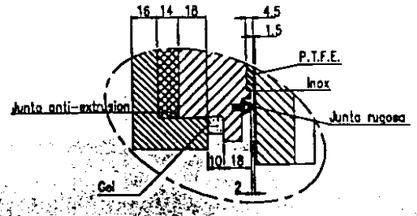


- Dimen. elastomero ø415x14
  - Espesor : 15(STD)
- Dimensiones P.T.F.E.: ø410x189.5x4.5
- Dimensiones Inox:
  - 2 Chapas 500x211x1.5
  - 2 Chapas 550x13x1.5
  - 4 Chaflanes 60x50

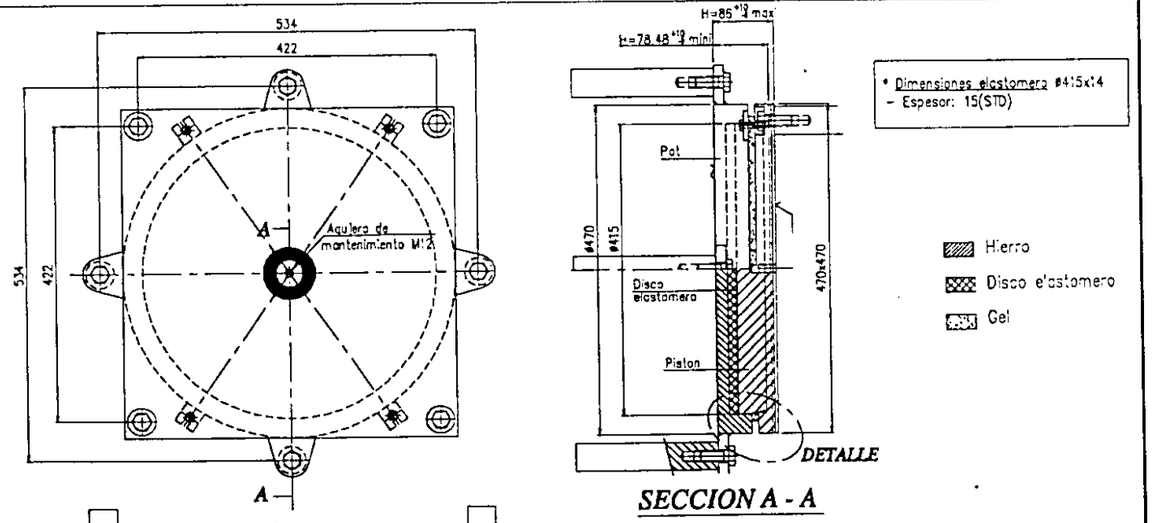
POT UNIDIRECCIONAL TRANSVERSAL GG 4000-244-10



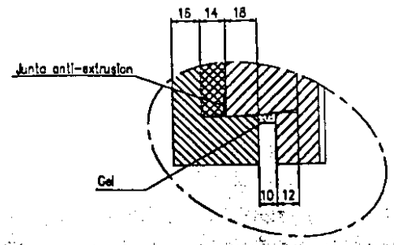
- Dimen. elastomero ø415x14
  - Espesorr : 15(STD)
- Dimensiones P.T.F.E.: ø380x4.5
- Dimensiones Inox:
  - 1 Chapa 530x430x1.5
  - 4 Chaflanes 50x50



POT UNIDIRECCIONAL GG 4000-70.10



- Dimensiones elastomero ø415x14
  - Espesor: 15(STD)



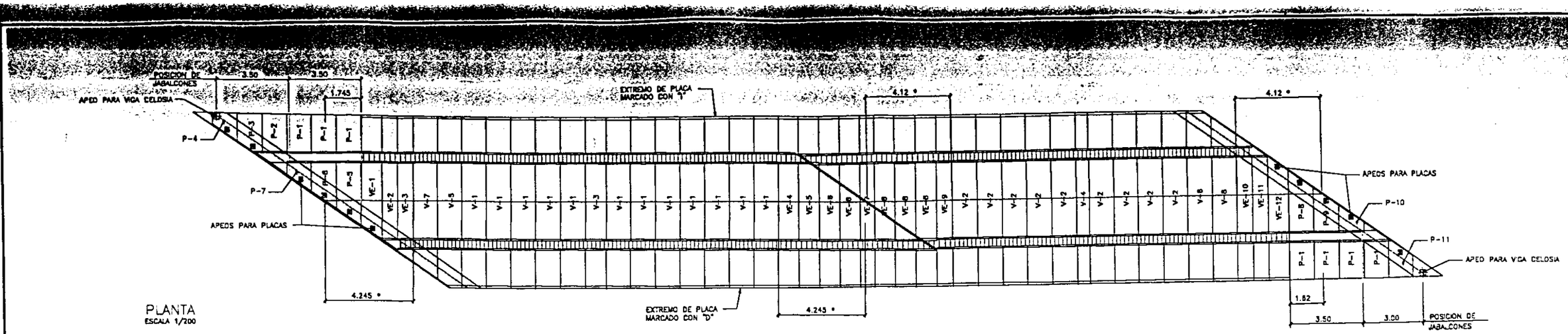
POT FIJO FX 4000-245

LINEA DE ALTA VELOCIDAD MADRID-BARCELONA-FRONTERA FRANCESA TRAMO MADRID-ZARAGOZA SUBTRAMO XV. PLATAFORMA	ESCALA: LAS INDICADAS	PROYECTO BASE: DOCUMENTO: DOC.Nº2 Nº DE PLANO 2.9.7 HOJA 10 DE ARCHIVO: EVN344.DWG	GENERADOS EN OBRA: Nº DE PLANO 2.9.7 HOJA // DE 30 ARCHIVO DE OBRA: D:\ZAMA\E-MC-4-4\REV1\2-9-7-10.DWG

REVISION Nº: 1
FECHA: 04/10/00
APROBACION:

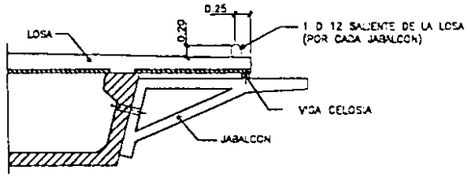
DOCUMENTO TIPO: PLANO
CODIGO ENTRADA: 2.9.7.0C //
ESTADO: VIGENTE
VALIDO CONSTRUCCION EN
ANULA A
DE FECHA: FEBRERO-00

TITULO DE PLANO
PUENTES EVN3-4.4
APOYOS: GG 4000-244-70/GG 4000-244-10
GL 4000-70.10/FX 4000-245



PLANTA
ESCALA 1/200

DETALLE JABALCONES Y HORQUILLAS SALIENTES
ESCALA 1/50



PLACA	N° DE UNID.	LONG. TOTAL	"A"	"C"	"I"	"D"	"E"	TIPO	ESQUEMA
V-1	12	8.30	1.20	3.79	1.81	1.93	0.385	PLACAS DE CELOSIA	
V-2	9	8.30	1.20	3.79	1.83	1.91	0.385		
V-3	1	8.30	1.00	3.79	1.81	1.93	0.385		
V-4	1	8.30	0.80	3.79	1.83	1.91	0.385		
V-5	1	8.30	1.20	3.79	1.81	1.93	0.385		
V-6	1	8.30	1.20	3.79	1.84	1.90	0.385		
V-7	1	7.87	1.20	3.79	1.82	1.49	0.385		
V-8	1	7.86	1.20	3.79	1.51	1.89	0.385		

PLACA	N° DE UNID.	LONG. TOTAL	"A"	"B"	"C"	"I"	"D"	"E"	"F"	TIPO	ESQUEMA
VE-1	1	8.045	1.00	-----	3.82	1.84	-----	0.385	-----	PLACAS DE CELOSIA	
VE-2	1	8.015	0.75	-----	3.79	1.84	-----	0.385	-----		
VE-3	1	7.06	0.75	-----	3.79	1.83	0.97	0.385	-----		
VE-4	1	8.30	0.945	1.02	3.79	1.83	1.91	0.385	-----		
VE-5	1	8.30	1.00	-----	3.80	1.90	1.90	0.325	0.375		
VE-6	2	8.30	1.00	-----	3.77	1.89	1.89	0.375	0.375		
VE-7	1	8.30	0.72	-----	3.80	1.87	1.87	0.38	0.38		
VE-8	3	8.30	1.00	-----	3.83	1.86	1.86	0.375	0.375		
VE-9	1	8.30	0.73	0.805	3.79	1.85	1.89	0.385	-----		
VE-10	1	7.11	0.75	-----	3.79	0.86	1.89	0.385	-----		
VE-11	1	6.055	0.75	-----	3.79	-----	1.89	0.385	-----		
VE-12	1	6.035	1.00	-----	3.77	-----	1.88	0.385	-----		

PLACA	N° DE UNID.	"Lt"	"A"	"B"	TIPO	ESQUEMA
P-1	7	1.88	1.20	-----	GA-60.25.5	
P-2	1	1.90	1.20	-----		
P-3	1	1.92	1.20	-----		
P-4	1	1.37	1.20	0.82		
P-5	1	3.14	1.20	0.82		
P-6	1	2.32	1.20	0.82		
P-7	1	1.50	1.20	0.82		
P-8	1	3.06	1.20	0.85		
P-9	1	2.21	1.20	0.85		
P-10	1	1.36	1.20	0.85		
P-11	1	1.88	1.20	0.85		

.- LAS PLACAS P-1 Y P-2 LLEVARAN 6 HORQUILLAS SOBRESALIENDO 14 cm. EN EL EXTREMO QUE APOYA EN EL JABALCON PARA CONECTAR A LA LOSA.

.- LAS PLACAS P-3, P-4 Y P-11 LLEVARAN 6 HORQUILLAS SOBRESALIENDO 14 cm. EN CADA EXTREMO PARA CONECTAR A LA LOSA Y DEBERAN SER APEADAS POR EL CONTRATISTA DURANTE EL HORMIGONADO DE LA MISMA.

.- LAS PLACAS P-5, P-6, P-7, P-8, P-9 Y P-10 LLEVARAN 6 HORQUILLAS SOBRESALIENDO 14 cm. EN EL EXTREMO ESVIADO PARA CONECTAR A LA LOSA Y DEBERAN SER APEADAS POR EL CONTRATISTA DURANTE EL HORMIGONADO DE LA MISMA.

* .-LAS COTAS DADAS MIDEN LA DISTANCIA ENTRE EL EXTREMO DE LA VIGA MEDIDO EN SU EJE Y LA PRIMERA PLACA CON CELOSIA A 20 cm.

.- LAS PLACAS VE-1 A VE-12 LLEVARAN LA CELOSIA A 25 cm.

LINEA DE ALTA VELOCIDAD MADRID-BARCELONA-FRONTERA FRANCESA
TRAMO MADRID-ZARAGOZA
SUBTRAMO XIV PLATAFORMA

ESCALA: LAS INDICADAS

PROYECTO BASE
DOCUMENTO: DOC. 2
Nº DE PLANO: 2.8.7 HOJA 9 DE
ARCHIVO: EVN3440.DWG

GENERADOS EN OBRA
Nº DE PLANO 2.8.7
HOJA 9 DE
ARCHIVO DE OBRA:

REVISION Nº: 1
FECHA: 28/09/00
APROBACION:

TITULO DE PLANO
PUENTES
E-VN3-4.4
PLANTA DE REPLANTEO DE PLACAS

4.2.7 Puente ED2-1.8

INDICE

1º DEFINICION GEOMETRICA

2º CALCULO DEL TABLERO

3º CALCULO DE PILAS

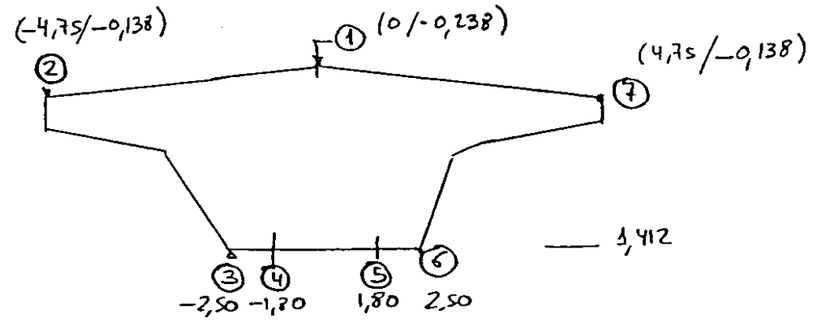
4º CALCULO DE ESTRIBOS

5º PROYECTO DE PRUEBA DE CARGA

PUENTE ED2-1.8

1º DEFINICION GEOMETRICA

```
NOMBRE del EJE : T0051
TRAMO donde se situa la estructura: 10
CASO en que se encuentra la estructura(0-1-2)
0   ....  La seccion de la carretera tiene calzada unica
1   ....  La estructura se situa en la calzada DERECHA
2   ....  La estructura se situa en la calzada IZQUIERDA
CASO=  0
NUMERO de VANOS del tablero:  3
PK Estribo nº1 :        1836.390
PK Pila  nº  1 :        1856.390
PK Pila  nº  2 :        1881.390
PK Estribo nº2 :        1901.390
Distancia eje REP.PLANTA al de la ESTRUCTURA:           .000
ESPESOR del pavimento (en metros):           .000
NUMERO puntos DE REPLANTEO:  7
PUNTO nº..  1 X=            .000 Y=           -.238
PUNTO nº..  2 X=          -4.750 Y=           -.138
PUNTO nº..  3 X=          -2.500 Y=           1.412
PUNTO nº..  4 X=          -1.800 Y=           1.412
PUNTO nº..  5 X=           1.800 Y=           1.412
PUNTO nº..  6 X=           2.500 Y=           1.412
PUNTO nº..  7 X=           4.750 Y=           1.412
NUMERO de puntos que acompañan a los bordes:  0
VANO nº..   1 NUMERO de secciones NORMALES: 21
VANO nº..   2 NUMERO de secciones NORMALES: 21
VANO nº..   3 NUMERO de secciones NORMALES: 21
NUMERO de secciones ESVIADAS a calcular:  4
SECCION Nº..  1  PK=        1836.390   AZIMUT(g)= 43.530
SECCION Nº..  2  PK=        1856.390   AZIMUT(g)= 43.530
SECCION Nº..  3  PK=        1881.390   AZIMUT(g)= 43.530
SECCION Nº..  4  PK=        1901.390   AZIMUT(g)= 43.530
TIPO de tablero (1-2-3-4):  1
VANO..  1 PUNTO..  1  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  2  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  3  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  4  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  5  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  6  Variacion VERTICAL tipo:  1
VANO..  1 PUNTO..  7  Variacion VERTICAL tipo:  1
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VANO..  1 PUNTO..  4  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  5  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  6  Variac. HORIZONTAL tipo:  1
VANO..  1 PUNTO..  7  Variac. HORIZONTAL tipo:  1
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VANO..  2 PUNTO..  6  Variacion VERTICAL tipo:  1
VANO..  2 PUNTO..  7  Variacion VERTICAL tipo:  1
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VANO..  3 PUNTO..  6  Variacion VERTICAL tipo:  1
VANO..  3 PUNTO..  7  Variacion VERTICAL tipo:  1
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VANO..  3 PUNTO..  7  Variac. HORIZONTAL tipo:  1
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ESQUEMA DE PUNTOS DE REPLANTEO

VAN-SEC-PUNTO	P.K.	AZ(g)	X	Y	Z
1 1 1	1836.390	244.383	682232.240	4605861.691	239.664
1 1 2	1836.390	244.383	682235.290	4605865.333	239.564
1 1 3	1836.390	244.383	682233.845	4605863.608	238.014
1 1 4	1836.390	244.383	682233.396	4605863.071	238.014
1 1 5	1836.390	244.383	682231.085	4605860.311	238.014
1 1 6	1836.390	244.383	682230.635	4605859.775	238.014
1 1 7	1836.390	244.383	682229.191	4605858.050	238.014
1 2 1	1837.390	244.357	682233.007	4605861.050	239.674
1 2 2	1837.390	244.357	682236.055	4605864.693	239.574
1 2 3	1837.390	244.357	682234.611	4605862.967	238.024
1 2 4	1837.390	244.357	682234.162	4605862.430	238.024
1 2 5	1837.390	244.357	682231.851	4605859.669	238.024
1 2 6	1837.390	244.357	682231.402	4605859.132	238.024
1 2 7	1837.390	244.357	682229.958	4605857.407	238.024
1 3 1	1838.390	244.332	682233.774	4605860.408	239.684
1 3 2	1838.390	244.332	682236.820	4605864.052	239.584
1 3 3	1838.390	244.332	682235.377	4605862.326	238.034
1 3 4	1838.390	244.332	682234.928	4605861.789	238.034
1 3 5	1838.390	244.332	682232.619	4605859.027	238.034
1 3 6	1838.390	244.332	682232.170	4605858.490	238.034
1 3 7	1838.390	244.332	682230.727	4605856.764	238.034
1 4 1	1839.390	244.306	682234.541	4605859.767	239.694
1 4 2	1839.390	244.306	682237.586	4605863.412	239.594
1 4 3	1839.390	244.306	682236.144	4605861.685	238.044
1 4 4	1839.390	244.306	682235.695	4605861.148	238.044
1 4 5	1839.390	244.306	682233.387	4605858.385	238.044
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1 4 7	1839.390	244.306	682231.496	4605856.121	238.044
1 5 1	1840.390	244.281	682235.309	4605859.126	239.704
1 5 2	1840.390	244.281	682238.353	4605862.772	239.604
1 5 3	1840.390	244.281	682236.911	4605861.045	238.054
1 5 4	1840.390	244.281	682236.462	4605860.508	238.054
1 5 5	1840.390	244.281	682234.155	4605857.744	238.054
1 5 6	1840.390	244.281	682233.707	4605857.206	238.054
1 5 7	1840.390	244.281	682232.265	4605855.479	238.054
1 6 1	1841.390	244.255	682236.077	4605858.485	239.714
1 6 2	1841.390	244.255	682239.119	4605862.133	239.614
1 6 3	1841.390	244.255	682237.678	4605860.405	238.064
1 6 4	1841.390	244.255	682237.230	4605859.867	238.064
1 6 5	1841.390	244.255	682234.924	4605857.103	238.064
1 6 6	1841.390	244.255	682234.475	4605856.565	238.064
1 6 7	1841.390	244.255	682233.034	4605854.837	238.064
1 7 1	1842.390	244.230	682236.845	4605857.845	239.724
1 7 2	1842.390	244.230	682239.886	4605861.493	239.624
1 7 3	1842.390	244.230	682238.445	4605859.765	238.074
1 7 4	1842.390	244.230	682237.997	4605859.227	238.074
1 7 5	1842.390	244.230	682235.692	4605856.462	238.074
1 7 6	1842.390	244.230	682235.244	4605855.924	238.074
1 7 7	1842.390	244.230	682233.804	4605854.196	238.074
1 8 1	1843.390	244.205	682237.613	4605857.204	239.734
1 8 2	1843.390	244.205	682240.653	4605860.855	239.634
1 8 3	1843.390	244.205	682239.213	4605859.126	238.084
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1 8 5	1843.390	244.205	682236.461	4605855.821	238.084
1 8 6	1843.390	244.205	682236.013	4605855.283	238.084
1 8 7	1843.390	244.205	682234.574	4605853.554	238.084
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1 9 4	1844.390	244.179	682239.533	4605857.949	238.094
1 9 5	1844.390	244.179	682237.230	4605855.181	238.094
1 9 6	1844.390	244.179	682236.782	4605854.643	238.094
1 9 7	1844.390	244.179	682235.343	4605852.914	238.094
1 10 1	1845.390	244.154	682239.150	4605855.925	239.754
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1 10 3	1845.390	244.154	682240.748	4605857.848	238.104
1 10 4	1845.390	244.154	682240.301	4605857.310	238.104
1 10 5	1845.390	244.154	682238.000	4605854.541	238.104
1 10 6	1845.390	244.154	682237.552	4605854.003	238.104
1 10 7	1845.390	244.154	682236.114	4605852.273	238.104
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1 11 3	1846.390	244.128	682241.517	4605857.209	238.114
1 11 4	1846.390	244.128	682241.070	4605856.671	238.114
1 11 5	1846.390	244.128	682238.769	4605853.902	238.114
1 11 6	1846.390	244.128	682238.322	4605853.363	238.114
1 11 7	1846.390	244.128	682236.884	4605851.632	238.114
1 12 1	1847.390	244.103	682240.689	4605854.647	239.774
1 12 2	1847.390	244.103	682243.722	4605858.302	239.674
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1 12 7	1847.390	244.103	682237.655	4605850.992	238.124
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1 13 2	1848.390	244.077	682244.491	4605857.665	239.684
1 13 3	1848.390	244.077	682243.054	4605855.933	238.134
1 13 4	1848.390	244.077	682242.608	4605855.394	238.134
1 13 5	1848.390	244.077	682240.309	4605852.623	238.134
1 13 6	1848.390	244.077	682239.863	4605852.085	238.134
1 13 7	1848.390	244.077	682238.426	4605850.353	238.134
1 14 1	1849.390	244.052	682242.228	4605853.371	239.794
1 14 2	1849.390	244.052	682245.259	4605857.028	239.694
1 14 3	1849.390	244.052	682243.824	4605855.296	238.144
1 14 4	1849.390	244.052	682243.377	4605854.757	238.144
1 14 5	1849.390	244.052	682241.080	4605851.985	238.144
1 14 6	1849.390	244.052	682240.633	4605851.446	238.144
1 14 7	1849.390	244.052	682239.198	4605849.713	238.144
1 15 1	1850.390	244.026	682242.999	4605852.733	239.804
1 15 2	1850.390	244.026	682246.028	4605856.391	239.704
1 15 3	1850.390	244.026	682244.593	4605854.658	238.154
1 15 4	1850.390	244.026	682244.147	4605854.119	238.154
1 15 5	1850.390	244.026	682241.851	4605851.346	238.154
1 15 6	1850.390	244.026	682241.404	4605850.807	238.154
1 15 7	1850.390	244.026	682239.969	4605849.074	238.154
1 16 1	1851.390	244.001	682243.769	4605852.095	239.814
1 16 2	1851.390	244.001	682246.796	4605855.755	239.714
1 16 3	1851.390	244.001	682245.362	4605854.022	238.164
1 16 4	1851.390	244.001	682244.916	4605853.482	238.164
1 16 5	1851.390	244.001	682242.621	4605850.708	238.164
1 16 6	1851.390	244.001	682242.175	4605850.169	238.164
1 16 7	1851.390	244.001	682240.741	4605848.435	238.164
1 17 1	1852.390	243.975	682244.539	4605851.458	239.824
1 17 2	1852.390	243.975	682247.566	4605855.119	239.724
1 17 3	1852.390	243.975	682246.132	4605853.385	238.174
1 17 4	1852.390	243.975	682245.686	4605852.845	238.174
1 17 5	1852.390	243.975	682243.392	4605850.071	238.174
1 17 6	1852.390	243.975	682242.946	4605849.531	238.174
1 17 7	1852.390	243.975	682241.513	4605847.797	238.174
1 18 1	1853.390	243.950	682245.310	4605850.821	239.834
1 18 2	1853.390	243.950	682248.335	4605854.483	239.734
1 18 3	1853.390	243.950	682246.902	4605852.749	238.184
1 18 4	1853.390	243.950	682246.457	4605852.209	238.184
1 18 5	1853.390	243.950	682244.164	4605849.433	238.184
1 18 6	1853.390	243.950	682243.718	4605848.893	238.184
1 18 7	1853.390	243.950	682242.285	4605847.159	238.184
1 19 1	1854.390	243.924	682246.081	4605850.184	239.844
1 19 2	1854.390	243.924	682249.105	4605853.848	239.744
1 19 3	1854.390	243.924	682247.673	4605852.112	238.194
1 19 4	1854.390	243.924	682247.227	4605851.573	238.194
1 19 5	1854.390	243.924	682244.936	4605848.796	238.194
1 19 6	1854.390	243.924	682244.490	4605848.256	238.194
1 19 7	1854.390	243.924	682243.058	4605846.521	238.194
1 20 1	1855.390	243.899	682246.853	4605849.548	239.854
1 20 2	1855.390	243.899	682249.875	4605853.213	239.754
1 20 3	1855.390	243.899	682248.443	4605851.477	238.204
1 20 4	1855.390	243.899	682247.998	4605850.937	238.204
1 20 5	1855.390	243.899	682245.708	4605848.159	238.204
1 20 6	1855.390	243.899	682245.262	4605847.619	238.204
1 20 7	1855.390	243.899	682243.831	4605845.883	238.204
1 21 1	1856.390	243.874	682247.625	4605848.912	239.864

1	21	2	1856.390	243.874	682250.645	4605852.578	239.764
1	21	3	1856.390	243.874	682249.214	4605850.841	238.214
1	21	4	1856.390	243.874	682248.769	4605850.301	238.214
1	21	5	1856.390	243.874	682246.480	4605847.523	238.214
1	21	6	1856.390	243.874	682246.035	4605846.982	238.214
1	21	7	1856.390	243.874	682244.604	4605845.246	238.214
2	1	1	1856.390	243.874	682247.625	4605848.912	239.864
2	1	2	1856.390	243.874	682250.645	4605852.578	239.764
2	1	3	1856.390	243.874	682249.214	4605850.841	238.214
2	1	4	1856.390	243.874	682248.769	4605850.301	238.214
2	1	5	1856.390	243.874	682246.480	4605847.523	238.214
2	1	6	1856.390	243.874	682246.035	4605846.982	238.214
2	1	7	1856.390	243.874	682244.604	4605845.246	238.214
2	2	1	1857.640	243.842	682248.589	4605848.117	239.877
2	2	2	1857.640	243.842	682251.608	4605851.785	239.777
2	2	3	1857.640	243.842	682250.178	4605850.047	238.227
2	2	4	1857.640	243.842	682249.733	4605849.507	238.227
2	2	5	1857.640	243.842	682247.446	4605846.727	238.227
2	2	6	1857.640	243.842	682247.001	4605846.187	238.227
2	2	7	1857.640	243.842	682245.571	4605844.450	238.227
2	3	1	1858.890	243.810	682249.555	4605847.323	239.889
2	3	2	1858.890	243.810	682252.572	4605850.992	239.789
2	3	3	1858.890	243.810	682251.143	4605849.254	238.239
2	3	4	1858.890	243.810	682250.698	4605848.713	238.239
2	3	5	1858.890	243.810	682248.412	4605845.933	238.239
2	3	6	1858.890	243.810	682247.967	4605845.392	238.239
2	3	7	1858.890	243.810	682246.538	4605843.654	238.239
2	4	1	1860.140	243.778	682250.521	4605846.529	239.902
2	4	2	1860.140	243.778	682253.535	4605850.200	239.802
2	4	3	1860.140	243.778	682252.107	4605848.461	238.252
2	4	4	1860.140	243.778	682251.663	4605847.920	238.252
2	4	5	1860.140	243.778	682249.378	4605845.138	238.252
2	4	6	1860.140	243.778	682248.934	4605844.598	238.252
2	4	7	1860.140	243.778	682247.506	4605842.859	238.252
2	5	1	1861.390	243.746	682251.487	4605845.736	239.914
2	5	2	1861.390	243.746	682254.500	4605849.408	239.814
2	5	3	1861.390	243.746	682253.072	4605847.669	238.264
2	5	4	1861.390	243.746	682252.628	4605847.128	238.264
2	5	5	1861.390	243.746	682250.345	4605844.345	238.264
2	5	6	1861.390	243.746	682249.901	4605843.804	238.264
2	5	7	1861.390	243.746	682248.473	4605842.064	238.264
2	6	1	1862.640	243.714	682252.453	4605844.944	239.927
2	6	2	1862.640	243.714	682255.464	4605848.617	239.827
2	6	3	1862.640	243.714	682254.038	4605846.877	238.277
2	6	4	1862.640	243.714	682253.594	4605846.336	238.277
2	6	5	1862.640	243.714	682251.312	4605843.552	238.277
2	6	6	1862.640	243.714	682250.868	4605843.010	238.277
2	6	7	1862.640	243.714	682249.442	4605841.270	238.277
2	7	1	1863.890	243.683	682253.420	4605844.151	239.939
2	7	2	1863.890	243.683	682256.429	4605847.826	239.839
2	7	3	1863.890	243.683	682255.004	4605846.086	238.289
2	7	4	1863.890	243.683	682254.560	4605845.544	238.289
2	7	5	1863.890	243.683	682252.279	4605842.759	238.289
2	7	6	1863.890	243.683	682251.836	4605842.217	238.289
2	7	7	1863.890	243.683	682250.410	4605840.476	238.289
2	8	1	1865.140	243.651	682254.387	4605843.360	239.952
2	8	2	1865.140	243.651	682257.395	4605847.036	239.852
2	8	3	1865.140	243.651	682255.970	4605845.295	238.302
2	8	4	1865.140	243.651	682255.527	4605844.753	238.302
2	8	5	1865.140	243.651	682253.247	4605841.967	238.302
2	8	6	1865.140	243.651	682252.804	4605841.425	238.302
2	8	7	1865.140	243.651	682251.379	4605839.683	238.302
2	9	1	1866.390	243.619	682255.355	4605842.568	239.964
2	9	2	1866.390	243.619	682258.361	4605846.247	239.864
2	9	3	1866.390	243.619	682256.937	4605844.504	238.314
2	9	4	1866.390	243.619	682256.494	4605843.962	238.314
2	9	5	1866.390	243.619	682254.216	4605841.175	238.314
2	9	6	1866.390	243.619	682253.773	4605840.633	238.314
2	9	7	1866.390	243.619	682252.349	4605838.890	238.314
2	10	1	1867.640	243.587	682256.323	4605841.777	239.977
2	10	2	1867.640	243.587	682259.327	4605845.457	239.877
2	10	3	1867.640	243.587	682257.904	4605843.714	238.327
2	10	4	1867.640	243.587	682257.462	4605843.172	238.327
2	10	5	1867.640	243.587	682255.185	4605840.383	238.327
2	10	6	1867.640	243.587	682254.742	4605839.841	238.327
2	10	7	1867.640	243.587	682253.319	4605838.098	238.327
2	11	1	1868.890	243.555	682257.292	4605840.987	239.989
2	11	2	1868.890	243.555	682260.294	4605844.668	239.889
2	11	3	1868.890	243.555	682258.872	4605842.925	238.339
2	11	4	1868.890	243.555	682258.429	4605842.382	238.339
2	11	5	1868.890	243.555	682256.154	4605839.592	238.339
2	11	6	1868.890	243.555	682255.712	4605839.050	238.339
2	11	7	1868.890	243.555	682254.290	4605837.306	238.339
2	12	1	1870.140	243.523	682258.261	4605840.197	240.002
2	12	2	1870.140	243.523	682261.261	4605843.880	239.902
2	12	3	1870.140	243.523	682259.840	4605842.136	238.352
2	12	4	1870.140	243.523	682259.398	4605841.593	238.352
2	12	5	1870.140	243.523	682257.124	4605838.802	238.352
2	12	6	1870.140	243.523	682256.682	4605838.259	238.352
2	12	7	1870.140	243.523	682255.260	4605836.515	238.352
2	13	1	1871.390	243.492	682259.230	4605839.408	240.014
2	13	2	1871.390	243.492	682262.228	4605843.092	239.914
2	13	3	1871.390	243.492	682260.808	4605841.347	238.364
2	13	4	1871.390	243.492	682260.366	4605840.804	238.364
2	13	5	1871.390	243.492	682258.094	4605838.012	238.364
2	13	6	1871.390	243.492	682257.652	4605837.469	238.364
2	13	7	1871.390	243.492	682256.231	4605835.724	238.364
2	14	1	1872.640	243.460	682260.199	4605838.619	240.027
2	14	2	1872.640	243.460	682263.196	4605842.305	239.927
2	14	3	1872.640	243.460	682261.777	4605840.559	238.377
2	14	4	1872.640	243.460	682261.335	4605840.016	238.377
2	14	5	1872.640	243.460	682259.064	4605837.223	238.377
2	14	6	1872.640	243.460	682258.622	4605836.680	238.377
2	14	7	1872.640	243.460	682257.203	4605834.934	238.377
2	15	1	1873.890	243.428	682261.170	4605837.831	240.039
2	15	2	1873.890	243.428	682264.164	4605841.518	239.939
2	15	3	1873.890	243.428	682262.746	4605839.772	238.389
2	15	4	1873.890	243.428	682262.304	4605839.228	238.389
2	15	5	1873.890	243.428	682260.035	4605836.434	238.389
2	15	6	1873.890	243.428	682259.593	4605835.890	238.389
2	15	7	1873.890	243.428	682258.175	4605834.144	238.389
2	16	1	1875.140	243.396	682262.140	4605837.043	240.052
2	16	2	1875.140	243.396	682265.133	4605840.732	239.952
2	16	3	1875.140	243.396	682263.715	4605838.984	238.402
2	16	4	1875.140	243.396	682263.274	4605838.441	238.402
2	16	5	1875.140	243.396	682261.006	4605835.645	238.402
2	16	6	1875.140	243.396	682260.565	4605835.102	238.402
2	16	7	1875.140	243.396	682259.147	4605833.355	238.402
2	17	1	1876.390	243.364	682263.111	4605836.256	240.064
2	17	2	1876.390	243.364	682266.102	4605839.946	239.964
2	17	3	1876.390	243.364	682264.685	4605838.198	238.414
2	17	4	1876.390	243.364	682264.244	4605837.654	238.414
2	17	5	1876.390	243.364	682261.977	4605834.857	238.414
2	17	6	1876.390	243.364	682261.536	4605834.314	238.414
2	17	7	1876.390	243.364	682260.120	4605832.566	238.414
2	18	1	1877.640	243.332	682264.082	4605835.469	240.077
2	18	2	1877.640	243.332	682267.071	4605839.160	239.977
2	18	3	1877.640	243.332	682265.655	4605837.412	238.427
2	18	4	1877.640	243.332	682265.215	4605836.868	238.427
2	18	5	1877.640	243.332	682262.949	4605834.070	238.427
2	18	6	1877.640	243.332	682262.509	4605833.526	238.427
2	18	7	1877.640	243.332	682261.093	4605831.777	238.427
2	19	1	1878.890	243.301	682265.054	4605834.683	240.089
2	19	2	1878.890	243.301	682268.041	4605838.376	239.989
2	19	3	1878.890	243.301	682266.626	4605836.626	238.439
2	19	4	1878.890	243.301	682266.186	4605836.082	238.439
2	19	5	1878.890	243.301	682263.922	4605833.283	238.439
2	19	6	1878.890	243.301	682263.481	4605832.739	238.439
2	19	7	1878.890	243.301	682262.066	4605830.990	238.439
2	20	1	1880.140	243.269	682266.026	4605833.897	240.102
2	20	2	1880.140	243.269	682269.011	4605837.591	240.002
2	20	3	1880.140	243.269	682267.597	4605835.841	238.452

2	20	4	1880.140	243.269	682267.157	4605835.297	238.452
2	20	5	1880.140	243.269	682264.894	4605832.497	238.452
2	20	6	1880.140	243.269	682264.454	4605831.952	238.452
2	20	7	1880.140	243.269	682263.040	4605830.202	238.452
2	21	1	1881.390	243.237	682266.998	4605833.111	240.114
2	21	2	1881.390	243.237	682269.982	4605836.807	240.014
2	21	3	1881.390	243.237	682268.568	4605835.057	238.464
2	21	4	1881.390	243.237	682268.129	4605834.512	238.464
2	21	5	1881.390	243.237	682265.867	4605831.711	238.464
2	21	6	1881.390	243.237	682265.428	4605831.166	238.464
2	21	7	1881.390	243.237	682264.014	4605829.415	238.464
3	1	1	1881.390	243.237	682266.998	4605833.111	240.114
3	1	2	1881.390	243.237	682269.982	4605836.807	240.014
3	1	3	1881.390	243.237	682268.568	4605835.057	238.464
3	1	4	1881.390	243.237	682268.129	4605834.512	238.464
3	1	5	1881.390	243.237	682265.867	4605831.711	238.464
3	1	6	1881.390	243.237	682265.428	4605831.166	238.464
3	1	7	1881.390	243.237	682264.014	4605829.415	238.464
3	2	1	1882.390	243.211	682267.776	4605832.483	240.124
3	2	2	1882.390	243.211	682270.758	4605836.180	240.024
3	2	3	1882.390	243.211	682269.346	4605834.429	238.474
3	2	4	1882.390	243.211	682268.906	4605833.884	238.474
3	2	5	1882.390	243.211	682266.646	4605831.082	238.474
3	2	6	1882.390	243.211	682266.207	4605830.537	238.474
3	2	7	1882.390	243.211	682264.794	4605828.786	238.474
3	3	1	1883.390	243.186	682268.555	4605831.856	240.134
3	3	2	1883.390	243.186	682271.536	4605835.554	240.034
3	3	3	1883.390	243.186	682270.124	4605833.802	238.484
3	3	4	1883.390	243.186	682269.684	4605833.257	238.484
3	3	5	1883.390	243.186	682267.425	4605830.454	238.484
3	3	6	1883.390	243.186	682266.986	4605829.909	238.484
3	3	7	1883.390	243.186	682265.574	4605828.157	238.484
3	4	1	1884.390	243.161	682269.334	4605831.228	240.144
3	4	2	1884.390	243.161	682272.313	4605834.928	240.044
3	4	3	1884.390	243.161	682270.902	4605833.175	238.494
3	4	4	1884.390	243.161	682270.463	4605832.630	238.494
3	4	5	1884.390	243.161	682268.205	4605829.826	238.494
3	4	6	1884.390	243.161	682267.766	4605829.281	238.494
3	4	7	1884.390	243.161	682266.354	4605827.529	238.494
3	5	1	1885.390	243.135	682270.113	4605830.601	240.154
3	5	2	1885.390	243.135	682273.090	4605834.302	240.054
3	5	3	1885.390	243.135	682271.680	4605832.549	238.504
3	5	4	1885.390	243.135	682271.241	4605832.003	238.504
3	5	5	1885.390	243.135	682268.984	4605829.199	238.504
3	5	6	1885.390	243.135	682268.545	4605828.653	238.504
3	5	7	1885.390	243.135	682267.135	4605826.900	238.504
3	6	1	1886.390	243.110	682270.892	4605829.974	240.164
3	6	2	1886.390	243.110	682273.868	4605833.676	240.064
3	6	3	1886.390	243.110	682272.458	4605831.923	238.514
3	6	4	1886.390	243.110	682272.020	4605831.377	238.514
3	6	5	1886.390	243.110	682269.764	4605828.571	238.514
3	6	6	1886.390	243.110	682269.325	4605828.026	238.514
3	6	7	1886.390	243.110	682267.916	4605826.272	238.514
3	7	1	1887.390	243.084	682271.671	4605829.348	240.174
3	7	2	1887.390	243.084	682274.646	4605833.051	240.074
3	7	3	1887.390	243.084	682273.237	4605831.297	238.524
3	7	4	1887.390	243.084	682272.799	4605830.751	238.524
3	7	5	1887.390	243.084	682270.544	4605827.944	238.524
3	7	6	1887.390	243.084	682270.106	4605827.399	238.524
3	7	7	1887.390	243.084	682268.697	4605825.645	238.524
3	8	1	1888.390	243.059	682272.451	4605828.722	240.184
3	8	2	1888.390	243.059	682275.424	4605832.426	240.084
3	8	3	1888.390	243.059	682274.016	4605830.672	238.534
3	8	4	1888.390	243.059	682273.578	4605830.126	238.534
3	8	5	1888.390	243.059	682271.324	4605827.318	238.534
3	8	6	1888.390	243.059	682270.886	4605826.772	238.534
3	8	7	1888.390	243.059	682269.478	4605825.018	238.534
3	9	1	1889.390	243.033	682273.231	4605828.096	240.194
3	9	2	1889.390	243.033	682276.203	4605831.802	240.094
3	9	3	1889.390	243.033	682274.795	4605830.046	238.544
3	9	4	1889.390	243.033	682274.357	4605829.500	238.544
3	9	5	1889.390	243.033	682272.105	4605826.692	238.544
3	9	6	1889.390	243.033	682271.667	4605826.146	238.544
3	9	7	1889.390	243.033	682270.259	4605824.391	238.544
3	10	1	1890.390	243.008	682274.011	4605827.471	240.204
3	10	2	1890.390	243.008	682276.981	4605831.177	240.104
3	10	3	1890.390	243.008	682275.574	4605829.421	238.554
3	10	4	1890.390	243.008	682275.137	4605828.875	238.554
3	10	5	1890.390	243.008	682272.886	4605826.066	238.554
3	10	6	1890.390	243.008	682272.448	4605825.520	238.554
3	10	7	1890.390	243.008	682271.041	4605823.764	238.554
3	11	1	1891.390	242.982	682274.792	4605826.845	240.214
3	11	2	1891.390	242.982	682277.760	4605830.553	240.114
3	11	3	1891.390	242.982	682276.354	4605828.797	238.564
3	11	4	1891.390	242.982	682275.917	4605828.250	238.564
3	11	5	1891.390	242.982	682273.667	4605825.440	238.564
3	11	6	1891.390	242.982	682273.229	4605824.894	238.564
3	11	7	1891.390	242.982	682271.823	4605823.137	238.564
3	12	1	1892.390	242.957	682275.572	4605826.220	240.224
3	12	2	1892.390	242.957	682278.540	4605829.929	240.124
3	12	3	1892.390	242.957	682277.134	4605828.172	238.574
3	12	4	1892.390	242.957	682276.697	4605827.626	238.574
3	12	5	1892.390	242.957	682274.448	4605824.815	238.574
3	12	6	1892.390	242.957	682274.011	4605824.268	238.574
3	12	7	1892.390	242.957	682272.605	4605822.511	238.574
3	13	1	1893.390	242.931	682276.354	4605825.596	240.234
3	13	2	1893.390	242.931	682279.319	4605829.306	240.134
3	13	3	1893.390	242.931	682277.915	4605827.548	238.584
3	13	4	1893.390	242.931	682277.477	4605827.002	238.584
3	13	5	1893.390	242.931	682275.230	4605824.190	238.584
3	13	6	1893.390	242.931	682274.793	4605823.643	238.584
3	13	7	1893.390	242.931	682273.388	4605821.885	238.584
3	14	1	1894.390	242.906	682277.135	4605824.971	240.244
3	14	2	1894.390	242.906	682280.099	4605828.683	240.144
3	14	3	1894.390	242.906	682278.695	4605826.925	238.594
3	14	4	1894.390	242.906	682278.258	4605826.378	238.594
3	14	5	1894.390	242.906	682276.011	4605823.565	238.594
3	14	6	1894.390	242.906	682275.575	4605823.018	238.594
3	14	7	1894.390	242.906	682274.170	4605821.260	238.594
3	15	1	1895.390	242.880	682277.916	4605824.348	240.254
3	15	2	1895.390	242.880	682280.879	4605828.060	240.154
3	15	3	1895.390	242.880	682279.475	4605826.302	238.604
3	15	4	1895.390	242.880	682279.039	4605825.755	238.604
3	15	5	1895.390	242.880	682276.793	4605822.941	238.604
3	15	6	1895.390	242.880	682276.356	4605822.394	238.604
3	15	7	1895.390	242.880	682274.953	4605820.635	238.604
3	16	1	1896.390	242.855	682278.698	4605823.724	240.264
3	16	2	1896.390	242.855	682281.659	4605827.438	240.164
3	16	3	1896.390	242.855	682280.256	4605825.679	238.614
3	16	4	1896.390	242.855	682279.820	4605825.131	238.614
3	16	5	1896.390	242.855	682277.575	4605822.317	238.614
3	16	6	1896.390	242.855	682277.139	4605821.769	238.614
3	16	7	1896.390	242.855	682275.736	4605820.010	238.614
3	17	1	1897.390	242.829	682279.480	4605823.101	240.274
3	17	2	1897.390	242.829	682282.440	4605826.816	240.174
3	17	3	1897.390	242.829	682281.037	4605825.056	238.624
3	17	4	1897.390	242.829	682280.601	4605824.509	238.624
3	17	5	1897.390	242.829	682278.358	4605821.693	238.624
3	17	6	1897.390	242.829	682277.922	4605821.146	238.624
3	17	7	1897.390	242.829	682276.520	4605819.386	238.624
3	18	1	1898.390	242.804	682280.262	4605822.478	240.284
3	18	2	1898.390	242.804	682283.220	4605826.194	240.184
3	18	3	1898.390	242.804	682281.819	4605824.434	238.634
3	18	4	1898.390	242.804	682281.383	4605823.886	238.634
3	18	5	1898.390	242.804	682279.141	4605821.069	238.634
3	18	6	1898.390	242.804	682278.705	4605820.522	238.634
3	18	7	1898.390	242.804	682277.303	4605818.762	238.634
3	19	1	1899.390	242.779	682281.045	4605821.855	240.294
3	19	2	1899.390	242.779	682284.002	4605825.572	240.194
3	19	3	1899.390	242.779	682282.601	4605823.812	238.644
3	19	4	1899.390	242.779	682282.165	4605823.264	238.644
3	19	5	1899.390	242.779	682279.924	4605820.446	238.644

3	19	6	1899.390	242.779	682279.488	4605819.898	238.644
3	19	7	1899.390	242.779	682278.088	4605818.138	238.644
3	20	1	1900.390	242.753	682281.827	4605821.233	240.304
3	20	2	1900.390	242.753	682284.783	4605824.951	240.204
3	20	3	1900.390	242.753	682283.383	4605823.190	238.654
3	20	4	1900.390	242.753	682282.947	4605822.642	238.654
3	20	5	1900.390	242.753	682280.707	4605819.823	238.654
3	20	6	1900.390	242.753	682280.272	4605819.275	238.654
3	20	7	1900.390	242.753	682278.872	4605817.514	238.654
3	21	1	1901.390	242.728	682282.610	4605820.610	240.314
3	21	2	1901.390	242.728	682285.564	4605824.330	240.214
3	21	3	1901.390	242.728	682284.165	4605822.568	238.664
3	21	4	1901.390	242.728	682283.730	4605822.020	238.664
3	21	5	1901.390	242.728	682281.491	4605819.201	238.664
3	21	6	1901.390	242.728	682281.056	4605818.653	238.664
3	21	7	1901.390	242.728	682279.656	4605816.891	238.664

SECCIONES ESVIADAS

4

SECC	PUNTO	PK	AZ	X	Y	Z
1	1	1836.391	43.530	682232.241	4605861.691	239.664
1	2	1836.326	43.530	682235.240	4605865.374	239.564
1	3	1836.356	43.530	682233.820	4605863.629	238.014
1	4	1836.366	43.530	682233.377	4605863.087	238.014
1	5	1836.414	43.530	682231.103	4605860.296	238.015
1	6	1836.423	43.530	682230.660	4605859.753	238.015
1	7	1836.454	43.530	682229.239	4605858.009	238.015
2	1	1856.389	43.530	682247.624	4605848.912	239.864
2	2	1856.364	43.530	682250.625	4605852.594	239.764
2	3	1856.378	43.530	682249.205	4605850.849	238.214
2	4	1856.380	43.530	682248.761	4605850.307	238.214
2	5	1856.399	43.530	682246.487	4605847.517	238.214
2	6	1856.404	43.530	682246.046	4605846.973	238.215
2	7	1856.416	43.530	682244.624	4605845.229	238.215
3	1	1881.390	43.530	682266.998	4605833.111	240.114
3	2	1881.412	43.530	682269.999	4605836.793	240.015
3	3	1881.400	43.530	682268.577	4605835.050	238.465
3	4	1881.398	43.530	682268.135	4605834.507	238.464
3	5	1881.381	43.530	682265.861	4605831.716	238.464
3	6	1881.379	43.530	682265.419	4605831.173	238.464
3	7	1881.368	43.530	682263.997	4605829.429	238.464
4	1	1901.390	43.530	682282.610	4605820.610	240.314
4	2	1901.450	43.530	682285.611	4605824.293	240.215
4	3	1901.422	43.530	682284.189	4605822.549	238.665
4	4	1901.412	43.530	682283.747	4605822.006	238.665
4	5	1901.368	43.530	682281.474	4605819.215	238.664
4	6	1901.359	43.530	682281.031	4605818.672	238.664
4	7	1901.330	43.530	682279.609	4605816.928	238.664

PUENTE ED2-1.8

2º CALCULO DEL TABLERO

GINPROSA

ASUNTO
CARGAS ACTUANTES
ED2 -1.8

1) Peso propio $\gamma = 2{,}5$ t/m³

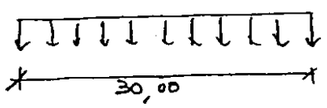
2) Carga muerta

Traviesas + carriles	—	0,52+0,12 = 0,64 t/m.
Balasto	—	5,40 x0,70x1,60 = 6,05 t/m.
Cableado Catenaria	—	0,30x2 = 0,60 t/m.
Barreras	—	0,75x2 = 1,50 t/m.
TOTAL CARGA MUERTA	—	8,8 t/m.

3) Cargas en pasos 0,5 t/m² x 1,75 x2 = 1,75 t/m.

4) TREN TIPO B (IPF-75)

Se supone una carga de 10 t/m aplicada como si fuese una sobrecarga de uso y los 2 t/m de exceso de peso debido a la vía se aplican como un tren de cargas puntuales.

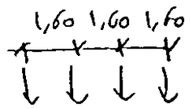


11 cargas puntuales $P = \frac{2 \times 30}{11} = 5{,}5$ ton.

5) TREN TIPO LH71

Carga uniforme de 8 t/m.

4 cargas puntuales de 12,2 ton.



6) TREN SW/0

Sobrecarga 13,3 t/m.

7) TREN SW/2

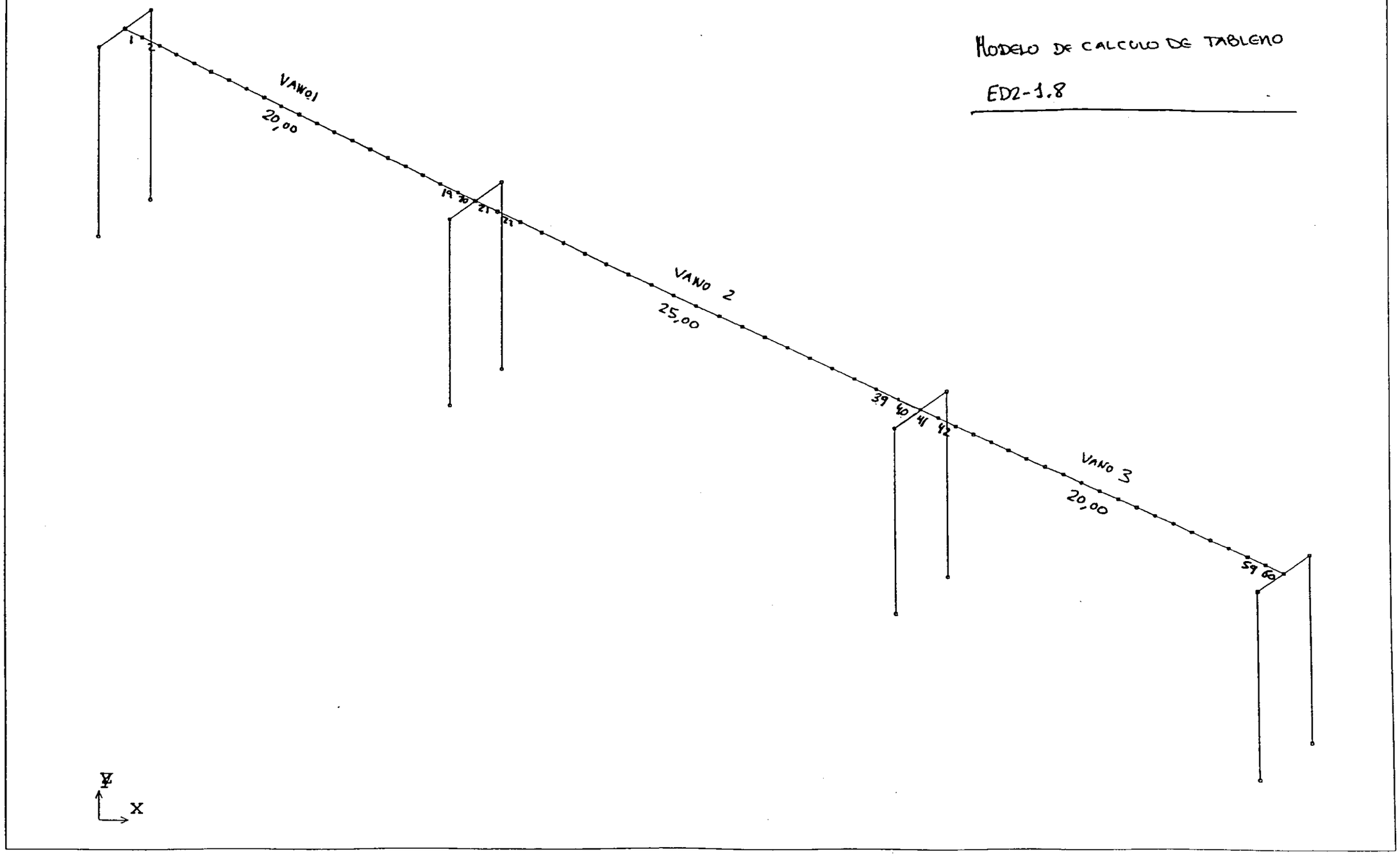
Sobrecarga 15,0 t/m.

Vano	Seccion	Area A (m2)	Inercia I (m4)	Fibra sup. v (m.)	Fibra inf. v' (m.)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ancho Sup. bs (m.)	Ancho cort. bw (m.)	Perimetro u (m.)	Canto volad. hf (m.)	Nº Aliger. na -	Dist. cdg.Alig va (m.)	Separ.Alig sa (m.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Inercia tors. J (m4.)	Inercia eje vert. (m4.)	Coord.sec. X (m.)
1	1	9.893	2.268	0.757	-0.893	1.650	9.500	5.000	5.800	5.000	21.242	0.337	0	0.000	0.000	7.041	0.275	3.800	32.325	0.000
1	2	9.893	2.268	0.757	-0.893	1.650	9.500	5.000	5.800	5.000	21.242	0.337	0	0.000	0.000	7.041	0.275	3.800	32.325	1.000
1	3	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	2.000
1	4	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	3.000
1	5	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	4.000
1	6	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	5.000
1	7	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	6.000
1	8	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	7.000
1	9	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	8.000
1	10	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	9.000
1	11	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	10.000
1	12	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	11.000
1	13	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	12.000
1	14	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	13.000
1	15	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	14.000
1	16	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	15.000
1	17	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	16.000
1	18	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	17.000
1	19	7.537	2.094	0.727	-0.923	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.850	3.200	7.041	0.275	3.800	32.325	18.000
1	20	9.893	2.268	0.757	-0.893	1.650	9.500	5.000	5.800	5.000	21.242	0.337	0	0.000	0.000	7.041	0.275	3.800	32.325	19.000
1	21	9.893	2.268	0.757	-0.893	1.650	9.500	5.000	5.800	5.000	21.242	0.337	0	0.000	0.000	7.041	0.275	3.800	32.325	20.000

Vano	Seccion	Area A (m2)	Inercia I (m4)	Fibra sup. v (m.)	Fibra inf. v' (m.)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ancho Sup. bs (m.)	Ancho cort. bw (m.)	Perimetro u (m.)	Canto volad. hf (m.)	Nº Aliger. na -	Dist. cdg.Alig va (m.)	Separ.Alig sa (m.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Inercia tors. J (m4.)	Inercia eje vert. (m4.)	Coord.sec. X (m.)
2	1	9.893	2.268	0.757	-0.893	1.650	9.500	5.000	5.800	5.000	21.242	0.337	0	0.000	0.000	7.041	0.275	3.800	32.325	0.000
2	2	9.893	2.268	0.757	-0.893	1.650	9.500	5.000	5.800	5.000	21.242	0.337	0	0.000	0.000	7.041	0.275	3.800	32.325	1.250
2	3	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	2.500
2	4	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	3.750
2	5	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	5.000
2	6	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	6.250
2	7	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	7.500
2	8	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	8.750
2	9	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	10.000
2	10	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	11.250
2	11	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	12.500
2	12	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	13.750
2	13	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	15.000
2	14	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	16.250
2	15	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	17.500
2	16	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	18.750
2	17	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	20.000
2	18	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	21.250
2	19	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	22.500
2	20	9.893	2.268	0.757	-0.893	1.650	9.500	5.000	5.800	5.000	21.242	0.337	0	0.000	0.000	7.041	0.275	3.800	32.325	23.750
2	21	9.893	2.268	0.757	-0.893	1.650	9.500	5.000	5.800	5.000	21.242	0.337	0	0.000	0.000	7.041	0.275	3.800	32.325	25.000

Vano	Seccion	Area A (m2)	Inercia I (m4)	Fibra sup. v (m.)	Fibra inf. v' (m.)	Canto h (m.)	Ancho b (m.)	Ancho Inf. bi (m.)	Ancho Sup. bs (m.)	Ancho cort. bw (m.)	Perimetro u (m.)	Canto volad. hf (m.)	Nº Aliger. na -	Dist. cdg.Alig va (m.)	Separ.Alig sa (m.)	Area Tors. Ae (m2)	Canto Tors. he (m.)	Inercia tors. J (m4.)	Inercia eje vert. (m4.)	Coord.sec. X (m.)
3	1	9.893	2.268	0.757	-0.893	1.650	9.500	5.000	5.800	5.000	21.242	0.337	0	0.000	0.000	7.041	0.275	3.800	32.325	0.000
3	2	9.893	2.268	0.757	-0.893	1.650	9.500	5.000	5.800	5.000	21.242	0.337	0	0.000	0.000	7.041	0.275	3.800	32.325	1.000
3	3	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	2.000
3	4	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	3.000
3	5	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	4.000
3	6	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	5.000
3	7	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	6.000
3	8	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	7.000
3	9	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	8.000
3	10	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	9.000
3	11	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	10.000
3	12	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	11.000
3	13	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	12.000
3	14	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	13.000
3	15	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	14.000
3	16	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	15.000
3	17	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	16.000
3	18	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	17.000
3	19	7.537	2.121	0.759	-0.891	1.650	9.500	5.000	5.800	2.000	21.242	0.337	3	0.750	3.200	7.203	0.218	3.582	32.325	18.000
3	20	9.893	2.268	0.757	-0.893	1.650	9.500	5.000	5.800	5.000	21.242	0.337	0	0.000	0.000	7.041	0.275	3.800	32.325	19.000
3	21	9.893	2.268	0.757	-0.893	1.650	9.500	5.000	5.800	5.000	21.242	0.337	0	0.000	0.000	7.041	0.275	3.800	32.325	20.000

GeoStar 2.0 (64K Version)

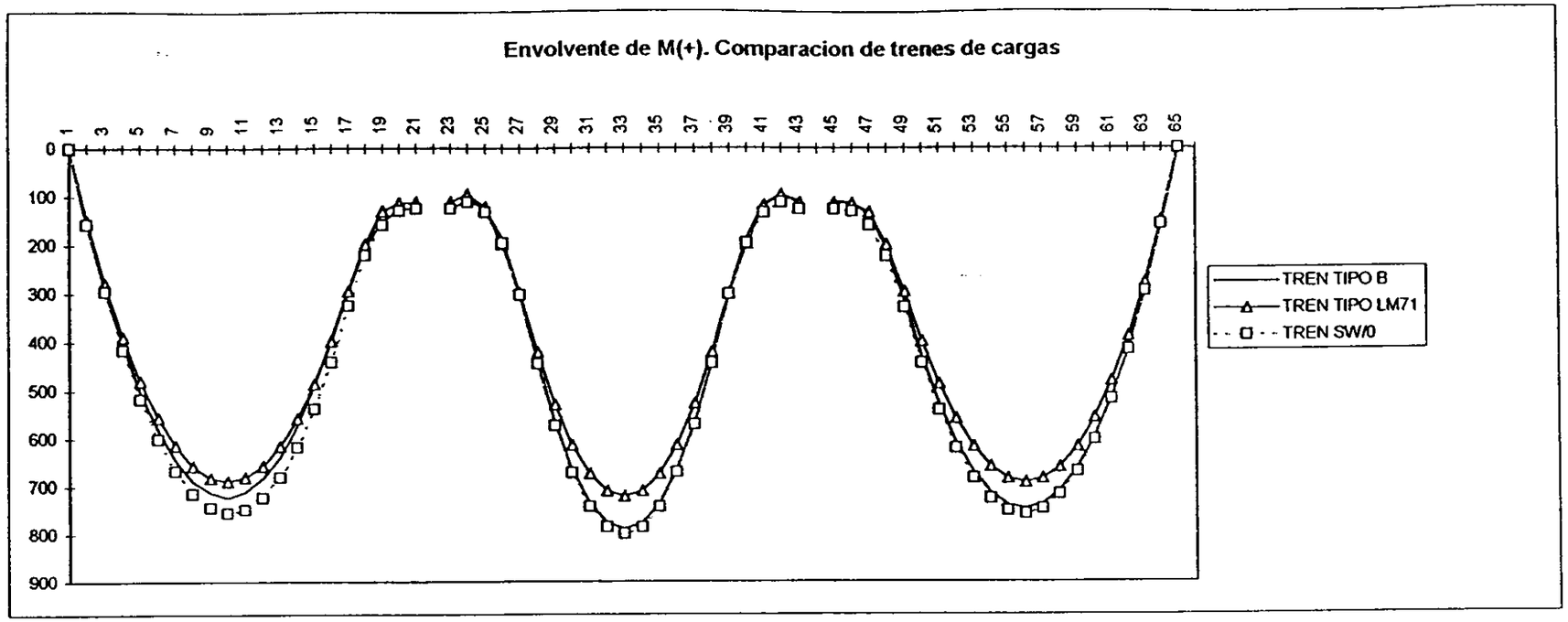


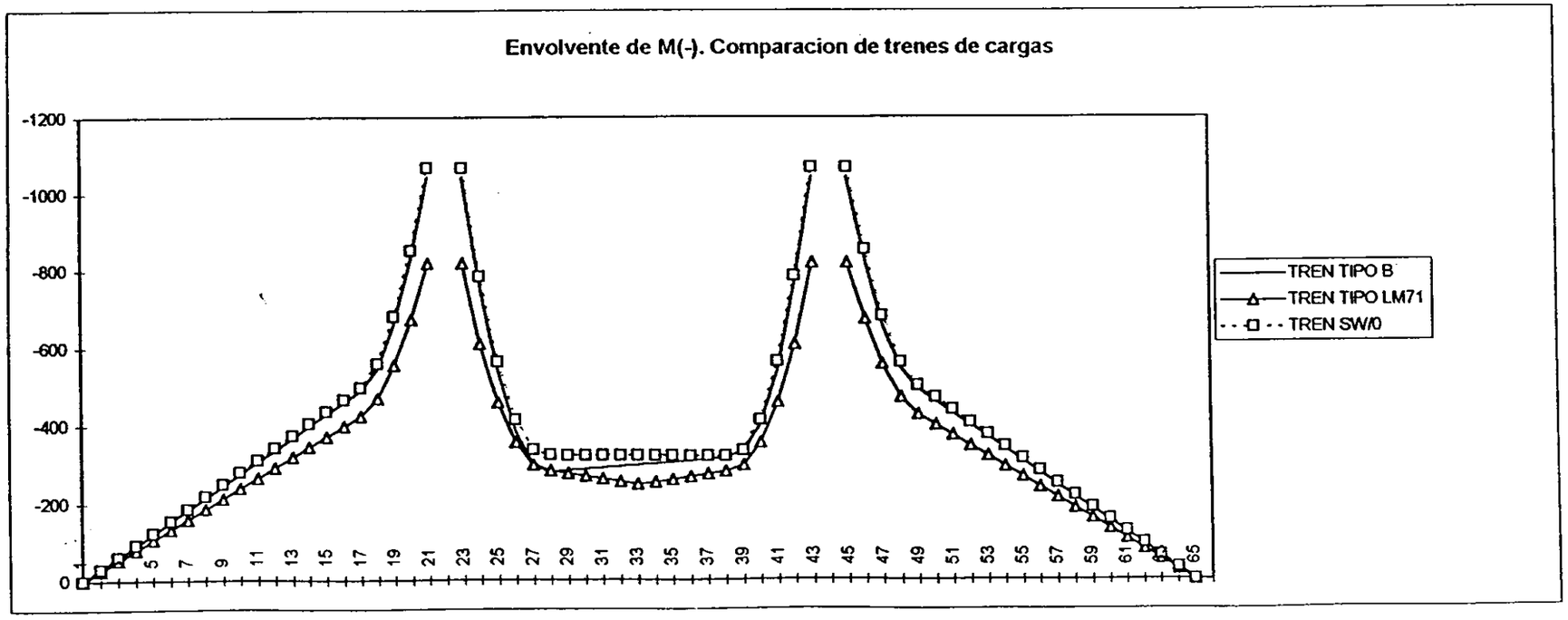
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VALORES CON COEFICIENTES DE IMPACTO Y COEFICIENTES DE EXCENTRICIDAD.

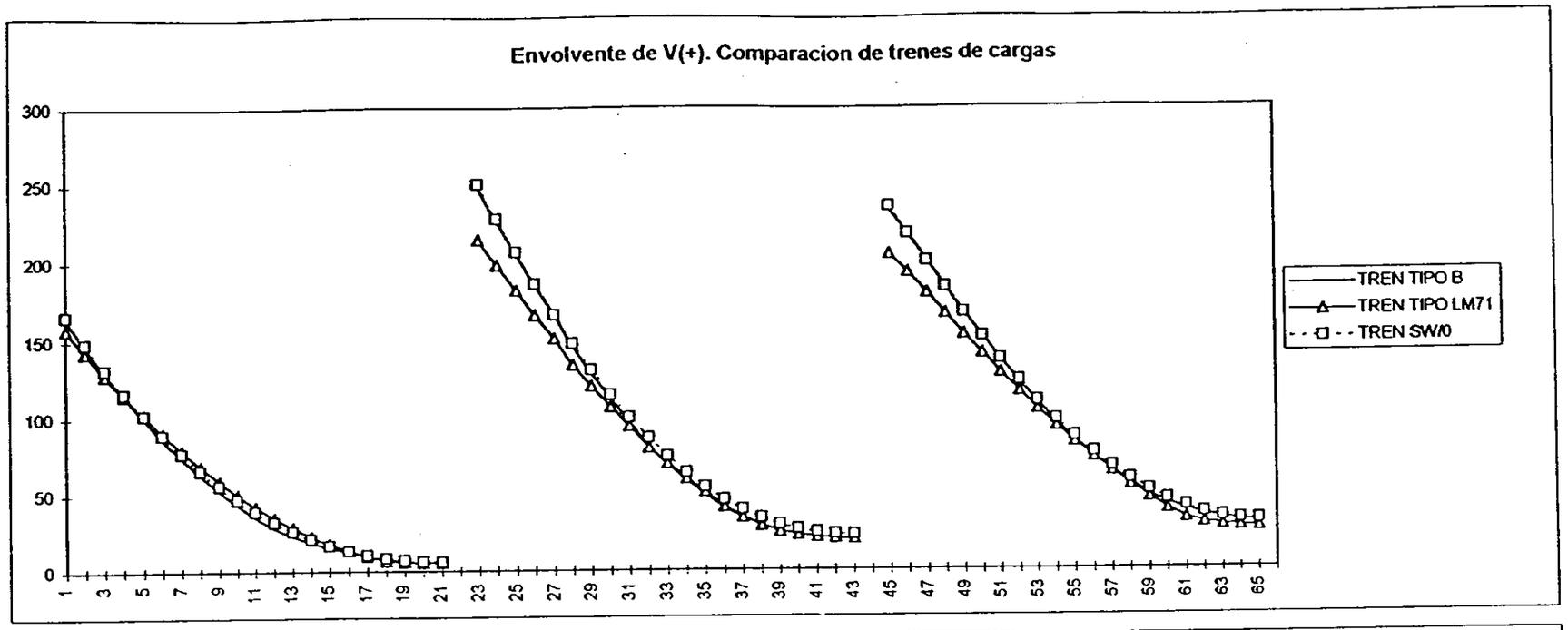
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		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc		M(+) - Vconc		M(-) - Vconc		V(+) - Mconc		V(-) - Mconc	
VANO	SECC.	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)	Mf (m.t.)	Q (t.)
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1	3	288	129	-61	-31	261	131	-34	-32	278	127	-53	-26	257	128	-32	-28	295.49	130	-62	-31	264	132	-30	-33	328	144	-69	-34	293	146	-33	-37
1	4	404	111	-92	-31	347	116	-34	-35	388	112	-79	-26	345	115	-36	-30	415.93	111	-93	-31	349	116	-26	-36	461.68	124	-103	-34	388	129	-29	-40
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1	7	645	57	-183	-31	446	74	-6	-48	614	55	-159	-26	475	79	140	-46	667.95	57	-186	-31	462	77	20	-51	741.42	63	-207	-34	512	85	22	-57
1	8	689	38	-214	-31	442	63	4	-54	657	28	-185	-26	482	69	172	-54	715.53	38	-217	-31	462	66	37	-58	794.24	43	-241	-34	512	73	41	-65
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1	10	723	3	-275	-31	394	44	114	-70	690	-2	-238	-26	455	51	206	-72	756.05	2	-279	-31	424	47	53	-76	839.21	2	-310	-34	470	52	59	-84
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1	12	683	-36	-336	-31	314	29	73	-93	657	-29	-291	-26	388	35	188	-93	723.72	-34	-341	-31	355	32	28	-98	803.32	-38	-379	-34	394	36	31	-108
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3	13	736	-16	-246	31	97	64	412	-52	684	-13	-213	27	200	64	471	-59	746.95	-21	-250	31	48	67	450	-56	829.11	-23	-277	35	53	74	499	-62
3	14	708	-34	-215	31	81	56	487	-62	659	-28	-186	27	178	55	479	-68	717.33	-39	-219	31	36	59	463	-66	796.24	-43	-243	35	40	65	514	-73
3	15	660	-52	-184	31	58	48	482	-74	617	-43	-160	27	147	46	472	-79	669.48	-57	-187	31	19	51	463	-77	743.12	-63	-208	35	21	57	514	-86
3	16	597	-70	-153	31	-18	43	458	-87	556	-69	-133	27	107	39	449	-90	603.43	-75	-156	31	1	45	446	-89	669.81	-83	-173	35	1	50	495	-99
3	17	514	-88	-123	31	-29	38	418	-101	480	-85	-106	27	70	33	407	-102	519.18	-93	-125	31	-15	40	410	-102	576.29	-104	-139	35	-17	45	455	-114
3	18	411	-106	-92	31	-35	35	354	-115	387	-111	-80	27	-37	30	343	-114	416.7	-112	-94	31	-27	36	350	-117	462.54	-124	-104	35	-30	40	389	-130
3	19	294	-124	-61	31	-34	33	263	-131	277	-126	-53	27	-33	28	256	-128	296.01	-130	-62	31	-31	33	264	-132	328.57	-144	-69	35	-34	37	293	-147
3	20	158	-142	-31	31	-23	31	148	-148	148	-142	-27	27	-21	27	142	-142	157.11	-148	-31	31	-23	32	149	-149	174.39	-164	-35	35	-25	35	165	-165
3	21	0	-160	0	12	0	31	0	-165	0	-107	0	14	0	27	0	-157	0	-166	0	31	0	31	0	-166	0	-185	0	35	0	35	0	-185

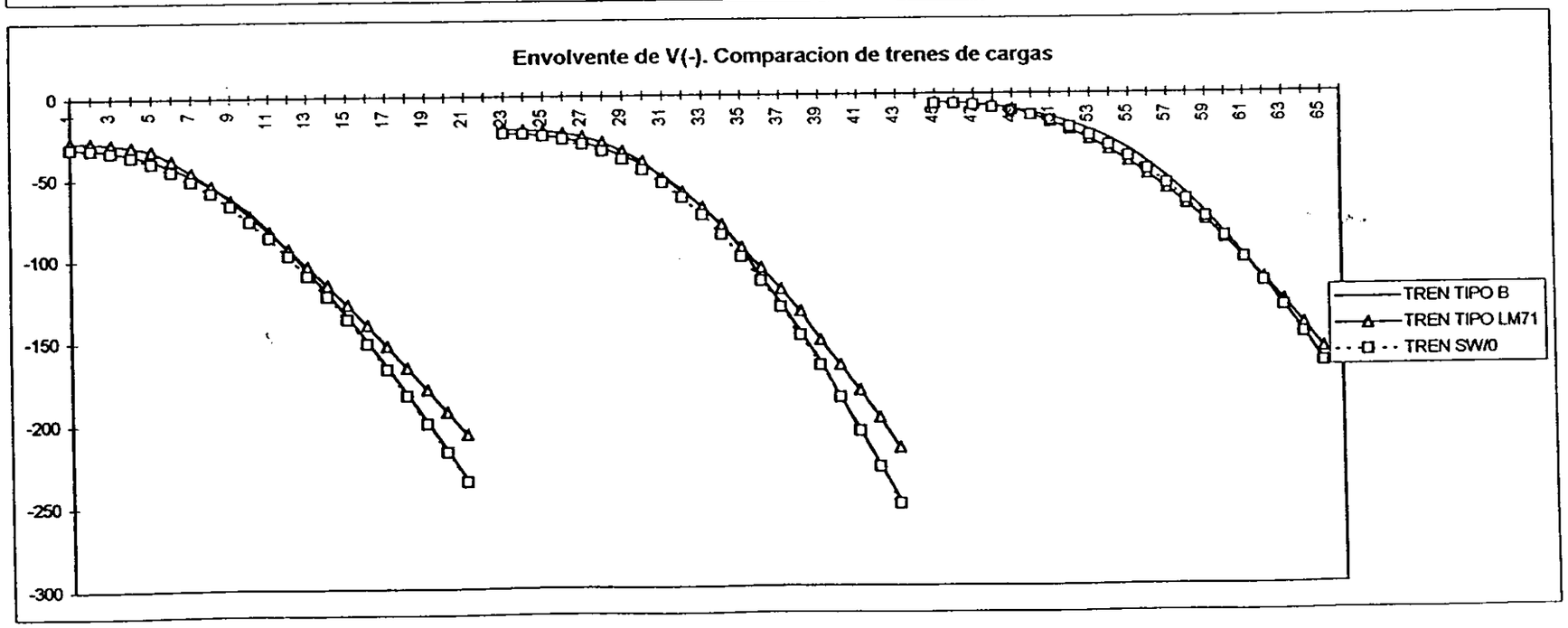
Graficos


Envolvente de M(+). Comparacion de trenes de cargas
0
100
200
300
400
500
600
700
800
900
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65
TREN TIPO B
TREN TIPO LM71
TREN SW/0


Envolvente de M(-). Comparacion de trenes de cargas
-1200
-1000
-800
-600
-400
-200
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65
TREN TIPO B
TREN TIPO LM71
TREN SW/0

Graficos


Envolvente de V(+). Comparacion de trenes de cargas
300
250
200
150
100
50
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65
TREN TIPO B
TREN TIPO LM71
TREN SW/0


Envolvente de V(-). Comparacion de trenes de cargas
0
-50
-100
-150
-200
-250
-300
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65
TREN TIPO B
TREN TIPO LM71
TREN SW/0

GINPROSA

ASUNTO
ED2-1.8.
CALCULO DEL COEFICIENTE DE IMPACTO.

PAG. 1

Masa vibrante

$\gamma = 2,5\ t/m3$

Carga muert = 8,8 tm.

Adoptan un peso específico ficticio $\gamma' = 2,5 + \frac{8,8}{area} = 3,66\ t/m^3$

$\gamma'_{VIH} = 0,36$ UTM.

De acuerdo al calculo de los modos de vibracion especialmente el mayor periodo es

$T = \frac{1}{5,21} = 0,19\ seg \longrightarrow n = 5,21\ Hz.$

Esta frecuencia esta comprendida en los limites marcados por el Eurocodigo-2 $n_{min} = \frac{80}{25} = 3,2\ Hz$

$n_{max} = 74,76 \times L^{-0,748} = 8,53\ Hz.$

Coeficiente de impacto segun IPF-75

$\mu = \frac{N \cdot T}{2L} = \frac{55,5 \cdot 0,19}{2L}$ < L = 25m → I = 1,16 ; L = 20m → **I = 1,21**

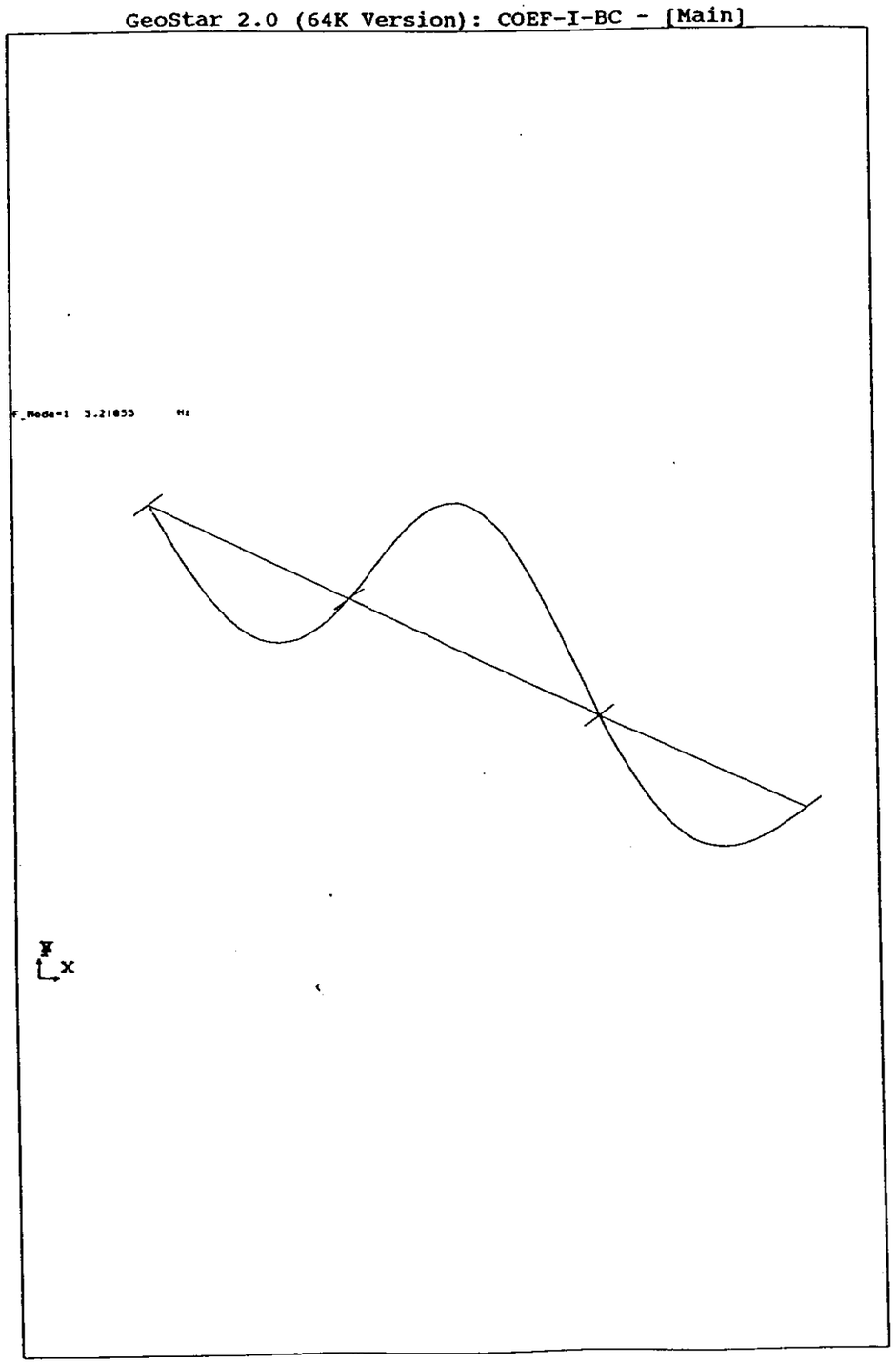
Coeficiente según EC-2:

$\phi_2 = \frac{1,44}{\sqrt{L\phi} - 0,2} + 0,87$

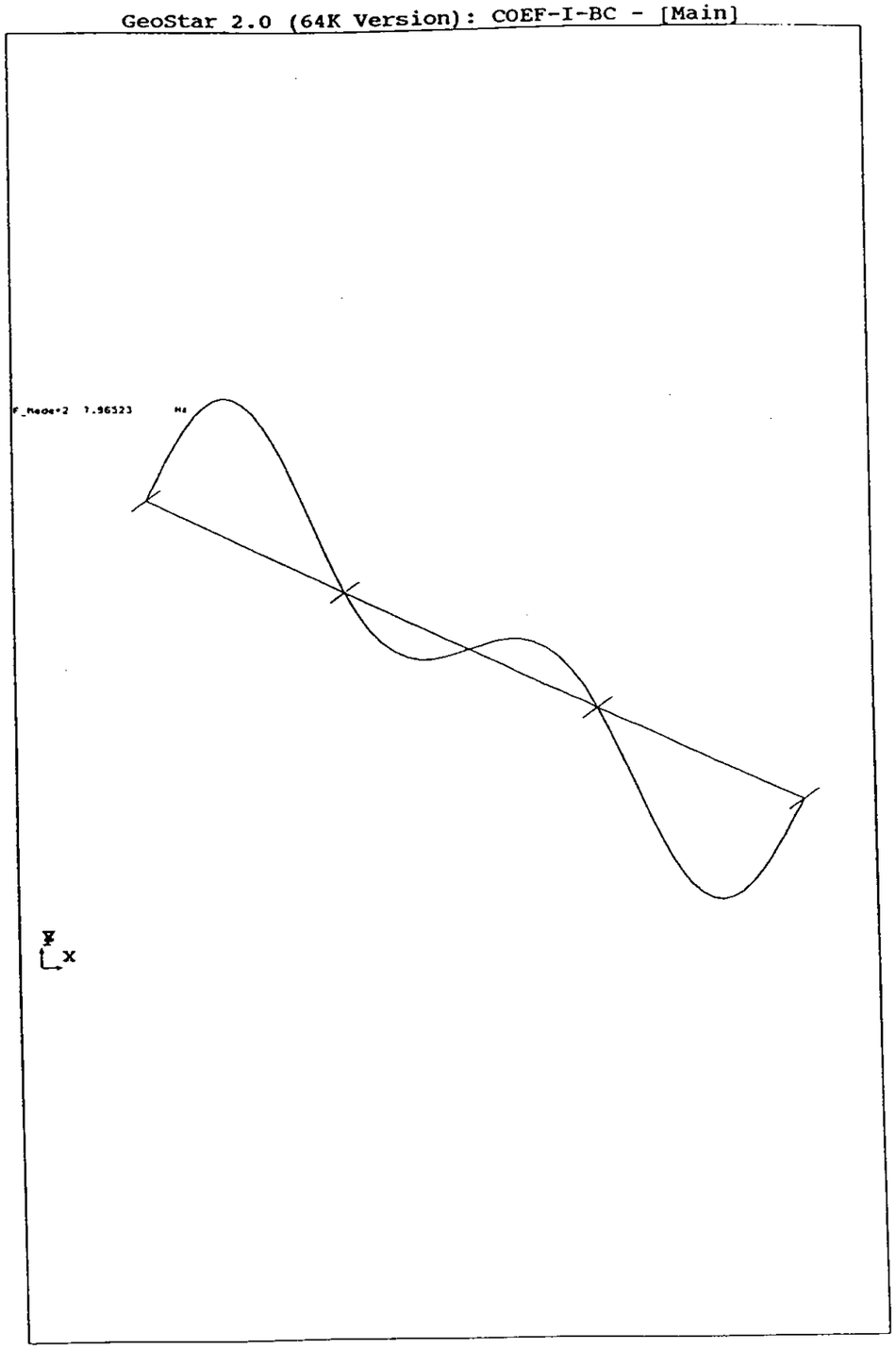
$L\phi = k \cdot Lm = 1,30 \times \frac{65}{3} = 28,1\ m.$

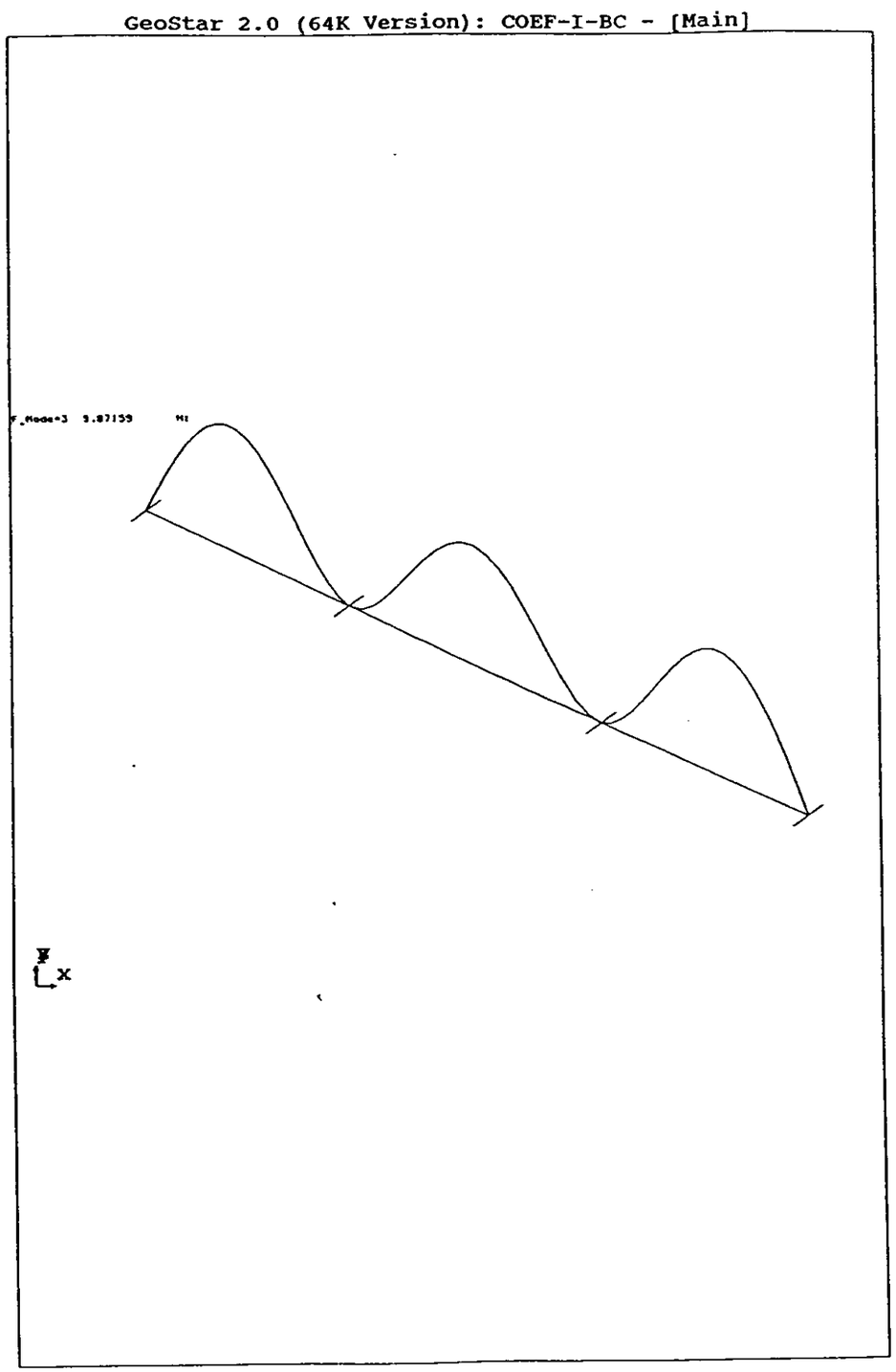
$\phi_2 = 1,10$

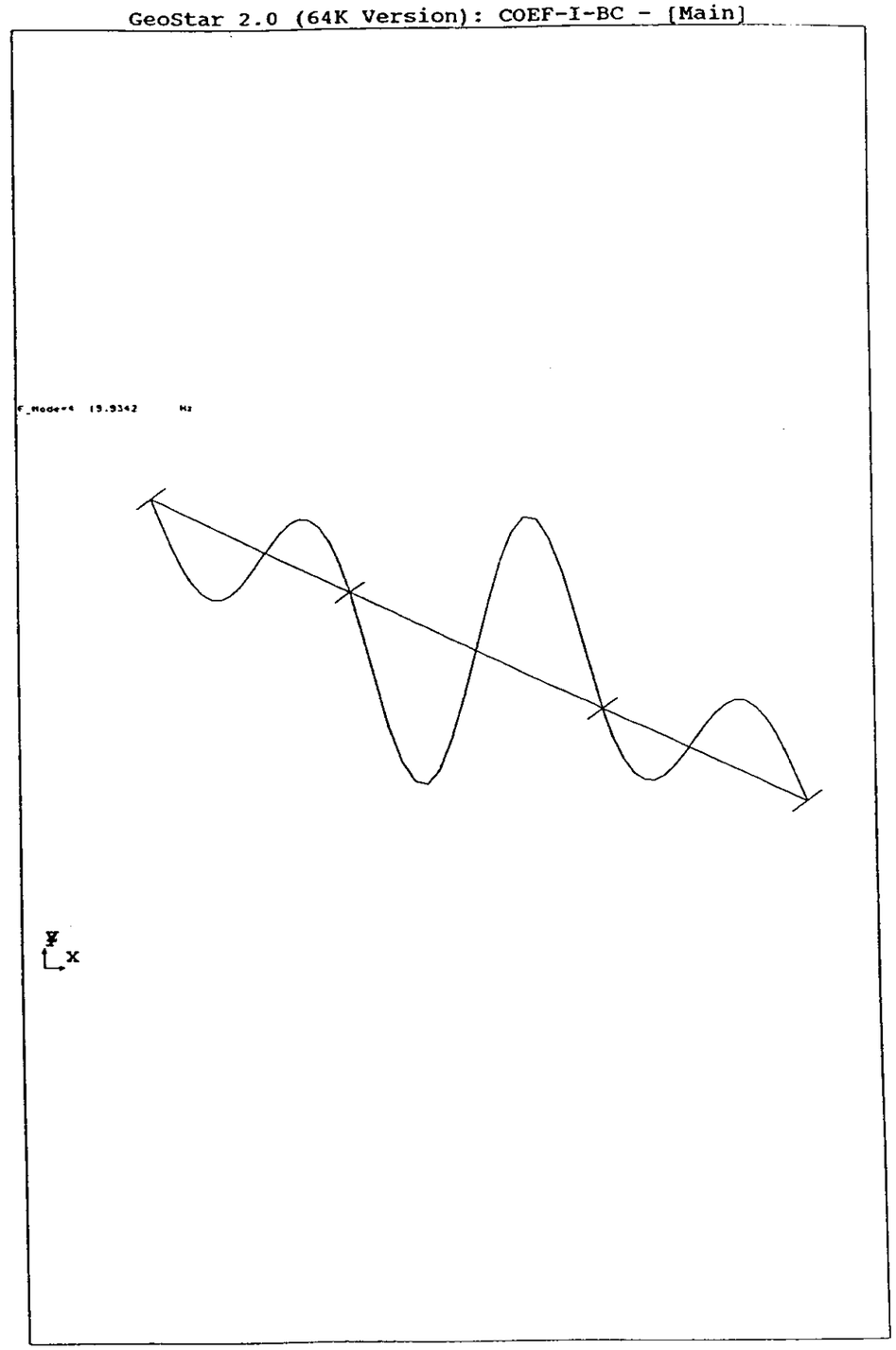
GeoStar 2.0 (64K Version): COEF-I-BC - [Main]



GeoStar 2.0 (64K Version): COEF-I-BC - [Main]




GeoStar 2.0 (64K Version): COEF-I-BC - [Main]
F_Mode=3 9.87159 Hz
Y
X


GeoStar 2.0 (64K Version): COEF-I-BC - [Main]
F_Mode=4 15.9342 Hz
Y
X

```
**********************************************************************
**********************************************************************
**                                  **
**                                  **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS   / M    M **
** C    O  O S     MM  MM  O  O S      / MM  MM **
** C    O  O SSSS  M MM M  O  O SSSS  / M MM M **
** C    O  O    S  M    M  O  O    S / M    M **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS/   M    M **
**                                  **
**                                  **
**              VERSION: 2.00               **
**             DISTRIBUTED BY:                **
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**           TEL. NO.  (310) 207-2800              **
**          COPYRIGHT 1988  S. R. A. C.            **
**                                  **
**********************************************************************
**********************************************************************
```

Problem name: COEF-I-BC
Date : 07/24/1998 Time: 13:13:13
Title :
Subtitle :

Element group data

Element group number= 1
Element name:
BEAM3D Three dimensional Elastic Beam elements
Type of beam element = ... 0
EQ. 0 ; Symmetric beam element
EQ. 1 ; Unsymmetric beam element
EQ. 2 ; Symmetric tapered beam element

Real constant data

Real constant set 1
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.8933
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.2683
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 2
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7152
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1811
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 3
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 4
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 5
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 6
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 7
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 8
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 9
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 10
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325

Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 11
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 12
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 13
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 14
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 15
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 16
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 17
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 18
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 19
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7152
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1811
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 20
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.8933
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.2683
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 21
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.8933
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.2683
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 22
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7152
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1946
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.6908
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 23
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 24
Associated with :
BEAM3D Three dimensional Elastic Beam elements

Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 25
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 26
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 27
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 28
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 29
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 30
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 31
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 32
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 33
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 34
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 35
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 36
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 37
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 38

Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 39
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7152
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1946
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.6908
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 40
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.8933
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.2683
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 41
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.8933
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.2683
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 42
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7152
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1946
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.6908
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 43
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 44
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 45
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 46
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 47
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 48
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 49
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 50
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 51
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000

Torsion const for max shear stress = .00000
Real constant set 52
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 53
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 54
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 55
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 56
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 57
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 58
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 59
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7152
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1946
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.6908
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 60
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.8933
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.2683
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 61
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 1000.0
Moment of Inertia about element Y-axis = 1000.0
Moment of Inertia about element Z-axis = 1000.0
Depth of beam (y-axis) = 10.000
Width of beam (z-axis) = 10.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1000.0
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 62
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 10.000
Moment of Inertia about element Y-axis = .10000E-03
Moment of Inertia about element Z-axis = .10000E-03
Depth of beam (y-axis) = 1.0000
Width of beam (z-axis) = 1.0000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = .10000E-03
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000

Material propery data

Material property set 1

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0
ALPX : X thermal expansion	.10000E-04	0
DENS : Mass Density	.36600	0

Material property set 2

	Value	Temp curve no.
EX : X Elastic Modulus	1.0000	0
NUXY : Poisson Ratio	.20000	0

Material property set 3

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0

Nodal input data

NODE BOUNDARY CONDITION CODES
NODAL POINT COORDINATES
(0 = FREE ; 1 = FIXED)

	X	Y	Z	XX	YY	ZZ	X	Y	Z
1	1	1	1	1	1	1	.00000	.00000	.10000E+07
2	0	0	0	0	0	0	2232.2	5861.7	.00000
3	0	0	0	0	0	0	2233.0	5861.0	.00000
4	0	0	0	0	0	0	2233.8	5860.4	.00000
5	0	0	0	0	0	0	2234.5	5859.8	.00000
6	0	0	0	0	0	0	2235.3	5859.1	.00000
7	0	0	0	0	0	0	2236.1	5858.5	.00000
8	0	0	0	0	0	0	2236.8	5857.8	.00000
9	0	0	0	0	0	0	2237.6	5857.2	.00000
10	0	0	0	0	0	0	2238.4	5856.6	.00000
11	0	0	0	0	0	0	2239.1	5855.9	.00000
12	0	0	0	0	0	0	2239.9	5855.3	.00000
13	0	0	0	0	0	0	2240.7	5854.6	.00000
14	0	0	0	0	0	0	2241.5	5854.0	.00000
15	0	0	0	0	0	0	2242.2	5853.4	.00000
16	0	0	0	0	0	0	2243.0	5852.7	.00000
17	0	0	0	0	0	0	2243.8	5852.1	.00000
18	0	0	0	0	0	0	2244.5	5851.5	.00000
19	0	0	0	0	0	0	2245.3	5850.8	.00000
20	0	0	0	0	0	0	2246.1	5850.2	.00000
21	0	0	0	0	0	0	2246.9	5849.5	.00000

22	0	0	0	0	0	0	2247.6	5848.9	.00000
23	0	0	0	0	0	0	2248.6	5848.1	.00000
24	0	0	0	0	0	0	2249.6	5847.3	.00000
25	0	0	0	0	0	0	2250.5	5846.5	.00000
26	0	0	0	0	0	0	2251.5	5845.7	.00000
27	0	0	0	0	0	0	2252.5	5844.9	.00000
28	0	0	0	0	0	0	2253.4	5844.2	.00000
29	0	0	0	0	0	0	2254.4	5843.4	.00000
30	0	0	0	0	0	0	2255.4	5842.6	.00000
31	0	0	0	0	0	0	2256.3	5841.8	.00000
32	0	0	0	0	0	0	2257.3	5841.0	.00000
33	0	0	0	0	0	0	2258.3	5840.2	.00000
34	0	0	0	0	0	0	2259.2	5839.4	.00000
35	0	0	0	0	0	0	2260.2	5838.6	.00000
36	0	0	0	0	0	0	2261.2	5837.8	.00000
37	0	0	0	0	0	0	2262.1	5837.0	.00000
38	0	0	0	0	0	0	2263.1	5836.3	.00000
39	0	0	0	0	0	0	2264.1	5835.5	.00000
40	0	0	0	0	0	0	2265.1	5834.7	.00000
41	0	0	0	0	0	0	2266.0	5833.9	.00000
42	0	0	0	0	0	0	2267.0	5833.1	.00000
43	0	0	0	0	0	0	2267.8	5832.5	.00000
44	0	0	0	0	0	0	2268.6	5831.9	.00000
45	0	0	0	0	0	0	2269.3	5831.2	.00000
46	0	0	0	0	0	0	2270.1	5830.6	.00000
47	0	0	0	0	0	0	2270.9	5830.0	.00000
48	0	0	0	0	0	0	2271.7	5829.3	.00000
49	0	0	0	0	0	0	2272.5	5828.7	.00000
50	0	0	0	0	0	0	2273.2	5828.1	.00000
51	0	0	0	0	0	0	2274.0	5827.5	.00000
52	0	0	0	0	0	0	2274.8	5826.8	.00000
53	0	0	0	0	0	0	2275.6	5826.2	.00000
54	0	0	0	0	0	0	2276.4	5825.6	.00000
55	0	0	0	0	0	0	2277.1	5825.0	.00000
56	0	0	0	0	0	0	2277.9	5824.3	.00000
57	0	0	0	0	0	0	2278.7	5823.7	.00000
58	0	0	0	0	0	0	2279.5	5823.1	.00000
59	0	0	0	0	0	0	2280.3	5822.5	.00000
60	0	0	0	0	0	0	2281.0	5821.9	.00000
61	0	0	0	0	0	0	2281.8	5821.2	.00000
62	0	0	0	0	0	0	2282.6	5820.6	.00000
63	1	1	1	0	0	1	2233.4	5863.1	.00000
64	1	1	1	0	0	0	2231.1	5860.3	.00000
65	1	1	1	0	0	0	2248.8	5850.3	.00000
66	1	1	1	0	0	0	2246.5	5847.5	.00000
67	1	1	1	0	0	0	2268.1	5834.5	.00000
68	1	1	1	0	0	0	2265.9	5831.7	.00000
69	1	1	1	0	0	0	2283.7	5822.0	.00000
70	1	1	1	0	0	0	2281.5	5819.2	.00000

Element input data

ELEM EGRP MP REAL ECS NODE 1 NODE 2 NODE 3 NODE 4 NODE 5 NODE 6
NODE 7 NODE 8 NODE 9 NODE10 NODE11 NODE12
NODE13 NODE14 NODE15 NODE16 NODE17 NODE18
NODE19 NODE20

1	1	1	1	-1	2	3	1		
2	1	1	2	-1	3	4	1		
3	1	1	3	-1	4	5	1		
4	1	1	4	-1	5	6	1		
5	1	1	5	-1	6	7	1		
6	1	1	6	-1	7	8	1		
7	1	1	7	-1	8	9	1		
8	1	1	8	-1	9	10	1		
9	1	1	9	-1	10	11	1		
10	1	1	10	-1	11	12	1		
11	1	1	11	-1	12	13	1		
12	1	1	12	-1	13	14	1		
13	1	1	13	-1	14	15	1		
14	1	1	14	-1	15	16	1		
15	1	1	15	-1	16	17	1		
16	1	1	16	-1	17	18	1		
17	1	1	17	-1	18	19	1		
18	1	1	18	-1	19	20	1		
19	1	1	19	-1	20	21	1		
20	1	1	20	-1	21	22	1		
21	1	1	21	-1	22	23	1		
22	1	1	22	-1	23	24	1		
23	1	1	23	-1	24	25	1		
24	1	1	24	-1	25	26	1		
25	1	1	25	-1	26	27	1		
26	1	1	26	-1	27	28	1		
27	1	1	27	-1	28	29	1		
28	1	1	28	-1	29	30	1		
29	1	1	29	-1	30	31	1		
30	1	1	30	-1	31	32	1		
31	1	1	31	-1	32	33	1		
32	1	1	32	-1	33	34	1		
33	1	1	33	-1	34	35	1		
34	1	1	34	-1	35	36	1		
35	1	1	35	-1	36	37	1		
36	1	1	36	-1	37	38	1		
37	1	1	37	-1	38	39	1		
38	1	1	38	-1	39	40	1		
39	1	1	39	-1	40	41	1		
40	1	1	40	-1	41	42	1		
41	1	1	41	-1	42	43	1		
42	1	1	42	-1	43	44	1		
43	1	1	43	-1	44	45	1		
44	1	1	44	-1	45	46	1		
45	1	1	45	-1	46	47	1		
46	1	1	46	-1	47	48	1		
47	1	1	47	-1	48	49	1		
48	1	1	48	-1	49	50	1		
49	1	1	49	-1	50	51	1		
50	1	1	50	-1	51	52	1		
51	1	1	51	-1	52	53	1		
52	1	1	52	-1	53	54	1		
53	1	1	53	-1	54	55	1		
54	1	1	54	-1	55	56	1		
55	1	1	55	-1	56	57	1		
56	1	1	56	-1	57	58	1		
57	1	1	57	-1	58	59	1		
58	1	1	58	-1	59	60	1		
59	1	1	59	-1	60	61	1		
60	1	1	60	-1	61	62	1		
61	1	3	61	-1	63	2	1		
62	1	3	61	-1	2	64	1		
63	1	3	61	-1	65	22	1		
64	1	3	61	-1	22	66	1		
65	1	3	61	-1	67	42	1		
66	1	3	61	-1	42	68	1		
67	1	3	61	-1	69	62	1		
68	1	3	61	-1	62	70	1		

```
 CONTROL INFORMATION
  NUMBER OF LOAD CASES .....(NLCASE) =
1
  SOLUTION MODE .....(MODEX) =     2
    EQ. 0, STATIC ANALYSIS
    EQ. 1, BUCKLING ANALYSIS
    EQ. 2, DYNAMIC ANALYSIS
  THERMAL LOADING FLAG .....(ITHERM) =
0
    EQ. 0, NO THERMAL EFFECTS CONSIDERED
    EQ. 1, ADD TEMPERATURE EFFECT
  GRAVITY LOADING FLAG .....(IGRAV) =
0
    EQ. 0, NO GRAVITY LOADING CONSIDERED
    EQ. 1, ADD GRAVITY LOADING EFFECT
  CENTRIFUGAL LOADING FLAG .....(ICNTRF)
=    0
    EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
    EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
  IN-PLANE STIFFENING FLAG .....(INPLN) =
0
    EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
    EQ. 1, IN-PLANE EFFECTS CONSIDERED
  SOFT SPRING ADDITION FLAG .....(ISOFT) =
0
    EQ. 0, NO SOFT SPRING OPTION
    EQ. 1, SOFT SPRING ADDED

  SAVE DECOMPOSED STIFFNESS MATRIX FLAG ...
(ISAVK) =     0
    EQ. 0, DO NOT SAVE DECOMPOSED K
    EQ. 1, SAVE DECOMPOSED K
  FORM STIFFNESS MATRIX FLAG .....(IFORMK)
=     0
    EQ. 0, FORM STIFFNESS MATRIX
    EQ. 1, USE EXISTING DECOMPOSED STIFFNESS
MATRIX

  SPIN SOFTENING FLAG .....(ISPIN) =     0
    EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
    EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
  INERTIA RELIEF FLAG .....(IFORMK) =
0
    EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
    EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
  RIGID CONNECTIONS FLAG .....(IRIGID) =
0
    EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS &
SHELLS
    EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS &
SHELLS


 TOTAL SYSTEM DATA
  NUMBER OF EQUATIONS .....(NEQ) =
389
  NUMBER OF MATRIX ELEMENTS .....(NWK)
=   3624
  MAXIMUM HALF BANDWIDTH .....(MK ) =
18
  MEAN HALF BANDWIDTH .....(MM ) =
9
  NUMBER OF ELEMENTS.....(NUME) =
68
  NUMBER OF NODAL POINTS.....(NUMNP)=
70
  ADJUSTED BLOCK SIZE .....(MTBLK)=
3625
  EXTRA MEMORY AVAILABLE (in 8-byte words) ..
.(XMTBLK)=  4812335
  NUMBER OF STIFFNESS BLOCKS..... (NBLK)
=     1

  MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE
=  .163732E+11 (   137)
  MINIMUM DIAGONAL STIFFNESS MATRIX VALUE =
.238694E+08 (   237)
1


 ---------------------------------------------------
 |       MASS MOMENT INFORMATION
|
 |-------------------------------------------------|
 |MASS    .187715E+03 |VOLUME  .149118E+05
|WEIGHT  .000000E+00 |
 |-------------------------------------------------|
 | MASS MOMENT OF INERTIA W.R.T. C.G.
|
 |-------------------------------------------------|
 |IX      .266504E+05 |IY      .400154E+05 |IZ
.678628E+05 |
 |-------------------------------------------------|
 | MASS PRODUCT OF INERTIA W.R.T. C.G.
|
 |-------------------------------------------------|
 |PXY    -.325906E+05 |PXZ     .000000E+00 |PYZ
.000000E+00 |
 |-------------------------------------------------|
 | RADII OF GYRATION W.R.T. C.G.
|
 |-------------------------------------------------|
 |RX      .119152E+02 |RY      .146004E+02 |RZ
.190137E+02 |
 |-------------------------------------------------|
```

CENTER OF GRAVITY
CGx .225734E+04 CGy .584104E+04 CGz .000000E+00
PRINCIPAL MASS MOMENT OF INERTIA
P1 .678627E+05 P2 .666016E+05 P3 .642907E+02
PRINCIPAL RADII OF GYRATION
R1 .190137E+02 R2 .188362E+02 R3 .585227E+00
PRINCIPAL AXES (DIRECTION COSINES IN ROWS W.R.T C.G)
N_11 .649614E+00 N_12 .760264E+00 N_13 .000000E+00
N_21 .632114E+00 N_22 .774876E+00 N_23 .000000E+00
N_31 .000000E+00 N_32 .000000E+00 N_33 .227970E-01

Note: In the above table, WEIGHT is computed based on the user
defined acceleration for the first active Load Case

CONVERGENCE REACHED FOR RTOL .1000E-04

FREQUENCY ANALYSIS
by
SUBSPACE ALGORITHM

FREQUENCY NUMBER	FREQUENCY (RAD/SEC)	FREQUENCY (CYCLES/SEC)	PERIOD (SECONDS)
1	.3273885E+02	.5210550E+01	.1919183E+00
2	.5004702E+02	.7965230E+01	.1255457E+00
3	.6202506E+02	.9871594E+01	.1013008E+00
4	.1252502E+03	.1993418E+02	.5016509E-01
5	.1759996E+03	.2801120E+02	.3570000E-01
6	.1930525E+03	.3072525E+02	.3254652E-01
7	.2288079E+03	.3641590E+02	.2746053E-01
8	.2739496E+03	.4360042E+02	.2293556E-01
9	.3570894E+03	.5683254E+02	.1759555E-01
10	.3572757E+03	.5686219E+02	.1758638E-01

SOLUTION PARAMETERS
NUMBER OF EIGENVALUES.....(NFR)= 10
MASS TYPE: 1-LUMPED,2-CONSISTENT....(MASS)= 1
MODE SHAPE PRINT FLAG.....(MPRNT)= 1
INTERMEDIATE SOLUTION PRINT FLAG....(IFPR)= 0
STURM SEQUENCE CHECK FLAG.....(ISS)= 0
MAXIMUM NUMBER OF ITERATIONS..... (ITMAX)= 16
FREQUENCY SHIFT FLAG.....(IFRSH)= 0
FREQUENCY SHIFT.....(FRSH)= .0000000E+00
CONVERGENCE TOLERANCE.....(RTOL)= .1000000E-04
COMPOSITE MODAL DAMPING CALC. FLAG..(IMDC)= 0
MODAL ACCELERATION FLAG.....(IMAM)= 0

SUBSPACE ITERATION

ITERATION NUMBER 1

ITERATION NUMBER 2

ITERATION NUMBER 3

ITERATION NUMBER 4

ITERATION NUMBER 5

ITERATION NUMBER 6

ITERATION NUMBER 7

ITERATION NUMBER 8

ITERATION NUMBER 9

ITERATION NUMBER 10

GINPROSA

ASUNTO
ED2 - 1.8
TENDONES DE ANCLAJE AL ESTRIBO

FECHA

PAG. 1

Peso de tablero + carga muerta = 3228 ton.

Fuerza de reacción sobre punto fijo = 0,03 × 3228 = 97 ton.

Carga de frenado = $\frac{(10 \times 67 + 30 \times 2)}{8} = 91,3$ ton

Momento de eje vertical debido a la fuerza centrífuga y viento $M_x = 123$ mt.

Las fuerzas se toman con los tendones los esfuerzos de cálculo son:

En servicio = $H_s = \frac{(91,3+97)}{2} + \frac{123}{3,3 \times 2} = 112$ ton.

En rotura $H_d = H_s \times 1,50 = 170$ ton.

Se disponen tendones de $12 \times 0,6''$ con una carga de rotura $P_u = 319$ ton. Estos tendones se tesan al 40 % de la carga de rotura $P_o = 0,40 \times 319 = 128$ ton.

Se ejecutan dos neoprenos por tendón de $300 \times 400 \times 71(32)$

GINPROSA

ASUNTO
ED2 -1.8
VERIFICACIÓN DEL PRETENSADO

PAG. 1

Se realizarán las siguientes comprobaciones:

a) Durante las fases constructivas

Combinación: $PP + \binom{0,9}{1,1} Pret + SC_{constructiva}$

Condiciones $\sigma_{max} = f_{ck}/1,60 = 2500$ t/m²

$\sigma_{min} = f_{ctk} = -244$ t/m²

b) En las fases finales:

Combinación frecuente:

$PP + CM + \binom{0,9}{1,1} Pret + 0,60\ SC + 0,5\ \sigma_{ind}$

Condición: $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = 0$

Combinación rara:

$PP + CM + \binom{0,9}{1,1} \times Pret + SC + 0,6\ \sigma_{ind}.$

Condición $\sigma_{max} = f_{ck}/1,60$

$\sigma_{min} = f_{ctk}$

PROGRAMA PARA EL CALCULO DE CABLES DE PRETENSADO

DEPARTAMENTO DE ESTRUCTURAS.GINPRO.S.A.
Ingenieros y arquitectos consultores

PROYECTO:
REFERENCIA CABLE:FAM-1.LIS

PARAMETROS DE TRAZADO

Numero de tramos de cableado NTC= 3

Tipo de cableado(1-2-3-4) para tramo nº1 TIPO=1
Parametros del tramo:
S0= 0.000 S1= 8.500 S2= 0.000 S3= 8.500 S4= 3.000 SR= 0.000
H1= 0.730 H2= 1.000 H3= 1.000 H4= 0.400

Tipo de cableado(1-2-3-4) para tramo nº2 TIPO=3
Parametros del tramo:
S1= 3.000 S2= 9.500 S3= 0.000 S4= 9.500 S5= 3.000
H1= 0.400 H2= 1.400 H3= 1.400 H5= 0.400

Tipo de cableado(1-2-3-4) para tramo nº3 TIPO=2
Parametros del tramo:
S0= 0.000 S1= 8.500 S2= 0.000 S3= 8.500 S4= 3.000 SR= 0.000
H1= 0.730 H2= 1.000 H3= 1.000 H4= 0.400

DATOS GENERALES

Anclaje IZQUIERDO (1=ACTIVO)(2=PASIVO)...1
Anclaje DERECHO (1=ACTIVO)(2=PASIVO)...1
Anclaje desde el que se tesa primero..(1=IZDO.)(2=DCHO.)...1
Fuerza de tesado inicial P0(ton)= 4080.0
Fuerza de tesado final P1(ton)= 3824.0
Area del cable (cm2)=268.799988
Coef.rozamiento cable-vaina MU=0.210000
Coef.rozamientos parasitos (K/MU)=0.006000
Penetracion de cuñas a(mm.)=5.000000
Modulo de elasticidad del acero pretensar Ep(kp/cm2)= 1900000
Se incluyen perdidas por Acortamiento Elástico de Hormigón(0=SI 1=NO)...OP=1
Modulo de elasticidad del Hormigon Ec,j(kp/cm2)= 300000
Tension media del hormigon(Po/Ac)(Kp/cm2.)= 50.00
Las perdidas por acortamiento elástico serán= 1.04%

GEOMETRIA DEL CABLE

TRAZADO EN ALZADO:
Numero de tramos de parabola o rectas en la forma(y=Ax^2+Bx+C) NA=10

tramo	Xinic(m.)	Xfinal(m.)	A	B	C
1	0.000000	8.500000	-0.003737	0.063529	0.730000
2	8.500000	17.000000	-0.006138	0.104348	0.556522
3	17.000000	20.000000	0.017391	-0.695652	7.356521
4	20.000000	23.000000	0.026667	-1.066667	11.066666
5	23.000000	32.500000	-0.008421	0.547368	-7.494737
6	32.500000	42.000000	-0.008421	0.547368	-7.494737
7	42.000000	45.000000	0.026667	-2.400000	54.399998
8	45.000000	48.000000	0.017391	-1.565217	35.617393
9	48.000000	56.500000	-0.006138	0.693606	-18.594374
10	56.500000	65.000000	-0.003737	0.422284	-10.929515

TRAZADO EN PLANTA:
El trazado es un circulo de radio R=2500.000000

ANGULOS DE DESVIACION ACUMULADOS EN ALZADO:

Angulos comenzando por el anclaje IZDO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	8.500000	0.000000	0.063444
2	8.500000	17.000000	0.063444	0.167416
3	17.000000	20.000000	0.167416	0.271387
4	20.000000	23.000000	0.271387	0.430043
5	23.000000	32.500000	0.430043	0.588698
6	32.500000	42.000000	0.588698	0.747353
7	42.000000	45.000000	0.747353	0.906008
8	45.000000	48.000000	0.906008	1.009980
9	48.000000	56.500000	1.009980	1.113952
10	56.500000	65.000000	1.113952	1.177396

Angulos comenzando por el anclaje DCHO.(rad):

tramo	Xinic(m.)	Xfinal(m.)	alfa1	alfa2
1	0.000000	8.500000	1.177396	1.113952
2	8.500000	17.000000	1.113952	1.009980
3	17.000000	20.000000	1.009980	0.906008
4	20.000000	23.000000	0.906008	0.747353
5	23.000000	32.500000	0.747353	0.588698
6	32.500000	42.000000	0.588698	0.430043
7	42.000000	45.000000	0.430043	0.271387
8	45.000000	48.000000	0.271387	0.167416
9	48.000000	56.500000	0.167416	0.063444
10	56.500000	65.000000	0.063444	0.000000

ALARGAMIENTOS POR PENETRACION DE CUÑAS Y RETESADO

Penetracion de cuñas por izda. a_izda= 5.000(mm.)
Penetracion por retesado por izda. retesado _izda= 2.773(mm.)
Penetracion de cuñas ficticia por izda. a_ficticia_izda= 7.773(mm.)

Alcance de penetracion de cuñas+retesado por izda. x= 16.787(m.) perdidas= 5.425%

Penetracion de cuñas por dcha. a_dcha= 5.000(mm.)
Penetracion por retesado por dcha. retesado _dcha= 2.773(mm.)
Penetracion de cuñas ficticia por dcha. a_ficticia_dcha= 7.773(mm.)

Alcance de penetracion de cuñas+retesado por dcha. x= 48.213(m.) perdidas= 5.425%

Punto de interseccion de curvas de perdidas x= 32.500(m.) perdidas= 15.177%

CURVA DE PERDIDAS POR ROZAMIENTO + PENET.CUÑAS + RETESADO Y ACORTAMIENTO ELASTICO DE HORMIGON.

tramo	Xinic(m.)	Xfinal(m.)	K1(%)	K2(%)	Axil-1(ton.)	Axil-2(ton.)
1	0.000000	8.500000	11.9	9.5	3594.7	3691.7
2	8.500000	16.787489	9.5	6.5	3691.7	3816.1
3	16.787489	17.000000	6.5	6.5	3816.1	3812.9
4	17.000000	20.000000	6.5	8.9	3812.9	3715.4
5	20.000000	23.000000	8.9	12.3	3715.4	3578.6
6	23.000000	32.500000	12.3	16.2	3578.6	3418.2
7	32.500000	42.000000	16.2	12.3	3418.2	3578.6
8	42.000000	45.000000	12.3	8.9	3578.6	3715.4
9	45.000000	48.000000	8.9	6.5	3715.4	3812.9
10	48.000000	48.212509	6.5	6.5	3812.9	3816.1
11	48.212509	56.500000	6.5	9.5	3816.1	3691.7
12	56.500000	65.000000	9.5	11.9	3691.7	3594.7

ALARGAMIENTOS DEL CABLE

Alargamiento por la izda.(mm.)= 443.057
Alargamiento por la dcha.(mm.)= 41.393
ALARGAMIENTO TOTAL(mm.)= 484.451

CARGAS VERTICALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	q1	q2
1	0.000000	8.500000	26.705	27.592
2	8.500000	16.787489	45.320	46.129
3	16.787489	17.000000	46.129	46.054
4	17.000000	20.000000	-130.486	-129.232
5	20.000000	23.000000	-198.156	-183.756
6	23.000000	32.500000	58.028	57.570
7	32.500000	42.000000	57.570	58.028
8	42.000000	45.000000	-183.756	-198.156
9	45.000000	48.000000	-129.232	-130.486
10	48.000000	48.212509	46.054	46.129
11	48.212509	56.500000	46.129	45.320
12	56.500000	65.000000	27.592	26.705

CARGAS PUNTUALES EN ALZADO (TON.)

Punto aplicacion	Componente Vertical	Componente Longitudinal
x= 0.000	-227.912	3587.510
x= 65.000	-227.912	-3587.510

CARGAS HORIZONTALES POR UD. DE LONGITUD(TON/M.)

tramo	Xinic(m.)	Xfinal(m.)	q1	q2
1	0.000000	8.500000	1.438	1.477
2	8.500000	16.787489	1.477	1.526
3	16.787489	17.000000	1.526	1.525
4	17.000000	20.000000	1.525	1.486
5	20.000000	23.000000	1.486	1.431
6	23.000000	32.500000	1.431	1.367
7	32.500000	42.000000	1.367	1.431
8	42.000000	45.000000	1.431	1.486
9	45.000000	48.000000	1.486	1.525
10	48.000000	48.212509	1.525	1.526
11	48.212509	56.500000	1.526	1.477
12	56.500000	65.000000	1.477	1.438

CÁLCULO DE TENSIONES EN PUENTES	Fase nº: 0. PUENTE EN VACIO
PROYECTO: L.A.V. MADRID-ZARAGOZA	
ESTRUCTURA: E02-4.8	

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	Σ pp(i) + 0.9 x Σ pret(i)	885	-4
2	Σ pp(i) + 1.1 x Σ pret(i)	1128	-86
3	Σ pp(i) + 0.9 x Σ pret(i) +scc(nfase)	874	0
4	Σ pp(i) + 1.1 x Σ pret(i) +scc(nfase)	1117	-52

i= 1 al nfase
pp(i) = peso propio de la fase i
pret(i)= pretensado de la fase i
scc(fase) = sobrecarga constructiva

		ESFUERZOS DE HIPOTESIS SIN ACUMULAR									ESFUERZOS DE HIPOTESIS ACUMULADAS						TENSIONES EN FIBRAS SUPERIOR E INFERIOR							
		Peso Propio			Sobrecarga constructiva			Pretensado			Peso Propio			Pretensado			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4	
Vano	Seccion	N (t)	M (m.t)	V (m.t)	N (t)	M (m.t)	V (m.t)	N (t)	M (m.t)	V (m.t)	N (t)	M (m.t)	V (m.t)	N (t)	M (m.t)	V (m.t)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	-0.1	147.9	0.0	0.0	7.0	3595.0	95.5	-199.7	0.0	-0.1	147.9	3595.0	95.5	-199.7	355.7	293.2	434.7	358.4	355.7	293.2	434.7	358.4
1	2	0.0	135.4	123.2	0.0	6.6	6.1	3595.0	-90.7	-172.8	0.0	135.4	123.2	3595.0	-90.7	-172.8	345.0	305.9	411.6	385.7	347.2	303.3	413.8	383.1
1	3	0.0	247.7	101.4	0.0	12.2	5.1	3595.0	-302.6	-146.0	0.0	247.7	101.4	3595.0	-302.6	-146.0	420.7	440.1	495.1	562.2	424.9	434.8	499.3	556.8
1	4	0.0	339.6	82.6	0.0	16.8	4.2	3595.0	-487.6	-119.1	0.0	339.6	82.6	3595.0	-487.6	-119.1	394.8	473.0	456.3	611.4	400.7	465.6	462.2	604.0
1	5	0.0	412.8	63.7	0.0	20.6	3.2	3595.0	-593.3	-92.2	0.0	412.8	63.7	3595.0	-593.3	-92.2	387.2	482.7	441.4	630.4	394.3	473.6	448.5	621.3
1	6	0.0	467.1	44.9	0.0	23.3	2.3	3595.0	-672.1	-65.3	0.0	467.1	44.9	3595.0	-672.1	-65.3	381.4	490.0	430.1	644.6	389.5	479.7	438.2	634.4
1	7	0.0	502.5	26.0	0.0	25.1	1.3	3595.0	-724.0	-38.5	0.0	502.5	26.0	3595.0	-724.0	-38.5	377.5	495.0	422.6	654.2	386.2	483.9	431.3	643.1
1	8	0.0	519.1	7.2	0.0	26.0	0.4	3595.0	-749.1	-11.6	0.0	519.1	7.2	3595.0	-749.1	-11.6	375.4	497.6	418.8	659.0	384.4	486.2	427.8	647.6
1	9	0.0	516.9	-11.7	0.0	25.9	-0.6	3595.0	-747.3	15.2	0.0	516.9	-11.7	3595.0	-747.3	15.2	375.2	497.9	418.7	659.1	384.2	486.5	427.7	647.7
1	10	0.0	495.8	-30.5	0.0	24.9	-1.5	3692.0	-742.7	49.2	0.0	495.8	-30.5	3692.0	-742.7	49.2	380.9	516.9	427.3	680.4	389.5	506.0	435.9	669.4
1	11	0.0	455.9	-49.3	0.0	22.9	-2.5	3692.0	-668.8	96.6	0.0	455.9	-49.3	3692.0	-668.8	96.6	390.1	505.2	441.7	662.1	398.1	495.1	449.6	652.0
1	12	0.0	397.1	-68.2	0.0	20.0	-3.4	3692.0	-549.4	142.0	0.0	397.1	-68.2	3692.0	-549.4	142.0	407.0	483.8	466.9	630.2	414.0	475.0	473.8	621.4
1	13	0.0	319.5	-87.0	0.0	16.1	-4.4	3692.0	-384.8	187.3	0.0	319.5	-87.0	3692.0	-384.8	187.3	431.5	452.7	502.8	584.6	437.1	445.6	508.4	577.5
1	14	0.0	223.1	-105.9	0.0	11.2	-5.3	3692.0	-174.9	232.6	0.0	223.1	-105.9	3692.0	-174.9	232.6	463.7	411.9	549.5	525.3	467.6	407.0	553.4	520.4
1	15	0.0	107.7	-124.7	0.0	5.4	-6.3	3692.0	80.6	278.0	0.0	107.7	-124.7	3692.0	80.6	278.0	503.5	361.5	607.0	452.3	505.3	359.1	608.9	449.9
1	16	0.0	-26.4	-143.6	0.0	-1.3	-7.2	3692.0	381.1	323.3	0.0	-26.4	-143.6	3692.0	381.1	323.3	550.8	301.4	675.3	365.7	550.4	301.9	674.8	366.3
1	17	0.0	-179.3	-162.4	0.0	-9.0	-8.2	3692.0	726.9	368.6	0.0	-179.3	-162.4	3692.0	726.9	368.6	605.8	231.6	754.3	265.5	602.7	235.6	751.2	269.5
1	18	0.0	-351.2	-181.2	0.0	-17.6	-9.1	3692.0	1119.0	415.2	0.0	-351.2	-181.2	3692.0	1119.0	415.2	668.7	151.8	844.4	151.2	662.6	159.6	838.3	159.0
1	19	0.0	-541.8	-200.1	0.0	-27.2	-10.1	3813.0	1500.0	294.0	0.0	-541.8	-200.1	3813.0	1500.0	294.0	736.0	99.2	941.4	68.2	726.6	111.2	931.9	80.2
1	20	0.0	-752.9	-221.9	0.0	-37.7	-11.0	3813.0	1783.0	161.3	0.0	-752.9	-221.9	3813.0	1783.0	161.3	631.0	11.3	827.0	-52.0	618.4	26.2	814.4	-37.2
1	21	0.0	-987.1	-246.6	0.0	-49.2	-12.0	3813.0	1933.0	25.9	0.0	-987.1	-246.6	3813.0	1933.0	25.9	597.9	50.4	803.9	-24.8	581.5	69.8	787.5	-5.4
2	1	0.0	-986.8	246.6	0.0	-49.2	11.9	3715.0	1898.0	-3.3	0.0	-986.8	246.6	3715.0	1898.0	-3.3	578.6	53.8	780.3	-20.6	562.1	73.2	763.9	-1.2
2	2	0.0	-697.9	215.7	0.0	-35.1	10.7	3715.0	1739.0	-250.9	0.0	-697.9	215.7	3715.0	1739.0	-250.9	627.2	-3.6	818.3	-65.5	615.5	10.2	806.6	-51.7
2	3	0.0	-445.3	188.5	0.0	-22.5	9.5	3715.0	1275.0	-498.6	0.0	-445.3	188.5	3715.0	1275.0	-498.6	694.8	148.5	884.5	139.9	686.7	157.9	876.5	149.3
2	4	0.0	-224.3	164.9	0.0	-11.4	8.3	3579.0	573.3	-556.1	0.0	-224.3	164.9	3579.0	573.3	-556.1	531.7	304.8	667.7	351.6	527.6	309.5	663.6	356.3
2	5	0.0	-32.9	141.3	0.0	-1.7	7.1	3579.0	-42.8	-455.3	0.0	-32.9	141.3	3579.0	-42.8	-455.3	401.8	457.4	493.7	556.0	401.2	458.1	493.1	556.7
2	6	0.0	128.9	117.8	0.0	6.5	5.9	3578.0	-564.4	-380.0	0.0	128.9	117.8	3578.0	-564.4	-380.0	291.7	586.6	346.2	729.0	294.0	583.9	348.6	726.3
2	7	0.0	261.5	94.2	0.0	13.1	4.8	3578.0	-992.4	-304.6	0.0	261.5	94.2	3578.0	-992.4	-304.6	201.3	692.7	225.3	871.1	206.0	687.2	230.0	865.6
2	8	0.0	364.5	70.7	0.0	18.3	3.6	3578.0	-1326.0	-229.3	0.0	364.5	70.7	3578.0	-1326.0	-229.3	130.8	775.7	130.9	982.1	137.3	767.9	137.4	974.4
2	9	0.0	438.2	47.1	0.0	22.1	2.4	3578.0	-1566.0	-153.9	0.0	438.2	47.1	3578.0	-1566.0	-153.9	79.9	835.5	62.8	1062.1	87.8	826.2	70.7	1052.8
2	10	0.0	482.4	23.6	0.0	24.3	1.2	3578.0	-1711.0	-78.6	0.0	482.4	23.6	3578.0	-1711.0	-78.6	49.0	871.7	21.6	1110.5	57.7	861.5	30.3	1100.3
2	11	0.0	497.2	0.0	0.0	25.0	0.0	3578.0	-1762.0	-3.2	0.0	497.2	0.0	3578.0	-1762.0	-3.2	37.9	884.8	6.8	1127.9	46.9	874.3	15.8	1117.4
2	12	0.0	482.5	-23.5	0.0	24.3	-1.2	3418.0	-1618.0	68.7	0.0	482.5	-23.5	3418.0	-1618.0	68.7	59.9	817.4	34.9	1044.1	68.8	807.2	43.5	1033.9
2	13	0.0	438.4	-47.1	0.0	22.1	-2.4	3418.0	-1488.0	140.7	0.0	438.4	-47.1	3418.0	-1488.0	140.7	86.0	786.8	70.2	1002.6	93.9	777.5	78.1	993.3
2	14	0.0	364.9	-70.6	0.0	18.4	-3.6	3418.0	-1267.0	212.6	0.0	364.9	-70.6	3418.0	-1267.0	212.6	130.8	734.1	130.9	931.3	137.4	726.3	137.4	923.6
2	15	0.0	261.8	-94.2	0.0	13.2	-4.7	3418.0	-956.0	284.6	0.0	261.8	-94.2	3418.0	-956.0	284.6	194.0	659.7	216.4	830.8	198.8	654.2	221.1	825.3
2	16	0.0	129.4	-117.7	0.0	6.5	-5.9	3418.0	-555.4	356.6	0.0	129.4	-117.7	3418.0	-555.4	356.6	275.6	563.9	326.6	701.2	278.0	561.1	326.9	698.5
2	17	0.0	-32.5	-141.3	0.0	-1.7	-7.1	3418.0	-64.6	428.6	0.0	-32.5	-141.3	3418.0	-64.6	428.6	375.7	446.3	461.8	542.4	375.1	447.0	461.2	543.1
2	18	0.0	-223.8	-164.8	0.0	-11.3	-8.3	3419.0	515.8	500.5	0.0	-223.8	-164.8	3419.0	515.8	500.5	494.3	307.2	621.9	354.6	490.2	312.0	617.8	359.3
2	19	0.0	-444.6	-188.4	0.0	-22.5	-9.5	3419.0	1155.0	496.2	0.0	-444.6	-188.4	3419.0	1155.0	496.2	621.0	158.2	794.4	151.8	613.0	167.7	786.4	161.3
2	20	0.0	-697.1	-215.6	0.0	-35.1	-10.7	3579.0	1625.0	235.2	0.0	-697.1	-215.6	3579.0	1625.0	235.2	580.9	24.1	761.6	-31.6	569.2	37.9	749.9	-17.8
2	21	0.0	-986.0	-246.5	0.0	-49.2	-11.9	3579.0	1771.0	7.5	0.0	-986.0	-246.5	3579.0	1771.0	7.5	528.3	86.1	718.8	19.0	511.9	105.5	702.4	38.3
3	1	0.0	-985.8	246.5	0.0	-49.2	12.0	3715.0	1819.0	-24.5	0.0	-985.8	246.5	3715.0	1819.0	-24.5	555.2	81.4	751.6	13.2	538.8	100.8	735.2	32.6
3	2	0.0	-751.7	221.8	0.0	-37.7	11.0	3715.0	1730.0	-153.7	0.0	-751.7	221.8	3715.0	1730.0	-153.7	606.5	20.7	797.0	-40.4	594.0	35.8	784.5	-25.6
3	3	0.0	-540.8	200.0	0.0	-27.2	10.1	3715.0	1516.0	-282.9	0.0	-540.8	200.0	3715.0	1516.0	-282.9	738.2	97.4	945.2	88.6	726.5	108.8	935.5	80.0
3	4	0.0	-350.1	181.2	0.0	-17.6	9.1	3715.0	1168.0	-422.5	0.0	-350.1	181.2	3715.0	1168.0	-422.5	694.4	148.9	876.5	149.3	688.1	158.3	870.2	156.7
3	5	0.0	-178.3	162.3	0.0	-8.9	8.2	3816.0	789.3	-376.0	0.0	-178.3	162.3	3816.0	789.3	-376.0	646.0	232.0	803.7	266.9	642.8	235.8	800.5	270.7
3	6	0.0	-25.4	143.5	0.0	-1.2	7.2	3816.0	436.7	-329.2	0.0	-25.4	143.5	3816.0	436.7	-329.2	587.2	301.1	719.7	365.7	586.7	301.7	719.2	366.2
3	7	0.0	108.6	124.7	0.0	5.5	6.3	3816.0	131.2	-282.3	0.0	108.6	124.7	3816.0	131.2	-282.3	536.7	360.4	647.4	450.6	538.7	358.1	649.3	448.3
3	8	0.0	223.8	105.8	0.0	11.3	5.3	3816.0	-127.8	-235.5	0.0	223.8	105.8	3816.0	-127.8	-235.5	494.6	409.9	596.7	522.0	498.6	405.2	590.7	517.2
3	9	0.0	320.3	87.0	0.0	16.1	4.4	3816.0	-339.9	-188.6	0.0	320.3	87.0	3816.0	-339.9	-188.6	460.8	449.6	537.8	579.5	486.6	442.9	543.5	572.7
3	10	0.0	397.8	68.2	0.0	20.0	3.4	3816.0	-505.0	-141.8	0.0	397.8	68.2	3816.0	-505.0	-141.8	435.4	479.5	500.5	623.2	442.5	471.1	507.7	614.8
3	11	0.0	456.5	49.3	0.0	22.9	2.5	3816.0	-623.5	-94.9	0.0	456.5	49.3	3816.0	-623.5	-94.9	418.2	499.7	474.9	653.3	426.4	490.0	483.1	643.7
3	12	0.0	496.4	30.5	0.0	24.9	1.5	3816.0	-694.9	-48.1	0.0	496.4	30.5	3816.0	-694.9	-48.1	409.5	509.9	461.1	669.6	418.4	499.4	470.0	659.1
3	13	0.0	517.4	11.6	0.0	25.9	0.6	3692.0	-691.1	-9.5	0.0	517.4	11.6	3692.0	-691.1	-9.5	403.5	484.6	452.0	640.9	412.7	473.9	461.3	630.0
3	14	0.0	519.6	-7.2	0.0	26.0	-0.4	3692.0	-688.1	16.8	0.0	519.6	-7.2	3692.0	-688.1	16.8	405.2	482.8	454.0	638.6	414.5	471.8	463.3	627.6
3	15	0.0	503.0	-26.1	0.0	25.2	-1.3	3692.0	-657.6	44.3	0.0	503.0	-26.1	3692.0	-657.6	44.3	409.1	478.2	460.0	631.5	418.1	467.6	469.0	620.9
3	16	0.0	467.4	-44.9	0.0	23.3	-2.3	3692.0	-599.5	71.9	0.0	467.4	-44.9	3692.0	-599.5	71.9	415.1	471.2	470.1	619.6	423.4	461.4	478.5	609.7
3	17	0.0	413.1	-63.8	0.0	20.6	-3.2	3692.0	-513.7	99.5	0.0	413.1	-63.8	3692.0	-513.7	99.5	423.3	461.6	484.5	602.7	430.6	452.9	491.8	594.1
3	18	0.0	339.9	-82.6	0.0	16.9	-4.2	3692.0	-400.4	127.1	0.0	339.9	-82.6	3692.0	-400.4	127.1	433.5	449.5	502.9	581.1	439.6	442.4	508.9	574.0
3	19	0.0	247.9	-101.5	0.0	12.2	-5.1	3692.0	-259.5	154.7	0.0	247.9	-101.5	3692.0	-259.5	154.7	446.0	434.8	525.4	554.6	450.4	429.7	529.8	549.5
3	20	0.0	135.6	-123.2	0.0	6.6	-6.1	3691.0	-94.9	182.3	0.0	135.6	-123.2	3691.0	-94.9	182.3	352.5	316.0	420.8	398.1	354.7	313.4	423.0	395.5
3	21	0.0	-0.1	-148.0	0.0	0.0	-7.0	3691.0	97.6	209.9	0.0	-0.1	-148.0	3691.0	97.6	209.9	255.0	301.2	446.2	368.1	365.0	301.2	446.2	368.1

CÁLCULO DE TENSIONES EN PUENTES

PROYECTO: L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: ED2-1.8

Fase: PUENTE COMPLETO EN TIEMPO INICIAL

Resumen de combinaciones:

		Tension máxima	Tension mínima
1	PP,inicial + CM + 0.9 x Pret,inicial + 0.6 x SC(+) + 0.5 x GRAD	722	47
2	PP,inicial + CM + 1.1 x Pret,inicial + 0.6 x SC(+) + 0.5 x GRAD	928	-15
3	PP,inicial + CM + 0.9 x Pret,inicial + 0.6 x SC(-) + 0.5 x GRAD	862	57
4	PP,inicial + CM + 1.1 x Pret,inicial + 0.6 x SC(-) + 0.5 x GRAD	1105	26
5	PP,inicial + CM + 0.9 x Pret,inicial + 1.0* SC(+) + 0.6 x GRAD	788	19
6	PP,inicial + CM + 1.1 x Pret,inicial + 1.0* SC(+) + 0.6 x GRAD	956	-43
7	PP,inicial + CM + 0.9 x Pret,inicial + 1.0* SC(-) + 0.6 x GRAD	912	15
8	PP,inicial + CM + 1.1 x Pret,inicial + 1.0* SC(-) + 0.6 x GRAD	1155	-17

PP,inicial= Peso propio en tiempo inicial
Pret,inicial = Pretensado en tiempo inicial
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INICIAL																TENSIONES EN FIBRAS SUPERIOR E INFERIOR													
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t)	M (m.t.)	V (m.t.)	N (t)	M (m.t.)	V (m.t.)	N (t)	M (m.t.)	V (m.t.)	N (t)	M (m.t.)	V (m.t.)	N (t)	M (m.t.)	V (m.t.)	N (t)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	-0.1	147.9	3595.0	95.5	-199.7	0.0	0.0	65.2	0.0	142.5		0.0	-26.6	0.0	0.0	13.28		356	293	435	358	356	293	435	358	356	293	435	358	356	293	435	358
1	2	0.0	135.4	123.2	3595.0	-90.7	-172.8	0.0	60.8	56.4	154.7	146.9		-30.5	-30.5	0.0	13.3	13.28		398	243	465	323	359	289	426	369	420	218	486	298	355	294	422	374
1	3	0.0	247.7	101.4	3595.0	-302.6	-146.0	0.0	112.7	47.6	288.5	128.6		-61.0	-30.5	0.0	26.6	13.28		525	308	599	430	447	407	522	529	566	256	640	378	439	417	513	539
1	4	0.0	339.6	82.6	3595.0	-487.6	-119.1	0.0	155.9	38.8	403.9	111.2		-91.5	-30.5	0.0	39.9	13.28		540	289	602	427	430	429	491	567	598	216	659	354	417	445	479	583
1	5	0.0	412.8	63.7	3595.0	-593.3	-92.2	0.0	190.4	30.0	503.1	92.7		-122.0	-30.5	0.0	53.2	13.28		567	254	622	402	428	431	482	579	639	163	693	311	411	453	465	600
1	6	0.0	467.1	44.9	3595.0	-672.1	-65.3	0.0	216.0	21.2	581.9	74.3		-152.5	-30.5	0.0	66.5	13.28		589	226	638	381	425	435	473	590	672	121	721	275	403	462	452	617
1	7	0.0	502.5	26.0	3595.0	-724.0	-38.5	0.0	232.8	12.4	645.0	56.9		-183.1	-30.5	0.0	79.7	13.28		607	204	652	364	420	441	465	600	699	87	744	246	395	473	440	632
1	8	0.0	519.1	7.2	3595.0	-749.1	-11.6	0.0	240.8	3.6	688.8	38.4		-213.6	-30.5	0.0	93.0	13.28		619	189	662	350	415	448	458	609	718	63	761	225	385	486	428	647
1	9	0.0	516.9	-11.7	3595.0	-747.3	15.2	0.0	240.0	-5.2	712.9	18.3		-244.1	-30.5	0.0	106.3	13.28		626	180	669	341	408	457	451	618	728	50	772	211	374	500	417	661
1	10	0.0	495.8	-30.5	3692.0	-742.7	49.2	0.0	230.4	-14.0	723.4	2.7		-274.6	-30.5	0.0	119.6	13.28		632	198	679	361	404	488	450	651	737	65	783	228	366	536	412	700
1	11	0.0	455.9	-49.3	3692.0	-668.8	86.6	0.0	212.0	-22.8	711.8	-15.8		-305.1	-30.5	0.0	132.9	13.28		635	194	687	351	400	492	452	649	739	63	790	220	358	546	409	703
1	12	0.0	397.1	-68.2	3692.0	-549.4	142.0	0.0	184.8	-31.6	682.9	-35.9		-335.6	-30.5	0.0	146.1	13.28		639	190	699	336	401	491	461	637	739	63	799	209	355	550	414	697
1	13	0.0	319.5	-87.0	3692.0	-384.8	187.3	0.0	148.8	-40.4	639.1	-51.5		-366.1	-30.5	0.0	159.4	13.28		644	183	715	315	407	484	478	616	738	63	810	195	356	548	427	680
1	14	0.0	223.1	-105.9	3692.0	-174.9	232.6	0.0	104.0	-49.2	572.4	-74.5		-396.6	-30.5	0.0	172.7	13.28		649	177	735	290	417	471	503	584	735	68	820	182	362	541	448	654
1	15	0.0	107.7	-124.7	3692.0	80.6	278.0	0.0	50.4	-58.0	490.1	-90.1		-427.1	-30.5	0.0	186.0	13.28		655	169	759	260	432	452	535	543	730	74	833	165	373	527	476	618
1	16	0.0	-26.4	-143.6	3692.0	381.1	323.3	0.0	-12.0	-66.8	392.1	-105.8		-457.6	-30.5	0.0	199.3	13.28		663	159	787	223	451	428	576	492	724	81	849	146	388	508	512	573
1	17	0.0	-179.3	-162.4	3692.0	726.9	368.6	0.0	-83.2	-75.6	291.8	-106.9		-488.1	-30.5	0.0	212.5	13.28		675	144	823	178	475	397	624	431	723	83	871	117	407	483	556	517
1	18	0.0	-351.2	-181.2	3692.0	1119.0	415.2	0.0	-163.2	-84.4	203.3	-65.3		-544.8	-87.7	0.0	225.8	13.28		694	120	869	120	498	368	674	367	730	74	905	74	423	464	598	463
1	19	0.0	-541.8	-200.1	3813.0	1500.0	294.0	0.0	-252.0	-93.2	151.0	-34.6		-658.5	-154.7	0.0	239.1	13.28		721	118	927	87	511	384	717	353	751	80	956	49	420	500	625	469
1	20	0.0	-752.9	-221.9	3813.0	1783.0	161.3	0.0	-349.6	-102.0	126.4	-8.6		-831.0	-196.3	0.0	252.4	13.28		582	69	778	6	348	345	544	282	607	40	803	-24	237	476	433	413
1	21	0.0	-987.1	-246.6	3813.0	1933.0	25.9	0.0	-456.0	-110.8	123.6	6.2		-1044.2	-232.4	0.0	265.7	13.28		515	148	721	73	237	477	443	402	540	119	746	43	98	641	304	566
											0.0	0.0		0.0	0.0																				
2	1	0.0	-986.8	246.6	3715.0	1898.0	-3.3	0.0	-455.9	110.0	123.6	-22.6		-1044.2	245.4	0.0	265.6	0.0675		496	152	697	77	218	480	419	406	521	122	723	47	78	645	280	570
2	2	0.0	-897.9	215.7	3715.0	1739.0	-250.9	0.0	-325.3	99.0	108.1	-4.4		-763.2	204.2	0.0	265.7	0.0675		585	47	776	-15	366	305	557	243	608	19	799	-43	264	425	455	363
2	3	0.0	-445.3	188.5	3715.0	1275.0	-498.6	0.0	-208.3	88.0	122.7	26.4		-541.1	151.9	0.0	265.8	0.0675		694	149	884	141	504	372	694	364	721	117	911	109	427	463	617	455
2	4	0.0	-224.3	164.9	3579.0	573.3	-556.1	0.0	-105.1	77.0	185.1	86.0		-384.5	95.4	0.0	265.9	0.0675		581	246	717	293	412	446	548	493	617	204	753	251	357	511	493	557
2	5	0.0	-32.9	141.3	3579.0	-42.8	-455.3	0.0	-15.8	66.0	301.4	108.6		-287.7	41.3	0.0	266.0	0.0675		508	332	600	431	332	539	424	638	561	270	653	369	290	589	382	688
2	6	0.0	128.9	117.8	3578.0	-564.4	-380.0	0.0	59.8	55.0	442.0	108.9		-278.9	-2.9	0.0	266.1	0.0675		456	394	510	536	253	632	308	774	528	309	583	451	213	679	268	821
2	7	0.0	261.5	94.2	3578.0	-992.4	-304.6	0.0	121.8	44.0	567.5	86.7		-282.5	-2.9	0.0	266.1	0.0675		414	443	438	621	184	713	208	891	505	336	529	514	144	760	168	939
2	8	0.0	364.5	70.7	3578.0	-1326.0	-229.3	0.0	169.9	33.0	665.5	69.8		-286.2	-2.9	0.0	266.2	0.0675		382	480	382	687	130	776	130	983	487	357	487	564	89	925	89	1031
2	9	0.0	438.2	47.1	3578.0	-1566.0	-153.9	0.0	204.3	22.0	735.2	47.6		-289.8	-2.9	0.0	266.3	0.0675		358	508	341	735	91	823	74	1049	473	373	456	600	49	871	32	1098
2	10	0.0	482.4	23.6	3578.0	-1711.0	-78.6	0.0	224.9	11.0	776.4	18.9		-293.4	-2.9	0.0	266.4	0.0675		344	525	316	764	67	851	39	1090	464	384	437	622	25	901	-3	1139
2	11	0.0	497.2	0.0	3578.0	-1762.0	-3.2	0.0	231.8	0.0	789.3	2.1		-297.0	-2.9	0.0	266.5	0.0675		338	532	307	775	57	862	26	1105	460	388	429	631	15	912	-17	1155
2	12	0.0	482.5	-23.5	3418.0	-1618.0	68.7	0.0	225.0	-11.0	776.0	-19.2		-300.7	-2.9	0.0	266.6	0.0675		355	471	330	698	76	799	51	1025	475	329	450	556	33	849	8	1076
2	13	0.0	438.4	-47.1	3418.0	-1488.0	140.7	0.0	204.4	-22.0	734.4	-41.5		-304.3	-2.9	0.0	266.6	0.0675		364	460	349	675	94	778	78	993	479	325	463	541	50	829	34	1045
2	14	0.0	364.9	-70.6	3418.0	-1267.0	212.6	0.0	170.0	-33.0	664.3	-70.1		-307.9	-2.9	0.0	266.7	0.0675		382	439	382	636	126	740	126	937	486	316	487	513	81	782	82	989
2	15	0.0	261.8	-94.2	3418.0	-956.0	284.6	0.0	121.9	-44.0	565.9	-87.0		-311.5	-2.9	0.0	266.8	0.0675		407	410	429	581	171	687	193	858	497	303	520	474	126	739	149	911
2	16	0.0	129.4	-117.7	3418.0	-555.4	356.8	0.0	60.1	-55.0	440.1	-109.2		-315.2	-2.9	0.0	266.9	0.0675		439	372	490	509	229	618	280	755	512	286	563	424	184	671	235	808
2	17	0.0	-32.5	-141.3	3418.0	-64.6	428.6	0.0	-15.6	-66.0	299.9	-96.7		-331.1	-36.9	0.0	267.0	0.0675		482	321	568	417	299	536	385	632	535	259	621	356	252	592	338	688
2	18	0.0	-223.8	-164.8	3418.0	515.8	500.5	0.0	-104.9	-77.0	184.3	-85.9		-402.5	-77.2	0.0	267.1	0.0675		544	249	672	296	370	453	498	500	580	206	708	254	313	520	440	668
2	19	0.0	-444.6	-188.4	3419.0	1155.0	496.2	0.0	-208.0	-88.0	113.9	-29.4		-540.6	-152.0	0.0	267.1	0.0675		619	161	792	154	431	382	604	376	645	130	818	124	353	473	527	467
2	20	0.0	-697.1	-215.6	3579.0	1625.0	235.2	0.0	-324.9	-99.0	96.2	1.5		-763.2	-204.3	0.0	267.2	0.0675		536	77	717	21	320	332	601	277	658	51	739	-5	218	453	399	397
2	21	0.0	-986.0	-246.5	3579.0	1771.0	7.5	0.0	-455.5	-110.0	108.1	19.7		-1044.5	-245.5	0.0	267.3	0.0675		443	187	633	120	167	612	358	445	466	160	656	93	28	677	219	610
											0.0	0.0		0.0	0.0																				
3	1	0.0	-985.8	246.5	3715.0	1819.0	-24.5	0.0	-455.4	110.8	108.1	-5.4		-1044.5	232.4	0.0	267.3	-13.36		470	183	666	114	194	508	391	439	493	155	689	87	55	672	251	604
3	2	0.0	-751.7	221.8	3715.0	1730.0	-153.7	0.0	-349.1	102.0	111.8	9.3		-831.5	196.4	0.0	254.0	-13.36		555	82	745	21	324	355	514	294	578	54	769	-7	213	486	403	425
3	3	0.0	-540.8	200.0	3715.0	1516.0	-282.9	0.0	-251.5	93.2	137.5	35.4		-659.4	150.2	0.0	240.6	-13.36		721	118	928	89	507	369	714	341	749	85	956	56	412	480	619	451
3	4	0.0	-350.1	181.2	3715.0	1168.0	-422.5	0.0	-162.7	84.4	203.9	89.8		-546.6	97.8	0.0	227.2	-13.36		721	118	903	119	519	355	701	356	758	74	940	75	441	447	623	447
3	5	0.0	-178.3	162.3	3816.0	789.3	-376.0	0.0	-82.7	75.6	314.3	128.8		-491.2	30.7	0.0	213.9	-13.36		722	143	880	177	511	391	669	426	775	81	932	116	441	473	598	508
3	6	0.0	-25.4	143.5	3816.0	436.7	-329.2	0.0	-11.6	66.8	430.3	110.6		-460.5	30.7	0.0	200.5	-13.36		711	155	844	220	484	422	617	487	780	75	912	139	418	500	551	564
3	7	0.0	108.6	124.7	3816.0	131.2	-282.3	0.0	50.8	58.0	527.6	92.7		-429.8	30.7	0.0	187.2	-13.36		702	167	812	257	463	447	573	538	784	70	894	160	401	520	512	610
3	8	0.0	223.8	105.8	3816.0	-127.8	-235.5	0.0	104.3	49.2	608.4	74.6		-399.1	30.7	0.0	173.8	-13.36		694	176	786	288	446	467	538	579	787	67	879	179	389	534	481	646
3	9	0.0	320.3	87.0	3816.0	-339.9	-188.6	0.0	149.1	40.4	669.7	56.3		-368.4	30.7	0.0	160.4	-13.36		687	184	763	314	435	480	512	610	788	65	865	195	382	542	459	672
3	10	0.0	397.8	68.2	3816.0	-505.0	-141.8	0.0	185.1	31.6	713.4	38.5		-337.7	30.7	0.0	147.1	-13.36		681	191	746	335	429	487	494	631	788	65	853	208	381	544	446	687
3	11	0.0	456.5	49.3	3816.0	-623.5	-94.9	0.0	212.3	22.8	739.8	20.3		-307.0	30.7	0.0	133.7	-13.36		677	196	733	349	428	488	485	642	787	66	844	219	384	539	441	693
3	12	0.0	496.4	30.5	3816.0	-694.9	-48.1	0.0	230.6	14.0	746.3	2.1		-276.3	30.7	0.0	120.3	-13.36		674	199	725	359	433	483	484	642	785	69	836	229	393	529	445	689
3	13	0.0	517.4	11.6	3692.0	-691.1	-9.5	0.0	240.2	5.2	736.4	-15.8		-245.6	30.7	0.0	107.0	-13.36		667	176	715	332	437	446	485	602	776	47	824	203	402	487	450	643
3	14	0.0	519.6	-7.2	3692.0	-688.1	16.8	0.0	241.0	-3.6	708.4	-33.9		-214.9	30.7	0.0	93.6	-13.36		660	183	709	339	445	436	494	591	765	60	814	216	415	472	463	628
3	15	0.0	503.0	-26.1	3692.0	-657.6	44.3	0.0	233.0	-12.4	660.3	-52.1		-184.2	30.7	0.0	80.2	-13.36		648	197	699	350	453	427	504	580	746	83	797	236	427	458	477	611
3	16	0.0	467.4	-44.9	3692.0	-599.5	71.9	0.0	216.1	-21.2	596.8	-70.0		-153.5	30.7	0.0	66.9	-13.36		632	216	687	364	459	419	514	567	720	113	775	261	437	445	493	593
3	17	0.0	413.1	-63.8	3692.0	-513.7	99.5	0.0	190.5	-30.0	514.3	-88.2		-122.8	30.7	0.0	53.5	-13.36		611	241	673	382	465	412	526	554	687	152	748	293	447	433	509	574
3	18	0.0	339.9	-82.6	3692.0	-400.4	127.1	0.0	156.1	-38.8	411.5	-106.4		-92.1	30.7	0.0	40.2	-13.36		585	272	654	403	470	407	539	539	645	201	714	332	456	423	526	554
3	19	0.0	247.9	-101.5	3692.0	-259.5	154.7	0.0	112.8	-47.6	294.4	-124.2		-61.4	30.7	0.0	26.8	-13.36		554	308	634	427	473	403	553	523	597	257	677	377	464	413	544	533
3	20	0.0	135.6	-123.2	3691.0	-94.9	182.3	0.0	60.8	-56.4	157.5	-142.4		-30.7	30.7	0.0	13.4	-13.36		407	252	475	334	367	299	435	381	428	227	496	309	363	304	431	386
3	21	0.0	-0.1	-148.0	3691.0	97.6	209.9	0.0	-0.1	-65.2	0.0	-160.1		0.0	12.0	0.0	0.0	-13.36		365	301	446	368	365	301	446	368	365	301	446	368	365	301	446	368

CÁLCULO DE TENSIONES EN PUENTES

Fase : PUENTE COMPLETO EN TIEMPO INFINITO

PROYECTO : L.A.V. MADRID-ZARAGOZA
ESTRUCTURA: ED2-1.8

Resumen de combinaciones:

		Tension máxima (t/m2)	Tension mínima (t/m2)
1	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	644	83
2	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(+) + 0.5 x GRAD	790	29
3	PP,final + CM + 0.9 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	720	56
4	PP,final + CM + 1.1 x Pret,final + 0.6 * SC(-) + 0.5 x GRAD	932	48
5	PP,final + CM + 0.9 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	755	-44
6	PP,final + CM + 1.1 x Pret,final + 1.0* SC(+) + 0.6 x GRAD	820	1
7	PP,final + CM + 0.9 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	770	-84
8	PP,final + CM + 1.1 x Pret,final + 1.0* SC(-) + 0.6 x GRAD	982	6

PP,final= Peso propio en tiempo final
Pret,final = Pretensado en tiempo final
CM = Carga muerta
SC(+) , SC(-) = Envolventes de momentos positivos y negativos de la sobrecarga de uso
GRAD= Gradiente térmico

		TIEMPO INFINITO																TENSIONES EN FIBRAS SUPERIOR E INFERIOR											
		Peso Propio			Pretensado			Carga muerta			Envolvente SC(+)			Envolvente SC(-)			Gradiente			Combinacion 1		Combinacion 2		Combinacion 3		Combinacion 4		Combinacion 5		Combinacion 6		Combinacion 7		Combinacion 8	
Vano	Seccion	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	N (t.)	M (m.t.)	V (m.t.)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)	Ssup (t/m2)	Sinf (t/m2)
1	1	0.0	-0.1	147.9	3127.0	83.1	-173.7	0.0	0.0	65.2	0.0	142.5		0.0	-26.6		0.0	0.0	13.28	309	255	378	312	309	255	378	312	309	255	378	312	309	255	378	312
1	2	0.0	135.4	123.2	3127.0	-78.9	-150.4	0.0	60.8	56.4	154.7	146.9		-30.5	-30.5		0.0	13.3	13.28	359	196	417	265	320	242	378	312	380	171	438	241	316	247	374	317
1	3	0.0	247.7	101.4	3127.0	-263.2	-127.0	0.0	112.7	47.6	288.5	128.6		-61.0	-30.5		0.0	26.6	13.28	481	237	546	343	404	335	468	441	522	185	587	291	395	346	460	452
1	4	0.0	339.6	82.6	3127.0	-424.2	-103.6	0.0	155.9	38.8	403.9	111.2		-91.5	-30.5		0.0	39.9	13.28	504	208	557	328	394	347	447	468	561	135	615	255	381	364	435	484
1	5	0.0	412.8	63.7	3127.0	-516.2	-80.2	0.0	190.4	30.0	503.1	92.7		-122.0	-30.5		0.0	53.2	13.28	536	168	583	296	396	345	443	473	607	77	654	205	379	366	426	495
1	6	0.0	467.1	44.9	3127.0	-584.7	-56.9	0.0	216.0	21.2	581.9	74.3		-152.5	-30.5		0.0	66.5	13.28	561	136	603	270	396	345	438	479	644	30	686	165	375	371	417	506
1	7	0.0	502.5	26.0	3127.0	-629.9	-33.5	0.0	232.8	12.4	645.0	56.9		-183.1	-30.5		0.0	79.7	13.28	580	111	619	250	394	348	433	486	673	-6	712	132	368	380	408	518
1	8	0.0	519.1	7.2	3128.0	-651.7	-10.1	0.0	240.8	3.6	688.8	38.4		-213.6	-30.5		0.0	93.0	13.28	593	95	631	235	389	354	427	494	692	-31	730	109	360	391	397	532
1	9	0.0	516.9	-11.7	3128.0	-650.1	13.3	0.0	240.0	-5.2	712.9	18.3		-244.1	-30.5		0.0	106.3	13.28	600	86	638	226	382	362	420	503	703	-44	741	96	348	405	386	546
1	10	0.0	495.8	-30.5	3212.0	-646.2	42.8	0.0	230.4	-14.0	723.4	2.7		-274.8	-30.5		0.0	119.6	13.28	605	102	646	244	377	392	417	535	710	-31	750	112	338	441	379	583
1	11	0.0	455.9	-49.3	3212.0	-581.8	84.1	0.0	212.0	-22.8	711.8	-15.8		-305.1	-30.5		0.0	132.9	13.28	605	103	650	239	370	401	415	537	709	-29	753	108	328	454	373	591
1	12	0.0	397.1	-68.2	3212.0	-477.9	123.5	0.0	184.8	-31.6	682.9	-35.9		-335.6	-30.5		0.0	146.1	13.28	604	104	656	231	366	405	418	533	704	-23	756	104	320	465	372	592
1	13	0.0	319.5	-87.0	3212.0	-334.8	162.9	0.0	148.8	-40.4	639.1	-51.5		-366.1	-30.5		0.0	159.4	13.28	602	106	664	221	365	407	427	522	697	-14	759	101	314	471	376	586
1	14	0.0	223.1	-105.9	3212.0	-152.2	202.4	0.0	104.0	-49.2	572.4	-74.5		-396.6	-30.5		0.0	172.7	13.28	599	110	674	209	367	405	442	503	684	2	759	101	312	475	386	573
1	15	0.0	107.7	-124.7	3212.0	70.1	241.8	0.0	50.4	-58.0	490.1	-90.1		-427.1	-30.5		0.0	186.0	13.28	595	116	685	195	371	399	461	478	669	21	759	100	312	474	402	553
1	16	0.0	-26.4	-143.6	3212.0	331.6	281.3	0.0	-12.0	-66.8	392.1	-105.8		-457.6	-30.5		0.0	199.3	13.28	590	121	698	177	378	390	487	446	652	43	760	100	315	471	423	527
1	17	0.0	-179.3	-162.4	3212.0	632.4	320.7	0.0	-83.2	-75.6	291.8	-106.9		-488.1	-30.5		0.0	212.5	13.28	588	124	717	154	388	377	517	407	636	64	765	93	321	464	450	493
1	18	0.0	-351.2	-181.2	3212.0	973.2	361.3	0.0	-163.2	-84.4	203.3	-65.3		-544.8	-87.7		0.0	225.8	13.28	591	121	744	120	396	368	548	368	627	75	780	74	320	464	473	464
1	19	0.0	-541.8	-200.1	3317.0	1305.0	255.8	0.0	-252.0	-93.2	151.0	-34.6		-658.5	-154.7		0.0	239.1	13.28	601	136	780	109	391	402	570	375	631	99	809	72	300	518	478	492
1	20	0.0	-752.9	-221.9	3317.0	1551.0	140.3	0.0	-349.6	-102.0	126.4	-8.6		-831.0	-196.3		0.0	252.4	13.28	467	107	638	51	233	383	404	327	492	77	663	22	122	514	293	458
1	21	0.0	-987.1	-246.6	3317.0	1682.0	22.5	0.0	-456.0	-110.8	123.6	6.2		-1044.2	-232.4		0.0	265.7	13.28	394	192	574	127	116	521	296	455	420	162	599	97	-23	685	156	620
											0.0	0.0		0.0	0.0																				
2	1	0.0	-986.8	246.6	3232.0	1651.0	-2.9	0.0	-455.9	110.0	123.6	-22.6		-1044.2	245.4		0.0	265.6	0.0675	377	195	553	131	99	524	275	459	403	166	578	101	-40	688	136	624
2	2	0.0	-697.9	215.7	3232.0	1513.0	-218.3	0.0	-325.3	99.0	108.1	-4.4		-763.2	204.2		0.0	265.7	0.0675	473	83	639	29	254	341	420	287	496	55	662	1	152	461	319	407
2	3	0.0	-445.3	188.5	3232.0	1109.0	-433.8	0.0	-208.3	88.0	122.7	26.4		-541.1	151.9		0.0	265.8	0.0675	583	154	748	147	393	378	558	370	610	123	775	115	316	469	481	461
2	4	0.0	-224.3	164.9	3113.0	498.7	-483.8	0.0	-105.1	77.0	185.1	86.0		-384.5	95.4		0.0	265.9	0.0675	502	219	620	260	332	419	450	459	538	177	656	217	277	483	395	524
2	5	0.0	-32.9	141.3	3113.0	-37.2	-396.1	0.0	-15.8	66.0	301.4	108.6		-297.7	41.3		0.0	266.0	0.0675	455	274	535	360	278	481	358	567	507	212	587	298	236	531	316	617
2	6	0.0	128.9	117.8	3113.0	-491.0	-330.6	0.0	59.8	55.0	442.0	108.9		-278.9	-2.9		0.0	266.1	0.0675	424	311	471	435	221	548	269	672	496	225	544	349	181	595	229	719
2	7	0.0	261.5	94.2	3113.0	-863.4	-265.0	0.0	121.8	44.0	567.5	86.7		-282.5	-2.9		0.0	266.1	0.0675	400	338	421	493	170	608	191	764	491	232	512	387	130	656	151	811
2	8	0.0	364.5	70.7	3113.0	-1154.0	-199.5	0.0	169.9	33.0	665.5	69.8		-286.2	-2.9		0.0	266.2	0.0675	382	360	382	539	130	656	130	835	487	237	487	416	89	704	89	884
2	9	0.0	438.2	47.1	3113.0	-1362.0	-133.9	0.0	204.3	22.0	735.2	47.6		-289.8	-2.9		0.0	266.3	0.0675	369	376	354	573	101	690	86	887	483	241	468	438	59	739	45	936
2	10	0.0	482.4	23.6	3113.0	-1488.0	-68.4	0.0	224.9	11.0	776.4	18.9		-293.4	-2.9		0.0	266.4	0.0675	360	386	336	593	83	711	59	919	481	244	457	452	41	761	17	968
2	11	0.0	497.2	0.0	3113.0	-1533.0	-2.8	0.0	231.8	0.0	789.3	2.1		-297.0	-2.9		0.0	266.5	0.0675	356	390	329	602	75	720	48	932	479	246	451	458	33	770	6	982
2	12	0.0	482.5	-23.5	2974.0	-1408.0	59.8	0.0	225.0	-11.0	776.0	-19.2		-300.7	-2.9		0.0	266.6	0.0675	369	339	347	536	90	666	69	863	490	197	468	394	47	717	26	914
2	13	0.0	438.4	-47.1	2974.0	-1294.0	122.4	0.0	204.4	-22.0	734.4	-41.5		-304.3	-2.9		0.0	266.6	0.0675	374	333	360	521	103	651	90	839	488	199	475	386	60	702	46	890
2	14	0.0	364.9	-70.6	2974.0	-1102.0	185.0	0.0	170.0	-33.0	664.3	-70.1		-307.9	-2.9		0.0	266.7	0.0675	382	324	382	495	126	625	126	796	487	201	487	372	82	677	82	848
2	15	0.0	261.8	-94.2	2974.0	-831.7	247.6	0.0	121.9	-44.0	565.9	-87.0		-311.5	-2.9		0.0	266.8	0.0675	394	310	413	459	158	587	177	736	484	203	504	352	113	639	133	788
2	16	0.0	129.4	-117.7	2974.0	-483.2	310.2	0.0	60.1	-55.0	440.1	-109.2		-315.2	-2.9		0.0	266.9	0.0675	410	291	454	411	200	538	244	657	482	206	526	326	155	591	199	710
2	17	0.0	-32.5	-141.3	2974.0	-56.2	372.8	0.0	-15.6	-66.0	299.9	-96.7		-331.1	-36.9		0.0	267.0	0.0675	432	265	507	349	249	480	324	564	484	203	559	287	201	536	276	619
2	18	0.0	-223.8	-164.8	2974.0	448.8	435.4	0.0	-104.9	-77.0	184.3	-85.9		-402.5	-77.2		0.0	267.1	0.0675	469	221	580	262	296	425	407	466	505	179	616	220	238	493	349	534
2	19	0.0	-444.6	-188.4	2974.0	1005.0	431.7	0.0	-208.0	-88.0	113.9	-29.4		-540.6	-152.0		0.0	267.1	0.0675	517	164	668	159	329	386	480	380	543	134	694	128	252	476	403	471
2	20	0.0	-697.1	-215.6	3113.0	1414.0	204.6	0.0	-324.9	-99.0	96.2	1.5		-763.2	-204.3		0.0	267.2	0.0675	431	109	588	61	214	365	371	316	452	83	610	35	112	485	269	437
2	21	0.0	-986.0	-246.5	3113.0	1540.0	6.5	0.0	-455.5	-110.0	108.1	18.7		-1044.5	-245.5		0.0	267.3	0.0675	331	227	497	168	56	552	221	494	354	199	520	141	-84	717	82	658
											0.0	0.0		0.0	0.0																				
3	1	0.0	-985.8	246.5	3232.0	1583.0	-21.3	0.0	-455.4	110.8	108.1	-5.4		-1044.5	232.4		0.0	267.3	-13.36	355	222	526	163	79	547	250	488	378	195	549	135	-60	712	111	653
3	2	0.0	-751.7	221.8	3232.0	1505.0	-133.7	0.0	-349.1	102.0	111.8	9.3		-831.5	196.4		0.0	254.0	-13.36	443	118	609	64	212	391	378	337	467	90	632	37	101	522	267	468
3	3	0.0	-540.8	200.0	3232.0	1319.0	-246.1	0.0	-251.5	93.2	137.5	35.4		-659.4	150.2		0.0	240.6	-13.36	600	135	780	110	386	386	566	361	628	102	808	76	291	497	471	472
3	4	0.0	-350.1	181.2	3232.0	1017.0	-367.6	0.0	-162.7	84.4	203.9	89.8		-546.6	87.8		0.0	227.2	-13.36	614	118	773	118	413	355	571	355	652	74	810	74	334	447	493	447
3	5	0.0	-176.3	162.3	3320.0	686.7	-327.1	0.0	-82.7	75.6	314.3	128.8		-491.2	30.7		0.0	213.9	-13.36	630	122	767	153	419	370	556	401	682	60	820	91	348	453	486	483
3	6	0.0	-25.4	143.5	3320.0	379.9	-296.4	0.0	-11.6	66.8	430.3	110.6		-460.5	30.7		0.0	200.5	-13.36	634	118	749	174	407	384	522	441	702	37	818	93	341	462	456	518
3	7	0.0	108.6	124.7	3320.0	114.1	-245.6	0.0	50.8	58.0	527.6	92.7		-429.8	30.7		0.0	187.2	-13.36	637	114	733	192	398	395	494	473	719	17	815	96	336	467	433	545
3	8	0.0	223.8	105.8	3320.0	-111.2	-204.9	0.0	104.3	49.2	608.4	74.6		-399.1	30.7		0.0	173.8	-13.36	640	111	720	208	392	401	473	499	733	1	813	98	335	468	415	566
3	9	0.0	320.3	87.0	3320.0	-295.7	-164.1	0.0	149.1	40.4	669.7	56.3		-368.4	30.7		0.0	160.4	-13.36	642	108	708	221	390	404	457	517	743	-11	810	102	337	466	404	579
3	10	0.0	397.8	68.2	3320.0	-439.3	-123.4	0.0	185.1	31.6	713.4	38.5		-337.7	30.7		0.0	147.1	-13.36	643	107	700	232	391	403	448	528	750	-19	807	106	343	460	399	585
3	11	0.0	456.5	49.3	3320.0	-542.4	-82.6	0.0	212.3	22.8	739.8	20.3		-307.0	30.7		0.0	133.7	-13.36	644	106	693	240	395	398	444	532	754	-24	804	110	351	450	401	583
3	12	0.0	496.4	30.5	3320.0	-604.6	-41.9	0.0	230.6	14.0	746.3	2.1		-276.3	30.7		0.0	120.3	-13.36	644	106	688	245	403	389	447	528	755	-24	799	114	363	436	408	575
3	13	0.0	517.4	11.6	3212.0	-601.3	-8.3	0.0	240.2	5.2	736.4	-15.8		-245.6	30.7		0.0	107.0	-13.36	638	84	680	220	408	355	450	490	747	-44	790	92	373	396	415	532
3	14	0.0	519.6	-7.2	3212.0	-598.7	14.6	0.0	241.0	-3.6	708.4	-33.9		-214.9	30.7		0.0	93.6	-13.36	632	92	674	228	417	345	459	480	736	-31	779	105	386	381	428	516
3	15	0.0	503.0	-26.1	3212.0	-572.1	38.6	0.0	233.0	-12.4	660.3	-52.1		-184.2	30.7		0.0	80.2	-13.36	619	107	663	241	423	337	467	470	716	-7	760	126	397	368	441	501
3	16	0.0	467.4	-44.9	3212.0	-521.5	62.6	0.0	216.1	-21.2	596.8	-70.0		-153.5	30.7		0.0	66.9	-13.36	600	129	648	258	427	332	475	461	688	26	736	155	405	358	453	487
3	17	0.0	413.1	-63.8	3212.0	-447.0	86.6	0.0	190.5	-30.0	514.3	-88.2		-122.8	30.7		0.0	53.5	-13.36	575	158	629	281	429	330	482	453	651	69	704	192	412	351	465	473
3	18	0.0	339.9	-82.6	3212.0	-348.4	110.6	0.0	156.1	-38.8	411.5	-106.4		-92.1	30.7		0.0	40.2	-13.36	544	195	605	309	429	330	489	445	605	124	665	238	416	346	476	460
3	19	0.0	247.9	-101.5	3212.0	-225.7	134.6	0.0	112.8	-47.6	294.4	-124.2		-61.4	30.7		0.0	26.8	-13.36	508	237	577	342	427	333	496	437	551	187	620	291	418	343	487	447
3	20	0.0	135.6	-123.2	3212.0	-82.5	158.6	0.0	60.8	-56.4	157.5	-142.4		-30.7	30.7		0.0	13.4	-13.36	367	204	426	276	327	251	386	323	388	179	448	250	323	256	382	328
3	21	0.0	-0.1	-148.0	3212.0	84.9	182.6	0.0	-0.1	-65.2	0.0	-160.1		0.0	12.0		0.0	0.0	-13.36	318	262	388	320	318	262	388	320	318	262	388	320	318	262	388	320

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ED2-1.8

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGUN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGUN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
1	1	0.0	-0.2	9.893	1.650	9.500	5.000	268.800	0.730	0.920	0.00	4.20	21.242	6.99
1	2	546.3	130.8	9.893	1.650	9.500	5.000	268.800	0.790	0.860	13.58	0.00	21.242	6.99
1	3	1013.2	232.8	7.537	1.650	9.500	5.000	268.800	0.842	0.808	0.01	0.00	21.242	5.32
1	4	1408.8	308.7	7.537	1.650	9.500	5.000	268.800	0.887	0.763	0.00	0.00	21.242	5.32
1	5	1739.2	359.8	7.537	1.650	9.500	5.000	268.800	0.924	0.726	0.00	0.00	21.242	5.32
1	6	1997.1	386.0	7.537	1.650	9.500	5.000	268.800	0.954	0.696	0.00	0.00	21.242	5.32
1	7	2190.0	387.2	7.537	1.650	9.500	5.000	268.800	0.977	0.673	0.00	0.00	21.242	5.32
1	8	2312.6	363.6	7.537	1.650	9.500	5.000	268.800	0.992	0.658	0.00	0.00	21.242	5.32
1	9	2364.2	315.1	7.537	1.650	9.500	5.000	268.800	0.999	0.651	0.00	0.00	21.242	5.32
1	10	2353.8	241.7	7.537	1.650	9.500	5.000	268.800	0.998	0.652	0.00	0.00	21.242	5.32
1	11	2268.8	143.5	7.537	1.650	9.500	5.000	268.800	0.986	0.664	0.00	0.00	21.242	5.32
1	12	2116.3	20.3	7.537	1.650	9.500	5.000	268.800	0.962	0.688	0.00	0.00	21.242	5.32
1	13	1900.2	-127.7	7.537	1.650	9.500	5.000	268.800	0.925	0.725	0.00	2.66	21.242	5.32
1	14	1608.4	-300.5	7.537	1.650	9.500	5.000	268.800	0.876	0.774	0.00	1.55	21.242	5.32
1	15	1251.2	-498.4	7.537	1.650	9.500	5.000	268.800	0.814	0.836	1.22	0.14	21.242	5.32
1	16	852.5	-744.1	7.537	1.650	9.500	5.000	268.800	0.741	0.909	4.36	0.00	21.242	5.32
1	17	520.3	-1126.0	7.537	1.650	9.500	5.000	268.800	0.655	0.995	8.06	0.00	21.242	5.32
1	18	180.7	-1588.8	7.537	1.650	9.500	5.000	268.800	0.557	1.093	12.28	0.00	21.242	5.32
1	19	-129.3	-2178.5	7.537	1.650	9.500	5.000	268.800	0.469	1.181	0.00	0.00	21.242	5.32
1	20	-424.1	-2900.3	9.893	1.650	9.500	5.000	268.800	0.417	1.233	0.00	0.00	21.242	6.99
1	21	-714.8	-3731.0	9.893	1.650	9.500	5.000	268.800	0.400	1.250	0.00	0.00	21.242	6.99

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGUN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGUN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
2	1	-714.6	-3730.4	9.893	1.650	9.500	5.000	268.800	0.400	1.250	0.00	0.00	21.242	6.99
2	2	-360.1	-2679.6	9.893	1.650	9.500	5.000	268.800	0.442	1.208	0.00	0.00	21.242	6.99
2	3	-5.5	-1792.1	7.537	1.650	9.500	5.000	268.800	0.567	1.083	0.00	0.00	21.242	5.32
2	4	380.1	-1070.9	7.537	1.650	9.500	5.000	268.800	0.755	0.895	3.76	0.00	21.242	5.32
2	5	807.3	-519.5	7.537	1.650	9.500	5.000	268.800	0.926	0.724	0.00	2.68	21.242	5.32
2	6	1345.3	-248.5	7.537	1.650	9.500	5.000	268.800	1.071	0.579	0.00	5.96	21.242	5.32
2	7	1825.3	-78.8	7.537	1.650	9.500	5.000	268.800	1.190	0.460	0.00	8.66	21.242	5.32
2	8	2199.2	51.7	7.537	1.650	9.500	5.000	268.800	1.282	0.368	0.00	0.00	21.242	5.32
2	9	2466.0	143.6	7.537	1.650	9.500	5.000	268.800	1.347	0.303	0.00	0.00	21.242	5.32
2	10	2625.1	196.5	7.537	1.650	9.500	5.000	268.800	1.387	0.263	0.00	0.00	21.242	5.32
2	11	2677.3	210.5	7.537	1.650	9.500	5.000	268.800	1.400	0.250	0.00	0.00	21.242	5.32
2	12	2625.1	185.8	7.537	1.650	9.500	5.000	268.800	1.387	0.263	0.00	0.00	21.242	5.32
2	13	2465.7	122.1	7.537	1.650	9.500	5.000	268.800	1.347	0.303	0.00	0.00	21.242	5.32
2	14	2198.9	19.5	7.537	1.650	9.500	5.000	268.800	1.282	0.368	0.00	0.00	21.242	5.32
2	15	1824.6	-122.0	7.537	1.650	9.500	5.000	268.800	1.190	0.460	0.00	8.66	21.242	5.32
2	16	1344.7	-302.3	7.537	1.650	9.500	5.000	268.800	1.071	0.579	0.00	5.96	21.242	5.32
2	17	807.0	-568.7	7.537	1.650	9.500	5.000	268.800	0.926	0.724	0.00	2.68	21.242	5.32
2	18	381.3	-1096.8	7.537	1.650	9.500	5.000	268.800	0.755	0.895	3.76	0.00	21.242	5.32
2	19	-15.8	-1789.8	7.537	1.650	9.500	5.000	268.800	0.567	1.083	0.00	0.00	21.242	5.32
2	20	-374.8	-2677.7	9.893	1.650	9.500	5.000	268.800	0.442	1.208	0.00	0.00	21.242	6.99
2	21	-734.2	-3729.1	9.893	1.650	9.500	5.000	268.800	0.401	1.249	0.00	0.00	21.242	6.99

VANO	SECCIÓN	Md(+) (mt)	Md(-) (mt)	Area A (m2)	Canto h (m.)	Ancho b (m.)	Ancho inf. bi (m.)	Ap (cm2.)	dp,inf (m.)	dp,sup (m.)	SEGUN ARTICULO 47.8 As min.inf. (cm2/m.)	SEGUN ARTICULO 47.8 As min.sup. (cm2/m.)	Perimetro u (m.)	ART.51.3 As min. (cm2/m.)
3	1	-733.9	-3728.6	9.893	1.650	9.500	5.000	268.800	0.401	1.249	0.00	0.00	21.242	6.99
3	2	-442.1	-2898.4	9.893	1.650	9.500	5.000	268.800	0.417	1.233	0.00	0.00	21.242	6.99
3	3	-145.9	-2177.5	7.537	1.650	9.500	5.000	268.800	0.469	1.181	0.00	0.00	21.242	5.32
3	4	185.1	-1589.2	7.537	1.650	9.500	5.000	268.800	0.556	1.094	12.32	0.00	21.242	5.32
3	5	557.4	-1128.3	7.537	1.650	9.500	5.000	268.800	0.655	0.995	8.06	0.00	21.242	5.32
3	6	913.0	-746.1	7.537	1.650	9.500	5.000	268.800	0.741	0.909	4.36	0.00	21.242	5.32
3	7	1311.2	-501.2	7.537	1.650	9.500	5.000	268.800	0.815	0.835	1.17	0.16	21.242	5.32
3	8	1665.5	-303.3	7.537	1.650	9.500	5.000	268.800	0.876	0.774	0.00	1.55	21.242	5.32
3	9	1949.2	-130.1	7.537	1.650	9.500	5.000	268.800	0.925	0.725	0.00	2.66	21.242	5.32
3	10	2165.0	18.1	7.537	1.650	9.500	5.000	268.800	0.962	0.688	0.00	0.00	21.242	5.32
3	11	2313.4	141.4	7.537	1.650	9.500	5.000	268.800	0.987	0.663	0.00	0.00	21.242	5.32
3	12	2390.4	239.9	7.537	1.650	9.500	5.000	268.800	0.999	0.651	0.00	0.00	21.242	5.32
3	13	2401.5	313.5	7.537	1.650	9.500	5.000	268.800	0.999	0.651	0.00	0.00	21.242	5.32
3	14	2343.9	362.2	7.537	1.650	9.500	5.000	268.800	0.992	0.658	0.00	0.00	21.242	5.32
3	15	2214.8	386.1	7.537	1.650	9.500	5.000	268.800	0.977	0.673	0.00	0.00	21.242	5.32
3	16	2020.7	384.9	7.537	1.650	9.500	5.000	268.800	0.954	0.696	0.00	0.00	21.242	5.32
3	17	1757.2	359.1	7.537	1.650	9.500	5.000	268.800	0.924	0.726	0.00	0.00	21.242	5.32
3	18	1421.5	308.3	7.537	1.650	9.500	5.000	268.800	0.887	0.763	0.00	0.00	21.242	5.32
3	19	1022.8	232.5	7.537	1.650	9.500	5.000	268.800	0.842	0.808	0.01	0.00	21.242	5.32
3	20	551.0	130.7	9.893	1.650	9.500	5.000	268.800	0.790	0.860	13.58	0.00	21.242	6.99
3	21	-0.1	-0.2	9.893	1.650	9.500	5.000	268.800	0.730	0.920	0.00	4.20	21.242	6.99

CÁLCULO DE ARMADURAS MÍNIMAS SEGÚN ARTICULOS 47.8., 51.3. Y 51.5.1. DE LA EP-93

PROYECTO : L.A.V MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ED2-1.8

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./m2.)	Tens.inf. σ i (t./m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./m2.)	Tens.inf. σ i (t./m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	309	255	0.000	0.00	0.00	0.00	0.00	0.000	7	309	255	0.000	0.00	0.000	0.00	6.99	6.99	6.99	6.99	6.99
0.00	0.000	5	380	171	0.000	0.00	0.00	0.00	0.00	0.000	7	316	247	0.000	0.00	0.000	0.00	6.99	6.99	13.58	6.99	6.99
0.00	0.000	5	522	185	0.000	0.00	0.00	0.00	0.00	0.000	7	395	346	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	561	135	0.000	0.00	0.00	0.00	0.00	0.000	7	381	364	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	607	77	0.000	0.00	0.00	0.00	0.00	0.000	7	379	366	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	644	30	0.000	0.00	0.00	0.00	0.00	0.000	7	375	371	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	673	-6	1.635	0.00	0.07	0.74	0.00	0.000	7	368	380	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	692	-31	1.579	0.00	0.35	3.53	0.00	0.000	7	360	391	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	703	-44	1.552	0.00	0.49	4.91	0.00	0.000	7	348	405	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	710	-31	1.582	0.00	0.34	3.41	0.00	0.000	7	338	441	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	709	-29	1.586	0.00	0.32	3.22	0.00	0.000	7	328	454	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	704	-23	1.598	0.00	0.26	2.60	0.00	0.000	7	320	465	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	697	-14	1.618	0.00	0.16	1.60	0.00	0.000	7	314	471	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	684	2	0.000	0.00	0.00	0.00	0.00	0.000	7	312	475	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	669	21	0.000	0.00	0.00	0.00	0.00	0.000	7	312	474	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	652	43	0.000	0.00	0.00	0.00	0.00	0.000	7	315	471	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	636	64	0.000	0.00	0.00	0.00	0.00	0.000	7	321	464	0.000	0.00	0.000	0.00	5.32	5.32	8.06	5.32	5.32
0.00	0.000	5	627	75	0.000	0.00	0.00	0.00	0.00	0.000	7	320	464	0.000	0.00	0.000	0.00	5.32	5.32	12.28	5.32	5.32
0.00	0.000	5	631	99	0.000	0.00	0.00	0.00	0.00	0.000	7	300	519	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	492	77	0.000	0.00	0.00	0.00	0.00	0.000	7	122	514	0.000	0.00	0.000	0.00	6.99	6.99	6.99	6.99	6.99
0.00	0.000	5	420	162	0.000	0.00	0.00	0.00	0.00	0.000	7	-23	685	0.053	0.00	0.508	2.67	6.99	6.99	6.99	6.99	6.99

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./m2.)	Tens.inf. σ i (t./m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./m2.)	Tens.inf. σ i (t./m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	309	255	0.000	0.00	0.00	0.00	0.00	0.000	7	309	255	0.000	0.00	0.000	0.00	6.99	6.99	6.99	6.99	6.99
0.00	0.000	5	380	171	0.000	0.00	0.00	0.00	0.00	0.000	7	316	247	0.000	0.00	0.000	0.00	6.99	6.99	6.99	6.99	6.99
0.00	0.000	5	522	185	0.000	0.00	0.00	0.00	0.00	0.000	7	395	346	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	561	135	0.000	0.00	0.00	0.00	0.00	0.000	7	381	364	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	607	77	0.000	0.00	0.00	0.00	0.00	0.000	7	379	366	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	644	30	0.000	0.00	0.00	0.00	0.00	0.000	7	375	371	0.000	0.00	0.000	0.00	5.96	5.96	5.32	5.32	5.32
0.00	0.000	5	673	-6	1.635	0.00	0.07	0.74	0.00	0.000	7	368	380	0.000	0.00	0.000	0.00	8.66	8.66	5.32	5.32	5.32
0.00	0.000	5	692	-31	1.579	0.00	0.35	3.53	0.00	0.000	7	360	391	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	703	-44	1.552	0.00	0.49	4.91	0.00	0.000	7	348	405	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	710	-31	1.582	0.00	0.34	3.41	0.00	0.000	7	338	441	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	709	-29	1.586	0.00	0.32	3.22	0.00	0.000	7	328	454	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	704	-23	1.598	0.00	0.26	2.60	0.00	0.000	7	320	465	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	697	-14	1.618	0.00	0.16	1.60	0.00	0.000	7	314	471	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	684	2	0.000	0.00	0.00	0.00	0.00	0.000	7	312	475	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	669	21	0.000	0.00	0.00	0.00	0.00	0.000	7	312	474	0.000	0.00	0.000	0.00	8.66	8.66	5.32	5.32	5.32
0.00	0.000	5	652	43	0.000	0.00	0.00	0.00	0.00	0.000	7	315	471	0.000	0.00	0.000	0.00	5.96	5.96	5.32	5.32	5.32
0.00	0.000	5	636	64	0.000	0.00	0.00	0.00	0.00	0.000	7	321	464	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	627	75	0.000	0.00	0.00	0.00	0.00	0.000	7	320	464	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	631	99	0.000	0.00	0.00	0.00	0.00	0.000	7	300	519	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	492	77	0.000	0.00	0.00	0.00	0.00	0.000	7	122	514	0.000	0.00	0.000	0.00	6.99	6.99	6.99	6.99	6.99
0.00	0.000	5	420	162	0.000	0.00	0.00	0.00	0.00	0.000	7	-23	685	0.053	0.00	0.508	2.67	6.99	6.99	6.99	6.99	6.99

Pretensado preteso inf. (cm2.)	Dist. pret. preteso.Di (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./m2.)	Tens.inf. σ i (t./m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.inf. (cm2/m.)	Pretensado preteso sup. (cm2.)	Dist. pret. preteso.Ds (m.)	Número hipótesis combinacion	Tens.sup. σ s (t./m2.)	Tens.inf. σ i (t./m2.)	Fibra neutra x (m.)	Pret.preteso traccionado (cm2)	Ac.Traccion. Act. (m2.)	ART.51.5.1 As mín.sup. (cm2/m.)	ENVOLVENTE TOTAL As1 (cm2/m.)	As1a (cm2/m.)	As2 (cm2/m.)	As2a (cm2/m.)	As3 (cm2/m.)
0.00	0.000	5	309	255	0.000	0.00	0.00	0.00	0.00	0.000	7	309	255	0.000	0.00	0.000	0.00	6.99	6.99	6.99	6.99	6.99
0.00	0.000	5	380	171	0.000	0.00	0.00	0.00	0.00	0.000	7	316	247	0.000	0.00	0.000	0.00	6.99	6.99	6.99	6.99	6.99
0.00	0.000	5	522	185	0.000	0.00	0.00	0.00	0.00	0.000	7	395	346	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	561	135	0.000	0.00	0.00	0.00	0.00	0.000	7	381	364	0.000	0.00	0.000	0.00	5.32	5.32	12.32	5.32	5.32
0.00	0.000	5	607	77	0.000	0.00	0.00	0.00	0.00	0.000	7	379	366	0.000	0.00	0.000	0.00	5.32	5.32	8.06	5.32	5.32
0.00	0.000	5	644	30	0.000	0.00	0.00	0.00	0.00	0.000	7	375	371	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	673	-6	1.635	0.00	0.07	0.74	0.00	0.000	7	368	380	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	692	-31	1.579	0.00	0.35	3.53	0.00	0.000	7	360	391	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	703	-44	1.552	0.00	0.49	4.91	0.00	0.000	7	348	405	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	710	-31	1.582	0.00	0.34	3.41	0.00	0.000	7	338	441	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	709	-29	1.586	0.00	0.32	3.22	0.00	0.000	7	328	454	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	704	-23	1.598	0.00	0.26	2.60	0.00	0.000	7	320	465	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	697	-14	1.618	0.00	0.16	1.60	0.00	0.000	7	314	471	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	684	2	0.000	0.00	0.00	0.00	0.00	0.000	7	312	475	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	669	21	0.000	0.00	0.00	0.00	0.00	0.000	7	312	474	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	652	43	0.000	0.00	0.00	0.00	0.00	0.000	7	315	471	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	636	64	0.000	0.00	0.00	0.00	0.00	0.000	7	321	464	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	627	75	0.000	0.00	0.00	0.00	0.00	0.000	7	320	464	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	631	99	0.000	0.00	0.00	0.00	0.00	0.000	7	300	519	0.000	0.00	0.000	0.00	5.32	5.32	5.32	5.32	5.32
0.00	0.000	5	492	77	0.000	0.00	0.00	0.00	0.00	0.000	7	122	514	0.000	0.00	0.000	0.00	6.99	6.99	13.58	6.99	6.99
0.00	0.000	5	420	162	0.000	0.00	0.00	0.00	0.00	0.000	7	-23	685	0.053	0.00	0.508	2.67	6.99	6.99	6.99	6.99	6.99

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ED2-1.8

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 20.00 tg(θ)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
1	1	9.893	2.268	0.757	-0.893	0.000	144.0	5.000	5.000	1.650	160.0	90
1	2	9.893	2.268	0.757	-0.893	0.000	144.0	5.000	5.000	1.650	160.0	90
1	3	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	4	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	5	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	6	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	7	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	8	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	9	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	10	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	11	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	12	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	13	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	14	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	15	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	16	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	17	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	18	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	19	7.537	2.094	0.727	-0.923	0.000	144.0	2.000	5.000	1.650	160.0	90
1	20	9.893	2.268	0.757	-0.893	0.000	144.0	5.000	5.000	1.650	160.0	90
1	21	9.893	2.268	0.757	-0.893	0.000	144.0	5.000	5.000	1.650	160.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMICO Mgrad (m.t)	GRAD. TERMICO Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
1	1	-0.1	147.9	0.0	65.2	165	0	-31	0	0.0	13.28	0.00	0.00	83.11	-173.7	3127
1	2	135.4	123.2	60.8	56.4	147	147	-31	-23	13.3	13.28	0.00	0.00	-78.88	-150.4	3127
1	3	247.7	101.4	112.7	47.6	131	261	-32	-34	26.6	13.28	0.00	0.00	-263.2	-127	3127
1	4	339.6	82.6	155.9	38.8	116	347	-35	-34	39.9	13.28	0.00	0.00	-424.2	-103.6	3127
1	5	412.8	63.7	190.4	30.0	100	409	-38	-28	53.2	13.28	0.00	0.00	-516.2	-80.23	3127
1	6	467.1	44.9	216.0	21.2	87	434	-43	-18	66.5	13.28	0.00	0.00	-584.7	-56.85	3127
1	7	502.5	26.0	232.8	12.4	74	446	-48	-6	79.7	13.28	0.00	0.00	-629.9	-33.49	3127
1	8	519.1	7.2	240.8	3.6	63	442	-54	4	93.0	13.28	0.00	0.00	-651.7	-10.1	3128
1	9	516.9	-11.7	240.0	-5.2	53	423	-61	11	106.3	13.28	0.00	0.00	-650.1	13.26	3128
1	10	495.8	-30.5	230.4	-14.0	44	394	-70	114	119.6	13.28	0.00	0.00	-646.2	42.77	3212
1	11	455.9	-49.3	212.0	-22.8	36	356	-81	101	132.9	13.28	0.00	0.00	-581.8	84.08	3212
1	12	397.1	-68.2	184.8	-31.6	29	314	-93	73	146.1	13.28	0.00	0.00	-477.9	123.5	3212
1	13	319.5	-87.0	148.8	-40.4	23	280	-106	41	159.4	13.28	0.00	0.00	-334.8	162.9	3212
1	14	223.1	-105.9	104.0	-49.2	19	246	-120	-19	172.7	13.28	0.00	0.00	-152.2	202.4	3212
1	15	107.7	-124.7	50.4	-58.0	15	214	-134	-99	186.0	13.28	0.00	0.00	70.08	241.8	3212
1	16	-26.4	-143.6	-12.0	-66.8	12	184	-149	-189	199.3	13.28	0.00	0.00	331.6	281.3	3212
1	17	-179.3	-162.4	-83.2	-75.6	10	159	-165	-313	212.5	13.28	0.00	0.00	632.4	320.7	3212
1	18	-351.2	-181.2	-163.2	-84.4	8	140	-182	-460	225.8	13.28	0.00	0.00	973.2	361.3	3212
1	19	-541.8	-200.1	-252.0	-93.2	7	127	-198	-621	239.1	13.28	0.00	0.00	1305	255.8	3317
1	20	-752.9	-221.9	-349.6	-102.0	6	122	-216	-818	252.4	13.28	0.00	0.00	1551	140.3	3317
1	21	-987.1	-246.6	-456.0	-110.8	6	124	-234	-1041	265.7	13.28	0.00	0.00	1682	22.52	3317

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 25.00 tg(θ)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
2	1	9.893	2.268	0.757	-0.893	0.000	144.0	5.000	5.000	1.650	160.0	90
2	2	9.893	2.268	0.757	-0.893	0.000	144.0	5.000	5.000	1.650	160.0	90
2	3	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	4	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	5	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	6	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	7	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	8	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	9	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	10	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	11	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	12	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	13	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	14	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	15	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	16	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	17	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	18	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	19	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
2	20	9.893	2.268	0.757	-0.893	0.000	144.0	5.000	5.000	1.650	160.0	90
2	21	9.893	2.268	0.757	-0.893	0.000	144.0	5.000	5.000	1.650	160.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMICO Mgrad (m.t)	GRAD. TERMICO Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
2	1	-986.8	246.6	-455.9	110.0	248	-1042	-23	124	265.6	0.06747	0.00	0.00	1651	-2.855	3232
2	2	-697.9	215.7	-325.3	99.0	227	-750	-23	101	265.7	0.06747	0.00	0.00	1513	-218.3	3232
2	3	-445.3	188.5	-208.3	88.0	206	-497	-24	90	265.8	0.06747	0.00	0.00	1109	-433.8	3232
2	4	-224.3	164.9	-105.1	77.0	186	-291	-26	90	265.9	0.06747	0.00	0.00	498.7	-483.8	3113
2	5	-32.9	141.3	-15.8	66.0	166	-114	-29	97	266.0	0.06747	0.00	0.00	-37.23	-396.1	3113
2	6	128.9	117.8	59.8	55.0	146	20	-32	112	266.1	0.06747	0.00	0.00	-491	-330.6	3113
2	7	261.5	94.2	121.8	44.0	128	131	-37	130	266.1	0.06747	0.00	0.00	-863.4	-265	3113
2	8	364.5	70.7	169.9	33.0	112	212	-43	150	266.2	0.06747	0.00	0.00	-1154	-199.5	3113
2	9	438.2	47.1	204.3	22.0	97	257	-50	168	266.3	0.06747	0.00	0.00	-1362	-133.9	3113
2	10	482.4	23.6	224.9	11.0	81	290	-58	235	266.4	0.06747	0.00	0.00	-1488	-68.36	3113
2	11	497.2	0.0	231.8	0.0	69	248	-69	249	266.5	0.06747	0.00	0.00	-1533	-2.813	3113
2	12	482.5	-23.5	225.0	-11.0	58	234	-81	291	266.6	0.06747	0.00	0.00	-1408	59.81	2974
2	13	438.4	-47.1	204.4	-22.0	49	210	-95	259	266.6	0.06747	0.00	0.00	-1294	122.4	2974
2	14	364.9	-70.6	170.0	-33.0	40	168	-112	213	266.7	0.06747	0.00	0.00	-1102	185	2974
2	15	261.8	-94.2	121.9	-44.0	34	136	-128	132	266.8	0.06747	0.00	0.00	-831.7	247.6	2974
2	16	129.4	-117.7	60.1	-55.0	29	114	-146	21	266.9	0.06747	0.00	0.00	-483.2	310.2	2974
2	17	-32.5	-141.3	-15.6	-66.0	26	96	-164	-113	267.0	0.06747	0.00	0.00	-56.24	372.8	2974
2	18	-223.8	-164.8	-104.9	-77.0	23	85	-186	-291	267.1	0.06747	0.00	0.00	448.8	435.4	2974
2	19	-444.6	-188.4	-208.0	-88.0	21	82	-206	-497	267.1	0.06747	0.00	0.00	1005	431.7	2974
2	20	-697.1	-215.6	-324.9	-99.0	20	89	-227	-750	267.2	0.06747	0.00	0.00	1414	204.6	3113
2	21	-966.0	-246.5	-455.5	-110.0	20	108	-248	-1042	267.3	0.06747	0.00	0.00	1540	6.503	3113

VANO	SECCIÓN	Area A (m2)	Inercia I (m4)	Fibra sup v (m.)	Fibra inf. v' (m.)	LUZ VANO= 20.00 tg(θ)	z=d*0,9 (cm.)	Ancho cort. bw (m.)	Ancho inf. bi (m.)	Canto h (m.)	Canto útil d (cm.)	α (°)
3	1	9.893	2.268	0.757	-0.893	0.000	144.0	5.000	5.000	1.650	160.0	90
3	2	9.893	2.268	0.757	-0.893	0.000	144.0	5.000	5.000	1.650	160.0	90
3	3	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	4	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	5	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	6	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	7	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	8	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	9	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	10	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	11	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	12	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	13	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	14	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	15	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	16	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	17	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	18	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	19	7.537	2.121	0.759	-0.891	0.000	144.0	2.000	5.000	1.650	160.0	90
3	20	9.893	2.268	0.757	-0.893	0.000	144.0	5.000	5.000	1.650	160.0	90
3	21	9.893	2.268	0.757	-0.893	0.000	144.0	5.000	5.000	1.650	160.0	90

VANO	SECCIÓN	PESO PROPIO Mpp (m.t)	PESO PROPIO Vpp (t.)	CARGA MUERTA Mse (m.t)	CARGA MUERTA Vse (t.)	Vmax(+) y Mconc Vsc (m.t)	Vmax(+) y Mconc Msc (t.)	Vmin(-) y Mconc Vsc (m.t)	Vmin(-) y Mconc Msc (t.)	GRAD. TERMICO Mgrad (m.t)	GRAD. TERMICO Vgrad (t.)	ASIENTOS DIF. Masi (m.t)	ASIENTOS DIF. Vasi (t.)	PRETENSADO FINAL Mpf (m.t)	PRETENSADO FINAL Vpf (t.)	PRETENSADO FINAL Npf (t.)
3	1	-985.8	246.5	-455.4	110.8	234	-1041	-5	108	267.3	-13.36	0.00	0.00	1583	-21.29	3232
3	2	-751.7	221.8	-349.1	102.0	218	-819	-6	107	254.0	-13.36	0.00	0.00	1505	-133.7	3232
3	3	-540.8	200.0	-251.5	93.2	201	-623	-6	113	240.6	-13.36	0.00	0.00	1319	-246.1	3232
3	4	-350.1	181.2	-162.7	84.4	184	-451	-7	127	227.2	-13.36	0.00	0.00	1017	-367.6	3232
3	5	-178.3	162.3	-82.7	75.6	168	-314	-9	147	213.9	-13.36	0.00	0.00	686.7	-327.1	3320
3	6	-25.4	143.5	-11.6	66.8	152	-191	-12	173	200.5	-13.36	0.00	0.00	379.9	-286.4	3320
3	7	108.6	124.7	50.8	58.0	137	-90	-15	204	187.2	-13.36	0.00	0.00	114.1	-245.6	3320
3	8	223.8	105.8	104.3	49.2	122	-21	-18	237	173.8	-13.36	0.00	0.00	-111.2	-204.9	3320
3	9	320.3	87.0	149.1	40.4	109	40	-23	272	160.4	-13.36	0.00	0.00	-295.7	-164.1	3320
3	10	397.8	68.2	185.1	31.6	96	82	-28	306	147.1	-13.36	0.00	0.00	-439.3	-123.4	3320
3	11	456.5	49.3	212.3	22.8	84	103	-35	345	133.7	-13.36	0.00	0.00	-542.4	-82.59	3320
3	12	496.4	30.5	230.6	14.0	73	104	-43	383	120.3	-13.36	0.00	0.00	-604.6	-41.85	3320
3	13	517.4	11.6	240.2	5.2	64	97	-52	412	107.0	-13.36	0.00	0.00	-601.3	-8.263	3212
3	14	519.6	-7.2	241.0	-3.6	56	81	-62	487	93.6	-13.36	0.00	0.00	-598.7	14.58	3212
3	15	503.0	-26.1	233.0	-12.4	48	58	-74	482	80.2	-13.36	0.00	0.00	-572.1	38.56	3212
3	16	467.4	-44.9	216.1	-21.2	43	-18	-87	458	66.9	-13.36	0.00	0.00	-521.5	62.58	3212
3	17	413.1	-63.8	190.5	-30.0	38	-29	-101	418	53.5	-13.36	0.00	0.00	-447	86.58	3212
3	18	339.9	-82.6	156.1	-38.8	35	-35	-115	354	40.2	-13.36	0.00	0.00	-348.4	110.6	3212
3	19	247.9	-101.5	112.8	-47.6	33	-34	-131	263	26.8	-13.36	0.00	0.00	-225.7	134.6	3212
3	20	135.6	-123.2	60.8	-56.4	31	-23	-148	148	13.4	-13.36	0.00	0.00	-82.52	158.6	3212
3	21	-0.1	-148.0	-0.1	-65.2	31	0	-165	0	0.0	-13.36	0.00	0.00	84.94	182.6	3212

CALCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : ED2-1.8

VANO	SECCIÓN	CORT Vcd (+) canto var.	CORT Vcd (-) canto var.	CORT. Vrd (+) (t.)	CORT Vrd (-) (t.)	MOMEN. Md.(+) (t x m.)	MOMEN Md (-) (t x m.)	CORT. Vrd. (t.)	MOMEN Md (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f c,k (t/m2.)	ZONA
1	1	0.0	0.0	414.0	-27.7	83.0	83.0	414.0	83.0	343.8	283.4	-244.3	A-B
1	2	0.0	0.0	360.0	-35.3	456.4	62.9	360.0	456.4	468.3	136.3	-244.3	A-B
1	3	0.0	0.0	312.2	-41.6	708.9	10.7	312.2	708.9	661.1	102.5	-244.3	A-B
1	4	0.0	0.0	271.7	-46.7	898.8	-29.7	271.7	898.8	727.1	18.8	-244.3	A-B
1	5	0.0	0.0	230.9	-53.3	1082.0	-15.3	230.9	1082.0	790.7	-61.9	-244.3	A-B
1	6	0.0	0.0	192.3	-61.3	1190.1	3.7	192.3	1190.1	828.2	-109.5	-244.3	A-B
1	7	0.0	0.0	155.6	-70.7	1261.9	23.1	155.6	1261.9	853.2	-141.2	-244.3	A-B
1	8	0.0	0.0	120.6	-81.5	1290.1	38.9	120.6	1290.1	863.1	-153.5	-244.3	A-B
1	9	0.0	0.0	97.3	-103.8	825.2	501.5	103.8	501.5	589.2	194.0	-244.3	A-B
1	10	0.0	0.0	88.2	-128.9	777.1	613.8	128.9	613.8	639.3	155.7	-244.3	A-B
1	11	0.0	0.0	92.5	-146.1	752.5	571.2	146.1	571.2	624.6	174.4	-244.3	A-B
1	12	0.0	0.0	96.4	-166.2	735.5	505.1	166.2	505.1	601.6	203.6	-244.3	A-B
1	13	0.0	0.0	103.2	-187.6	746.1	429.8	187.6	429.8	575.5	236.8	-244.3	A-B
1	14	0.0	0.0	111.2	-210.2	770.8	310.2	210.2	310.2	533.9	289.5	-244.3	A-B
1	15	0.0	0.0	120.2	-233.7	812.2	158.9	233.7	158.9	481.3	356.2	-244.3	A-B
1	16	0.0	0.0	130.3	-258.4	872.6	-9.8	258.4	-9.8	422.8	430.5	-244.3	A-B
1	17	0.0	0.0	141.4	-284.2	954.1	-230.5	284.2	-230.5	346.1	527.7	-244.3	A-B
1	18	0.0	0.0	154.5	-309.4	1059.0	-488.1	309.4	-488.1	256.6	641.2	-244.3	A-B
1	19	0.0	0.0	22.4	-481.8	1139.9	-817.1	481.8	-817.1	156.3	800.1	-244.3	A-B
1	20	0.0	0.0	-121.7	-669.4	1119.6	-1330.4	669.4	-1330.4	-108.4	859.3	-244.3	A-B
1	21	0.0	0.0	-270.0	-864.1	967.2	-2044.0	864.1	-2044.0	-346.4	1140.4	-244.3	C

VANO	SECCIÓN	Pd. (Ton)	σ xd (T/m2)	cot θ	θ	α	VERIFIC cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2)	Vu1 (ton)	Vrd (ton)	COMPRO Vrd<=Vu1
1	1	3127.0	316.1	1.51	33.44	90	VERIFICA	500.0	160.0	0.267	5885.6	414.0	VERIFICA
1	2	3127.0	316.1	1.51	33.44	90	VERIFICA	500.0	160.0	0.267	5885.6	360.0	VERIFICA
1	3	3127.0	414.9	1.64	31.33	90	VERIFICA	200.0	160.0	0.267	2274.1	312.2	VERIFICA
1	4	3127.0	414.9	1.64	31.33	90	VERIFICA	200.0	160.0	0.267	2274.1	271.7	VERIFICA
1	5	3127.0	414.9	1.64	31.33	90	VERIFICA	200.0	160.0	0.267	2274.1	230.9	VERIFICA
1	6	3127.0	414.9	1.64	31.33	90	VERIFICA	200.0	160.0	0.267	2274.1	192.3	VERIFICA
1	7	3127.0	414.9	1.64	31.33	90	VERIFICA	200.0	160.0	0.267	2274.1	155.6	VERIFICA
1	8	3128.0	415.0	1.64	31.33	90	VERIFICA	200.0	160.0	0.267	2274.0	120.6	VERIFICA
1	9	3128.0	415.0	1.64	31.33	90	VERIFICA	200.0	160.0	0.267	2274.0	103.8	VERIFICA
1	10	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	128.9	VERIFICA
1	11	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	146.1	VERIFICA
1	12	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	166.2	VERIFICA
1	13	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	187.6	VERIFICA
1	14	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	210.2	VERIFICA
1	15	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	233.7	VERIFICA
1	16	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	258.4	VERIFICA
1	17	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	284.2	VERIFICA
1	18	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	309.4	VERIFICA
1	19	3317.0	440.1	1.67	30.86	90	VERIFICA	200.0	160.0	0.267	2254.3	481.8	VERIFICA
1	20	3317.0	335.3	1.54	32.99	90	VERIFICA	500.0	160.0	0.267	5846.1	669.4	VERIFICA
1	21	3317.0	335.3	1.54	32.99	90	VERIFICA	500.0	160.0	0.267	5846.1	864.1	VERIFICA

VANO	SECCIÓN	CORT Vcd (+) canto var.	CORT Vcd (-) canto var.	CORT Vrd (+) (t.)	CORT Vrd (-) (t.)	MOMEN. Md (+) (t x m.)	MOMEN Md.(-) (t x m.)	CORT. Vrd. (t.)	MOMEN Md (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f c,k (t/m2.)	ZONA
2	1	0.0	0.0	904.7	284.2	-1677.4	538.0	904.7	-1677.4	-232.7	987.4	-244.3	A-B
2	2	0.0	0.0	594.0	30.5	-748.4	744.2	594.0	-748.4	77.1	621.5	-244.3	A-B
2	3	0.0	0.0	289.8	-220.9	-218.2	656.4	289.8	-218.2	350.8	520.5	-244.3	A-B
2	4	0.0	0.0	157.5	-304.8	-33.6	336.6	304.8	336.6	533.4	271.5	-244.3	A-B
2	5	0.0	0.0	164.6	-252.3	118.2	65.1	252.3	65.1	436.3	385.7	-244.3	A-B
2	6	0.0	0.0	147.1	-223.4	221.9	-153.3	223.4	-153.3	358.2	477.5	-244.3	A-B
2	7	0.0	0.0	135.0	-196.0	307.1	-322.8	196.0	-322.8	297.6	548.7	-244.3	A-B
2	8	0.0	0.0	124.4	-170.2	365.0	-447.8	170.2	-447.8	252.9	601.2	-244.3	A-B
2	9	0.0	0.0	115.4	-146.1	387.3	-531.6	146.1	-531.6	222.9	636.5	-244.3	A-B
2	10	0.0	0.0	104.7	-124.7	407.2	-499.2	124.7	-499.2	234.5	622.8	-244.3	A-B
2	11	0.0	0.0	100.6	-106.0	332.0	-503.7	106.0	-503.7	232.9	624.7	-244.3	A-B
2	12	0.0	0.0	116.4	-113.0	-20.4	89.6	116.4	-20.4	387.3	403.2	-244.3	A-B
2	13	0.0	0.0	134.2	-123.2	-0.5	59.3	134.2	-0.5	394.4	394.8	-244.3	A-B
2	14	0.0	0.0	152.4	-138.7	31.8	19.8	152.4	31.8	405.9	381.2	-244.3	A-B
2	15	0.0	0.0	174.3	-152.3	118.2	-58.6	174.3	118.2	436.9	344.9	-244.3	A-B
2	16	0.0	0.0	198.8	-167.3	258.9	-167.3	198.8	258.9	487.2	285.8	-244.3	A-B
2	17	0.0	0.0	224.7	-184.2	445.2	-297.2	224.7	445.2	553.8	207.4	-244.3	A-B
2	18	0.0	0.0	252.2	-205.8	680.8	-481.0	252.2	680.8	638.1	108.4	-244.3	A-B
2	19	0.0	0.0	214.6	-291.7	941.4	-719.6	291.7	-719.6	137.2	697.0	-244.3	A-B
2	20	0.0	0.0	-48.4	-607.6	1029.2	-1244.5	607.6	-1244.5	-100.4	804.9	-244.3	A-B
2	21	0.0	0.0	-284.7	-900.9	805.8	-2185.5	900.9	-2185.5	-414.3	1175.6	-244.3	C

VANO	SECCIÓN	Pd. (Ton)	σ xd (T/m2)	cot θ	θ	α	VERIFIC cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2)	Vu1 (ton)	Vrd (ton)	COMPRO Vrd<=Vu1
2	1	3232.0	326.7	1.53	33.19	90	VERIFICA	500.0	160.0	0.267	5863.7	904.7	VERIFICA
2	2	3232.0	326.7	1.53	33.19	90	VERIFICA	500.0	160.0	0.267	5863.7	594.0	VERIFICA
2	3	3232.0	428.8	1.66	31.07	90	VERIFICA	200.0	160.0	0.267	2263.1	289.8	VERIFICA
2	4	3113.0	413.0	1.64	31.37	90	VERIFICA	200.0	160.0	0.267	2275.6	304.8	VERIFICA
2	5	3113.0	413.0	1.64	31.37	90	VERIFICA	200.0	160.0	0.267	2275.6	252.3	VERIFICA
2	6	3113.0	413.0	1.64	31.37	90	VERIFICA	200.0	160.0	0.267	2275.6	223.4	VERIFICA
2	7	3113.0	413.0	1.64	31.37	90	VERIFICA	200.0	160.0	0.267	2275.6	196.0	VERIFICA
2	8	3113.0	413.0	1.64	31.37	90	VERIFICA	200.0	160.0	0.267	2275.6	170.2	VERIFICA
2	9	3113.0	413.0	1.64	31.37	90	VERIFICA	200.0	160.0	0.267	2275.6	146.1	VERIFICA
2	10	3113.0	413.0	1.64	31.37	90	VERIFICA	200.0	160.0	0.267	2275.6	124.7	VERIFICA
2	11	3113.0	413.0	1.64	31.37	90	VERIFICA	200.0	160.0	0.267	2275.6	106.0	VERIFICA
2	12	2974.0	394.6	1.62	31.73	90	VERIFICA	200.0	160.0	0.267	2290.3	116.4	VERIFICA
2	13	2974.0	394.6	1.62	31.73	90	VERIFICA	200.0	160.0	0.267	2290.3	134.2	VERIFICA
2	14	2974.0	394.6	1.62	31.73	90	VERIFICA	200.0	160.0	0.267	2290.3	152.4	VERIFICA
2	15	2974.0	394.6	1.62	31.73	90	VERIFICA	200.0	160.0	0.267	2290.3	174.3	VERIFICA
2	16	2974.0	394.6	1.62	31.73	90	VERIFICA	200.0	160.0	0.267	2290.3	198.8	VERIFICA
2	17	2974.0	394.6	1.62	31.73	90	VERIFICA	200.0	160.0	0.267	2290.3	224.7	VERIFICA
2	18	2974.0	394.6	1.62	31.73	90	VERIFICA	200.0	160.0	0.267	2290.3	252.2	VERIFICA
2	19	2974.0	394.6	1.62	31.73	90	VERIFICA	200.0	160.0	0.267	2290.3	291.7	VERIFICA
2	20	3113.0	314.7	1.51	33.47	90	VERIFICA	500.0	160.0	0.267	5888.5	607.6	VERIFICA
2	21	3113.0	314.7	1.51	33.47	90	VERIFICA	500.0	160.0	0.267	5888.5	900.9	VERIFICA

VANO	SECCIÓN	CORT. Vcd (+) canto var.	CORT Vcd (-) canto var.	CORT. Vrd (+) (t.)	CORT. Vrd.(-) (t.)	MOMEN. Md.(+) (t x m.)	MOMEN. Md.(-) (t x m.)	CORT. Vrd. (t.)	MOMEN Md (t x m.)	σ c1;d superior (t/m2.)	σ c1;d inferior (t/m2.)	f c,k (t/m2.)	ZONA
3	1	0.0	0.0	865.2	272.1	-2140.4	849.1	865.2	-2140.4	-387.2	1169.8	-244.3	C
3	2	0.0	0.0	679.4	129.3	-1375.1	1055.5	679.4	-1375.1	-132.0	868.4	-244.3	A-B
3	3	0.0	0.0	495.1	-11.7	-803.2	1136.8	495.1	-803.2	141.5	766.4	-244.3	A-B
3	4	0.0	0.0	306.7	-159.8	-428.0	1086.8	306.7	-428.0	275.7	608.7	-244.3	A-B
3	5	0.0	0.0	281.1	-146.9	-176.1	993.6	281.1	-176.1	377.5	514.5	-244.3	A-B
3	6	0.0	0.0	257.0	-134.5	38.2	907.3	257.8	38.2	454.2	424.4	-244.3	A-B
3	7	0.0	0.0	233.6	-123.1	218.3	843.7	233.6	218.3	518.6	348.7	-244.3	A-B
3	8	0.0	0.0	211.2	-112.8	349.7	800.2	211.2	349.7	565.6	293.5	-244.3	A-B
3	9	0.0	0.0	190.2	-103.5	468.0	774.8	190.2	468.0	607.9	243.8	-244.3	A-B
3	10	0.0	0.0	170.0	-95.4	558.3	764.9	170.0	558.3	640.2	205.8	-244.3	A-B
3	11	0.0	0.0	151.5	-89.6	615.7	778.3	151.5	615.7	660.7	181.7	-244.3	A-B
3	12	0.0	0.0	134.9	-85.7	642.5	804.5	134.9	642.5	670.3	170.4	-244.3	A-B
3	13	0.0	0.0	113.1	-90.5	680.7	859.6	113.1	680.7	669.6	140.0	-244.3	A-B
3	14	0.0	0.0	88.4	-115.2	207.1	1413.4	115.2	1413.4	931.7	-167.9	-244.3	A-B
3	15	0.0	0.0	76.2	-150.6	177.4	1375.3	150.6	1375.3	918.0	-151.9	-244.3	A-B
3	16	0.0	0.0	67.2	-187.5	66.0	1291.0	187.5	1291.0	887.9	-116.5	-244.3	A-B
3	17	0.0	0.0	59.8	-225.2	53.2	1165.0	225.2	1165.0	842.8	-63.5	-244.3	A-B
3	18	0.0	0.0	53.9	-264.8	45.8	986.5	264.8	986.5	779.0	11.5	-244.3	A-B
3	19	0.0	0.0	49.3	-306.1	47.9	749.4	306.1	749.4	694.2	111.2	-244.3	A-B
3	20	0.0	0.0	43.7	-352.4	59.2	453.8	352.4	453.8	476.0	145.9	-244.3	A-B
3	21	0.0	0.0	36.7	-405.3	84.8	84.8	405.3	84.8	352.9	291.3	-244.3	A-B

VANO	SECCIÓN	Pd. (Ton)	σ xd (T/m2)	cot θ	θ	α	VERIFIC. cot α >= 0,6	bo (cm.)	d (cm.)	f cd (T/cm2)	Vu1 (ton)	Vrd (ton)	COMPRO. Vrd<=Vu1
3	1	3232.0	326.7	1.53	33.19	90	VERIFICA	500.0	160.0	0.267	5863.7	865.2	VERIFICA
3	2	3232.0	326.7	1.53	33.19	90	VERIFICA	500.0	160.0	0.267	5863.7	679.4	VERIFICA
3	3	3232.0	428.8	1.66	31.07	90	VERIFICA	200.0	160.0	0.267	2263.1	495.1	VERIFICA
3	4	3232.0	428.8	1.66	31.07	90	VERIFICA	200.0	160.0	0.267	2263.1	306.7	VERIFICA
3	5	3320.0	440.5	1.67	30.85	90	VERIFICA	200.0	160.0	0.267	2254.0	281.1	VERIFICA
3	6	3320.0	440.5	1.67	30.85	90	VERIFICA	200.0	160.0	0.267	2254.0	257.0	VERIFICA
3	7	3320.0	440.5	1.67	30.85	90	VERIFICA	200.0	160.0	0.267	2254.0	233.6	VERIFICA
3	8	3320.0	440.5	1.67	30.85	90	VERIFICA	200.0	160.0	0.267	2254.0	211.2	VERIFICA
3	9	3320.0	440.5	1.67	30.85	90	VERIFICA	200.0	160.0	0.267	2254.0	190.2	VERIFICA
3	10	3320.0	440.5	1.67	30.85	90	VERIFICA	200.0	160.0	0.267	2254.0	170.0	VERIFICA
3	11	3320.0	440.5	1.67	30.85	90	VERIFICA	200.0	160.0	0.267	2254.0	151.5	VERIFICA
3	12	3320.0	440.5	1.67	30.85	90	VERIFICA	200.0	160.0	0.267	2254.0	134.9	VERIFICA
3	13	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	113.1	VERIFICA
3	14	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	115.2	VERIFICA
3	15	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	150.6	VERIFICA
3	16	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	187.5	VERIFICA
3	17	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	225.2	VERIFICA
3	18	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	264.8	VERIFICA
3	19	3212.0	426.2	1.66	31.12	90	VERIFICA	200.0	160.0	0.267	2265.2	306.1	VERIFICA
3	20	3212.0	324.7	1.53	33.24	90	VERIFICA	500.0	160.0	0.267	5867.9	352.4	VERIFICA
3	21	3212.0	324.7	1.53	33.24	90	VERIFICA	500.0	160.0	0.267	5867.9	405.3	VERIFICA

CÁLCULO DE ARMADURA DE CORTANTE ARTICULO 48.1.3 DE LA EP-93

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : ED2-1.8

VANO	SECCIÓN	fyo,d (T/cm2)	Vcuo (Ton)	Mo (Tm)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton)	Aα. calculada (cm2/m)	Aα. mínima (cm2/m)	Aα. necesaria (cm2/m)
1	1	4.2	653.20	-1030.8	-	-	653.20	0.0	63.5	63.5
1	2	4.2	653.20	881.3	-	-	653.20	0.0	63.5	63.5
1	3	4.2	261.28	1204.7	-	-	261.28	5.1	63.5	63.5
1	4	4.2	261.28	1365.7	-	-	261.28	1.0	63.5	63.5
1	5	4.2	261.28	1457.7	-	-	261.28	0.0	63.5	63.5
1	6	4.2	261.28	1526.2	-	-	261.28	0.0	63.5	63.5
1	7	4.2	261.28	1571.4	-	-	261.28	0.0	63.5	63.5
1	8	4.2	261.28	1593.5	-	-	261.28	0.0	63.5	63.5
1	9	4.2	261.28	1591.9	-	-	261.28	0.0	63.5	63.5
1	10	4.2	261.28	1613.3	-	-	261.28	0.0	63.5	63.5
1	11	4.2	261.28	1548.9	-	-	261.28	0.0	63.5	63.5
1	12	4.2	261.28	1445.0	-	-	261.28	0.0	63.5	63.5
1	13	4.2	261.28	1301.9	-	-	261.28	0.0	63.5	63.5
1	14	4.2	261.28	1119.3	-	-	261.28	0.0	63.5	63.5
1	15	4.2	261.28	-1297.1	-	-	261.28	0.0	63.5	63.5
1	16	4.2	261.28	-1558.6	-	-	261.28	0.0	63.5	63.5
1	17	4.2	261.28	-1859.4	-	-	261.28	2.3	63.5	63.5
1	18	4.2	261.28	-2200.2	-	-	261.28	4.8	63.5	63.5
1	19	4.2	261.28	-2572.1	-	-	261.28	21.8	63.5	63.5
1	20	4.2	653.20	-2556.3	-	-	653.20	1.7	63.5	63.5
1	21	4.2	653.20	-2687.3	1.604	0.762	798.32	7.1	63.5	63.5

VANO	SECCIÓN	fyo,d (T/cm2)	Vcuo (Ton)	Mo (Tm)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton)	Aα. calculada (cm2/m)	Aα. mínima (cm2/m)	Aα. necesaria (cm2/m)
2	1	4.2	653.20	-2630.5	-	-	653.20	27.2	63.5	63.5
2	2	4.2	653.20	-2492.5	-	-	653.20	0.0	63.5	63.5
2	3	4.2	261.28	-2307.9	-	-	261.28	2.8	63.5	63.5
2	4	4.2	261.28	-1653.5	-	-	261.28	4.4	63.5	63.5
2	5	4.2	261.28	1019.9	-	-	261.28	0.0	63.5	63.5
2	6	4.2	261.28	1473.6	-	-	261.28	0.0	63.5	63.5
2	7	4.2	261.28	1846.0	-	-	261.28	0.0	63.5	63.5
2	8	4.2	261.28	2136.6	-	-	261.28	0.0	63.5	63.5
2	9	4.2	261.28	2344.6	-	-	261.28	0.0	63.5	63.5
2	10	4.2	261.28	2470.6	-	-	261.28	0.0	63.5	63.5
2	11	4.2	261.28	2515.6	-	-	261.28	0.0	63.5	63.5
2	12	4.2	261.28	2346.8	-	-	261.28	0.0	63.5	63.5
2	13	4.2	261.28	2232.8	-	-	261.28	0.0	63.5	63.5
2	14	4.2	261.28	2040.8	-	-	261.28	0.0	63.5	63.5
2	15	4.2	261.28	1770.5	-	-	261.28	0.0	63.5	63.5
2	16	4.2	261.28	1422.0	-	-	261.28	0.0	63.5	63.5
2	17	4.2	261.28	995.0	-	-	261.28	0.0	63.5	63.5
2	18	4.2	261.28	-1552.0	-	-	261.28	0.0	63.5	63.5
2	19	4.2	261.28	-2106.2	-	-	261.28	3.1	63.5	63.5
2	20	4.2	653.20	-2357.4	-	-	653.20	0.0	63.5	63.5
2	21	4.2	653.20	-2483.4	1.554	0.764	775.75	13.7	63.5	63.5

VANO	SECCIÓN	fyo,d (T/cm2)	Vcuo (Ton)	Mo (Tm)	[1+ Mo x (2-cotg θ) / Md] no mayor que 2.	[1-Vrdx(cotg θ-1)/3xVcuo]	Vcu (Ton)	Aα. calculada (cm2/m)	Aα. mínima (cm2/m)	Aα. necesaria (cm2/m)
3	1	4.2	653.20	-2562.5	1.564	0.767	783.13	8.9	63.5	63.5
3	2	4.2	653.20	-2484.5	-	-	653.20	2.8	63.5	63.5
3	3	4.2	261.28	-2517.9	-	-	261.28	23.3	63.5	63.5
3	4	4.2	261.28	-2215.9	-	-	261.28	4.5	63.5	63.5
3	5	4.2	261.28	-1918.3	-	-	261.28	2.0	63.5	63.5
3	6	4.2	261.28	-1611.5	-	-	261.28	0.0	63.5	63.5
3	7	4.2	261.28	-1345.7	-	-	261.28	0.0	63.5	63.5
3	8	4.2	261.28	1159.2	-	-	261.28	0.0	63.5	63.5
3	9	4.2	261.28	1343.7	-	-	261.28	0.0	63.5	63.5
3	10	4.2	261.28	1487.3	-	-	261.28	0.0	63.5	63.5
3	11	4.2	261.28	1590.4	-	-	261.28	0.0	63.5	63.5
3	12	4.2	261.28	1652.6	-	-	261.28	0.0	63.5	63.5
3	13	4.2	261.28	1615.2	-	-	261.28	0.0	63.5	63.5
3	14	4.2	261.28	1612.6	-	-	261.28	0.0	63.5	63.5
3	15	4.2	261.28	1586.0	-	-	261.28	0.0	63.5	63.5
3	16	4.2	261.28	1535.4	-	-	261.28	0.0	63.5	63.5
3	17	4.2	261.28	1460.9	-	-	261.28	0.0	63.5	63.5
3	18	4.2	261.28	1362.3	-	-	261.28	0.4	63.5	63.5
3	19	4.2	261.28	1239.6	-	-	261.28	4.5	63.5	63.5
3	20	4.2	653.20	906.7	-	-	653.20	0.0	63.5	63.5
3	21	4.2	653.20	-1058.4	-	-	653.20	0.0	63.5	63.5

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : ED2-1.8

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
1	1	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	414.0	-27.7	83.0	83.0
1	2	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	360.0	-35.3	456.4	62.9
1	3	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	312.2	-41.6	708.9	10.7
1	4	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	271.7	-46.7	898.8	-29.7
1	5	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	230.9	-53.3	1082.0	-15.3
1	6	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	192.3	-61.3	1190.1	3.7
1	7	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	155.6	-70.7	1261.9	23.1
1	8	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	120.6	-81.5	1290.1	38.9
1	9	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	97.3	-103.8	825.2	501.5
1	10	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	88.2	-128.9	777.1	613.8
1	11	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	92.5	-146.1	752.5	571.2
1	12	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	96.4	-166.2	735.5	505.1
1	13	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	103.2	-187.6	746.1	429.8
1	14	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	111.2	-210.2	770.8	310.2
1	15	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	120.2	-233.7	812.2	158.9
1	16	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	130.3	-258.4	872.6	-9.8
1	17	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	141.4	-284.2	954.1	-230.5
1	18	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	154.5	-309.4	1059.0	-488.1
1	19	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	22.4	-481.8	1139.9	-817.1
1	20	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	-121.7	-669.4	1119.6	-1330.4
1	21	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	-270.0	-864.1	967.2	-2044.0

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
2	1	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	904.7	284.2	-1677.4	538.0
2	2	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	594.0	30.5	-748.4	744.2
2	3	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	289.8	-220.9	-218.2	656.4
2	4	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	157.5	-304.8	-33.6	336.6
2	5	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	164.6	-252.3	118.2	65.1
2	6	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	147.1	-223.4	221.9	-153.3
2	7	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	135.0	-196.0	307.1	-322.8
2	8	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	124.4	-170.2	365.0	-447.8
2	9	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	115.4	-146.1	387.3	-531.6
2	10	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	104.7	-124.7	407.2	-499.2
2	11	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	100.6	-106.0	332.0	-503.7
2	12	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	116.4	-113.0	-20.4	89.6
2	13	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	134.2	-123.2	-0.5	59.3
2	14	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	152.4	-138.7	31.8	19.9
2	15	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	174.3	-152.3	118.2	-58.6
2	16	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	198.8	-167.3	258.9	-167.3
2	17	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	224.7	-184.2	445.2	-297.2
2	18	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	252.2	-205.8	680.8	-481.0
2	19	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	214.6	-291.7	941.4	-719.6
2	20	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	-48.4	-607.6	1029.2	-1244.5
2	21	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	-264.7	-900.9	805.8	-2185.5

VANO	SECCIÓN	Ancho b (m.)	Ancho Sup bs (m.)	Canto h (m.)	Canto volad. hf (m.)	Angulo a (°)	armado voladizo (cm2/m)	armado nucleo (cm2/m)	Ao (cm2.)	A'o (cm2.)	Ap (cm2.)	fyd (Kp/cm2.)	fya,d (Kp/cm2.)	f pd (Kp/cm2.)	CORT. Vrd. (+) (t.)	CORT. Vrd. (-) (t.)	MOMEN. Md. (+) (t x m.)	MOMEN. Md. (-) (t x m.)
3	1	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	865.2	272.1	-2140.4	849.1
3	2	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	679.4	129.3	-1375.1	1055.5
3	3	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	495.1	-11.7	-803.2	1136.8
3	4	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	306.7	-159.8	-428.0	1086.6
3	5	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	281.1	-146.9	-176.1	993.6
3	6	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	257.0	-134.5	38.2	907.3
3	7	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	233.6	-123.1	218.3	843.7
3	8	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	211.2	-112.8	349.7	800.2
3	9	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	190.2	-103.5	468.0	774.8
3	10	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	170.0	-95.4	558.3	764.9
3	11	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	151.5	-89.6	615.7	778.3
3	12	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	134.9	-85.7	642.5	804.5
3	13	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	113.1	-90.5	680.7	859.6
3	14	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	88.4	-115.2	207.1	1413.4
3	15	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	76.2	-150.6	177.4	1375.3
3	16	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	67.2	-187.5	66.0	1291.0
3	17	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	59.8	-225.2	53.2	1165.0
3	18	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	53.9	-264.8	45.8	986.5
3	19	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	49.3	-306.1	47.9	749.4
3	20	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	43.7	-352.4	59.2	453.8
3	21	9.500	5.800	1.650	0.337	90	5.65	13.4	10.5	77.7	0	4435	4200	15455	36.7	-405.3	84.8	84.8

CÁLCULO DE ARMADURA DE RASANTE

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : ED2-1.8

VANO	SECCIÓN	A (cm2)	τ d ala comp (Kp/cm2.)	τ d ala tracc (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
1	1	-	18.1	-	30.0	8.40	ALA COMPRIMIDA	-	1.2	-	30.0	0.56	ALA COMPRIMIDA	8.40
1	2	-	15.8	-	30.0	7.30	ALA COMPRIMIDA	-	1.5	-	30.0	0.72	ALA COMPRIMIDA	7.30
1	3	-	13.7	-	30.0	6.33	ALA COMPRIMIDA	-	1.8	-	30.0	0.84	ALA COMPRIMIDA	6.33
1	4	-	11.9	-	30.0	5.51	ALA COMPRIMIDA	98.63	-	1.1	45.0	0.89	ALA TRACCIONADA	5.51
1	5	-	10.1	-	30.0	4.68	ALA COMPRIMIDA	98.63	-	1.3	45.0	1.02	ALA TRACCIONADA	4.68
1	6	-	8.4	-	30.0	3.90	ALA COMPRIMIDA	-	2.7	-	30.0	1.24	ALA COMPRIMIDA	3.90
1	7	-	6.8	-	30.0	3.16	ALA COMPRIMIDA	-	3.1	-	30.0	1.43	ALA COMPRIMIDA	3.16
1	8	-	5.3	-	30.0	2.45	ALA COMPRIMIDA	-	3.6	-	30.0	1.65	ALA COMPRIMIDA	2.45
1	9	-	4.3	-	30.0	1.97	ALA COMPRIMIDA	-	4.5	-	30.0	2.11	ALA COMPRIMIDA	2.11
1	10	-	3.9	-	30.0	1.79	ALA COMPRIMIDA	-	5.6	-	30.0	2.61	ALA COMPRIMIDA	2.61
1	11	-	4.0	-	30.0	1.88	ALA COMPRIMIDA	-	6.4	-	30.0	2.96	ALA COMPRIMIDA	2.96
1	12	-	4.2	-	30.0	1.95	ALA COMPRIMIDA	-	7.3	-	30.0	3.37	ALA COMPRIMIDA	3.37
1	13	-	4.5	-	30.0	2.09	ALA COMPRIMIDA	-	8.2	-	30.0	3.80	ALA COMPRIMIDA	3.80
1	14	-	4.9	-	30.0	2.25	ALA COMPRIMIDA	-	9.2	-	30.0	4.26	ALA COMPRIMIDA	4.26
1	15	-	5.3	-	30.0	2.44	ALA COMPRIMIDA	-	10.2	-	30.0	4.74	ALA COMPRIMIDA	4.74
1	16	-	5.7	-	30.0	2.64	ALA COMPRIMIDA	98.63	-	6.2	45.0	4.94	ALA TRACCIONADA	4.94
1	17	-	6.2	-	30.0	2.87	ALA COMPRIMIDA	98.63	-	6.8	45.0	5.43	ALA TRACCIONADA	5.43
1	18	-	6.8	-	30.0	3.13	ALA COMPRIMIDA	98.63	-	7.4	45.0	5.91	ALA TRACCIONADA	5.91
1	19	-	1.0	-	30.0	0.45	ALA COMPRIMIDA	98.63	-	11.5	45.0	9.21	ALA TRACCIONADA	9.21
1	20	-	5.3	-	30.0	2.47	ALA COMPRIMIDA	98.63	-	15.9	45.0	12.80	ALA TRACCIONADA	12.80
1	21	-	11.8	-	30.0	5.47	ALA COMPRIMIDA	98.63	-	20.6	45.0	16.52	ALA TRACCIONADA	16.52

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm)	armadura superior Aα, sup (cm2/m.)	armadura inferior Aα, inf (cm2/m.)
1	1	30	18.1	69.28	0.12	1.10	7.30
1	2	30	15.8	69.28	0.13	0.83	6.47
1	3	30	13.7	69.28	0.14	0.62	5.71
1	4	30	11.9	69.28	0.14	0.47	5.04
1	5	30	10.1	69.28	0.14	0.34	4.34
1	6	30	8.4	69.28	0.15	0.24	3.66
1	7	30	6.8	69.28	0.15	0.16	3.00
1	8	30	5.3	69.28	0.16	0.09	2.35
1	9	30	4.5	69.28	0.16	0.07	2.04
1	10	30	5.6	69.28	0.15	0.11	2.51
1	11	30	6.4	69.28	0.15	0.14	2.83
1	12	30	7.3	69.28	0.15	0.18	3.19
1	13	30	8.2	69.28	0.15	0.23	3.58
1	14	30	9.2	69.28	0.15	0.28	3.98
1	15	30	10.2	69.28	0.14	0.35	4.39
1	16	45	6.2	80.00	0.16	0.19	4.75
1	17	45	6.8	80.00	0.15	0.23	5.20
1	18	45	7.4	80.00	0.15	0.27	5.64
1	19	45	11.5	80.00	0.14	0.66	8.55
1	20	45	15.9	80.00	0.13	1.28	11.52
1	21	45	20.6	80.00	0.13	2.13	14.39

VANO	SECCIÓN	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
2	1	98.63	-	21.6	45.0	17.29	ALA TRACCIONADA	-	12.4	-	30.0	5.76	ALA COMPRIMIDA	17.29
2	2	98.63	-	14.2	45.0	11.36	ALA TRACCIONADA	-	1.3	-	30.0	0.62	ALA COMPRIMIDA	11.36
2	3	98.63	-	6.9	45.0	5.54	ALA TRACCIONADA	-	9.7	-	30.0	4.48	ALA COMPRIMIDA	5.54
2	4	98.63	-	3.8	45.0	3.01	ALA TRACCIONADA	-	13.3	-	30.0	6.18	ALA COMPRIMIDA	6.18
2	5	-	7.2	-	30.0	3.34	ALA COMPRIMIDA	-	11.0	-	30.0	5.12	ALA COMPRIMIDA	5.12
2	6	-	6.4	-	30.0	2.98	ALA COMPRIMIDA	98.63	-	5.3	45.0	4.27	ALA TRACCIONADA	4.27
2	7	-	5.9	-	30.0	2.74	ALA COMPRIMIDA	98.63	-	4.7	45.0	3.75	ALA TRACCIONADA	3.75
2	8	-	5.4	-	30.0	2.52	ALA COMPRIMIDA	98.63	-	4.1	45.0	3.25	ALA TRACCIONADA	3.25
2	9	-	5.1	-	30.0	2.34	ALA COMPRIMIDA	98.63	-	3.5	45.0	2.79	ALA TRACCIONADA	2.79
2	10	-	4.6	-	30.0	2.12	ALA COMPRIMIDA	98.63	-	3.0	45.0	2.38	ALA TRACCIONADA	2.38
2	11	-	4.4	-	30.0	2.04	ALA COMPRIMIDA	98.63	-	2.5	45.0	2.03	ALA TRACCIONADA	2.04
2	12	98.63	-	2.8	45.0	2.23	ALA TRACCIONADA	-	4.9	-	30.0	2.29	ALA COMPRIMIDA	2.29
2	13	98.63	-	3.2	45.0	2.57	ALA TRACCIONADA	-	5.4	-	30.0	2.50	ALA COMPRIMIDA	2.57
2	14	-	6.7	-	30.0	3.09	ALA COMPRIMIDA	-	6.1	-	30.0	2.81	ALA COMPRIMIDA	3.09
2	15	-	7.6	-	30.0	3.53	ALA COMPRIMIDA	98.63	-	3.6	45.0	2.91	ALA TRACCIONADA	3.53
2	16	-	8.7	-	30.0	4.03	ALA COMPRIMIDA	98.63	-	4.0	45.0	3.20	ALA TRACCIONADA	4.03
2	17	-	9.8	-	30.0	4.56	ALA COMPRIMIDA	98.63	-	4.4	45.0	3.52	ALA TRACCIONADA	4.56
2	18	-	11.0	-	30.0	5.12	ALA COMPRIMIDA	98.63	-	4.9	45.0	3.93	ALA TRACCIONADA	5.12
2	19	-	9.4	-	30.0	4.35	ALA COMPRIMIDA	98.63	-	7.0	45.0	5.58	ALA TRACCIONADA	5.58
2	20	-	2.1	-	30.0	0.96	ALA COMPRIMIDA	98.63	-	14.5	45.0	11.62	ALA TRACCIONADA	11.62
2	21	-	12.5	-	30.0	5.77	ALA COMPRIMIDA	98.63	-	21.5	45.0	17.22	ALA TRACCIONADA	17.22

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm)	armadura superior Aα, sup (cm2/m.)	armadura inferior Aα, inf (cm2/m.)
2	1	45	21.6	80.00	0.12	2.33	14.96
2	2	45	14.2	80.00	0.14	1.00	10.35
2	3	45	6.9	80.00	0.15	0.24	5.30
2	4	30	13.3	69.28	0.14	0.60	5.59
2	5	30	11.0	69.28	0.14	0.41	4.71
2	6	45	5.3	80.00	0.16	0.14	4.13
2	7	45	4.7	80.00	0.16	0.11	3.64
2	8	45	4.1	80.00	0.16	0.08	3.17
2	9	45	3.5	80.00	0.16	0.06	2.73
2	10	45	3.0	80.00	0.16	0.04	2.34
2	11	30	4.4	69.28	0.16	0.06	1.98
2	12	30	4.9	69.28	0.16	0.08	2.21
2	13	45	3.2	80.00	0.16	0.05	2.51
2	14	30	6.7	69.28	0.15	0.15	2.94
2	15	30	7.6	69.28	0.15	0.19	3.34
2	16	30	8.7	69.28	0.15	0.25	3.78
2	17	30	9.8	69.28	0.14	0.32	4.23
2	18	30	11.0	69.28	0.14	0.41	4.71
2	19	45	7.0	80.00	0.15	0.24	5.33
2	20	45	14.5	80.00	0.14	1.05	10.56
2	21	45	21.5	80.00	0.12	2.31	14.91

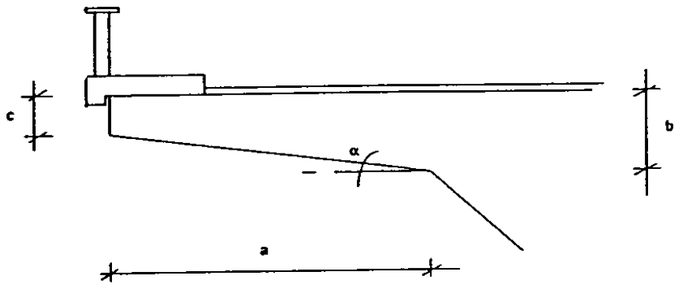
VANO	SECCIÓN	A (cm2)	τ d ala comp. (Kp/cm2.)	τ d ala tracc. (Kp/cm2.)	q (°)	Aα (+) (cm2/m.)	Situacion del ala	A (cm2)	t d ala comp. (Kp/cm2.)	t d ala tracc (Kp/cm2.)	θ (°)	Aα (-) (cm2/m.)	Situacion del ala	ENVOLVENTE Aα (cm2/m.)
3	1	98.63	-	20.6	45.0	16.54	ALA TRACCIONADA	-	11.9	-	30.0	5.52	ALA COMPRIMIDA	16.54
3	2	98.63	-	16.2	45.0	12.99	ALA TRACCIONADA	-	5.7	-	30.0	2.62	ALA COMPRIMIDA	12.99
3	3	98.63	-	11.8	45.0	9.46	ALA TRACCIONADA	-	0.5	-	30.0	0.24	ALA COMPRIMIDA	9.46
3	4	98.63	-	7.3	45.0	5.86	ALA TRACCIONADA	-	7.0	-	30.0	3.24	ALA COMPRIMIDA	5.86
3	5	98.63	-	6.7	45.0	5.37	ALA TRACCIONADA	-	6.4	-	30.0	2.96	ALA COMPRIMIDA	5.37
3	6	-	11.2	-	30.0	5.21	ALA COMPRIMIDA	-	5.9	-	30.0	2.73	ALA COMPRIMIDA	5.21
3	7	-	10.2	-	30.0	4.74	ALA COMPRIMIDA	-	5.4	-	30.0	2.50	ALA COMPRIMIDA	4.74
3	8	-	9.2	-	30.0	4.28	ALA COMPRIMIDA	-	4.9	-	30.0	2.29	ALA COMPRIMIDA	4.28
3	9	-	8.3	-	30.0	3.86	ALA COMPRIMIDA	-	4.5	-	30.0	2.10	ALA COMPRIMIDA	3.86
3	10	-	7.4	-	30.0	3.45	ALA COMPRIMIDA	-	4.2	-	30.0	1.93	ALA COMPRIMIDA	3.45
3	11	-	6.6	-	30.0	3.07	ALA COMPRIMIDA	-	3.9	-	30.0	1.82	ALA COMPRIMIDA	3.07
3	12	-	5.9	-	30.0	2.74	ALA COMPRIMIDA	-	3.8	-	30.0	1.74	ALA COMPRIMIDA	2.74
3	13	-	5.0	-	30.0	2.29	ALA COMPRIMIDA	-	4.0	-	30.0	1.84	ALA COMPRIMIDA	2.29
3	14	-	3.9	-	30.0	1.79	ALA COMPRIMIDA	-	5.0	-	30.0	2.34	ALA COMPRIMIDA	2.34
3	15	-	3.3	-	30.0	1.55	ALA COMPRIMIDA	-	6.6	-	30.0	3.05	ALA COMPRIMIDA	3.80
3	16	-	2.9	-	30.0	1.36	ALA COMPRIMIDA	-	8.2	-	30.0	3.80	ALA COMPRIMIDA	4.57
3	17	-	2.6	-	30.0	1.21	ALA COMPRIMIDA	-	9.9	-	30.0	4.57	ALA COMPRIMIDA	5.37
3	18	-	2.4	-	30.0	1.09	ALA COMPRIMIDA	-	11.6	-	30.0	5.37	ALA COMPRIMIDA	6.21
3	19	-	2.2	-	30.0	1.00	ALA COMPRIMIDA	-	13.4	-	30.0	6.21	ALA COMPRIMIDA	7.15
3	20	-	1.9	-	30.0	0.89	ALA COMPRIMIDA	-	15.4	-	30.0	7.15	ALA COMPRIMIDA	8.22
3	21	-	1.6	-	30.0	0.74	ALA COMPRIMIDA	-	17.7	-	30.0	8.22	ALA COMPRIMIDA	8.22

VANO	SECCIÓN	b (°)	t d (Kp/cm2.)	t max (Kp/cm2.)	e (cm)	armadura superior Aα, sup (cm2/m.)	armadura inferior Aα, inf (cm2/m.)
3	1	45	20.6	80.00	0.13	2.13	14.41
3	2	45	16.2	80.00	0.13	1.31	11.67
3	3	45	11.8	80.00	0.14	0.70	8.77
3	4	45	7.3	80.00	0.15	0.27	5.60
3	5	45	6.7	80.00	0.15	0.23	5.15
3	6	30	11.2	69.28	0.14	0.42	4.79
3	7	30	10.2	69.28	0.14	0.35	4.39
3	8	30	9.2	69.28	0.15	0.29	4.00
3	9	30	8.3	69.28	0.15	0.23	3.62
3	10	30	7.4	69.28	0.15	0.19	3.26
3	11	30	6.6	69.28	0.15	0.15	2.92
3	12	30	5.9	69.28	0.15	0.12	2.62
3	13	30	5.0	69.28	0.16	0.08	2.21
3	14	30	5.0	69.28	0.16	0.09	2.25
3	15	30	6.6	69.28	0.15	0.15	2.91
3	16	30	8.2	69.28	0.15	0.23	3.58
3	17	30	9.9	69.28	0.14	0.33	4.24
3	18	30	11.6	69.28	0.14	0.45	4.92
3	19	30	13.4	69.28	0.14	0.60	5.61
3	20	30	15.4	69.28	0.13	0.80	6.35
3	21	30	17.7	69.28	0.13	1.05	7.17

CALCULO DE ARMADURA DE VOLADIZO

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : ED2-1.8

DATOS GEOMETRIA

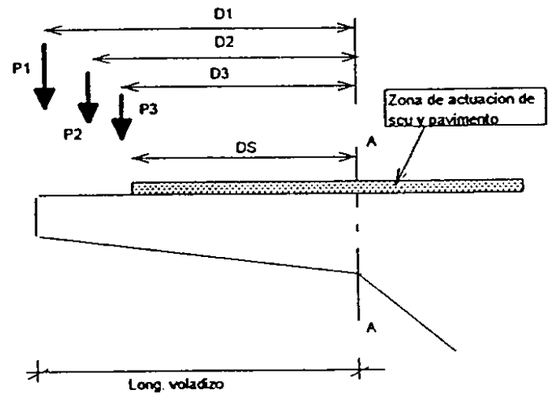


a (longitud voladizo) (m.) =	1.85
b (canto en base del voladizo) (m.) =	0.337
c (canto en extremo del voladizo) (m.) =	0.200
α (angulo cara inferior voladizo) (rad) =	0.074
Recubrimiento (c.d.g. armadura) (m.) =	0.050

DATOS MATERIALES

HORMIGONES		
	Fck(kp/cm2)	γc
Tablero	400	1.5
ACEROS		
	Fk(kp/cm2)	γs
Acero pasivo	5100	1.15

DATOS CARGAS (P1, P2, P3 son cargas permanentes).



Cargas actuantes (valores caracteristicos)

Peso propio hormigón (t/m3) =	2.50

P1(t/m)=	0.75	D1(m.)=	1.85
P2(t/m)=	0.00	D2(m.)=	0.00
P3(t/m)=	0.00	D3(m)=	0.00

Peso pavimento (t/m2)=	0.00
Valor s.c.u. (t/m2)=	0.50

Distancia actuacion s.c. DS(m.)=	1.85

Esfuerzos debidos al carro en Seccion A-A

Momento Mk(m.t/m)=	0.00
Cortante Vk(m.t/m)=	0.00

Coeficientes de ponderacion de acciones

ESTADOS LIMITES ULTIMOS	
	γf
Acciones permanentes desfav.	1.5
Acciones variables desfavorables	1.5

CALCULO

ESFUERZOS (DE SERVICIO) DEBIDOS A LAS CARGAS:

Carga	Momento(mT/	ortante (T/m)
Peso propio	-1.05	1.24
P1	-1.39	0.75
P2	0.00	0.00
P3	0.00	0.00
Pavimento	0.00	0.00
Sobrecarga repartida (s.c.u.)	-0.86	0.93
Carro	0.00	0.00
TOTAL	-3.29	2.92

ESFUERZOS DE DISEÑO PARA EL DIMENSIONAMIENTO

Carga	Momento(mT/	ortante (T/m	V.reducido (T/
Peso propio	-1.58	1.86	1.46
P1	-2.08	1.13	0.59
P2	0.00	0.00	0.00
P3	0.00	0.00	0.00
Pavimento	0.00	0.00	0.00
Sobrecarga repartida (s.c.u.)	-1.28	1.39	1.06
Carro	0.00	0.00	0.00
TOTAL	-4.94	4.38	3.10

ARMADO FLEXION (por metro)

As sup.(cm²)	omprobació	Def.sup.(o/oo	Def.inf.(o/oo)	ef. acero(o/oo)
3.99	Vale	-11.886	0.826	-10.000

ARMADO CORTANTE (como viga, por metro)

As 90°(cm²/m)	omprobació	Vu1 (T)	Vcu (T)	Vsu (T)
0.00	Vale	229.60	23.43	0.00

DISTRIBUCIÓN CONJUNTA DE ARMADURA DE RASANTE Y FLEXIÓN EN VOLADIZOS

PROYECTO : L.A.V. MADRID - ZARAGOZA
ESTRUCTURA : ED2-1.8

ARMADURA SUPERIOR DISPUESTA=	20.93	CM2/M
ARMADURA INFERIOR DISPUESTA=	10.05	CM2/M

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
1	1	8.40	1.10	7.30	3.99	0.00	5.09	7.30	0.00	15.85	0.00	0.00
1	2	7.30	0.83	6.47	3.99	0.00	4.82	6.47	0.00	16.11	0.00	0.00
1	3	6.33	0.62	5.71	3.99	0.00	4.61	5.71	0.00	16.32	0.00	0.00
1	4	5.51	0.47	5.04	3.99	0.00	4.46	5.04	0.00	16.47	0.00	0.00
1	5	4.68	0.34	4.34	3.99	0.00	4.33	4.34	0.00	16.60	0.00	0.00
1	6	3.90	0.24	3.66	3.99	0.00	4.22	3.66	0.00	16.71	0.00	0.00
1	7	3.16	0.16	3.00	3.99	0.00	4.14	3.00	0.00	16.79	0.00	0.00
1	8	2.45	0.09	2.35	3.99	0.00	4.08	2.35	0.00	16.85	0.00	0.00
1	9	2.11	0.07	2.04	3.99	0.00	4.06	2.04	0.00	16.87	0.00	0.00
1	10	2.61	0.11	2.51	3.99	0.00	4.09	2.51	0.00	16.84	0.00	0.00
1	11	2.96	0.14	2.83	3.99	0.00	4.12	2.83	0.00	16.81	0.00	0.00
1	12	3.37	0.18	3.19	3.99	0.00	4.16	3.19	0.00	16.77	0.00	0.00
1	13	3.80	0.23	3.58	3.99	0.00	4.21	3.58	0.00	16.72	0.00	0.00
1	14	4.26	0.28	3.98	3.99	0.00	4.27	3.98	0.00	16.66	0.00	0.00
1	15	4.74	0.35	4.39	3.99	0.00	4.34	4.39	0.00	16.59	0.00	0.00
1	16	4.94	0.19	4.75	3.99	0.00	4.18	4.75	0.00	16.75	0.00	0.00
1	17	5.43	0.23	5.20	3.99	0.00	4.22	5.20	0.00	16.71	0.00	0.00
1	18	5.91	0.27	5.64	3.99	0.00	4.26	5.64	0.00	16.67	0.00	0.00
1	19	9.21	0.66	8.55	3.99	0.00	4.65	8.55	0.00	16.28	0.00	0.00
1	20	12.80	1.28	11.52	3.99	0.00	5.26	11.52	0.00	15.67	0.00	0.00
1	21	16.52	2.13	14.39	3.99	0.00	6.11	14.39	0.00	14.82	0.00	0.00

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
2	1	17.29	2.33	14.96	3.99	0.00	6.32	14.96	0.00	14.61	0.35	0.00
2	2	11.36	1.00	10.35	3.99	0.00	4.99	10.35	0.00	15.94	0.00	0.00
2	3	5.54	0.24	5.30	3.99	0.00	4.23	5.30	0.00	16.70	0.00	0.00
2	4	6.18	0.60	5.59	3.99	0.00	4.58	5.59	0.00	16.35	0.00	0.00
2	5	5.12	0.41	4.71	3.99	0.00	4.40	4.71	0.00	16.54	0.00	0.00
2	6	4.27	0.14	4.13	3.99	0.00	4.13	4.13	0.00	16.80	0.00	0.00
2	7	3.75	0.11	3.64	3.99	0.00	4.10	3.64	0.00	16.83	0.00	0.00
2	8	3.25	0.08	3.17	3.99	0.00	4.07	3.17	0.00	16.86	0.00	0.00
2	9	2.79	0.06	2.73	3.99	0.00	4.05	2.73	0.00	16.88	0.00	0.00
2	10	2.38	0.04	2.34	3.99	0.00	4.03	2.34	0.00	16.90	0.00	0.00
2	11	2.04	0.06	1.98	3.99	0.00	4.05	1.98	0.00	16.88	0.00	0.00
2	12	2.29	0.08	2.21	3.99	0.00	4.07	2.21	0.00	16.86	0.00	0.00
2	13	2.57	0.05	2.51	3.99	0.00	4.04	2.51	0.00	16.89	0.00	0.00
2	14	3.09	0.15	2.94	3.99	0.00	4.14	2.94	0.00	16.79	0.00	0.00
2	15	3.53	0.19	3.34	3.99	0.00	4.18	3.34	0.00	16.75	0.00	0.00
2	16	4.03	0.25	3.78	3.99	0.00	4.24	3.78	0.00	16.69	0.00	0.00
2	17	4.56	0.32	4.23	3.99	0.00	4.31	4.23	0.00	16.62	0.00	0.00
2	18	5.12	0.41	4.71	3.99	0.00	4.40	4.71	0.00	16.54	0.00	0.00
2	19	5.58	0.24	5.33	3.99	0.00	4.23	5.33	0.00	16.70	0.00	0.00
2	20	11.62	1.05	10.56	3.99	0.00	5.04	10.56	0.00	15.89	0.00	0.00
2	21	17.22	2.31	14.91	3.99	0.00	6.30	14.91	0.00	14.63	0.28	0.00

VANO	SECCIÓN	ARMADURA TOTAL RASANTE	ARMADURA RASANTE SUPERIOR	ARMADURA RASANTE INFERIOR	ARMADURA FLEXION SUPERIOR	ARMADURA FLEXION INFERIOR	ARMADURA NECESARIA SUPERIOR	ARMADURA NECESARIA INFERIOR	REFUERZO ARMADURA SUPERIOR	EXCESO ARMADURA SUPERIOR	ARMADURA INFERIOR RESTANTE	REFUERZO ARMADURA INFERIOR
3	1	16.54	2.13	14.41	3.99	0.00	6.12	14.41	0.00	14.81	0.00	0.00
3	2	12.99	1.31	11.67	3.99	0.00	5.30	11.67	0.00	15.63	0.00	0.00
3	3	9.46	0.70	8.77	3.99	0.00	4.69	8.77	0.00	16.25	0.00	0.00
3	4	5.86	0.27	5.60	3.99	0.00	4.26	5.60	0.00	16.68	0.00	0.00
3	5	5.37	0.23	5.15	3.99	0.00	4.21	5.15	0.00	16.72	0.00	0.00
3	6	5.21	0.42	4.79	3.99	0.00	4.41	4.79	0.00	16.52	0.00	0.00
3	7	4.74	0.35	4.39	3.99	0.00	4.34	4.39	0.00	16.59	0.00	0.00
3	8	4.28	0.29	4.00	3.99	0.00	4.27	4.00	0.00	16.66	0.00	0.00
3	9	3.86	0.23	3.62	3.99	0.00	4.22	3.62	0.00	16.71	0.00	0.00
3	10	3.45	0.19	3.26	3.99	0.00	4.17	3.26	0.00	16.76	0.00	0.00
3	11	3.07	0.15	2.92	3.99	0.00	4.13	2.92	0.00	16.80	0.00	0.00
3	12	2.74	0.12	2.62	3.99	0.00	4.10	2.62	0.00	16.83	0.00	0.00
3	13	2.29	0.08	2.21	3.99	0.00	4.07	2.21	0.00	16.86	0.00	0.00
3	14	2.34	0.09	2.25	3.99	0.00	4.07	2.25	0.00	16.86	0.00	0.00
3	15	3.05	0.15	2.91	3.99	0.00	4.13	2.91	0.00	16.80	0.00	0.00
3	16	3.80	0.23	3.58	3.99	0.00	4.21	3.58	0.00	16.72	0.00	0.00
3	17	4.57	0.33	4.24	3.99	0.00	4.31	4.24	0.00	16.62	0.00	0.00
3	18	5.37	0.45	4.92	3.99	0.00	4.44	4.92	0.00	16.49	0.00	0.00
3	19	6.21	0.60	5.61	3.99	0.00	4.59	5.61	0.00	16.34	0.00	0.00
3	20	7.15	0.80	6.35	3.99	0.00	4.78	6.35	0.00	16.15	0.00	0.00
3	21	8.22	1.05	7.17	3.99	0.00	5.04	7.17	0.00	15.89	0.00	0.00

CÁLCULO DE ARMADURA DE TORSION . ART. 48.2 EP-93

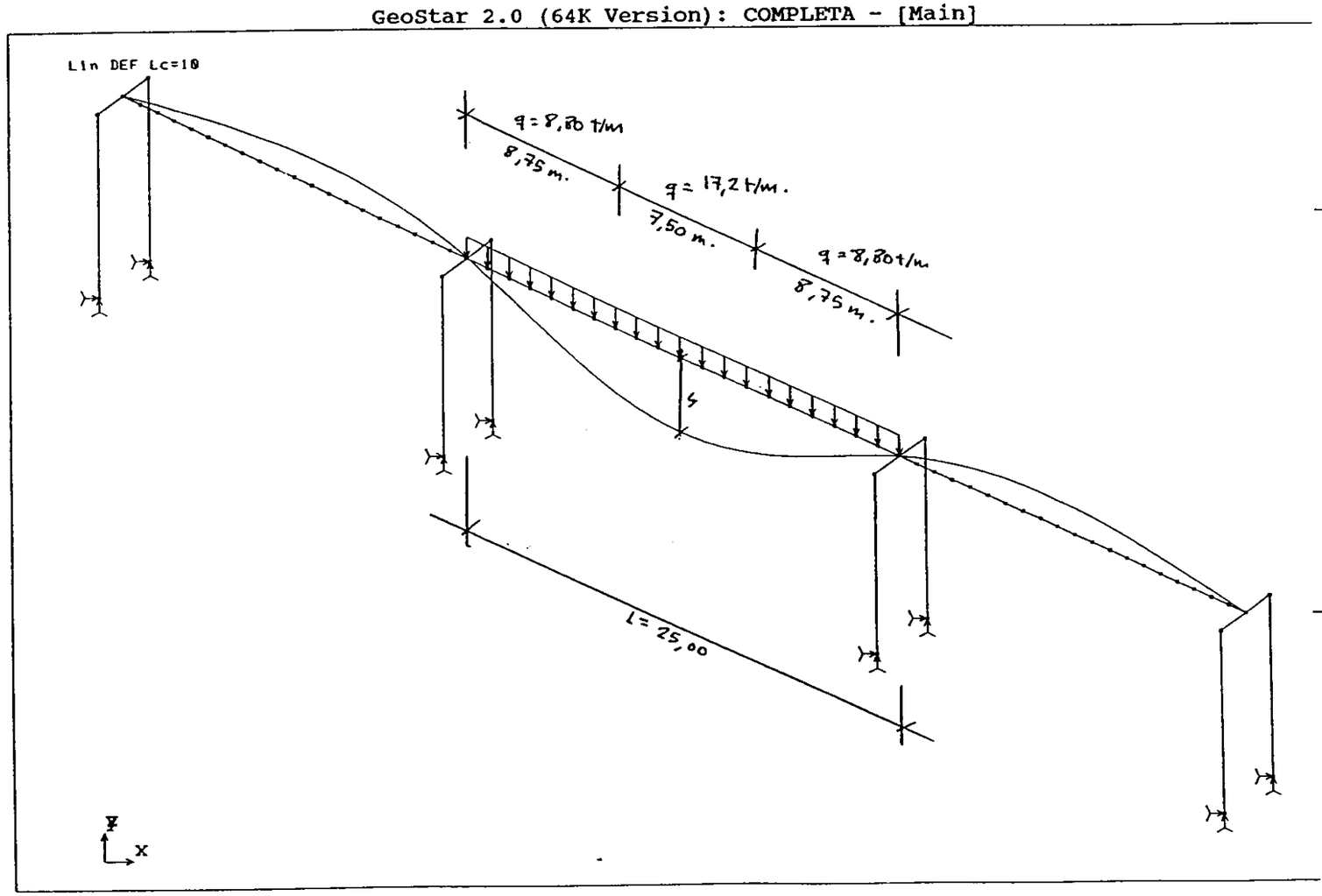
PROYECTO : L.A.V. MADRID - ZARAGOZA . SUBTRAMO XV
ESTRUCTURA : E-1502.8

En la tabla figuran los valores de los momentos torsores pésimos en cada vano (en m.t.) y para l distintas hipotesis de carga, obtenidas con el modelo de viga continua con apoyos esviados.

	VANO					
Hipotesis	1		2		3	
PP	-3	-3	0	0	2	2
CM	0	0	0	0	0	0
PRET	0	0	0	0	0	0
GRAD	0	0	0	0	0	0
SC1	-68	57				
SC2	62	-60				
SC3			80	-72		
SC4			-82	74		
SC5					-63	64
SC6					64	-63
SCMAX	62	57	80	74	64	64
SCMIN	-68	-60	-82	-72	-63	-63

Td(+)	89	81	120	111	99	99
Td(-)	-105	-93	-123	-108	-93	-93
Ae	7.537	7.537	7.537	7.537	7.537	7.537
he	0.218	0.218	0.218	0.218	0.218	0.218
Tu1	1479	1479	1479	1479	1479	1479
Td/Tu1	0.07	0.06	0.08	0.08	0.07	0.07
At(cm2/m)	1.65	1.46	1.94	1.75	1.56	1.56
At(cm2/m)	1.57	1.39	1.84	1.66	1.48	1.48

ED2-1.8 **ESTADO LIMITE DE DEFORMACIONES**



$$\frac{S}{L} = \frac{4,22}{25.000} = \frac{1}{5924} < \frac{1}{1363} \therefore \text{VERIFICA.}$$

Load case 10

Node	UX	UY	UZ	RX	RY	RZ
1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.000002	-0.000002	0.000002	-0.000122	-0.000148	0.000001
3	0.000003	0.000000	0.000193	-0.000121	-0.000147	0.000001
4	0.000004	0.000001	0.000381	-0.000119	-0.000143	0.000001
5	0.000004	0.000002	0.000563	-0.000114	-0.000138	0.000002
6	0.000005	0.000003	0.000737	-0.000108	-0.000130	0.000002
7	0.000006	0.000004	0.000899	-0.000100	-0.000119	0.000002
8	0.000007	0.000006	0.001047	-0.000090	-0.000107	0.000002
9	0.000008	0.000007	0.001177	-0.000078	-0.000092	0.000002
10	0.000010	0.000009	0.001287	-0.000064	-0.000075	0.000002
11	0.000011	0.000010	0.001374	-0.000048	-0.000056	0.000002
12	0.000012	0.000012	0.001435	-0.000031	-0.000035	0.000002
13	0.000013	0.000014	0.001467	-0.000012	-0.000011	0.000002
14	0.000015	0.000016	0.001467	0.000009	0.000014	0.000002
15	0.000016	0.000018	0.001432	0.000032	0.000042	0.000003
16	0.000018	0.000020	0.001359	0.000057	0.000072	0.000003
17	0.000020	0.000022	0.001246	0.000084	0.000105	0.000003
18	0.000022	0.000025	0.001090	0.000112	0.000140	0.000003
19	0.000024	0.000027	0.000887	0.000143	0.000177	0.000003
20	0.000026	0.000030	0.000635	0.000175	0.000216	0.000003
21	0.000028	0.000033	0.000332	0.000208	0.000255	0.000004
22	0.000030	0.000035	-0.000024	0.000241	0.000296	0.000004
23	0.000033	0.000039	-0.000536	0.000275	0.000337	0.000004
24	0.000036	0.000043	-0.001100	0.000294	0.000358	0.000004
25	0.000040	0.000047	-0.001685	0.000297	0.000362	0.000004
26	0.000042	0.000051	-0.002260	0.000285	0.000347	0.000004
27	0.000045	0.000054	-0.002799	0.000261	0.000317	0.000003
28	0.000047	0.000057	-0.003279	0.000225	0.000273	0.000003
29	0.000049	0.000060	-0.003676	0.000179	0.000216	0.000002
30	0.000051	0.000062	-0.003974	0.000125	0.000149	0.000001
31	0.000051	0.000063	-0.004158	0.000064	0.000075	0.000001
32	0.000052	0.000063	-0.004220	0.000001	-0.000002	0.000000
33	0.000051	0.000063	-0.004157	-0.000062	-0.000079	-0.000001
34	0.000050	0.000062	-0.003972	-0.000122	-0.000153	-0.000001
35	0.000049	0.000060	-0.003673	-0.000176	-0.000219	-0.000002
36	0.000047	0.000058	-0.003275	-0.000222	-0.000276	-0.000003
37	0.000044	0.000055	-0.002795	-0.000258	-0.000320	-0.000003
38	0.000041	0.000052	-0.002256	-0.000283	-0.000349	-0.000004
39	0.000038	0.000048	-0.001681	-0.000294	-0.000363	-0.000004
40	0.000035	0.000044	-0.001097	-0.000291	-0.000359	-0.000004
41	0.000032	0.000040	-0.000535	-0.000274	-0.000337	-0.000004
42	0.000029	0.000037	-0.000023	-0.000240	-0.000295	-0.000004
43	0.000026	0.000034	0.000330	-0.000207	-0.000254	-0.000004
44	0.000024	0.000031	0.000631	-0.000175	-0.000214	-0.000003
45	0.000022	0.000029	0.000882	-0.000143	-0.000174	-0.000003
46	0.000020	0.000026	0.001084	-0.000113	-0.000137	-0.000003
47	0.000018	0.000024	0.001239	-0.000085	-0.000103	-0.000003
48	0.000016	0.000022	0.001351	-0.000059	-0.000070	-0.000003
49	0.000014	0.000020	0.001423	-0.000035	-0.000040	-0.000003
50	0.000012	0.000018	0.001458	-0.000012	-0.000012	-0.000002
51	0.000011	0.000016	0.001458	0.000009	0.000014	-0.000002
52	0.000009	0.000014	0.001426	0.000028	0.000037	-0.000002
53	0.000008	0.000013	0.001366	0.000045	0.000058	-0.000002
54	0.000007	0.000011	0.001279	0.000061	0.000077	-0.000002
55	0.000005	0.000010	0.001170	0.000074	0.000094	-0.000002
56	0.000004	0.000008	0.001040	0.000086	0.000109	-0.000002
57	0.000003	0.000007	0.000894	0.000096	0.000121	-0.000002
58	0.000002	0.000006	0.000733	0.000104	0.000131	-0.000002
59	0.000001	0.000005	0.000560	0.000111	0.000139	-0.000002
60	0.000000	0.000004	0.000378	0.000116	0.000144	-0.000001
61	-0.000001	0.000003	0.000192	0.000118	0.000147	-0.000001
62	-0.000002	0.000002	0.000002	0.000119	0.000148	-0.000001

GINPROSA

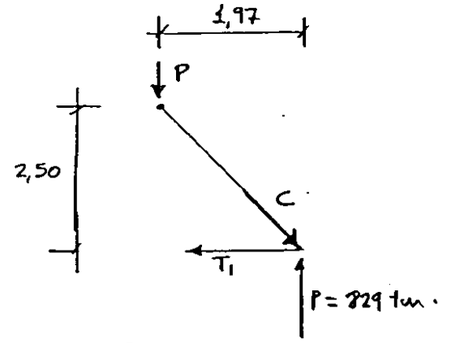
ASUNTO
ED2 - 1.8
CALCULO DE PILAS

ANCLADURAS DEL ENCEPADO

Altura de relleno sobre encepado 2.00 m.

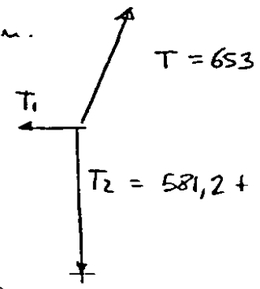
yy=	8.90	sy=	5.4
zz=	6.00	sz=	3.5
cz=	2.50		
Peso Encepado	601		

		Estado Limite Ultimo		Estado Limite de Servicio	
Cara superior de encepado	N	1956	511	1290	644
	FY	27	27	18	18
	FZ	31	18	21	20
	MY	587	230	312	266
	MZ	144	134	95	89
Cara inferior de encepado	N	2857	1052	1891	1245
	FY	27	27	18	18
	FZ	31	18	21	20
	MY	666	275	364	317
	MZ	211	201	139	133
Carga en pilotes	Carga maxima	829	321	537	369
	Carga minima	600	205	408	254



PLANO HORIZONTAL

C = 1055 m.
T = 653 tm.



$T_1 = 298$ tm

$T_2 = 661,8$ tm.

$A_1 = \frac{T_1}{4,435} = 68\ cm^2 \rightarrow 9\,\phi 32 \rightarrow \phi 32/0,15$

$A_2 = \frac{T_2}{4,435} = 131\ cm^2 \rightarrow \phi 32/0,15$ /2 capas.

ARMADURA EN NUESTRA SUPERIOR

La sección de la viga superior es de 0,54 x 1,30 m.

Los esfuerzos que solicitan la viga se obtienen de los cálculos en 2º orden con el programa PYMES que se adjuntan.

M_d = 70 m·t

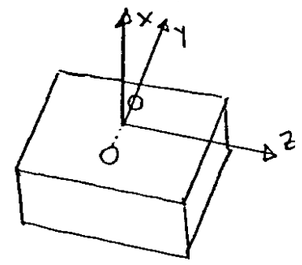
V_d = 70/2,30 = 30,5 ton.

Armadura necesaria ⟶ $A_{s\,flexión}$ = 13,2 cm²

Armadura de cortante ⟶ ninguna

ACCIONES EN CARA SUPERIOR DE ENCEPADO (INCLUYEN 2º ORDEN)

Estado límite de último



	Hipótesis I	Hipótesis 2
F_x =	−1956 ton.	−511 t.
F_y =	26,6 ton	26,6 t.
F_z =	31,4 ton.	18,0 t.
M_y =	587,4 m·t	230 m·t
M_z =	149 m·t.	134 m·t

Estado límite servicio

	Hipótesis I	Hipótesis II
F_x	−1290 t.	−644 t.
F_y	17,6 t.	17,6 t.
F_z	20,6 t.	20,2 t.
M_y	312 m·t.	266 m·t
M_z	95 m·t.	89,4 m·t

Peso del encepado = 6 x 8,90 x 2,5 x 2,50 = 333 ton.

Canto encepado C_z = 2,50 m.

GINPROSA

ASUNTO
ED2-1.8
CALCULO DE PILAS

FECHA

PAG. 1 /

ACCIONES ACTUANTES EN CABEZA DE PILAS.

CONCESION:

Se considera el 3% de la carga vertical permanente.

VIENTO

$f_w = 154\ (2 - 0{,}7\lambda)$ $\lambda = 1$

$f_w = 200$ kp/m² $W = f_w \cdot A$ $A = (1{,}65 + 0{,}70 + 3{,}50 + 1{,}50)$

$A = 7{,}35$ m $W = 1{,}45$ t/m.

FUERZA CENTRIFUGA

$F_c = Q \cdot \frac{V^2}{127 \cdot r}$

$r = 2500$ m.

$Q = 12$ t/m.

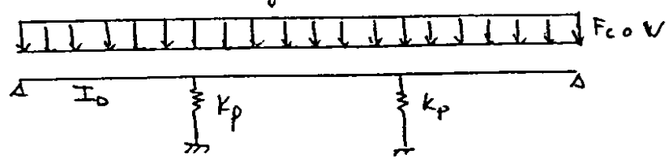
$V = 220$ Km/h.

$F_c = 1{,}83$ t/m.

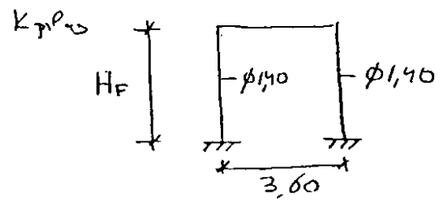
FRENADO

No actua sobre los pilos pues va directamente al E-1

Para el reparto de acciones horizontales de viento y de fuerza centrifuga se realiza el siguiente modelo estructural



Inercia del dintel $I_D = 32$ m⁴



$H_F = 11{,}1$ m.

$\phi = 1{,}40$ m $A = 1{,}54$ m² $I = 0{,}1885$ m⁴

GINPROSA

ASUNTO
ED2-1,8
CALCULO DE PILAS

PAG. 2 /

El resumen del calculo es el siguiente.

APOYO	Viento F_y	Viento F_x	Fuerza Centrifuga F_y	Fuerza Centrifuga F_x
E-1	41,60 t.	0	52,5	0
P-1	2,66 x 2	±18 t	3,35 x 2	± 21,5 t.
P-2	2,66 x 2	±18 t	3,35 x 2	± 21,5 t
E-2	41,60	0	52,9	0

Se suponen impedidas las rotaciones en el cabezal y el resultado es:

APOYO	Viento F_y	Viento F_x	Viento M_z	Fuerza Centrifuga F_y	Fuerza Centrifuga F_x	Fuerza Centrifuga M_z
E-1	56,05	0	718,5 mt	70,7	0	907 mt
P-1	0,90 x 2	±6,1	0	1,12 x 2	±7,60	0
P-2	1,35 x 2	±9,1	0	1,70 x 2	± 11,50	0
E-2	33,7	0	0	47,50	0	0

Para el calculo de fustes se tomaran el valor mas desfavorable.

PUENTE ED2-1.8

3º CALCULO DE PILAS

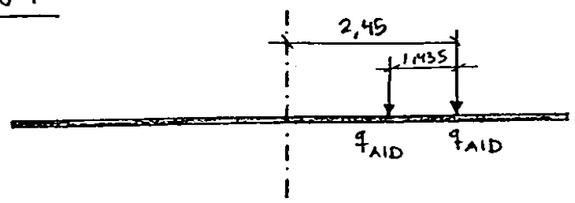
GINPROSA

ASUNTO
COMPROBACIONES FRENTE A DESCARRILAMIENTO SEGUN EC-2

FECHA

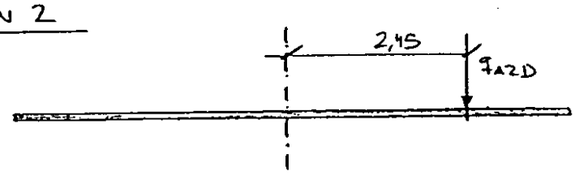
PAG. 1

SITUACION 1



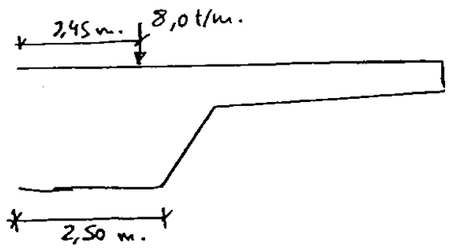
q_{A1D} = 50 KN/m. Cont.nuas en blogues de 6,4 m separados 1,40 m.

SITUACION 2



q_{A2D} = 80 KN/m y 20 m. de longitud.

COMPROBACION DEL VOLADIZO



La carga no entra en el voladizo.
No es necesaria pues su compruba.

ESTABILIDAD DEL CONJUNTO

Momento volcador = $(2,45 - \frac{1,435}{2}) \times 10 \times 67 =$ 1161 mt.

Momento estabilizador = (ppt cm) x 1,80 = 2748 x 1,80 = 4946 mt.

Coeficiente seguridad al vuelco = $\frac{4946}{1161}$ = 4,2 OK

Tensor de diseño = $(2,45 - \frac{1,435}{2}) \times 10 \times \frac{25}{2}$ = 217 ml.

El tensor ultimo es $T_4 = 2 . A_c . A_A . f_{td} = 2 \times 7,20 \times 20,9 \times 4,2$

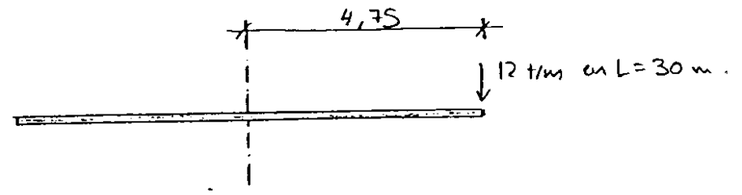
T_4 = 1264 mt OK

GINPROSA

ASUNTO
COMPROBACIONES DESCARRILAMIENTO SEGÚN UIC-776-1

PAG. 1

CASO A



Momento volcador = 30 x 12 x 4,75 = 1710 mt.

" estabilizador = (ppt cm) x 1,80 = 2748 x 1,90 = 4946

⇒ NO HAY VUELCO

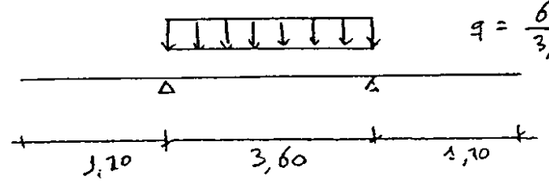
Tensor maximo = 30 x 12 x 75/2 = 717,5 mt

Tensor ultimo = T_4 = 1264 mt ⇒ Tu > Td OK

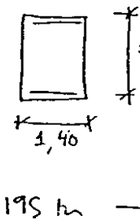
La reacción máxima en apoyos la calculo a de

$R_{2,max} = 333 \times 2 = 666$ ton.

Para el calculo de la armadura inferior suponemos que la reacción se concentra entre apoyos:



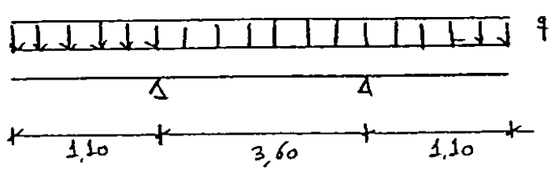
$M_2 = 185 \times \frac{3,6^2}{8} = 300$ mt



$\longrightarrow A_s = 38,2$ cm² 10 ϕ 25.

$V_2 = 333$ ton $\longrightarrow V_{cu} = 195$ ton $\longrightarrow A_{90} = 22$ cm²/m.

Para el calculo de la armadura superior se extiende la reacción hasta la zona de comienzo de rodaduras.

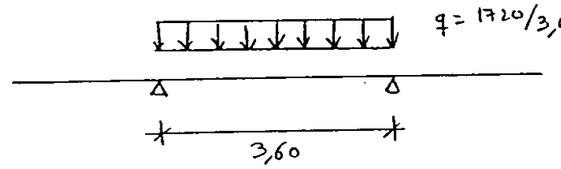


$M_2 = 115 \cdot \frac{1,1^2}{2} = 80$ mt/m $\longrightarrow$ armado mínimo

La reacción máxima en apoyo de pilas es:

$R_{2,max} = 860$ ton. $\times 2 = 1720$ ton.

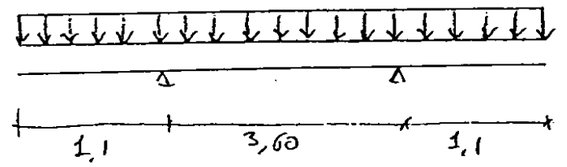
Para el calculo de la armadura inferior la suponemos concentrada entre apoyos



$M_2 = 478 \cdot \frac{3,6^2}{8} = 774$ mt $\longrightarrow M_d = \frac{M_2}{5} = 155$ mt/m. $\rightarrow$
$A_s = 23$ cm²/m
ϕ 25/0,15

$V_2 = 860$ ton $\rightarrow V_d/m = 860/5 = 177$ t/m $\rightarrow V_{cu} = 122$ ton.
$A_{90} = 12,70$ cm²/m.

Para el calculo de la armadura superior suponemos la reacción extendida hasta el comienzo de las rodaduras.



$M_2 = 296,6 \cdot 1,1^2/2 = 180$ mt/m $\rightarrow M_d = \frac{180}{5} = 36$ mt/m. $\rightarrow$ Mínimo.

Reacciones

APOYO	PP T=0 (t.)	PP T=inf. (t.)	CM (t.)	GRAD. 5º (t.)	Pret T=0 (t.)	Pret T=inf. (t.)
1	194	194	65	13	29	25
2	493	493	221	-13	-31	-27
3	493	493	221	-13	-22	-19
4	194	194	65	13	24	21

INCLUIDA Y SC. EN PASEOS							
TREN B		TREN LM71		TREN SW/0		TREN SW/2	
Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)
162	-30	130	-22	137	-26	152	-28
441	-27	305	-20	401	-24	445	-27
443	-25	305	-20	401	-24	446	-27
164	-30	130	-22	137	-26	152	-29

APOYO	Reacciones por linea de apoyos				Reacciones por apoyo			
	E.L.S		E.L.U.		E.L.S		E.L.U.	
	Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)	Rmax(t.) (t.)	Rmin(t) (t.)
1	466	252	680	213	233	126	340	107
2	1130	645	1712	559	565	323	856	279
3	1138	654	1720	568	569	327	860	284
4	463	248	679	209	232	124	340	105

Apoyos POT 300 t
Apoyos POT 600 t
Apoyos POT 600 t
Apoyos POT 300 t

Hipotesis I: Axil maximo (en KN y m.)

	Cargas por apoyo en E.L.U para introducir al PYRUS							
	Cargas Permanentes G				Cargas Variables Q			
PILA	FX	FY	FZ	qx	FX	FY	FZ	qy
1 Y 2	-5221	0	-157	-58	-3949	90	0	4.1

Hipotesis I: Axil maximo (en KN y m.)

Cargas por apoyo en E.L.S para introducir al PYRUS							
Cargas Permanentes G				Cargas Variables Q			
FX	FY	FZ	qx	FX	FY	FZ	qy
-3422	0	-103	-38	-2632	60	0	2.7

Hipotesis II: Axil minimo (en KN y m.)

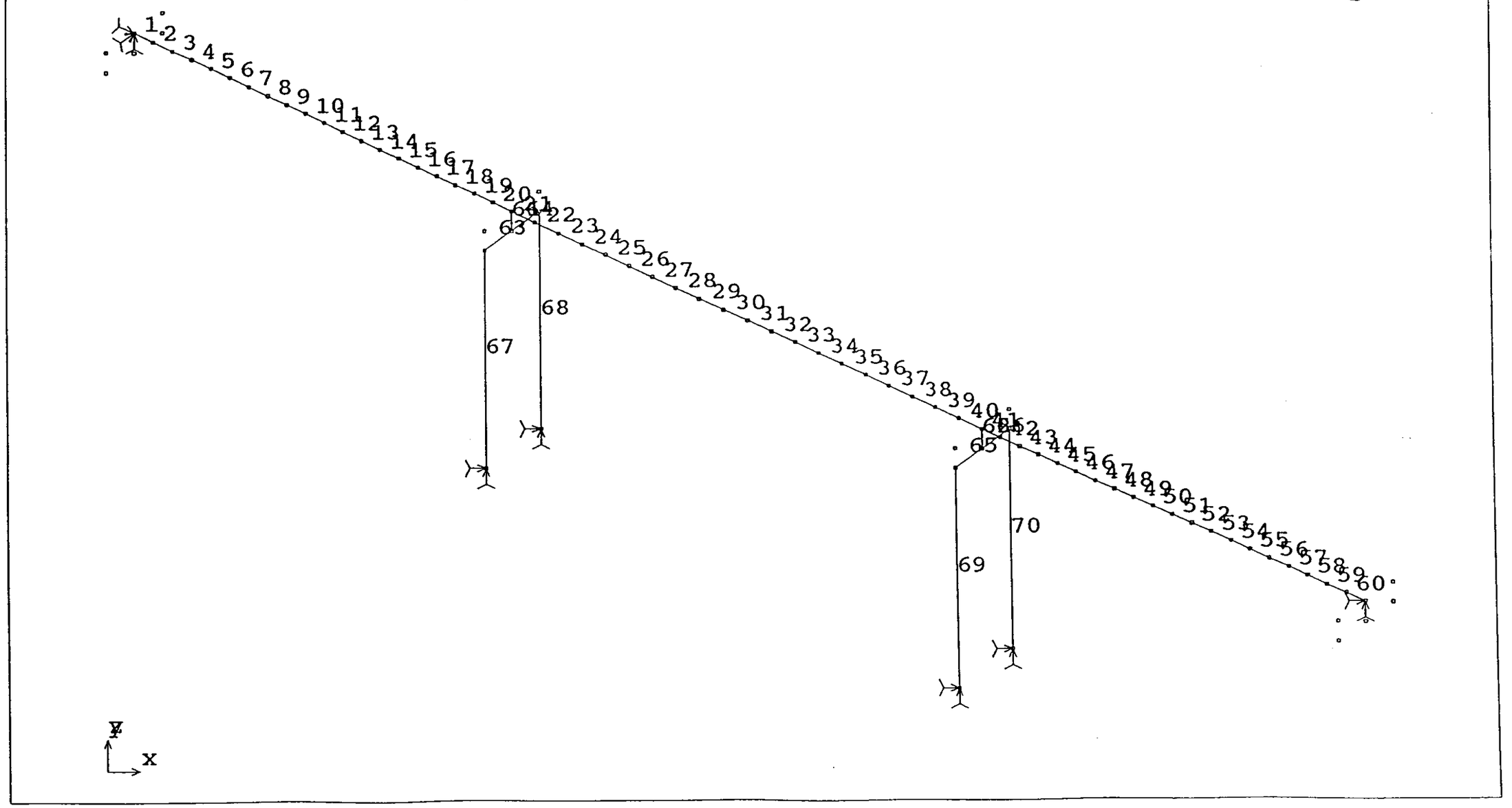
	Cargas por apoyo en E.L.U para introducir al PYRUS							
	Cargas Permanentes G				Cargas Variables Q			
PILA	FX	FY	FZ	qx	FX	FY	FZ	qy
1 Y 2	-2998	0	-90	-35	812	90	0	4.1

Hipotesis II: Axil minimo (en KN y m.)

Cargas por apoyo en E.L.S para introducir al PYRUS							
Cargas Permanentes G				Cargas Variables Q			
FX	FY	FZ	qx	FX	FY	FZ	qy
-3364	0	-101	-38	541	60	0	2.7

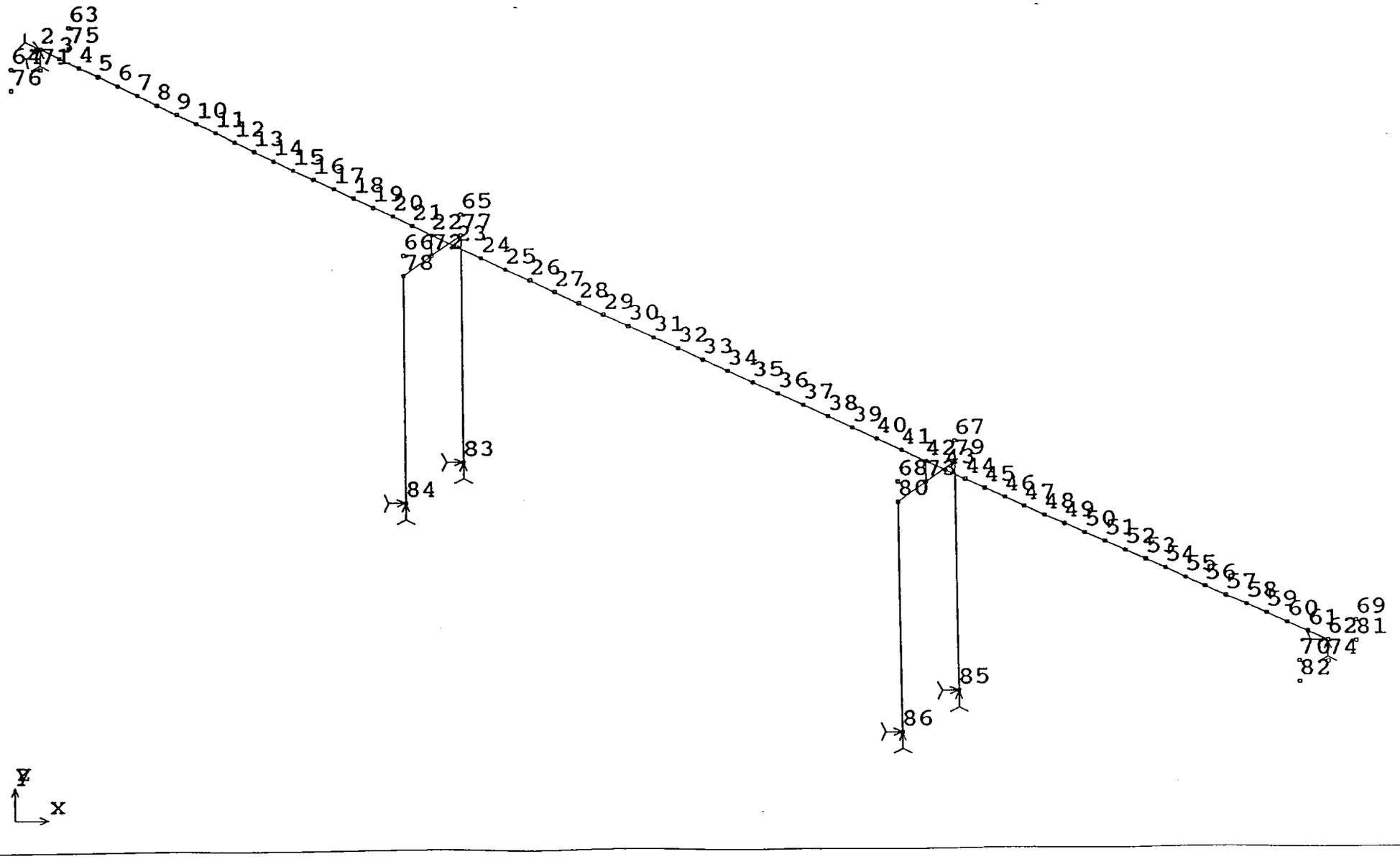
GeoStar 2.0 (64K Version) : pilas - [Main]

MODELO DE CALCULO DE PILAS
ED2-1.8
NUMERACION DE ELEMENTOS



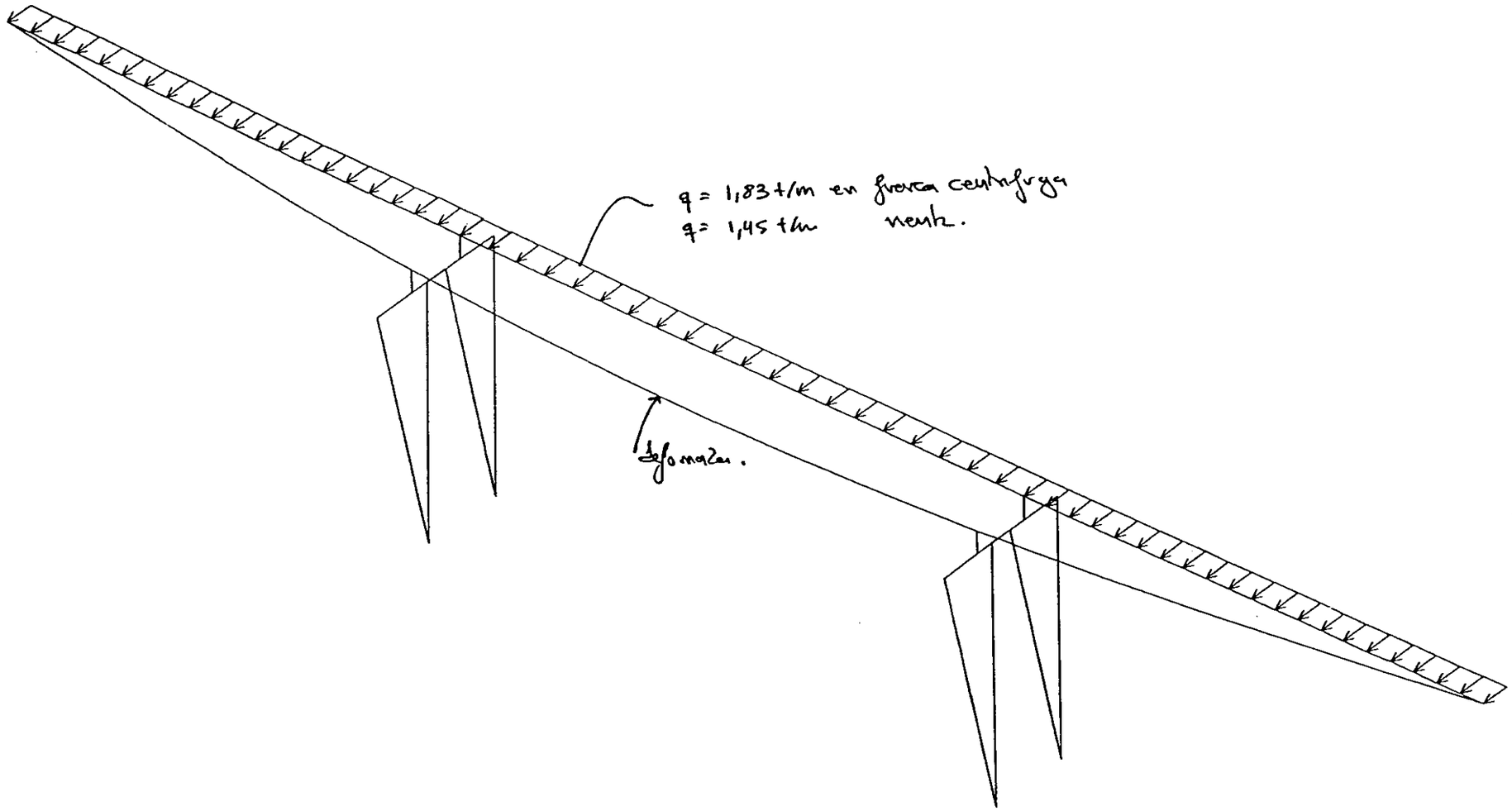
GeoStar 2.0 (64K Version) : pilas - [Main]

MODELO DE CALCULO DE PILAS
ED2-1.8
NUMERACION DE NODOS



Lin DEF Lc=2

ED2-1-8





```
**********************************************************************
**********************************************************************
**                                **
**                                **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS   /M    M **
** C    O  O  S     MM  MM  O  O  S      / MM  MM **
** C    O  O  SSSS  M MM M  O  O  SSSS  / M MM M **
** C    O  O     S  M    M  O  O     S / M    M **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS/  M    M **
**                                **
**                                **
**            VERSION: 2.00              **
**            DISTRIBUTED BY:            **
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**         TEL. NO.  (310) 207-2800             **
**        COPYRIGHT 1988  S. R. A. C.           **
**                                **
**********************************************************************
**********************************************************************
```

Problem name: pilas
Date : 07/25/1998 Time: 09:48:05
Title :
Subtitle :

Element group data

Element group number= 1
Element name:
BEAM3D Three dimensional Elastic Beam elements
Type of beam element = ... 0
EQ. 0 ; Symmetric beam element
EQ. 1 ; Unsymmetric beam element
EQ. 2 ; Symmetric tapered beam element

Real constant data

Real constant set 1
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.8933
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.2683
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 2
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7152
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1811
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 3
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 4
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 5
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 6
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 7
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000

Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 8
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 9
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 10
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 11
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 12
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 13
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 14
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 15
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 16
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 17
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 18
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.0940
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 19
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7152
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1811
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 20
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.8933
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.2683
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 21
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.8933
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.2683
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 22
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7152
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1946
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.6908
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 23
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 24
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209

Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 25
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 26
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 27
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 28
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 29
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 30
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 31
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 32
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 33
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 34
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 35
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 36
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 37
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 38
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 39
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7152
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1946
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.6908
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 40
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.8933
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.2683
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000

Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 41
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.8933
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.2683
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 42
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7152
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1946
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.6908
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 43
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 44
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 45
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 46
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 47
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 48
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 49
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 50
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 51
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 52
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 53
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 54
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 55
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 56
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 57
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325

Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 58
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 7.5371
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1209
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.5821
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 59
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 8.7152
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.1946
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.6908
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 60
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 9.8933
Moment of Inertia about element Y-axis = 32.325
Moment of Inertia about element Z-axis = 2.2683
Depth of beam (y-axis) = 1.6500
Width of beam (z-axis) = 9.5000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 3.7996
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = 5.0000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 61
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 1000.0
Moment of Inertia about element Y-axis = 1000.0
Moment of Inertia about element Z-axis = 1000.0
Depth of beam (y-axis) = 10.000
Width of beam (z-axis) = 10.000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = 1000.0
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 62
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 1000.0
Moment of Inertia about element Y-axis = 1000.0
Moment of Inertia about element Z-axis = 1000.0
Depth of beam (y-axis) = .00000
Width of beam (z-axis) = .00000
End release code (I-node) [000000] = 111
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = .00000
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000
Real constant set 63
Associated with :
BEAM3D Three dimensional Elastic Beam elements
Area = 1.5400
Moment of Inertia about element Y-axis = .18850
Moment of Inertia about element Z-axis = .18850
Depth of beam (y-axis) = 1.4000
Width of beam (z-axis) = 1.4000
End release code (I-node) [000000] = 0
End release code (J-node) [000000] = 0
Moment of inertia about element x-axis = .00000
Shear factor in the element y-axis = .00000
Shear factor in the element z-axis = .00000
Temp. difference in the element y-axis = .00000
Temp. difference in the element z-axis = .00000
Orientation angle = .00000
Torsion const for max shear stress = .00000

Material propery data

Material property set 1

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0
ALPX : X thermal expansion	.10000E-04	0
DENS : Mass Density	2.5000	0

Material property set 2

	Value	Temp curve no.
EX : X Elastic Modulus	1.0000	0
NUXY : Poisson Ratio	.20000	0

Material property set 3

	Value	Temp curve no.
EX : X Elastic Modulus	.35000E+07	0
NUXY : Poisson Ratio	.20000	0

Nodal input data

NODE	BOUNDARY CONDITION CODES (0 = FREE ; 1 = FIXED)						NODAL POINT COORDINATES		
	X	Y	Z	XX	YY	ZZ	X	Y	Z
1	1	1	1	1	1	1	.00000	.00000	.10000E+07
2	1	1	1	0	0	0	2232.2	5861.7	.00000
3	0	0	0	0	0	0	2233.0	5861.0	.00000
4	0	0	0	0	0	0	2233.8	5860.4	.00000
5	0	0	0	0	0	0	2234.5	5859.8	.00000
6	0	0	0	0	0	0	2235.3	5859.1	.00000
7	0	0	0	0	0	0	2236.1	5858.5	.00000
8	0	0	0	0	0	0	2236.8	5857.8	.00000
9	0	0	0	0	0	0	2237.6	5857.2	.00000
10	0	0	0	0	0	0	2238.4	5856.6	.00000
11	0	0	0	0	0	0	2239.1	5855.9	.00000
12	0	0	0	0	0	0	2239.9	5855.3	.00000
13	0	0	0	0	0	0	2240.7	5854.6	.00000
14	0	0	0	0	0	0	2241.5	5854.0	.00000
15	0	0	0	0	0	0	2242.2	5853.4	.00000
16	0	0	0	0	0	0	2243.0	5852.7	.00000
17	0	0	0	0	0	0	2243.8	5852.1	.00000
18	0	0	0	0	0	0	2244.5	5851.5	.00000
19	0	0	0	0	0	0	2245.3	5850.8	.00000
20	0	0	0	0	0	0	2246.1	5850.2	.00000
21	0	0	0	0	0	0	2246.9	5849.5	.00000
22	0	0	0	0	0	0	2247.6	5848.9	.00000
23	0	0	0	0	0	0	2248.6	5848.1	.00000
24	0	0	0	0	0	0	2249.6	5847.3	.00000
25	0	0	0	0	0	0	2250.5	5846.5	.00000
26	0	0	0	0	0	0	2251.5	5845.7	.00000
27	0	0	0	0	0	0	2252.5	5844.9	.00000
28	0	0	0	0	0	0	2253.4	5844.2	.00000
29	0	0	0	0	0	0	2254.4	5843.4	.00000
30	0	0	0	0	0	0	2255.4	5842.6	.00000
31	0	0	0	0	0	0	2256.3	5841.8	.00000
32	0	0	0	0	0	0	2257.3	5841.0	.00000
33	0	0	0	0	0	0	2258.3	5840.2	.00000
34	0	0	0	0	0	0	2259.2	5839.4	.00000
35	0	0	0	0	0	0	2260.2	5838.6	.00000
36	0	0	0	0	0	0	2261.2	5837.8	.00000
37	0	0	0	0	0	0	2262.1	5837.0	.00000
38	0	0	0	0	0	0	2263.1	5836.3	.00000
39	0	0	0	0	0	0	2264.1	5835.5	.00000
40	0	0	0	0	0	0	2265.1	5834.7	.00000
41	0	0	0	0	0	0	2266.0	5833.9	.00000
42	0	0	0	0	0	0	2267.0	5833.1	.00000
43	0	0	0	0	0	0	2267.8	5832.5	.00000
44	0	0	0	0	0	0	2268.6	5831.9	.00000
45	0	0	0	0	0	0	2269.3	5831.2	.00000
46	0	0	0	0	0	0	2270.1	5830.6	.00000
47	0	0	0	0	0	0	2270.9	5830.0	.00000
48	0	0	0	0	0	0	2271.7	5829.3	.00000
49	0	0	0	0	0	0	2272.5	5828.7	.00000
50	0	0	0	0	0	0	2273.2	5828.1	.00000
51	0	0	0	0	0	0	2274.0	5827.5	.00000
52	0	0	0	0	0	0	2274.8	5826.8	.00000
53	0	0	0	0	0	0	2275.6	5826.2	.00000
54	0	0	0	0	0	0	2276.4	5825.6	.00000
55	0	0	0	0	0	0	2277.1	5825.0	.00000
56	0	0	0	0	0	0	2277.9	5824.3	.00000
57	0	0	0	0	0	0	2278.7	5823.7	.00000
58	0	0	0	0	0	0	2279.5	5823.1	.00000
59	0	0	0	0	0	0	2280.3	5822.5	.00000
60	0	0	0	0	0	0	2281.0	5821.9	.00000
61	0	0	0	0	0	0	2281.8	5821.2	.00000
62	1	1	1	0	0	0	2282.6	5820.6	.00000
63	1	1	1	1	1	1	2233.4	5863.1	.00000
64	1	1	1	1	1	1	2231.1	5860.3	.00000
65	1	1	1	1	1	1	2248.8	5850.3	.00000
66	1	1	1	1	1	1	2246.5	5847.5	.00000
67	1	1	1	1	1	1	2268.1	5834.5	.00000
68	1	1	1	1	1	1	2265.9	5831.7	.00000
69	1	1	1	1	1	1	2283.7	5822.0	.00000
70	1	1	1	1	1	1	2281.5	5819.2	.00000
71	1	1	1	1	1	1	2232.2	5861.7	-1.(
72	0	0	0	0	0	0	2247.6	5848.9	-1.(
73	0	0	0	0	0	0	2267.0	5833.1	-1.0000
74	1	1	1	1	1	1	2282.6	5820.6	-1.0000
75	1	1	1	1	1	1	2233.4	5863.1	-1.0000
76	1	1	1	1	1	1	2231.1	5860.3	-1.0000
77	0	0	0	0	0	0	2248.8	5850.3	-1.0000
78	0	0	0	0	0	0	2246.5	5847.5	-1.0000
79	0	0	0	0	0	0	2268.1	5834.5	-1.0000
80	0	0	0	0	0	0	2265.9	5831.7	-1.0000
81	1	1	1	1	1	1	2283.7	5822.0	-1.0000
82	1	1	1	1	1	1	2281.5	5819.2	-1.0000
83	1	1	1	0	0	0	2248.8	5850.3	-12.100
84	1	1	1	0	0	0	2246.5	5847.5	-12.100
85	1	1	1	0	0	0	2268.1	5834.5	-12.100
86	1	1	1	0	0	0	2265.9	5831.7	-12.100

Element input data

ELEM	EGRP	MP	REAL	ECS	NODE 1	NODE 2	NODE 3	NODE 4	NODE 5	NODE 6
					NODE 7	NODE 8	NODE 9	NODE10	NODE11	NODE12
					NODE13	NODE14	NODE15	NODE16	NODE17	NODE18
					NODE19	NODE20				
1	1	1	1	-1	2	3	1			
2	1	1	2	-1	3	4	1			
3	1	1	3	-1	4	5	1			
4	1	1	4	-1	5	6	1			
5	1	1	5	-1	6	7	1			
6	1	1	6	-1	7	8	1			
7	1	1	7	-1	8	9	1			
8	1	1	8	-1	9	10	1			
9	1	1	9	-1	10	11	1			
10	1	1	10	-1	11	12	1			
11	1	1	11	-1	12	13	1			
12	1	1	12	-1	13	14	1			
13	1	1	13	-1	14	15	1			
14	1	1	14	-1	15	16	1			
15	1	1	15	-1	16	17	1			
16	1	1	16	-1	17	18	1			
17	1	1	17	-1	18	19	1			
18	1	1	18	-1	19	20	1			
19	1	1	19	-1	20	21	1			
20	1	1	20	-1	21	22	1			
21	1	1	21	-1	22	23	1			
22	1	1	22	-1	23	24	1			
23	1	1	23	-1	24	25	1			
24	1	1	24	-1	25	26	1			
25	1	1	25	-1	26	27	1			
26	1	1	26	-1	27	28	1			
27	1	1	27	-1	28	29	1			
28	1	1	28	-1	29	30	1			
29	1	1	29	-1	30	31	1			
30	1	1	30	-1	31	32	1			
31	1	1	31	-1	32	33	1			
32	1	1	32	-1	33	34	1			
33	1	1	33	-1	34	35	1			
34	1	1	34	-1	35	36	1			
35	1	1	35	-1	36	37	1			
36	1	1	36	-1	37	38	1			
37	1	1	37	-1	38	39	1			
38	1	1	38	-1	39	40	1			
39	1	1	39	-1	40	41	1			
40	1	1	40	-1	41	42	1			
41	1	1	41	-1	42	43	1			
42	1	1	42	-1	43	44	1			
43	1	1	43	-1	44	45	1			

44	1	1	44	-1	45	46	1
45	1	1	45	-1	46	47	1
46	1	1	46	-1	47	48	1
47	1	1	47	-1	48	49	1
48	1	1	48	-1	49	50	1
49	1	1	49	-1	50	51	1
50	1	1	50	-1	51	52	1
51	1	1	51	-1	52	53	1
52	1	1	52	-1	53	54	1
53	1	1	53	-1	54	55	1
54	1	1	54	-1	55	56	1
55	1	1	55	-1	56	57	1
56	1	1	56	-1	57	58	1
57	1	1	57	-1	58	59	1
58	1	1	58	-1	59	60	1
59	1	1	59	-1	60	61	1
60	1	1	60	-1	61	62	1
61	1	3	62	-1	22	72	2
62	1	3	62	-1	42	73	2
63	1	3	61	-1	78	72	22
64	1	3	61	-1	72	77	22
65	1	3	61	-1	80	73	42
66	1	3	61	-1	73	79	42
67	1	3	63	-1	78	84	22
68	1	3	63	-1	77	83	22
69	1	3	63	-1	80	86	42
70	1	3	63	-1	79	85	42

Beam Element concentrated load information

Element concentrated load for load case # 1
ELEM ECS/DIR/DISTANCE/VALUE
Element concentrated load for load case # 2
ELEM ECS/DIR/DISTANCE/VALUE

Beam Element pressure distribution

Element pressure distribution for load case # 1
ELEM ECS/DIR/X1/P1/X2/P2

1	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
2	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
3	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
4	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
5	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
6	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
7	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
8	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
9	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
10	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
11	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
12	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
13	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
14	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
15	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
16	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
17	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
18	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
19	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
20	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
21	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
22	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
23	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
24	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
25	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
26	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
27	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
28	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
29	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
30	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
31	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
32	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
33	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
34	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
35	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
36	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
37	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
38	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
39	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
40	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
41	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
42	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
43	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
44	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
45	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
46	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
47	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
48	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
49	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
50	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
51	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
52	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
53	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
54	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
55	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
56	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
57	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
58	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
59	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450
60	-1/3/ .0000	/ 1.450	/ 1.000	/ 1.450

Element pressure distribution for load case # 2
ELEM ECS/DIR/X1/P1/X2/P2

1	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
2	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
3	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
4	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
5	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
6	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
7	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
8	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
9	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
10	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
11	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
12	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
13	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
14	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
15	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
16	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
17	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
18	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
19	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
20	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
21	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
22	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
23	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
24	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
25	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
26	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
27	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
28	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
29	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
30	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
31	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
32	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
33	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
34	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
35	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
36	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
37	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
38	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
39	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
40	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
41	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
42	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
43	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
44	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
45	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
46	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
47	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
48	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
49	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
50	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
51	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
52	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
53	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
54	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
55	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
56	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
57	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
58	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
59	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830
60	-1/3/ .0000	/ 1.830	/ 1.000	/ 1.830

SOLUTION TIME LOG IN SEC FOR STRESS CALCULATIONS

READING GENERAL INFORMATION AND ELEMENT DATA... = 1
STRESS CALCULATION AND PRINTOUT..... = 0
UPDATING DATABASE..... = 0
TOTAL SOLUTION TIME..... = 1
(0: 0: 1)

%%%

Pila ''M1-S'
****

Título : 'PILAS ED2-1.8'
Altura de la pila : 11.500 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo
Nu [m] d-xyz r-xyz

Nu	[m]	d-xyz	r-xyz
2	11.500	---	--B
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba	Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :					
Nudo 2	Fuerza	x [kN]	-3422.000		
	Fuerza	z [kN]	-103.000		
Barra 1	Fuerza	x [kN/m]	-38.000		
Comp. Carga Q1 :					
Nudo 2	Fuerza	x [kN]	-2632.000		
	Fuerza	y [kN]	60.000		
Barra 1	Fuerza	y [kN/m]	2.700		

D I M E N S I O N A M I E N T O (global) <B.M1-S.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia	1.000 * Carga permanente G1
No de elementos	6
Tolerancia desequi. fuerzas	0.065 [kN]
Tolerancia desequi. momentos	0.012 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1 + 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	1.300	1.300	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-6.18	0.00	-60.85	0.000	0.000	0.000
Máxima	0.00	4.28	0.00	0.045	7.963	0.558

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-6454.58	-88.46	103.00	0.00	-1563.11	-419.76
Máxima	-6090.42	-62.59	103.00	3.93	0.00	475.63

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	EIy [kNm²]	EIz [kNm²]
Mínima	-8.0	-286.2	-0.616	-1.363	1.164E+5	2.281E+6
Máxima	0.0	61.9	0.073	0.295	1.230E+6	2.335E+6

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	11.50	FUSTE	132.7	1.01	27
	9.583	FUSTE	132.7	1.01	28
	7.667	FUSTE	132.7	1.01	30
	5.750	FUSTE	132.7	1.01	32
	3.833	FUSTE	132.7	1.01	36
	1.917	FUSTE	132.7	1.01	39
	0.000	FUSTE	132.7	1.01	43

(≤) : Armadura ≤ ρ_min = 0.40%
(≥) : Armadura ≥ ρ_max = 8.00%

Pila ''H1-U'
****

Título : 'PILAS ED2-1.8'
Altura de la pila : 11.500 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo

Nu	[m]	d-xyz	r-xyz
2	11.500	---	--B
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba	Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :					
Nudo 2	Fuerza	x [kN]	-5221.000		
	Fuerza	z [kN]	157.000		
Barra 1	Fuerza	x [kN/m]	-58.000		
Comp. Carga Q1 :					
Nudo 2	Fuerza	x [kN]	-3949.000		
	Fuerza	y [kN]	90.000		
Barra 1	Fuerza	y [kN/m]	4.100		

D I M E N S I O N A M I E N T O (global) <B.H1-U.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_c)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia	1.000 * Carga permanente G1
No de elementos	6
Tolerancia desequi. fuerzas	0.098 [kN]
Tolerancia desequi. momentos	0.018 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1
	+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	1.300	1.300	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-10.12	0.00	0.00	-0.157	-15.677	0.000
Máxima	0.00	7.34	120.05	0.000	0.000	0.951

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-9781.42	-133.22	-157.00	-11.80	-0.00	-656.18
Máxima	-9225.58	-93.93	-157.00	0.00	2937.47	719.68

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	EIy [kNm²]	EIz [kNm²]
Mínima	-13.0	-443.5	-1.227	-2.494	8.715E+5	1.907E+6
Máxima	0.0	171.2	0.341	0.815	1.248E+6	2.187E+6

DIMENSIONAMIENTO SEGUN TEORIA DE 2º ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	11.50	FUSTE	132.7	1.01	42
	9.583	FUSTE	132.7	1.01	43
	7.667	FUSTE	132.7	1.01	47
	5.750	FUSTE	132.7	1.01	53
	3.833	FUSTE	132.7	1.01	60
	1.917	FUSTE	132.7	1.01	67
	0.000	FUSTE	132.7	1.01	73

(≤) : Armadura ≤ ρ_min = 0.40%
(≥) : Armadura ≥ ρ_max = 8.00%

Pila ''H2-S'
****

Título : 'PILAS ED2-1.8'
Altura de la pila : 11.500 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo
Nu [m] d-xyz r-xyz

Nu	[m]	d-xyz	r-xyz
2	11.500	---	--B
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba		Tipo Car.	Dim.		Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :							
Nudo	2	Fuerza	x	[kN]	-3364.000		
		Fuerza	z	[kN]	-101.000		
Barra	1	Fuerza	x	[kN/m]	-38.000		
Comp. Carga Q1 :							
Nudo	2	Fuerza	x	[kN]	541.000		
		Fuerza	y	[kN]	60.000		
Barra	1	Fuerza	y	[kN/m]	2.700		

D I M E N S I O N A M I E N T O (global) <8.H2-S.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia.	1.000 * Carga permanente G1
No de elementos	6
Tolerancia desequi. fuerzas	0.032 [kN]
Tolerancia desequi. momentos	0.012 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1
	+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.
Fuerza en la armadura comprimida > 50% fuerza de comp. del hormigón.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	1.300	1.300	H300PIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-4.26	0.00	-56.39	0.000	0.000	0.000
Máxima	0.00	4.38	0.00	0.045	7.278	0.563

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-3223.58	-88.46	101.00	0.00	-1330.15	-434.50
Máxima	-2859.42	-62.59	101.00	3.61	0.00	447.39

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	Ely [kNm²]	Elz [kNm²]
Mínima	-5.9	-243.5	-0.435	-1.160	4.474E+4	1.848E+6
Máxima	0.0	100.6	0.272	0.479	1.144E+6	2.495E+6

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	11.50	FUSTE	132.7	1.01	15
	9.583	FUSTE	132.7	1.01	15
	7.667	FUSTE	132.7	1.01	16
	5.750	FUSTE	132.7	1.01	19
	3.833	FUSTE	132.7	1.01	23
	1.917	FUSTE	132.7	1.01	27
	0.000	FUSTE	132.7	1.01	31

(≤) : Armadura ≤ μ_min = 0.40%
(≥) : Armadura ≥ μ_max = 8.00%

Pila ''M2-U'
****

Título : 'PILAS ED2-1.8'
Altura de la pila : 11.500 [m]
Long. max. de barra: Altura pila / 6

NUDOS x Apoyo

Nu	[m]	d-xyz	r-xyz
2	11.500	---	--B
1	0.000	BBB	BBB

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
1	2-1	'FUSTE'	SecFAGUS			1	1.000

CARGAS :

Nu/Ba	Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :					
Nudo 2	Fuerza x	[kN]	-2998.000		
	Fuerza z	[kN]	-90.000		
Barra 1	Fuerza x	[kN/m]	-35.000		
Comp. Carga Q1 :					
Nudo 2	Fuerza x	[kN]	812.000		
	Fuerza y	[kN]	90.000		
Barra 1	Fuerza y	[kN/m]	4.100		

D I M E N S I O N A M I E N T O (global) <B.H2-U.1>

PARAMETROS DE CALCULO:

Norma	EH
Criterio de rotura	Agotamiento de secciones o del sistema
Rotura de secciones	Limitación de deformaciones según FAGUS-2
- Hormigón (def. centrada)	-2.000 [o/oo]
- Hormigón (flexión)	-3.500 [o/oo]
- Acero	10.00 [o/oo]
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	2.000
Carga contribuyente a fluencia	1.000 * Carga permanente G1
No de elementos	6
Tolerancia desequi. fuerzas	0.026 [kN]
Tolerancia desequi. momentos	0.010 [kNm]
Mayoración de cargas	1.000 * Carga permanente G1
	+ 1.000 * Carga variable Q1

RESULTADOS DEL CALCULO NO LINEAL:
La aramdura mínima (o existente) es suficiente.
Fuerza en la armadura comprimida > 50% fuerza de comp. del hormigón.

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]
FUSTE	1.300	1.300	H30OPIL AEH500	B1	0.000

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-3.50	0.00	-50.74	0.000	0.000	0.000
Máxima	0.00	7.71	0.00	0.070	6.506	0.969

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-2554.96	-133.22	90.00	-0.00	-1153.78	-654.43
Máxima	-2219.54	-93.93	90.00	4.79	0.00	670.12

TENSIONES, DEFORMACIONES & RIGIDECES-SECANTE/gamma_r

	sigHorm. [N/mm²]	sigAcero [N/mm²]	epsHorm. [o/oo]	epsAcero [o/oo]	EIy [kNm²]	EIz [kNm²]
Mínima	-6.1	-218.9	-0.451	-1.042	3.124E+2	1.537E+6
Máxima	0.0	115.0	0.420	0.548	1.138E+6	2.461E+6

DIMENSIONAMIENTO SEGUN TEORIA DE 2ª ORDEN

Zona	Coord-x [m]	Nombre de la sección	Armadura [cm²]	[o/o]	Agotamiento [o/o]
1	11.50	FUSTE	132.7	1.01	16
	9.583	FUSTE	132.7	1.01	14
	7.667	FUSTE	132.7	1.01	14
	5.750	FUSTE	132.7	1.01	16
	3.833	FUSTE	132.7	1.01	19
	1.917	FUSTE	132.7	1.01	23
	0.000	FUSTE	132.7	1.01	29

(≤) : Armadura ≤ μ_min = 0.40%
(≥) : Armadura ≥ μ_max = 8.00%

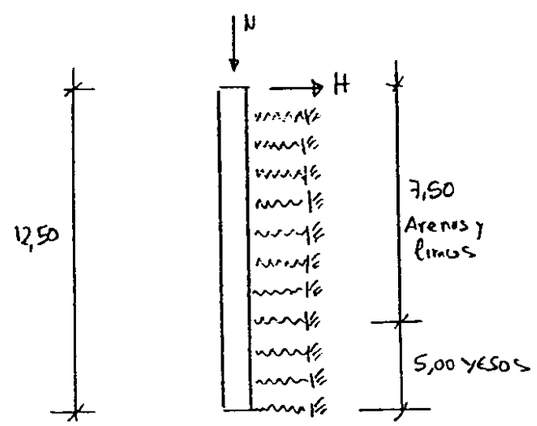
GINPROSA

ASUNTO: CALCULO DE ANCLADUNA EN PILOTES DE PILAS ED2-1.8

FECHA

PAG. 1 /

Las acciones en cabeza superior del pilote son las siguientes.



EN E.L.S (POR PILOTE)

N_{max} = 540 ton.

H_{conc} = 7,0 ton.

N_{min} = 254 ton.

H_{conc} = 7,0 ton.

Los pilotes estarán empotrados 5 m en yesos. Desde la superficie hasta la profundidad de los yesos hay unas arenas, gravas y limos. En estos materiales se aplica un nivel lateral, para tomar los esfuerzos horizontales, con el siguiente valor

$$K_h = 320 \times \frac{z}{D} \quad (t/m^3)$$

z = profundidad

D = diametro del pilote.

Esta ley ya incluye el efecto por el efecto grupo. Para los yesos se tomara el valor de 10 veces el valor de K_h de modo conservador.

De acuerdo con estos parametros se procede a pilotaje con el programa Pmus.

GINPROSA

ASUNTO: ED2-1,8. ANCLADUNA EN PILOTES DE PILAS.

PAG. 2 /

Las solicitaciones pesimas de diseño son:

Cabeza: $N = -540 \times 1,50 = -810$ t. ; $H_y = -29,3 \times 1,50 = 44$ mt

Empotramiento: $N = -577,1,50 = -865$ t. ; $H_y = 12,70 \times 1,50 = 19,1$ mt

Base: $N = -594,6 = -891,0$; $M = 0$

Para todos los casos se dispone armadura mínima.

Programm: P Y R U S V.2.20 Bn:2019. 1
GINPROSA Ingenieros Consultores 15.07.98
CALCULO DE PILOTES ED2-1.8 12:52

A N A L I S I S L I N E A L <L.PIL-1.1>

PARAMETROS DE CALCULO:
Norma..... EH
Coef. min. resist. (gamma_r)... 1.000
Coeficiente de fluencia..... 0.000
Factor armadura (global)..... 1.000
No de elementos 13
Mayoración de cargas..... 1.000 * Carga permanente G1

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]	Armadura var [cm²]
PILOTE	1.500	1.500	H200PTE AEH500	B1	0.000	176.7

DATOS DE BARRAS (incl. factores de armadura)

Barra	Sección arriba	Sección abajo	factor S de la armadura	Armadura variable arriba[cm²]	Armadura variable abajo[cm²]
13	PILOTE	PILOTE	1.000	176.7	176.7
12	PILOTE	PILOTE	1.000	176.7	176.7
11	PILOTE	PILOTE	1.000	176.7	176.7
10	PILOTE	PILOTE	1.000	176.7	176.7
9	PILOTE	PILOTE	1.000	176.7	176.7
8	PILOTE	PILOTE	1.000	176.7	176.7
7	PILOTE	PILOTE	1.000	176.7	176.7
6	PILOTE	PILOTE	1.000	176.7	176.7
5	PILOTE	PILOTE	1.000	176.7	176.7
4	PILOTE	PILOTE	1.000	176.7	176.7
3	PILOTE	PILOTE	1.000	176.7	176.7
2	PILOTE	PILOTE	1.000	176.7	176.7
1	PILOTE	PILOTE	1.000	176.7	176.7

DEFORMACIONES sin deformaciones accidentales

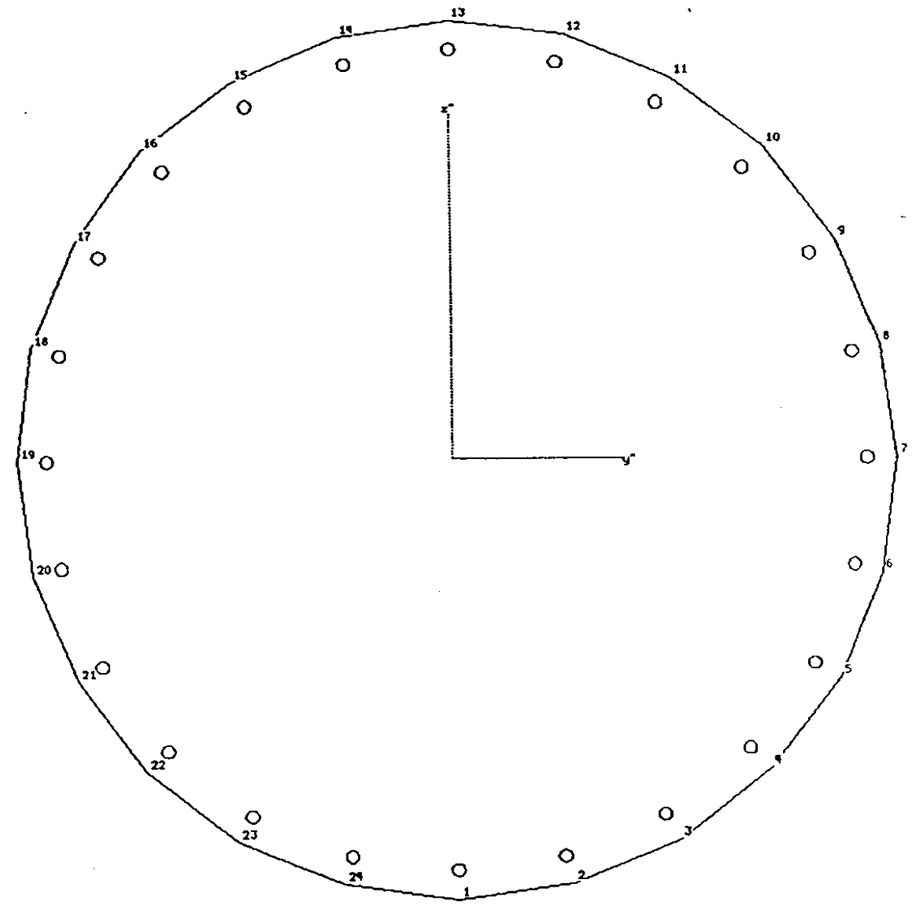
	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-1.76	0.00	0.00	0.000	-0.109	0.000
Máxima	0.00	0.00	0.83	0.000	0.000	0.000

ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-5945.95	0.00	-70.00	0.00	-293.80	0.00
Máxima	-5400.00	0.00	47.39	0.00	127.70	0.00

Programa F A G U S - 2 V.1.32
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Mstb. 1 : 10.0



Sección :"PILOTE" Armadura :"B1"
Tipo : tipo viga/ Círculo/tubo Unidades :[cm]
Material :"H200PTE"

Diámetro exterior = 150.000 cm

Características mecánicas de la sección:
Area : Ax= 1.747 [m2]
Momentos de inercia : Iy= 0.242889 [m4] Iz= 0.242889 [m4]
Inercia a torsión : Ix= 0.497010 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.750000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.750	-0.323852	0.185
dch.	Iz	0.750	0.323852	-0.185
abajo	Iy	-0.750	-0.323852	0.185
arriba	Iy	0.750	0.323852	-0.185

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	3.68	0.00	5.00		
2	AEH500	(2)	3.68	18.12	7.39		
3	AEH500	(2)	3.68	35.00	14.38		
4	AEH500	(2)	3.68	49.50	25.50		
5	AEH500	(2)	3.68	60.62	40.00		
6	AEH500	(2)	3.68	67.61	56.88		
7	AEH500	(2)	3.68	70.00	75.00		
8	AEH500	(2)	3.68	67.61	93.12		
9	AEH500	(2)	3.68	60.62	110.00		
10	AEH500	(2)	3.68	49.50	124.50		
11	AEH500	(2)	3.68	35.00	135.62		
12	AEH500	(2)	3.68	18.12	142.61		
13	AEH500	(2)	3.68	0.00	145.00		
14	AEH500	(2)	3.68	-18.12	142.61		
15	AEH500	(2)	3.68	-35.00	135.62		
16	AEH500	(2)	3.68	-49.50	124.50		
17	AEH500	(2)	3.68	-60.62	110.00		
18	AEH500	(2)	3.68	-67.61	93.12		
19	AEH500	(2)	3.68	-70.00	75.00		
20	AEH500	(2)	3.68	-67.61	56.88		
21	AEH500	(2)	3.68	-60.62	40.00		
22	AEH500	(2)	3.68	-49.50	25.50		
23	AEH500	(2)	3.68	-35.00	14.38		
24	AEH500	(2)	3.68	-18.12	7.39		

Total: 88.37 Cuantía de armadura: 0.506 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcv,mín [kp/cm2]
"H200PTE"	210000.0	-85.000	-2.000	0.0	10.000	200.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Pila ''PIL-1'
****

Título : 'CALCULO DE PILOTES ED2-1.8'
Altura de la pila : 12.500 [m]
Long. max. de barra: Altura pila / 6

NUDOS Nu	x [m]	Apoyo d-xyz	r-xyz	Rigideces de muelles dz [kN/m]
14	12.500	---	BBB	--
13	12.000	--E	---	1.600000E+03
12	11.000	--E	---	4.800000E+03
11	10.000	--E	---	8.000000E+03
10	9.000	--E	---	1.120000E+04
9	8.000	--E	---	1.440000E+04
8	7.000	--E	---	1.760000E+04
7	6.000	--E	---	2.080000E+04
6	5.000	--E	---	2.400000E+04
5	4.000	--E	---	2.720000E+05
4	3.000	--E	---	3.040000E+05
3	2.000	--E	---	3.360000E+05
2	1.000	--E	---	3.680000E+05
1	0.000	BBB	---	--

Apoyo: B=bloqueado, E=elástico

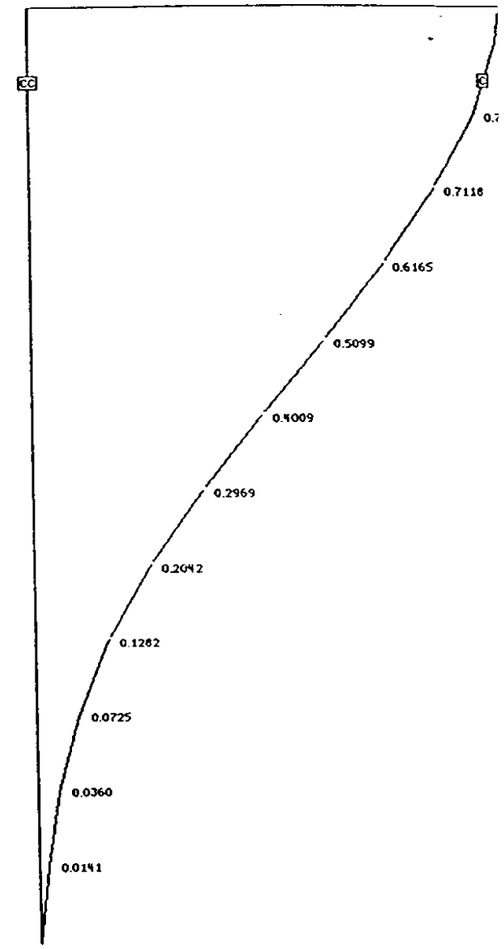
BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
13	14-13	'PILOTE'	SecFAGUS			1	1.000
12	13-12	'PILOTE'	SecFAGUS			1	1.000
11	12-11	'PILOTE'	SecFAGUS			1	1.000
10	11-10	'PILOTE'	SecFAGUS			1	1.000
9	10-9	'PILOTE'	SecFAGUS			1	1.000
8	9-8	'PILOTE'	SecFAGUS			1	1.000
7	8-7	'PILOTE'	SecFAGUS			1	1.000
6	7-6	'PILOTE'	SecFAGUS			1	1.000
5	6-5	'PILOTE'	SecFAGUS			1	1.000
4	5-4	'PILOTE'	SecFAGUS			1	1.000
3	4-3	'PILOTE'	SecFAGUS			1	1.000
2	3-2	'PILOTE'	SecFAGUS			1	1.000
1	2-1	'PILOTE'	SecFAGUS			1	1.000

CARGAS :

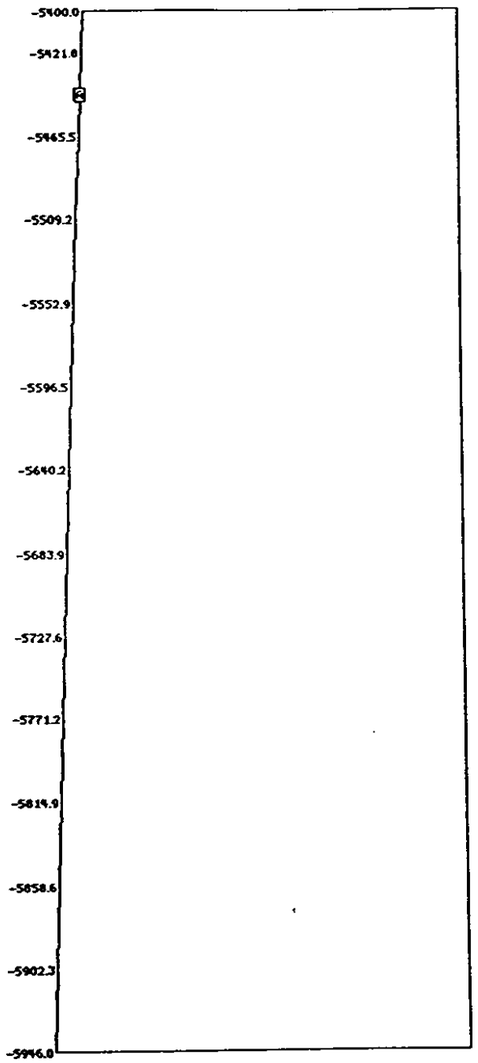
Nu/Ba		Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :						
Nudo	14	Fuerza	x [kN]	-5400.000		
		Fuerza	z [kN]	70.000		
Barra	13	Peso propio	x [kN/m3]	-25.000		
Barra	12	Peso propio	x [kN/m3]	-25.000		
Barra	11	Peso propio	x [kN/m3]	-25.000		
Barra	10	Peso propio	x [kN/m3]	-25.000		
Barra	9	Peso propio	x [kN/m3]	-25.000		
Barra	8	Peso propio	x [kN/m3]	-25.000		
Barra	7	Peso propio	x [kN/m3]	-25.000		
Barra	6	Peso propio	x [kN/m3]	-25.000		
Barra	5	Peso propio	x [kN/m3]	-25.000		
Barra	4	Peso propio	x [kN/m3]	-25.000		
Barra	3	Peso propio	x [kN/m3]	-25.000		
Barra	2	Peso propio	x [kN/m3]	-25.000		
Barra	1	Peso propio	x [kN/m3]	-25.000		

Escala 1 : 78.5
<L.PIL-1.1> Carga: 1.00*G1
- C: z-Desplazamiento, CC: z-Deformaciónes accidentales [mm]



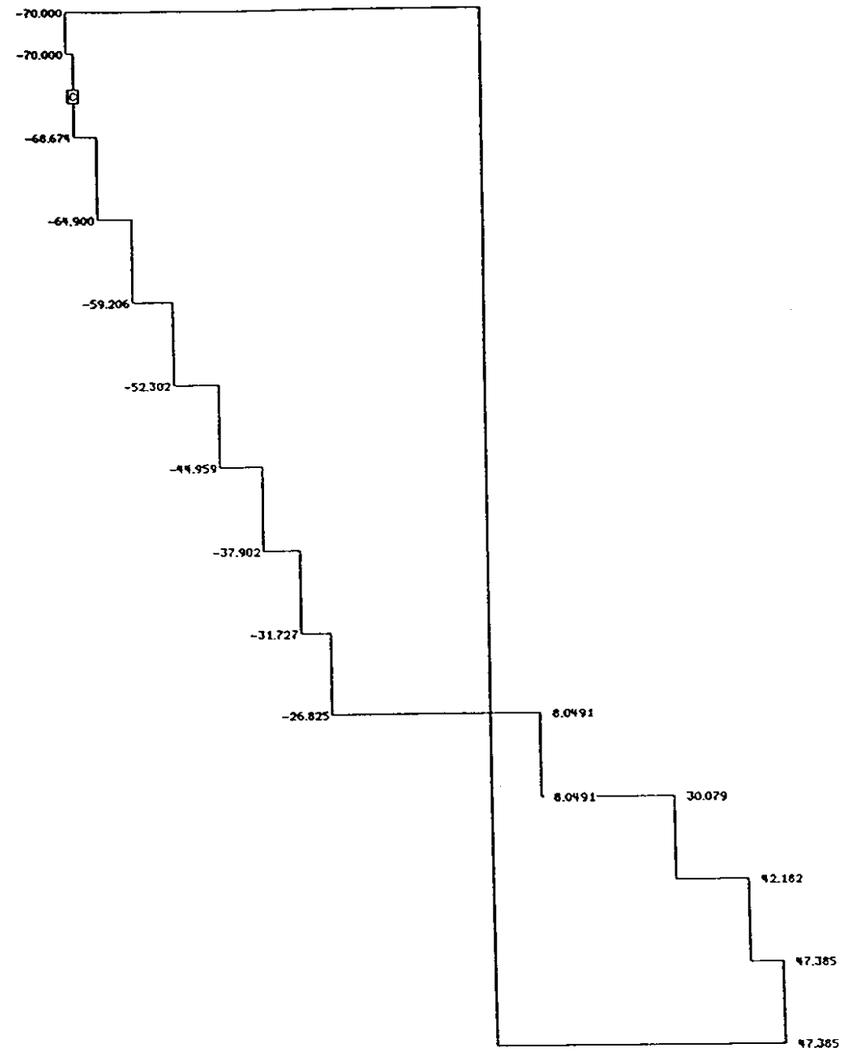
Programm: P Y R U S V.2.20 Bn:2019. 1
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CALCULO DE PILOTES ED2-1.8 12:28

Escala 1 : 70.7
<L.PIL-1.1> Carga: 1.00*G1
- A: Esfuerzo axil [kN]



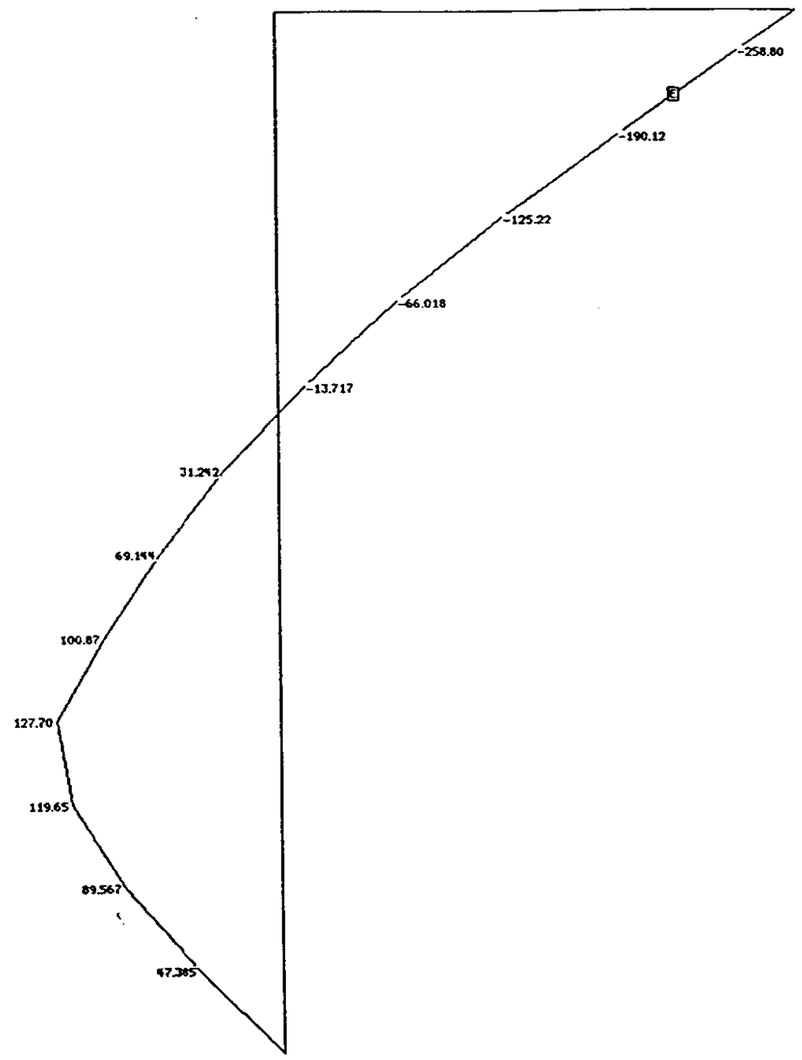
Programm: P Y R U S V.2.20 Bn:2019. 1
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CALCULO DE PILOTES ED2-1.8 12:28

Escala 1 : 70.7
<L.PIL-1.1> Carga: 1.00*G1
- C: Cortante en z [kN]



Programa: P Y R U S V.2.20 Bn:2019. 1
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CALCULO DE PILOTES ED2-1.8 12:28

Escala 1 : 70.7
<L.PIL-1.1> Carga: 1.00*G1
- E: Momento flector por el eje y [kNm]



Programa F A G U S - 2 V.1.32
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Dimensionamiento : Viga "PILOTE"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
-810.000				44.000		45.0

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección 2.08
Factor necesario de minoración de la resistencia de la sección .. 1.00

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado (As-min)	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	0.0	5.0			3.68	-	3.68
2 "AEH500"	18.1	7.4			3.68	-	3.68
3 "AEH500"	35.0	14.4			3.68	-	3.68
4 "AEH500"	49.5	25.5			3.68	-	3.68
5 "AEH500"	60.6	40.0			3.68	-	3.68
6 "AEH500"	67.6	56.9			3.68	-	3.68
7 "AEH500"	70.0	75.0			3.68	-	3.68
8 "AEH500"	67.6	93.1			3.68	-	3.68
9 "AEH500"	60.6	110.0			3.68	-	3.68
10 "AEH500"	49.5	124.5			3.68	-	3.68
11 "AEH500"	35.0	135.6			3.68	-	3.68
12 "AEH500"	18.1	142.6			3.68	-	3.68
13 "AEH500"	0.0	145.0			3.68	-	3.68
14 "AEH500"	-18.1	142.6			3.68	-	3.68
15 "AEH500"	-35.0	135.6			3.68	-	3.68
16 "AEH500"	-49.5	124.5			3.68	-	3.68
17 "AEH500"	-60.6	110.0			3.68	-	3.68
18 "AEH500"	-67.6	93.1			3.68	-	3.68
19 "AEH500"	-70.0	75.0			3.68	-	3.68
20 "AEH500"	-67.6	56.9			3.68	-	3.68
21 "AEH500"	-60.6	40.0			3.68	-	3.68
22 "AEH500"	-49.5	25.5			3.68	-	3.68
23 "AEH500"	-35.0	14.4			3.68	-	3.68
24 "AEH500"	-18.1	7.4			3.68	-	3.68
					Cuantía arm. 0.51 [o/o]	Suma	88.37

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-0.00	150.00	-2.922	-85.000	"H200PTE"
Armadura-Min	-0.00	145.00	-2.848	-4434.700	"AEH500"
Hormigón-Max	0.00	0.00	-0.696	-48.858	"H200PTE"
Armadura-Max	-0.00	5.00	-0.770	-1617.157	"AEH500"

Dimensionamiento : Viga "PILOTE"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
-865.000				19.100		45.0

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección 2.07
Factor necesario de minoración de la resistencia de la sección .. 1.00

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado (As-min)	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	0.0	5.0			3.68	-	3.68
2 "AEH500"	18.1	7.4			3.68	-	3.68
3 "AEH500"	35.0	14.4			3.68	-	3.68
4 "AEH500"	49.5	25.5			3.68	-	3.68
5 "AEH500"	60.6	40.0			3.68	-	3.68
6 "AEH500"	67.6	56.9			3.68	-	3.68
7 "AEH500"	70.0	75.0			3.68	-	3.68
8 "AEH500"	67.6	93.1			3.68	-	3.68
9 "AEH500"	60.6	110.0			3.68	-	3.68
10 "AEH500"	49.5	124.5			3.68	-	3.68
11 "AEH500"	35.0	135.6			3.68	-	3.68
12 "AEH500"	18.1	142.6			3.68	-	3.68
13 "AEH500"	0.0	145.0			3.68	-	3.68
14 "AEH500"	-18.1	142.6			3.68	-	3.68
15 "AEH500"	-35.0	135.6			3.68	-	3.68
16 "AEH500"	-49.5	124.5			3.68	-	3.68
17 "AEH500"	-60.6	110.0			3.68	-	3.68
18 "AEH500"	-67.6	93.1			3.68	-	3.68
19 "AEH500"	-70.0	75.0			3.68	-	3.68
20 "AEH500"	-67.6	56.9			3.68	-	3.68
21 "AEH500"	-60.6	40.0			3.68	-	3.68
22 "AEH500"	-49.5	25.5			3.68	-	3.68
23 "AEH500"	-35.0	14.4			3.68	-	3.68
24 "AEH500"	-18.1	7.4			3.68	-	3.68
				Cuantía arm. 0.51 [o/o]		Suma	88.37

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-0.00	150.00	-2.493	-85.000	"H200PTE"
Armadura-Min	0.00	145.00	-2.453	-4434.700	"AEH500"
Hormigón-Max	-0.00	0.00	-1.304	-74.694	"H200PTE"
Armadura-Max	-0.00	5.00	-1.343	-2820.749	"AEH500"

Programa F A G U S - 2 V.1.32
GINPROSA Ingenieros Consultores 15.07.98

Dimensionamiento : Viga "PILOTE"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
-891.000						45.0

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección 2.08
Factor necesario de minoración de la resistencia de la sección .. 1.00

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado (As-min)	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	0.0	5.0			3.68	-	3.68
2 "AEH500"	18.1	7.4			3.68	-	3.68
3 "AEH500"	35.0	14.4			3.68	-	3.68
4 "AEH500"	49.5	25.5			3.68	-	3.68
5 "AEH500"	60.6	40.0			3.68	-	3.68
6 "AEH500"	67.6	56.9			3.68	-	3.68
7 "AEH500"	70.0	75.0			3.68	-	3.68
8 "AEH500"	67.6	93.1			3.68	-	3.68
9 "AEH500"	60.6	110.0			3.68	-	3.68
10 "AEH500"	49.5	124.5			3.68	-	3.68
11 "AEH500"	35.0	135.6			3.68	-	3.68
12 "AEH500"	18.1	142.6			3.68	-	3.68
13 "AEH500"	0.0	145.0			3.68	-	3.68
14 "AEH500"	-18.1	142.6			3.68	-	3.68
15 "AEH500"	-35.0	135.6			3.68	-	3.68
16 "AEH500"	-49.5	124.5			3.68	-	3.68
17 "AEH500"	-60.6	110.0			3.68	-	3.68
18 "AEH500"	-67.6	93.1			3.68	-	3.68
19 "AEH500"	-70.0	75.0			3.68	-	3.68
20 "AEH500"	-67.6	56.9			3.68	-	3.68
21 "AEH500"	-60.6	40.0			3.68	-	3.68
22 "AEH500"	-49.5	25.5			3.68	-	3.68
23 "AEH500"	-35.0	14.4			3.68	-	3.68
24 "AEH500"	-18.1	7.4			3.68	-	3.68
				Cuantía arm. 0.51 [o/o]		Suma	88.37

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	-0.00	150.00	-2.000	-85.000	"H200PTE"
Armadura-Min	0.00	145.00	-2.000	-4200.000	"AEH500"
Hormigón-Max	-0.00	0.00	-2.000	-85.000	"H200PTE"
Armadura-Max	0.00	5.00	-2.000	-4200.000	"AEH500"

PUENTE ED2-1.8

4º CALCULO DE ESTRIBOS

E02-1.8
CALCULO DE ESTRIBO 1

DIMENSIONAMIENTO DE ARMADURA DE PILOTES

Acciones sobre el estribo (en cara inferior de encepado)	Carga vertical FX (t.)	F. horiz. tranv. FY (t.)	F. horiz. long. FZ (t.)	Momento MY c.d.g zapata (m.t.)	Momento MZ c.d.g zapata (m.t.)	Momento MX eje vertical (m.t.)
Peso propio + carga muerta de tablero	288	0	0	403	0	0
Sobrecargas de uso verticales	165	0	0	231	0	0
Frenado + coaccion	0	0	94	792	0	0
Viento + fuerza centrifuga	0	127	0	0	914	691
Empuje de tierras	0	0	324	878	0	0
Empuje de sc. 3 t/m2	0	0	86	394	0	0
Peso propio de estribo + tierras	715	0	0	-1072	0	0
- -	112	0	0	-246	0	0
- -	40	0	0	-18	0	0
Peso de encepado	891	0	0	0	0	0
Empuje pasivo	0	0	0	0	0	0
TOTALES	**2210**	**127**	**504**	**1362**	**914**	**691**

Acciones sobre cabeza de pilotes (en cara inferior de encepado)		Carga vertical FX (t.)	F. horiz. tranv. FY (t.)	F. horiz. long. FZ (t.)	Fueza horizontal total (t.)
Pilote de talon	FX,max	264	26	79	84
	FX,min	191	26	79	84
Pilote de puntera	FX,max	361	26	79	84
	FX,min	288	26	79	84

Con en programa PYRUS se realiza un modelo de calculo del pilote coaccionado lateralmente con un coeficiente de balasto dado por la siguiente expresion:

$Kh = 320 \times Z/D$ (t/m3)

Z= profundidad
D= diametro del pilote

Este valor del balasto es el correspondiente a las arenas y limos de la parte superior del pilote. Los 5.00 m inferiores estan empotrado en yesos, en esta zona se toma , de modo consevador, un coeficiente 10 veces superior. Los valores de Kh ya tienen en cuenta el efecto de grupo.

Constantes elaticas de muelles equivalente

Profundidad Z (m.)	Kh (t/m3)	Kh (KN/m)
0.50	107	1600
1.50	320	4800
2.50	533	8000
3.50	747	11200
4.50	960	14400
5.50	1173	17600
6.50	1387	20800
7.50	1600	24000
8.50	1813	27200
9.50	21280	319200
10.50	22400	336000
11.50	24533	368000
12.50	26667	400000
13.50	28800	432000
14.50	30933	464000

En los listados del programa PYRUS pueden verse los esfuerzos y desplazamientos del pilote a si como el calculo de las armaduras.

Pila ''PILE1'
****

Título : 'ED2-1.8. PILOTES DEL ESTRIBO 1'
Altura de la pila : 14.500 [m]
Long. max. de barra: Altura pila / 6

NUDOS Nu	x [m]	Apoyo d-xyz	r-xyz	Rigideces de muelles dz [kN/m]
16	14.500	---	BBB	--
15	14.000	--E	---	1.600000E+03
14	13.000	--E	---	4.800000E+03
13	12.000	--E	---	8.000000E+03
12	11.000	--E	---	1.120000E+04
11	10.000	--E	---	1.440000E+04
10	9.000	--E	---	1.760000E+04
9	8.000	--E	---	2.080000E+04
8	7.000	--E	---	2.400000E+04
7	6.000	--E	---	2.720000E+04
6	5.000	--E	---	3.192000E+05
5	4.000	--E	---	3.360000E+05
4	3.000	--E	---	3.680000E+05
3	2.000	--E	---	4.000000E+05
2	1.000	--E	---	4.320000E+05
1	0.000	BBB	---	--

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
15	16-15	'PILOTE'	SecFAGUS			1	1.000
		''	undef				
14	15-14	''	undef			1	1.000
13	14-13	''	undef			1	1.000
12	13-12	''	undef			1	1.000
11	12-11	''	undef			1	1.000
10	11-10	''	undef			1	1.000
9	10-9	''	undef			1	1.000
8	9-8	''	undef			1	1.000
7	8-7	''	undef			1	1.000
6	7-6	''	undef			1	1.000
5	6-5	''	undef			1	1.000
4	5-4	''	undef			1	1.000
3	4-3	''	undef			1	1.000
2	3-2	''	undef			1	1.000
1	2-1	''	undef			1	1.000
		'PILOTE'	SecFAGUS				

Programa: P Y R U S V.2.20 Bn:2019. 1
GINPROSA Ingenieros Consultores 16.07.98
ED2-1.8. PILOTES DEL ESTRIBO 1 10:32

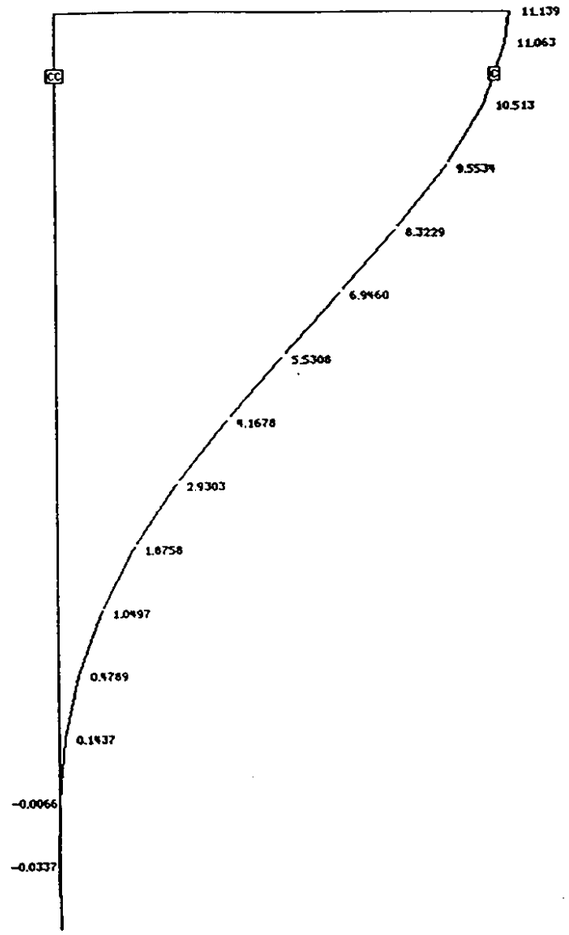
CARGAS :

Nu/Ba		Tipo Car.		Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :							
Nudo	16	Fuerza	x	[kN]	-3610.000		
		Fuerza	z	[kN]	840.000		
Barra	15	Peso propio	x	[kN/m3]	-25.000		
Barra	14	Peso propio	x	[kN/m3]	-25.000		
Barra	13	Peso propio	x	[kN/m3]	-25.000		
Barra	12	Peso propio	x	[kN/m3]	-25.000		
Barra	11	Peso propio	x	[kN/m3]	-25.000		
Barra	10	Peso propio	x	[kN/m3]	-25.000		
Barra	9	Peso propio	x	[kN/m3]	-25.000		
Barra	8	Peso propio	x	[kN/m3]	-25.000		
Barra	7	Peso propio	x	[kN/m3]	-25.000		
Barra	6	Peso propio	x	[kN/m3]	-25.000		
Barra	5	Peso propio	x	[kN/m3]	-25.000		
Barra	4	Peso propio	x	[kN/m3]	-25.000		
Barra	3	Peso propio	x	[kN/m3]	-25.000		
Barra	2	Peso propio	x	[kN/m3]	-25.000		
Barra	1	Peso propio	x	[kN/m3]	-25.000		

Programm: P Y R U S V.2.20 Bn:2019. 1
GINPROSA Ingenieros Consultores
ED2-1.8. PILOTES DEL ESTRIBO 1

16.07.98
10:33

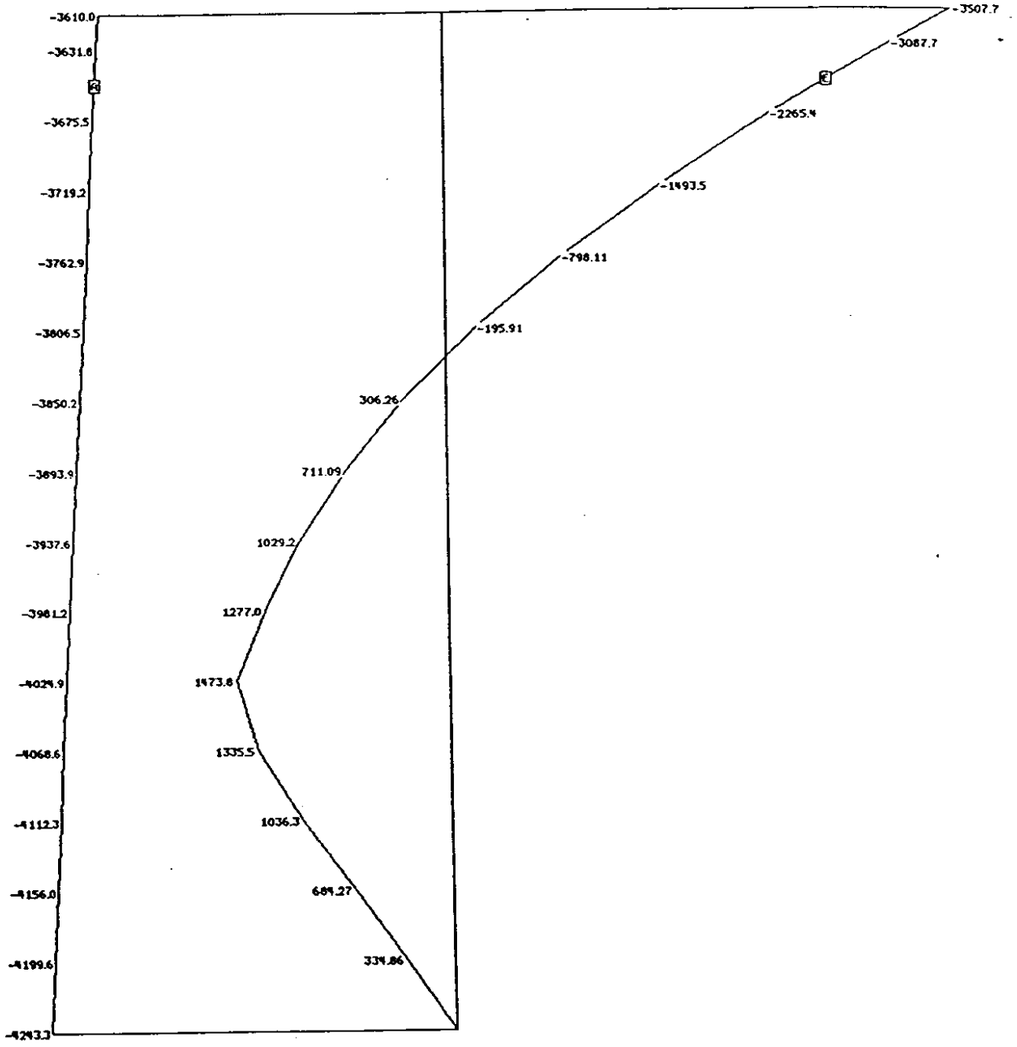
Escala 1 : 91.1
<L.PILE1.1> Carga: 1.00*G1
- C: z-Desplazamiento, CC: z-Deformaciónes accidentales [mm]



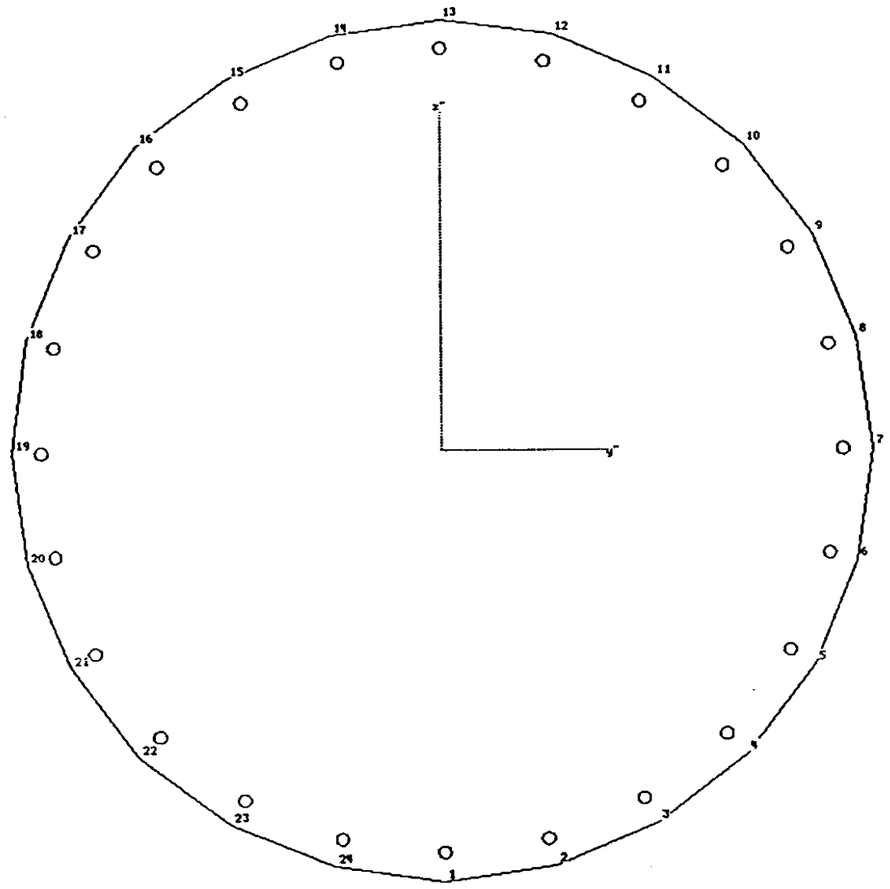
Programm: P Y R U S V.2.20 Bn:2019. 1
GINPROSA Ingenieros Consultores
ED2-1.8. PILOTES DEL ESTRIBO 1

16.07.98
10:33

Escala 1 : 82.0
<L.PILE1.1> Carga: 1.00*G1
- A: Esfuerzo axil [kN]
- E: Momento flector por el eje y [kNm]



Mstb. 1 : 10.0



Sección :"PILOTE" Armadura :"B1"
Tipo : tipo viga/ Círculo/tubo Unidades :[cm]
Material :"H200PTE"

Diámetro exterior = 150.000 cm

Características mecánicas de la sección:
Area : Ax= 1.747 [m2]
Momentos de inercia : Iy= 0.242889 [m4] Iz= 0.242889 [m4]
Inercia a torsión : Ix= 0.497010 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.750000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.750	-0.323852	0.185
dch.	Iz	0.750	0.323852	-0.185
abajo	Iy	-0.750	-0.323852	0.185
arriba	Iy	0.750	0.323852	-0.185

Programa F A G U S - 2 V.1.32
GINPROSA Ingenieros Consultores 16.07.98

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	3.68	0.00	5.00		
2	AEH500	(2)	3.68	18.12	7.39		
3	AEH500	(2)	3.68	35.00	14.38		
4	AEH500	(2)	3.68	49.50	25.50		
5	AEH500	(2)	3.68	60.62	40.00		
6	AEH500	(2)	3.68	67.61	56.88		
7	AEH500	(2)	3.68	70.00	75.00		
8	AEH500	(2)	3.68	67.61	93.12		
9	AEH500	(2)	3.68	60.62	110.00		
10	AEH500	(2)	3.68	49.50	124.50		
11	AEH500	(2)	3.68	35.00	135.62		
12	AEH500	(2)	3.68	18.12	142.61		
13	AEH500	(2)	3.68	0.00	145.00		
14	AEH500	(2)	3.68	-18.12	142.61		
15	AEH500	(2)	3.68	-35.00	135.62		
16	AEH500	(2)	3.68	-49.50	124.50		
17	AEH500	(2)	3.68	-60.62	110.00		
18	AEH500	(2)	3.68	-67.61	93.12		
19	AEH500	(2)	3.68	-70.00	75.00		
20	AEH500	(2)	3.68	-67.61	56.88		
21	AEH500	(2)	3.68	-60.62	40.00		
22	AEH500	(2)	3.68	-49.50	25.50		
23	AEH500	(2)	3.68	-35.00	14.38		
24	AEH500	(2)	3.68	-18.12	7.39		

Total: 88.37 Cuantía de armadura: 0.506 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,min [kp/cm2]
"H200PTE"	210000.0	-85.000	-2.000	0.0	10.000	200.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Dimensionamiento : Viga "PILOTE"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
-220.000				525.000		45.0

Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. [cm2]	As-nuevo [cm2]
1 "AEH500"	0.0	5.0			3.68	10.50	10.50
2 "AEH500"	18.1	7.4			3.68	10.50	10.50
3 "AEH500"	35.0	14.4			3.68	10.50	10.50
4 "AEH500"	49.5	25.5			3.68	10.50	10.50
5 "AEH500"	60.6	40.0			3.68	10.50	10.50
6 "AEH500"	67.6	56.9			3.68	10.50	10.50
7 "AEH500"	70.0	75.0			3.68	-	3.68
8 "AEH500"	67.6	93.1			3.68	-	3.68
9 "AEH500"	60.6	110.0			3.68	-	3.68
10 "AEH500"	49.5	124.5			3.68	-	3.68
11 "AEH500"	35.0	135.6			3.68	-	3.68
12 "AEH500"	18.1	142.6			3.68	-	3.68
13 "AEH500"	0.0	145.0			3.68	-	3.68
14 "AEH500"	-18.1	142.6			3.68	-	3.68
15 "AEH500"	-35.0	135.6			3.68	-	3.68
16 "AEH500"	-49.5	124.5			3.68	-	3.68
17 "AEH500"	-60.6	110.0			3.68	-	3.68
18 "AEH500"	-67.6	93.1			3.68	-	3.68
19 "AEH500"	-70.0	75.0			3.68	-	3.68
20 "AEH500"	-67.6	56.9			3.68	10.50	10.50
21 "AEH500"	-60.6	40.0			3.68	10.50	10.50
22 "AEH500"	-49.5	25.5			3.68	10.50	10.50
23 "AEH500"	-35.0	14.4			3.68	10.50	10.50
24 "AEH500"	-18.1	7.4			3.68	10.50	10.50

Cuantía arm. 0.93 [o/o] Suma 163.34

Deformaciones y tensiones extremas (Rotura):

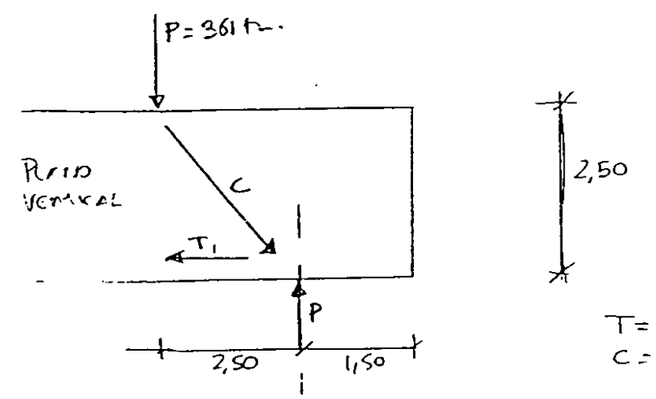
1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	0.00	150.00	-3.500	-85.000	"H200PTE"
Armadura-Min	0.00	145.00	-3.256	-4434.700	"AEH500"
Hormigón-Max	-0.00	0.00	3.818	0.000	"H200PTE"
Armadura-Max	-0.00	5.00	3.574	4434.700	"AEH500"

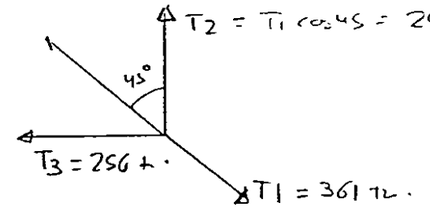
Fibra neutra zn 78.26 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 71.74 cm Zona comprimida/Canto útil 0.57

GINPROSA

ASUNTO
ED2 - 1.8
ARRIOSTRAMIENTO ENCEPADOS. (SISMICO)

En el pilote de esquina la carga máxima en cabeza es 361 tn.
El esquema de bielas a considerar es el siguiente.





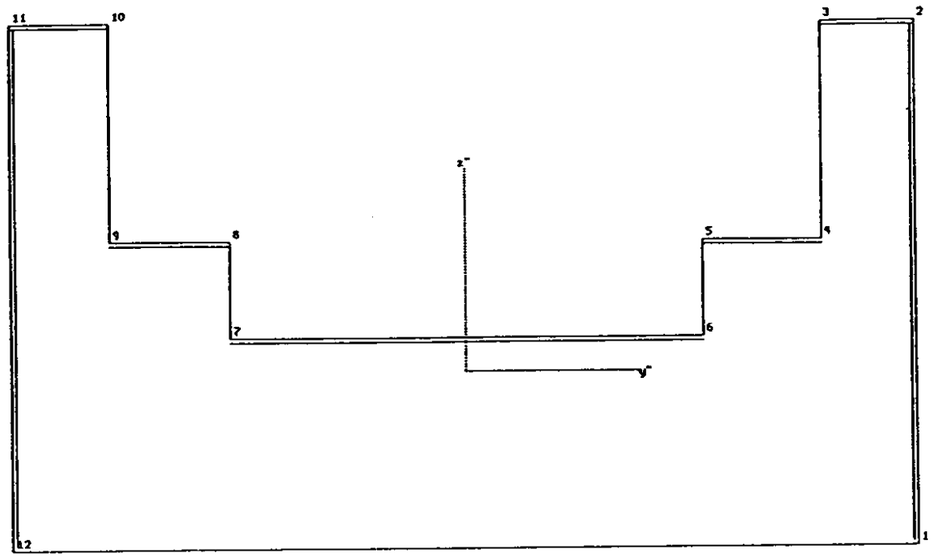
$$A_s = \frac{1,50 \cdot 256}{4,435} = 86,3\ cm^2 \longrightarrow \phi 32/0,125 \text{ en } \pm 1,00 \text{ m. a ambos lados del eje del pilote.}$$

ED2-1.8
CALCULO DE ESTRIBO 1

DIMENSIONAMIENTO DE ARMADURA DE MURO FRONTAL

Acciones sobre el estribo	Carga vertical FX (t.)	F. horiz. tranv. FY (t.)	F. horiz. long. FZ (t.)	Momento MY c.d.g zapata (m.t.)	Momento MZ c.d.g zapata (m.t.)
Peso propio + carga muerta de tablero	288	0	0	354	0
Sobrecargas de uso verticales	165	0	0	203	0
Frenado + coaccion	0	0	94	557	0
Viento + fuerza centrifuga	0	127	0	0	596
Empuje de tierras	0	0	139	307	0
Empuje de sc. 3 t/m2	0	0	63	208	0
TOTALES	453	127	295	1629	596
TOTALES MAYORADOS	**680**	**190**	**443**	**2444**	**894**

Mstb. 1 : 60.0



Sección :"ESTRIBO1" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H250

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	475.00	0.00	2	475.00	550.00
3	375.00	550.00	4	375.00	320.00
5	250.00	320.00	6	250.00	220.00
7	-250.00	220.00	8	-250.00	320.00
9	-375.00	320.00	10	-375.00	550.00
11	-475.00	550.00	12	-475.00	0.00

Características mecánicas de la sección:
Area : Ax= 30.000 [m2]
Momentos de inercia : Iy= 54.586 [m4] Iz= 301.688 [m4]
Inercia a torsión : Ix= 143.239 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs= 1.838 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-63.513	2.117
dch.	Iz	4.750	63.513	-2.117
abajo	Iy	-1.838	-29.693	0.497
arriba	Iy	3.662	14.907	-0.990

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	1.00	-475.00	545.00	-375.00	545.00
2	AEH500	(2)	1.00	475.00	545.00	375.00	545.00
3	AEH500	(2)	1.00	-375.00	315.00	-250.00	315.00
4	AEH500	(2)	1.00	375.00	315.00	250.00	315.00
5	AEH500	(2)	1.00	-250.00	215.00	250.00	215.00
6	AEH500	(2)	1.00	-470.00	545.00	-470.00	5.00
7	AEH500	(2)	1.00	470.00	545.00	470.00	5.00

Total: 7.00 Cuantía de armadura: 0.002 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcu,mín [kp/cm2]
"H250"	300000.0	-141.600	-2.000	0.0	6.460	250.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Programa F A G U S - 2 V.1.32
GINPROSA Ingenieros Consultores 16.07.98

Dimensionamiento : Viga "ESTRIBO1"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz	Alpha
				-2444.000	894.000	45.0

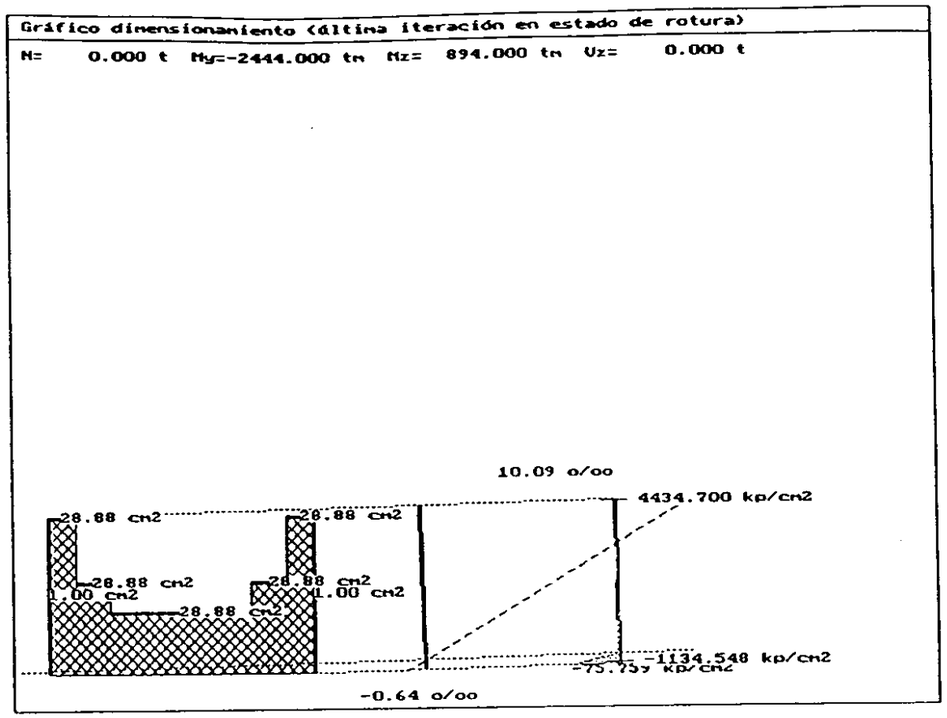
Armadura Longitudinal:	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]	dado [cm2]	dimens. As-nuevo [cm2]	[cm2]
1 "AEH500"	-475.0	545.0	-375.0	545.0	1.00	28.88	28.88
2 "AEH500"	475.0	545.0	375.0	545.0	1.00	28.88	28.88
3 "AEH500"	-375.0	315.0	-250.0	315.0	1.00	28.88	28.88
4 "AEH500"	375.0	315.0	250.0	315.0	1.00	28.88	28.88
5 "AEH500"	-250.0	215.0	250.0	215.0	1.00	28.88	28.88
6 "AEH500"	-470.0	545.0	-470.0	5.0	1.00	-	1.00
7 "AEH500"	470.0	545.0	470.0	5.0	1.00	-	1.00

Cuantía arm. 0.05 [o/o] Suma 146.38

Deformaciones y tensiones extremas (Rotura):

1	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [kp/cm2]	
Hormigón-Min	475.00	0.00	-0.636	-75.759	"H250"
Armadura-Min	470.00	5.00	-0.540	-1134.548	"AEH500"
Hormigón-Max	-475.00	550.00	10.094	0.000	"H250"
Armadura-Max	-475.00	545.00	10.000	4434.700	"AEH500"

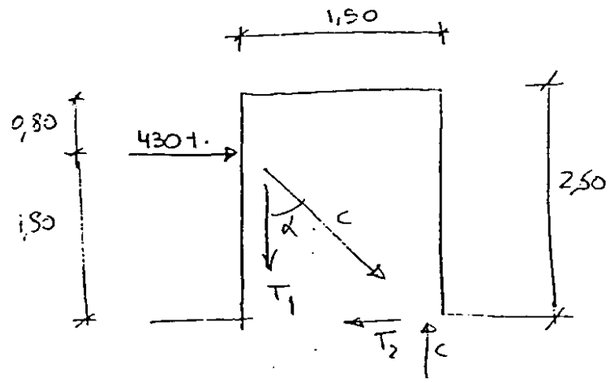
Fibra neutra zn 22.92 cm yn 3.76 cm Angulo 1.34



GINPROSA

ASUNTO
CD2-1.8.
ARMADURA DE CONTRAFUERTE DE TENDON

PAG. 1



$\alpha = \operatorname{arctg}\left(\frac{1,50}{1,80}\right) \qquad \alpha = 39,80°$

$T_1 = \frac{430}{tg\,\alpha} = 516\ t_m \rightarrow A_{s,1} = \frac{516}{4,035} = 116,3\ cm^2$

Esta armadura se distribuye en 1,60 m → 72,7 cm²/m.

Se disponen dos capas de φ25/0,10 → 98 cm²/m.

$T_2 = 430\ t_m \rightarrow \quad V_{cu} = 0,5\sqrt{\frac{400}{1,50}}\ 1,45 \times 1,60 = 189\ t_m.$

$A_{90} = \frac{430 - 189}{4,7 \cdot 0,9 \cdot 1,45} = 41,17\ cm^2/m. \rightarrow 4c\phi 12/0,20$

Armadura de percha en el patinado

$A_s = \frac{0,30 \cdot (430/1,5)}{2\ T/cm^2} = 43\ cm^2 \rightarrow 7c\phi 20$ /tendon.

ED2-1.8
CALCULO DE ESTRIBO 2

DIMENSIONAMIENTO DE ARMADURA DE PILOTES

Acciones sobre el estribo (en cara inferior de encepado)	Carga vertical FX (t.)	F. horiz. tranv. FY (t.)	F. horiz. long FZ (t.)	Momento MY c.d.g zapata (m.t.)	Momento MZ c.d.g zapata (m.t.)	Momento MX eje vertical (m.t.)
Peso propio + carga muerta de tablero	288	0	0	619	0	0
Sobrecargas de uso verticales	165	0	0	355	0	0
Frenado + coaccion	0	0	9	108	0	0
Viento + fuerza centrifuga	0	95	0	0	1177	203
Empuje de tierras	0	0	744	3471	0	0
Empuje de sc. 3 t/m2	0	0	139	1033	0	0
Peso propio de estribo + tierras	2129	0	0	-3726	0	0
" "	409	0	0	-1064	0	0
" "	34	0	0	-278	0	0
Peso de encepado	938	0	0	0	0	0
Empuje pasivo	0	0	0	0	0	0
TOTALES	3962	95	893	518	1177	203

Acciones sobre cabeza de pilotes (en cara inferior de encepado)		Carga vertical FX (t.)	F. horiz. tranv. FY (t.)	F. horiz. long FZ (t.)	Fuerza horizontal total (t.)
Pilote de talon	FX,max	466	14	103	104
	FX,min	378	14	103	104
Pilote de puntera	FX,max	502	14	103	104
	FX,min	415	14	103	104

Con en programa PYRUS se realiza un modelo de calculo del pilote coaccionado lateralmente con un coeficiente de balasto dado por la siguiente expresion:

Kh= 320 x Z/D (t/m3)

Z= profundidad
D= diametro del pilote

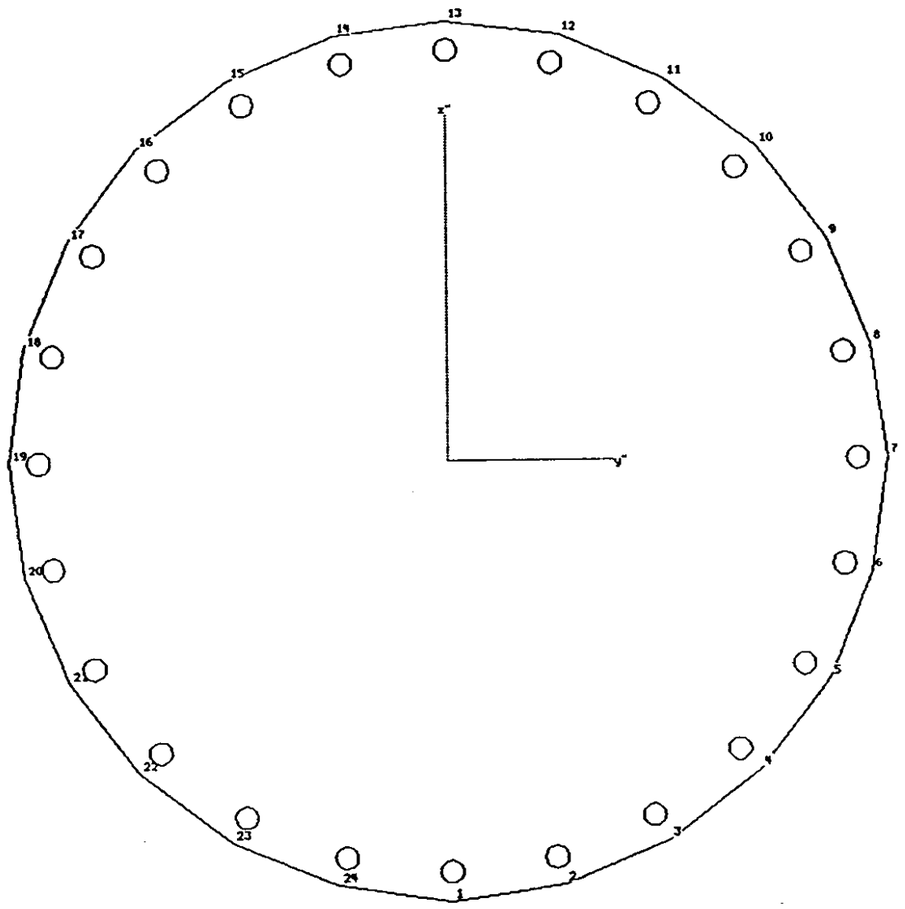
Este valor del balasto es el correspondiente a las arenas y limos de la parte superior del pilote. Los 5.00 m inferiores estan empotrado en yesos, en esta zona se toma , de modo conservador, un coeficiente 10 veces superior. Los valores de Kh ya tienen en cuenta el efecto de grupo.

Constantes elasticas de muelles equivalente

Profundidad Z (m.)	Kh (t/m3)	Kh (KN/m)
0.50	107	1600
1.50	320	4800
2.50	533	8000
3.50	747	11200
4.50	960	14400
5.50	6453	96800
6.50	13867	208000
7.50	16000	240000
8.50	18133	272000
9.50	20267	304000
10.50	22400	336000

En los listados del programa PYRUS pueden verse los esfuerzos y desplazamientos del pilote a si como el calculo de las armaduras.

Hstb. 1 : 10.0



Sección :"PILOTE" Armadura :"B1"
Tipo : tipo viga/ Círculo/tubo Unidades :(cm)
Material :"H200PTE"

Diámetro exterior = 150.000 cm

Características mecánicas de la sección:
Area : Ax= 1.747 [m2]
Momentos de inercia : Iy= 0.242889 [m4] Iz= 0.242889 [m4]
Inercia a torsión : Ix= 0.497010 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.750000 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-0.750	-0.323852	0.185
dch.	Iz	0.750	0.323852	-0.185
abajo	Iy	-0.750	-0.323852	0.185
arriba	Iy	0.750	0.323852	-0.185

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	AEH500	(2)	11.41	0.00	5.00		
2	AEH500	(2)	11.41	18.12	7.39		
3	AEH500	(2)	11.41	35.00	14.38		
4	AEH500	(2)	11.41	49.50	25.50		
5	AEH500	(2)	11.41	60.62	40.00		
6	AEH500	(2)	11.41	67.61	56.88		
7	AEH500	(2)	11.41	70.00	75.00		
8	AEH500	(2)	11.41	67.61	93.12		
9	AEH500	(2)	11.41	60.62	110.00		
10	AEH500	(2)	11.41	49.50	124.50		
11	AEH500	(2)	11.41	35.00	135.62		
12	AEH500	(2)	11.41	18.12	142.61		
13	AEH500	(2)	11.41	0.00	145.00		
14	AEH500	(2)	11.41	-18.12	142.61		
15	AEH500	(2)	11.41	-35.00	135.62		
16	AEH500	(2)	11.41	-49.50	124.50		
17	AEH500	(2)	11.41	-60.62	110.00		
18	AEH500	(2)	11.41	-67.61	93.12		
19	AEH500	(2)	11.41	-70.00	75.00		
20	AEH500	(2)	11.41	-67.61	56.88		
21	AEH500	(2)	11.41	-60.62	40.00		
22	AEH500	(2)	11.41	-49.50	25.50		
23	AEH500	(2)	11.41	-35.00	14.38		
24	AEH500	(2)	11.41	-18.12	7.39		

Total: 273.91 Cuantía de armadura: 1.568 [o/o]

$\frac{273\,91}{8\,04} = 35\,\text{Ø}32$

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H200PTE"	210000.0	-85.000	-2.000	0.0	10.000	300.000
"AEH500"	2.10E+06	4434.700				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Cálculo Resistencia Ultima: Viga "PILOTE"/"B1"

Solicitación Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
-753.000				597.000	

Coeficiente de seguridad 1.159

Cálculo Resistencia Ultima: Viga "PILOTE"/"B1"

Solicitación Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
-800.000					

Coeficiente de seguridad 3.294

Pila ''PILE2'
****

Título : 'ED2-1.8. CALCULO DE PILOTES'
Altura de la pila : 10.500 [m]
Long. max. de barra: Altura pila / 6

NUDOS Nu	x [m]	Apoyo d-xyz	r-xyz	Rigideces de muelles dz [kN/m]
12	10.500	---	BBB	--
11	10.000	--E	---	1.600000E+03
10	9.000	--E	---	4.800000E+03
9	8.000	--E	---	8.000000E+03
8	7.000	--E	---	1.120000E+04
7	6.000	--E	---	1.440000E+04
6	5.000	--E	---	9.680000E+04
5	4.000	--E	---	2.080000E+05
4	3.000	--E	---	2.400000E+05
3	2.000	--E	---	2.720000E+05
2	1.000	--E	---	3.040000E+05
1	0.000	BBB	---	--

Apoyo: B=bloqueado, E=elástico

BARRAS (1.línea: barra arriba, 2.línea: barra abajo)

Ba	Nu	Sección	Tipo	Exc: ey [m]	ez [m]	Arm: Zona	fac
11	12-11	'PILOTE'	SecFAGUS			1	1.000
		''	undef				
10	11-10	''	undef			1	1.000
9	10-9	''	undef			1	1.000
8	9-8	''	undef			1	1.000
7	8-7	''	undef			1	1.000
6	7-6	''	undef			1	1.000
5	6-5	''	undef			1	1.000
4	5-4	''	undef			1	1.000
3	4-3	''	undef			1	1.000
2	3-2	''	undef			1	1.000
1	2-1	''	undef			1	1.000
		'PILOTE'	SecFAGUS				

CARGAS :

Nu/Ba		Tipo Car.	Dim.	Valor Val.arriba	ey[m] Val.abajo	ez[m]
Comp. Carga G1 :						
Nudo	12.	Fuerza	x [kN]	-5020.000		
		Fuerza	z [kN]	1040.000		
Barra	11	Peso propio	x [kN/m3]	-25.000		
Barra	10	Peso propio	x [kN/m3]	-25.000		
Barra	9	Peso propio	x [kN/m3]	-25.000		
Barra	8	Peso propio	x [kN/m3]	-25.000		
Barra	7	Peso propio	x [kN/m3]	-25.000		
Barra	6	Peso propio	x [kN/m3]	-25.000		
Barra	5	Peso propio	x [kN/m3]	-25.000		
Barra	4	Peso propio	x [kN/m3]	-25.000		
Barra	3	Peso propio	x [kN/m3]	-25.000		
Barra	2	Peso propio	x [kN/m3]	-25.000		
Barra	1	Peso propio	x [kN/m3]	-25.000		

Programm: P Y R U S V.2.20 Bn:2019. 1
GINPROSA Ingenieros Consultores 16.07.98
ED2-1.8. CALCULO DE PILOTES 18:43

A N A L I S I S L I N E A L <L.PILE2.1>

PARAMETROS DE CALCULO:

Norma	EH
Coef. min. resist. (gamma_r)	1.000
Coeficiente de fluencia	0.000
Factor armadura (global)	1.000
No de elementos	11
Mayoración de cargas	1.000 * Carga permanente G1

DATOS DE LA SECCION

Nombre	Ancho dy [m]	Canto dz [m]	Materiales Horm. / Acero	Distrib. de la armadura	Armadura fija[cm²]	Armadura var [cm²]
PILOTE	1.500	1.500	H200PTE AEH500	B1	0.000	88.37

DATOS DE BARRAS (incl. factores de armadura)

Barra	Sección arriba	Sección abajo	factor S de la armadura	Armadura variable arriba[cm²]/abajo[cm²]	
11	PILOTE	PILOTE	1.000	88.37	88.37
10	PILOTE	PILOTE	1.000	88.37	88.37
9	PILOTE	PILOTE	1.000	88.37	88.37
8	PILOTE	PILOTE	1.000	88.37	88.37
7	PILOTE	PILOTE	1.000	88.37	88.37
6	PILOTE	PILOTE	1.000	88.37	88.37
5	PILOTE	PILOTE	1.000	88.37	88.37
4	PILOTE	PILOTE	1.000	88.37	88.37
3	PILOTE	PILOTE	1.000	88.37	88.37
2	PILOTE	PILOTE	1.000	88.37	88.37
1	PILOTE	PILOTE	1.000	88.37	88.37

DEFORMACIONES sin deformaciones accidentales

	DX [mm]	DY [mm]	DZ [mm]	RX [o/oo]	RY [o/oo]	RZ [o/oo]
Mínima	-1.43	0.00	0.00	0.000	-1.412	0.000
Máxima	0.00	0.00	9.29	0.000	0.000	0.000

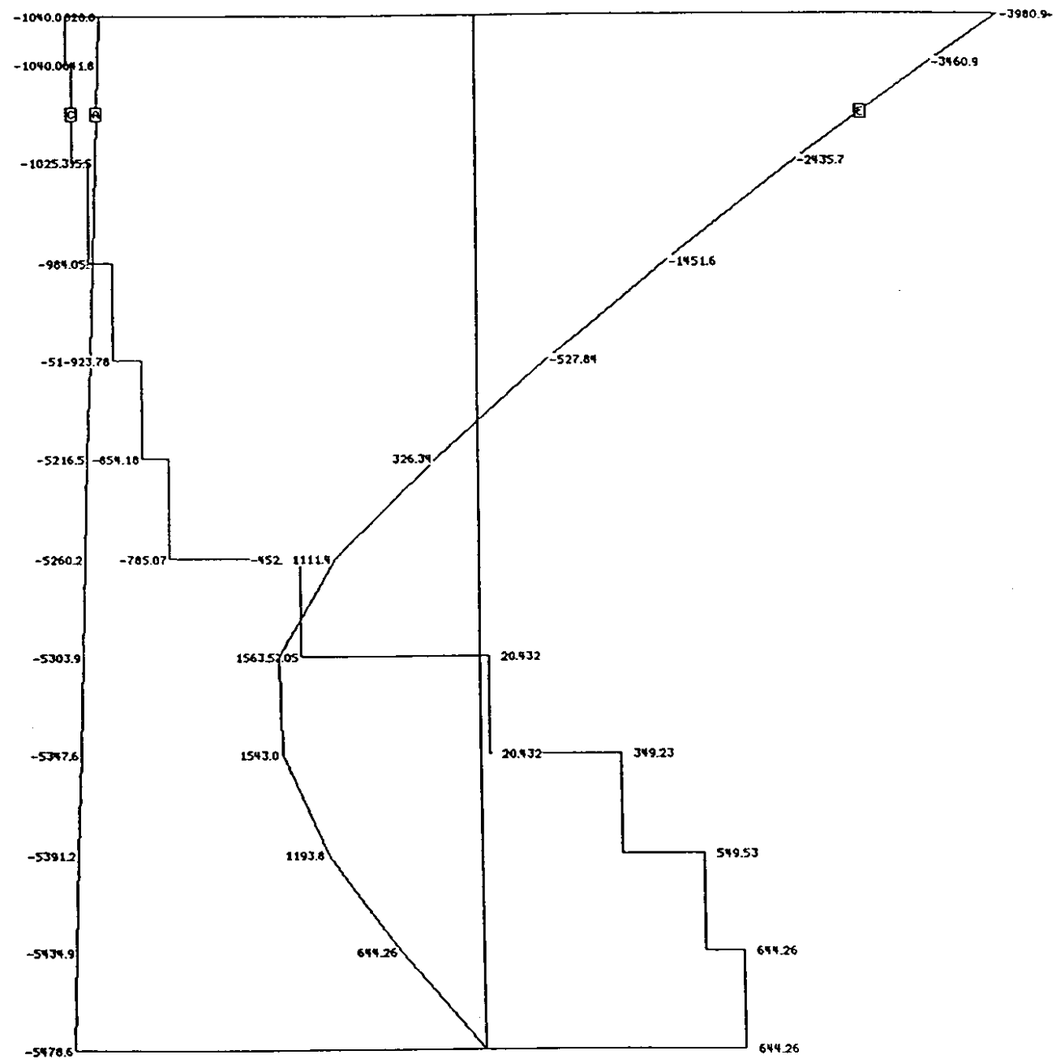
ESFUERZOS (global)

	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
Mínima	-5478.60	0.00	-1040.00	0.00	-3980.94	0.00
Máxima	-5020.00	0.00	644.26	0.00	1563.46	0.00

ESFUERZOS (global)
<L.PILE2.1> Carga: 1.00*G1

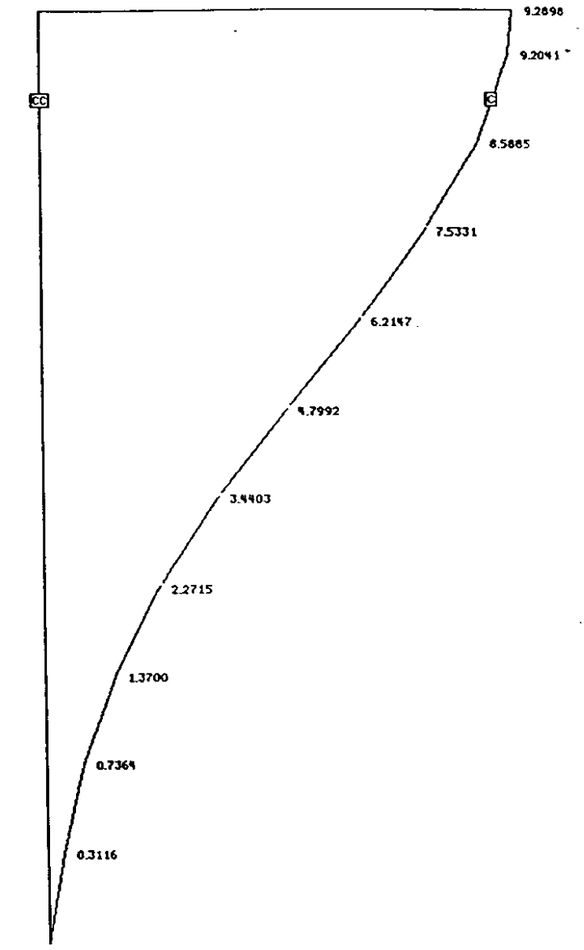
Coord-x	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
10.500	-5020.00	0.00	-1040.00	0.00	-3980.94	0.00
10.000	-5041.84	0.00	-1040.00	0.00	-3460.94	0.00
10.000	-5041.84	0.00	-1025.27	0.00	-3460.94	0.00
9.000	-5085.51	0.00	-1025.27	0.00	-2435.67	0.00
9.000	-5085.51	0.00	-984.05	0.00	-2435.67	0.00
8.000	-5129.19	0.00	-984.05	0.00	-1451.62	0.00
8.000	-5129.19	0.00	-923.78	0.00	-1451.62	0.00
7.000	-5172.87	0.00	-923.78	0.00	-527.84	0.00
7.000	-5172.87	0.00	-854.18	0.00	-527.84	0.00
6.000	-5216.54	0.00	-854.18	0.00	326.34	0.00
6.000	-5216.54	0.00	-785.07	0.00	326.34	0.00
5.000	-5260.22	0.00	-785.07	0.00	1111.41	0.00
5.000	-5260.22	0.00	-452.05	0.00	1111.41	0.00
4.000	-5303.89	0.00	-452.05	0.00	1563.46	0.00
4.000	-5303.89	0.00	20.43	0.00	1563.46	0.00
3.000	-5347.57	0.00	20.43	0.00	1543.03	0.00
3.000	-5347.57	0.00	349.23	0.00	1543.03	0.00
2.000	-5391.25	0.00	349.23	0.00	1193.79	0.00
2.000	-5391.25	0.00	549.53	0.00	1193.79	0.00
1.000	-5434.92	0.00	549.53	0.00	644.26	0.00
1.000	-5434.92	0.00	644.26	0.00	644.26	0.00
0.000	-5478.60	0.00	644.26	0.00	0.00	0.00

Escala 1 : 59.4
<L.PILE2.1> Carga: 1.00*G1
- A: Esfuerzo axil [kN]
- C: Cortante en z [kN]
- E: Momento flector por el eje y [kNm]



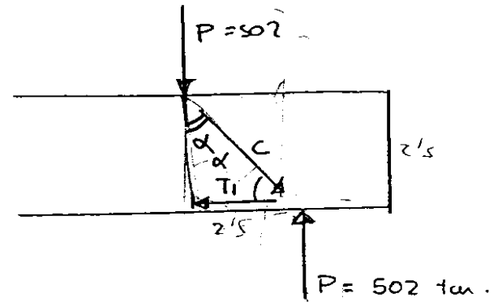
Programm: P Y R U S V.2.20 Bn:2019. 1
GINPROSA Ingenieros Consultores 16.07.98
ED2-1.8. CALCULO DE PILOTES 18:44

Escala 1 : 66.0
<L.PILE2.1> Carga: 1.00*G1
- C: z-Desplazamiento, CC: z-Deformaciónes accidentales (mm)



GINPROSA

ASUNTO
ED2 - 1.8
CALCULO DE ANCLADOS DE ENCEPADOS
ESTRIBOS



$\alpha = \arctg\left(\frac{2,60}{2,50}\right)$

$T_1 = 525$ tm.

$A_i = \frac{1,5 \cdot 525}{4,435} = 177,5$ cm²/pilote · 2 capas φ32/0,15

La armadura T_1 se dispone en dirección longitudinal. En dirección transversal se pone un 50%.

CALCULO ESTRIBOS CERRADOS

NOMBRE PROYECTO :	L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
NOMBRE OBRA :	ED2-1.8. ESTRIBO 2

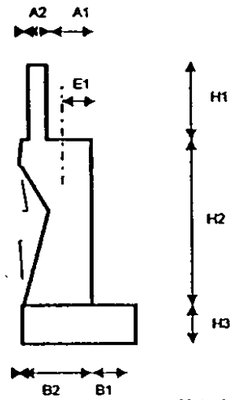
DATOS REQUERIDOS:

GESTION FICHEROS

Directorio fichero generación modelo (.GEO) :	G:\MAZAX\ED2-1.8\ESTRIBOS\COSMOS
Directorio fichero listados (.LIS) :	G:\MAZAX\ED2-1.8\ESTRIBOS\COSMOS

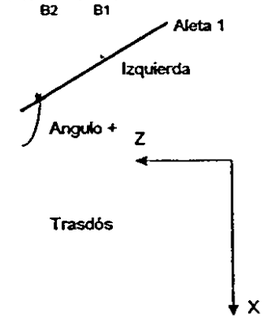
MURO FRONTAL

H1. Altura murete (m) :	2.360	
H2. Altura muro frontal (m) :	9.96	
H3. Canto zapata (m) :	2.50	
Altura tierras en trasdós (superior zapata)(m) :	12.32	
B1. Puntera zapata (m) :	3.50	Zapata tipo I
B2. Canto muro en base (m) :	2.20	
B3. Talón zapata (m) :	6.80	Zapata tipo III
A1 (m) :	1.70	
A2. Canto murete de guarda (m) :	0.50	
A3. Vuelo ménsula apoyo losa transición (m) :	0.00	
H4. Canto mín. apoyo losa transición (m) :	0.30	
α . Angulo trasdós muro (°) :	90.00	
β . Angulo inferior apoyo losa transición (°) :	45.00	
E1. Distancia apoyo tablero (m) :	0.60	
Longitud (m) :	9.50	



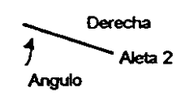
MUROS EN VUELTA (Intradós vertical)

	Izquierdo (1)	Derecho (2)
Longitud (m) :	8.00	8.00
Canto en base (m) :	1.50	1.50
Canto coronación (m) :	0.50	0.50
Angulo (°) :	90.00	90.00



ALETAS

	Izquierda (1)	Derecha (2)
Canto aleta en empotramiento (m) :	4.50	4.50
Canto aleta en extremo (m) :	0.50	0.50
Longitud aleta (m) :	6.00	6.00
Espesor aleta (m) :	0.50	0.50



CARACTERISTICAS DE TERRENO

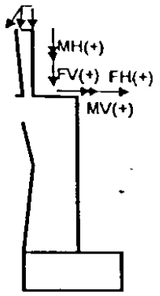
Peso específico (T/m³) :	2.00
Angulo rozamiento interno (°) :	30.00
Coeficiente rozamiento zapata-terreno :	0.58
Angulo. rozamiento tierras muro (°) :	0.00
Tension admisible (T / m²) :	30.00

CARACTERISTICAS DE LOS MATERIALES

Peso especifico hormigón (T / m³) :	2.50
Límite elástico acero (T / m²) :	51000.00
Resistencia hormigón. cimientos (T / m²) :	2500.00
Resistencia hormigón. alzado (T / m²) :	2500.00
Mod. Elasticidad Hormigón alzado (T / m²) :	3000000

CARGAS SOBRE EL ESTRIBO (Carga total sobre el estribo sin mayorar)

q (Sobrecarga de tráfico (T / m²) :	3.00
Peso barrera en muros en vuelta y aletas (T / m) :	1.10



	FV (T)	MV (mT)	FH (T)	MH (mT)
Acciones permanentes (G)				
Peso propio y carga muerta tablero :	288.00	0.00	—	—
Acciones permanentes de valor no constante (G*)				
Pretensado tablero :	0.00	0.00	—	—
Retracción y fluencia tablero :	—	—	0.00	0.00
Asientos estructura :	0.00	0.00	—	—
Acciones Variables (Q)				
Sobrecarga de uso máxima tablero :	165.00	0.00	0.00	0.00
Sobrecarga de uso mínima tablero :	0.00	0.00	0.00	0.00
Efectos térmicos tablero :	0.00	0.00	0.00	0.00

COEFICIENTES DE SEGURIDAD

Seguridad al deslizamiento	Csd=	1.50
Seguridad al vuelco	Csv=	1.80
Minoracion acero	γs=	1.15
Minoracion hormigon	γc=	1.50

	Estado Límite Ultimo	
	Favorable	Desfavorable
Acciones permanentes (G)		
Peso propio, cargas muertas :	0.90	1.50
Acciones permanentes de valor no constante (G*)		
Pretensado :	0.00	1.00
Reológicas (retracción y fluencia) :	0.00	1.50
Terreno (pesopropio, empujes y asientos) :	0.00	1.50
Acciones variables (Q)		
Sobrecargas, viento, temperatura :	0.00	1.50

Ψo (coeficiente valor de combinación variables) :	1.00	(poner 1 según antigua instrucción)

DATOS VARIOS

Número de apoyos :	2.00	
Separación apoyos (m) :	4.000	
Recubrimiento armadura (m) :	0.05	
Distancia sección 1-1 (a superior zapata) (m) :	3.75	Vale

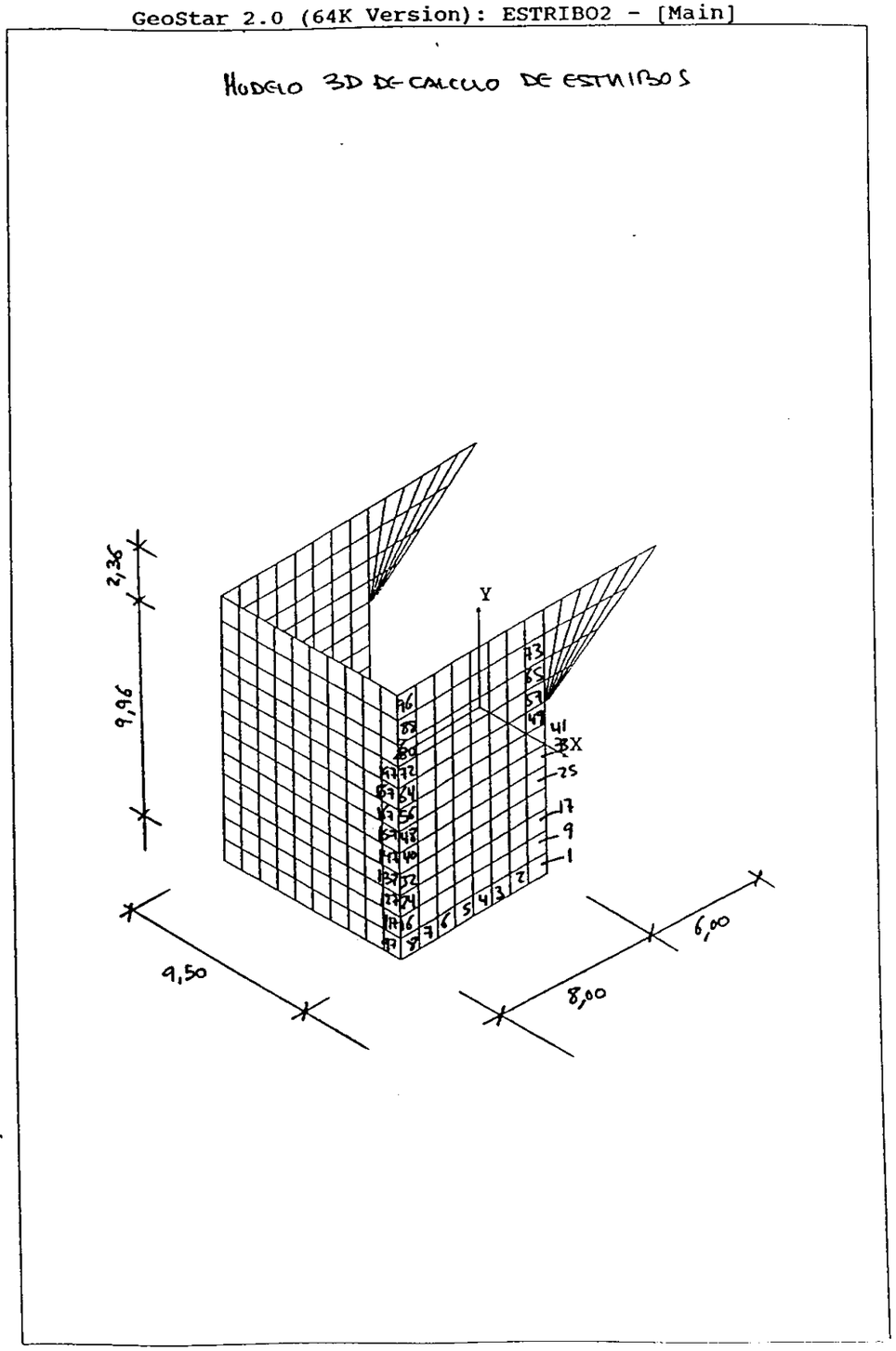
CALCULO DE ARMADURAS

Elemento	Sección		
	Designacion	Ancho (b)(m)	Canto (h)(m)
MURO	0-0	1.00	2.20
	1-1	1.00	2.20
MURETE	4-4	1.00	0.50
PUNTERA	2-2 (+)	1.00	2.50
	2-2 (-)	1.00	2.50
TALÓN	3-3 (+)	1.00	2.50
	3-3 (-)	1.00	2.50

Elemento	Sección	Armadura de flexión					
	Designacion	b cálculo(m)	h cálculo (m)	Nd (T)	Md (mT)	As (cm²/m)	Control c
MURO	0-0	1.00	2.20	123.48	459.00	63.301	Vale
	1-1	1.00	2.20	104.92	193.49	32.454	Vale
MURETE	4-4	1.00	0.50	2.66	6.37	3.554	Vale
PUNTERA	2-2 (+)	1.00	2.50	---	303.99	28.497	Vale
	2-2 (-)	1.00	2.50	---	78.35	7.245	Vale
TALÓN	3-3 (+)	1.00	2.50	---	-211.34	19.699	Vale
	3-3 (-)	1.00	2.50	---	-234.78	21.915	Vale

Elemento	Sección	Armadura de cortante				
	Designacion	b cálculo(m)	h cálculo (m)	Vd (T)	As (cm²/m²)	Control cálculo
MURO	0-0	1.00	2.20	94.37	0.00	Vale. As min = 7.94
	1-1	1.00	2.20	49.58	0.00	Vale. As min = 7.94
MURETE	4-4	1.00	0.50	6.32	0.00	Vale. As min = 7.94
PUNTERA	2-2 (+)	1.00	2.50	94.68	0.00	Vale. As min = 0.00
	2-2 (-)	1.00	2.50	24.58	0.00	Vale. As min = 0.00
TALÓN	3-3 (+)	1.00	2.50	27.33	0.00	Vale. As min = 7.94
	3-3 (-)	1.00	2.50	-71.23	0.00	Vale. As min = 7.94

GeoStar 2.0 (64K Version): ESTRIBO2 - [Main]



CALCULO DE ARMADURAS EN ESTRIBOS (modelo 3-D)

Proyecto : L.A.V. MADRID-ZARAGOZA. SUBTRAMO XV
Nombre obra : ED2-1.8. ESTRIBO 2

——>(ver espacio a la derecha para pasar a FAGUS2)

Directorio del grupo:	G:\MAZAXV\fagus
Nombre obra:	ED2-1-8

CALCULO ARMADURAS VERTICALES

ZONA	FAJA	Elemento Nº	Ny,d (T/m)	My,d (mT/m)	Vy,d (T/m)	Canto elemento (m.)	Armadura cortante (cm2/m)	Vu1>Vd	Armadura interior (cm2/m)	Armadura exterior (cm2/m)
MURO IZQUIERDO	BORDE	1	72.60	-264.30	119.20	1.46	5.29	Vale	52.53	1.00
		9	50.25	-180.60	103.70	1.38	3.57	Vale	37.63	1.00
		17	32.52	-125.30	91.68	1.30	2.36	Vale	27.19	1.00
		25	18.20	-88.34	81.32	1.22	1.36	Vale	19.73	1.00
		33	6.47	-63.55	72.30	1.14	0.53	Vale	14.36	1.00
		41	-3.16	-46.60	64.75	1.06	0.00	Vale	10.42	1.00
		49	-11.45	-34.29	58.95	0.97	0.00	Vale	7.30	1.00
		57	-19.65	-24.80	54.73	0.89	0.09	Vale	4.55	1.00
		65	-14.35	-10.43	27.18	0.81	0.00	Vale	1.46	1.00
		73	-9.34	-3.12	15.09	0.73	0.00	Vale	1.00	1.00
MURO IZQUIERDO	BASE	1	72.60	-264.30	119.20	1.46	5.29	Vale	52.53	1.00
		2	29.16	-240.30	96.65	1.46	1.06	Vale	43.71	1.00
		3	7.84	-201.50	75.84	1.46	0.00	Vale	34.68	1.00
		4	-5.83	-159.60	57.65	1.46	0.00	Vale	25.98	1.00
		5	-16.82	-117.80	40.88	1.46	0.00	Vale	17.65	1.00
		6	-28.51	-78.75	24.35	1.46	0.00	Vale	9.77	1.00
		7	-45.79	-45.83	8.44	1.46	0.00	Vale	2.33	1.00
		8	-81.79	-24.98	-5.07	1.46	0.00	Vale	1.00	1.00
MURO DERECHO	BORDE	224	72.60	-264.30	119.20	1.46	5.29	Vale	52.53	1.00
		232	50.25	-180.60	103.70	1.38	3.57	Vale	37.63	1.00
		240	32.52	-125.30	91.68	1.30	2.36	Vale	27.19	1.00
		248	18.20	-88.34	81.32	1.22	1.36	Vale	19.73	1.00
		256	6.47	-63.55	72.30	1.14	0.53	Vale	14.36	1.00
		264	-3.16	-46.60	64.75	1.06	0.00	Vale	10.42	1.00
		272	-11.45	-34.29	58.95	0.97	0.00	Vale	7.30	1.00
		280	-19.65	-24.80	54.73	0.89	0.09	Vale	4.55	1.00
		288	-14.35	-10.43	27.18	0.81	0.00	Vale	1.46	1.00
		296	-9.34	-3.12	15.09	0.73	0.00	Vale	1.00	1.00
MURO DERECHO	BASE	217	-81.79	-24.98	-5.07	1.46	0.00	Vale	1.00	1.00
		218	-45.79	-45.83	8.44	1.46	0.00	Vale	2.33	1.00
		219	-28.51	-78.75	24.35	1.46	0.00	Vale	9.77	1.00
		220	-16.82	-117.80	40.88	1.46	0.00	Vale	17.65	1.00
		221	-5.83	-159.60	57.65	1.46	0.00	Vale	25.98	1.00
		222	7.84	-201.50	75.84	1.46	0.00	Vale	34.68	1.00
		223	29.16	-240.30	96.65	1.46	1.06	Vale	43.71	1.00
		224	72.60	-264.30	119.20	1.46	5.29	Vale	52.53	1.00

CALCULO DE ARMADURAS HORIZONTALES

ZONA MURO FRONTAL	FAJA BIS.IZDA	Elemento	Nx (T/m)	Mx (mT/m)	Vx (T/m)	Canto elemento (m.)	Armadura cortante (cm2/m)	Vu1>Vd	Armadura interior (cm2/m)	Armadura exterior (cm2/m)
MURO IZQUIERDO	BISAGRA	8	-10.67	-12.49	4.22	1.46	0.00	Vale	1.00	1.00
		16	8.15	-25.72	0.51	1.38	0.00	Vale	5.37	1.00
		24	20.96	-42.19	-12.47	1.30	0.00	Vale	10.18	1.00
		32	29.55	-60.03	-25.62	1.22	0.00	Vale	15.28	1.00
		40	34.32	-75.67	-35.94	1.14	0.00	Vale	20.14	1.00
		48	35.71	-86.78	-42.51	1.06	0.00	Vale	24.30	1.00
		56	34.32	-92.32	-45.50	0.97	0.00	Vale	27.47	1.00
		64	30.75	-92.39	-46.02	0.89	0.00	Vale	29.51	1.00
		72	25.08	-87.46	-46.50	0.81	0.00	Vale	30.29	1.00
		80	14.41	-76.92	-51.45	0.73	2.88	Vale	28.82	1.00
MURO IZQUIERDO	BISAGRA	88	13.76	-46.98	-22.51	0.64	0.00	Vale	20.47	1.00
		96	12.69	-23.73	-8.68	0.55	0.00	Vale	12.74	1.00
MURO DERECHO	BISAGRA	217	-10.67	-12.49	-4.22	1.46	0.00	Vale	1.00	1.00
		225	8.15	-25.72	-0.51	1.38	0.00	Vale	5.37	1.00
		233	20.96	-42.19	12.47	1.30	0.00	Vale	10.18	1.00
		241	29.55	-60.03	25.62	1.22	0.00	Vale	15.28	1.00
		249	34.32	-75.67	35.94	1.14	0.00	Vale	20.14	1.00
		257	35.71	-86.78	42.51	1.06	0.00	Vale	24.30	1.00
		265	34.32	-92.32	45.50	0.97	0.00	Vale	27.47	1.00
		273	30.75	-92.39	46.02	0.89	0.00	Vale	29.51	1.00
		281	25.08	-87.46	46.50	0.81	0.00	Vale	30.29	1.00
		289	14.41	-76.92	51.45	0.73	2.88	Vale	28.82	1.00
MURO DERECHO	BISAGRA	297	13.76	-46.98	22.51	0.64	0.00	Vale	20.47	1.00
		305	12.69	-23.73	8.68	0.55	0.00	Vale	12.74	1.00
MURO FRONTAL	BIS.IZDA	97	-24.86	-14.18	1.40	2.20	0.00	Vale	1.00	1.00
		107	-3.77	-23.14	8.03	2.20	0.00	Vale	2.02	1.00
		117	14.73	-39.70	17.65	2.20	0.00	Vale	5.89	1.00
		127	31.23	-58.72	26.22	2.20	0.00	Vale	9.79	1.00
		137	43.64	-76.08	31.96	2.20	0.00	Vale	13.05	1.00
		147	51.11	-89.21	34.27	2.20	0.00	Vale	15.30	1.00
		157	54.00	-97.19	33.04	2.20	0.00	Vale	16.48	1.00
		167	53.46	-100.90	28.35	2.20	0.00	Vale	16.81	1.00
		177	52.06	-105.60	21.46	2.20	0.00	Vale	17.16	1.00
		187	65.96	-140.00	22.47	2.20	0.00	Vale	22.42	1.00
MURO FRONTAL	BIS.IZDA	197	17.13	-9.80	15.28	0.50	0.00	Vale	7.12	1.00
		207	20.37	-19.28	18.14	0.50	0.00	Vale	12.53	1.00
MURO FRONTAL	BIS.DCHA	106	-24.86	-14.18	-1.40	2.20	0.00	Vale	1.00	1.00
		116	-3.77	-23.14	-8.03	2.20	0.00	Vale	2.02	1.00

CALCULO ARMADURAS VERTICALES

ZONA	FAJA	Elemento Nº	Ny,d (T/m)	My,d (mT/m)	Vy,d (T/m)	Canto elemento (m.)	Armadura cortante (cm2/m)	Vu1>Vd	Armadura interior (cm2/m)	Armadura exterior (cm2/m)

CALCULO DE ARMADURAS HORIZONTALES

ZONA MURO FRONTAL	FAJA BIS.IZDA	Elemento	Nx (T/m)	Mx (mT/m)	Vx (T/m)	Canto elemento (m.)	Armadura cortante (cm2/m)	Vu1>Vd	Armadura interior (cm2/m)	Armadura exterior (cm2/m)
		126	14.73	-39.70	-17.65	2.20	0.00	Vale	5.89	1.00
		136	31.23	-58.72	-26.22	2.20	0.00	Vale	9.79	1.00
		146	43.64	-76.08	-31.96	2.20	0.00	Vale	13.05	1.00
		156	51.11	-89.21	-34.27	2.20	0.00	Vale	15.30	1.00
		166	54.00	-97.19	-33.04	2.20	0.00	Vale	16.48	1.00
		176	53.46	-100.90	-28.35	2.20	0.00	Vale	16.81	1.00
		186	52.06	-105.60	-21.46	2.20	0.00	Vale	17.16	1.00
		196	65.96	-140.00	-22.47	2.20	0.00	Vale	22.42	1.00
MURO FRONTAL	BIS.DCHA	206	17.13	-9.80	-15.28	0.50	0.00	Vale	7.12	1.00
		216	20.37	-19.28	-18.14	0.50	0.00	Vale	12.53	1.00
MURO FRONTAL	CENTRAL	96	12.69	-23.73	-8.68	2.20	0.00	Vale	3.96	1.00
		106	-24.86	-14.18	-1.40	2.20	0.00	Vale	1.00	1.00
		116	-3.77	-23.14	-8.03	2.20	0.00	Vale	2.02	1.00
		126	14.73	-39.70	-17.65	2.20	0.00	Vale	5.89	1.00
		136	31.23	-58.72	-26.22	2.20	0.00	Vale	9.79	1.00
		146	43.64	-76.08	-31.96	2.20	0.00	Vale	13.05	1.00
		156	51.11	-89.21	-34.27	2.20	0.00	Vale	15.30	1.00
		166	54.00	-97.19	-33.04	2.20	0.00	Vale	16.48	1.00
		176	53.46	-100.90	-28.35	2.20	0.00	Vale	16.81	1.00
		186	52.06	-105.60	-21.46	2.20	0.00	Vale	17.16	1.00

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **ED2-1.8. ALETAS ESTRIBO 2**

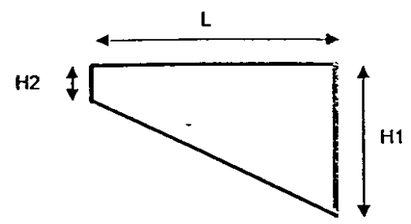
HOJA DE CALCULO DE ALETAS DE ESTRIBOS

DATOS REQUERIDOS:

DIMENSIONES(en metros)

H1= 4.5
H2= 0.5
L= 6

Espesor= 0.5
Recubrim.= 0.05



CARACTERISTICAS DE TERRENO

Peso tierras(T/m3)	γ= 2
Angulo rozamiento interno (°)	φ= 30
Ang. rozamiento tierras muro (°)	δ= 0

COEFICIENTES DE SEGURIDAD

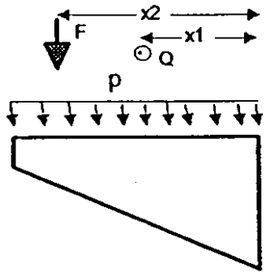
Mayoracion de cargas	γf= 1.5
Minoracion acero	gs= 1.15
Minoracion hormigon	gc= 1.5

CARACTERISTICAS DE LOS MATERIALES

Peso especifico hgon(T/m3)	γη= 2.5
Resistencia acero (T/m2)	Fyk= 51000
Resistencia hormigon (T/m2)	Fck= 2500

CARGAS (valores sin mayorar)

Cargas verticales	
Sobrecarga vertical (t/m)	p= 1
Carga vertical (t.)	F= 0.00
Situacion x2 (m)	x2= 0
Cargas horizontales	
Carga horizontal (t.)	Q= 0
Posicion x1 (m)	x1= 0
Sobrecarga sobre terreno (ton/m2)	
	q= 3



CUANTIAS MINIMAS

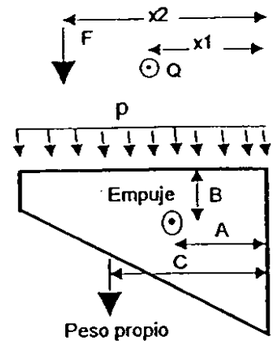
LONGITUDINAL SUPERIOR	0.400 o/oo
LONGITUDINAL INFERIOR	0.400 o/oo
CORTANTE	3.968 CM2/M
HORIZONTAL MUROS ALETA	0.900 o/oo
VERTICAL MUROS ALETA	1.600 o/oo
CORTANTE MUROS	0.000 CM2/M

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **ED2-1.8. ALETAS ESTRIBO 2**

HOJA DE CALCULO DE ALETAS DE ESTRIBOS

CARGAS DE PESO PROPIO Y EMPUJES DE TIERRAS SOBRE ESTRIBO(ton/m. sin mayorar)



COEFICIENTES EMPUJE ACTIVO ALETA

Coef. empuje activo λh=	0.333
Coef. empuje activo λv=	0.000

PESO PROPIO

	Peso	Dist.emp.	Dist. vert.
Peso aux. 1	3.750	3.000	0.250
Peso aux. 2	15.000	2.000	1.833
Peso propio	**18.750**	**2.200**	**1.517**

EMPUJE DE TIERRAS

HORIZONTAL

	Empuje.	Dist.emp.	Dist. vert.
Auxiliar	0.167	4.500	-
Auxiliar	1.500	3.000	-
Auxiliar	13.500	1.500	-
Auxiliar	1.500	4.000	-
Auxiliar	13.500	2.000	-
Empuje hor.	**30.167**	**1.939**	**1.887**

VERTICAL

	Empuje.	Dist.emp.
Empuje aux.1	0.000	4.500
Empuje aux.2	0.000	3.000
Empuje aux.3	0.000	1.500
Empuje aux.4	0.000	4.000
Empuje aux.5	0.000	2.000
Empuje vert.	**0.000**	**0.000**

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **ED2-1.8. ALETAS ESTRIBO 2**

HOJA DE CALCULO DE ALETAS DE ESTRIBOS

CALCULOS

ESFUERZOS DE DISEÑO
(Para cargas verticales, momentos positivos implica tracciones en cara superior)

Acciones	Verticales	Horizontales
M peso propio	41.250	0.000
M empuje hor.	0.000	58.500
M empuje vert.	0.000	0.000
M sobrec.vert.	18.000	0.000
M carga vert.	0.000	0.000
M carga hor.	0.000	0.000
Md (mt)	**88.875**	**87.750**
V peso propio	18.750	0.000
V empuje hor.	0.000	30.167
V empuje vert.	0.000	0.000
V sobrec.vert.	6.000	0.000
V carga vert.	0.000	0.000
V carga hor.	0.000	0.000
Vd (mt)	**37.125**	**45.250**

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **ED2-1.8. ALETAS ESTRIBO 2**

HOJA DE CALCULO DE ALETAS DE ESTRIBOS

CALCULO DE SECCIONES

Fcd	1666.67	
0,85*Fcd	1416.67	
Fcv	64.55	
Es	21000000	
Fyd	44347.83	
FYAD	42000.00	

Acciones	Verticales	Horizontales	
Md(m.t)	88.875	87.750	
Md max/Md med	1.000	1.529	
Md a usar calculo	88.875	134.192	
Canto seccion	4.500	0.500	
Canto util	4.450	0.450	
ancho seccion	0.500	4.500	
Ancho calculo	0.500	4.443	
Def acero	0.010	0.010	
Tension acero	44348	44348	
X	0.028	0.050	
As (cm.2)	**4.518**	**71.212**	
Prof. fibra neutra	0.318	0.076	
Def. hormigon	0.001	0.002	
Comentarios	VALE	VALE	
Vd	37.125	45.250	
Vd compuesto			58.531
Vu1			999.772
Vsu			0.000
Vcu			129.070
Vu2			129.070
Comentarios			
As (cm.2)			**0.000**

NOMBRE PROYECTO : **SUBTRAMO XV**

DESIGNACION ESTRIBO: **ED2-1.8. ALETAS ESTRIBO 2**

HOJA DE CALCULO DE ALETAS DE ESTRIBOS

ARMADO

	Calculo	Minima	total
Long. superior	4.518	9.000	**9.000**
Long inferior	0.000	9.000	**9.000**
Cortante	0.000	23.810	**23.810**
Horizontal trasdos	71.212	13.500	**71.212**
Vertical trasdos	0.000	24.000	**24.000**
Horizontal intrados	0.000	6.750	**6.750**
Vertical intrados	0.000	24.000	**24.000**
Cortante transversal		NO	

TOTAL ENVOLVENTE ARMADURA (CM.2)

Long. superior	**9.000**
Long inferior	**9.000**
Horizontal trasdos	**71.212**
Horizontal intrados	**6.750**
Estribos por rama (2 ramas)	**35.905**

DATOS ARMADO

Separacion maxima barras	0.3
Separacion minima barras	0.1

TOTAL ARMADURAS

	TOTAL	DIAMETRO	A.REAL	AREAL/ANEC	
Long. superior	3.0	20	9.42	1.05	VALE
Long inferior	3.0	20	9.42	1.05	VALE
Horizontal trasdos	23.0	20	72.26	1.01	VALE
Horizontal intrados	21.0	10	16.49	2.44	VALE
Estribos	46.0	10	36.13	1.01	VALE

PUENTE ED2-1.8

5º PROYECTO DE PRUEBA DE CARGA

PRUEBA DE CARGA

OBJETO DE LA PRUEBA

El objeto de la prueba es comprobar la respuesta estructural, frente a situaciones de carga estática, de manera tal que confrontando la respuesta real con la teórica, determinar la fiabilidad del comportamiento en servicio del puente.

Esta prueba de carga se realizará antes de la colocación del balasto, carriles, etc., mediante el empleo de camiones cargados con arena, y servirá para obtener una recepción provisional de la obra. Para la recepción definitiva de la estructura será necesario realizar otra prueba de carga con locomotoras, una vez colocada la infraestructura ferroviaria, que no es objeto del presente documento.

CARGA DE PRUEBA

La prueba se realizará empleando camiones, el la disposición que se adjunta a continuación, de tres ejes separados 3.825 y 1.36 m. con cargas por eje de 7.6, 13.7 y 13.7 T.

APARATOS DE MEDIDA Y MEDICIONES

Para la realización de las mediciones se colocarán flexímetros en el centro del vano (medidas f1) y apoyos (medidas f2). Los valores de los desplazamientos que se adjuntan son los descensos relativos esperados entre los puntos de los vanos y los fijos de los apoyos. Estos valores deben ser del orden de la magnitud del valor f1-f2 medido en obra.

La apreciación mínima de cualquiera de los flexímetros será del orden del 3% de los valores máximos esperados de las magnitudes a medir.

El rango de los aparatos deberá ser como mínimo superior en un 50% a los esperados de dicha magnitud.

Las medidas se realizarán inmediatamente antes de la carga, inmediatamente después de su colocación y a los quince minutos de haberla retirado.

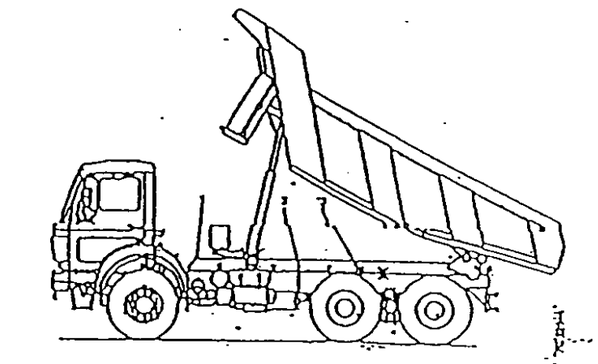
Durante la realización de la prueba se deberá anotar las condiciones climatológicas existentes a lo largo de la misma.

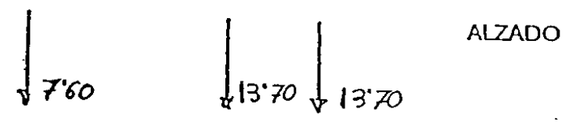
ANALISIS

Para obtener las solicitaciones y desplazamientos verticales en los puntos a medir se procesó la estructura mediante el programa COSMOS/M. El modelo es el mismo usado en el cálculo del tablero. Los esfuerzos que se consiguen son del orden del 30 % de los obtenidos en la realización de una prueba de carga con locomotoras y la infraestructura ferroviaria colocada.

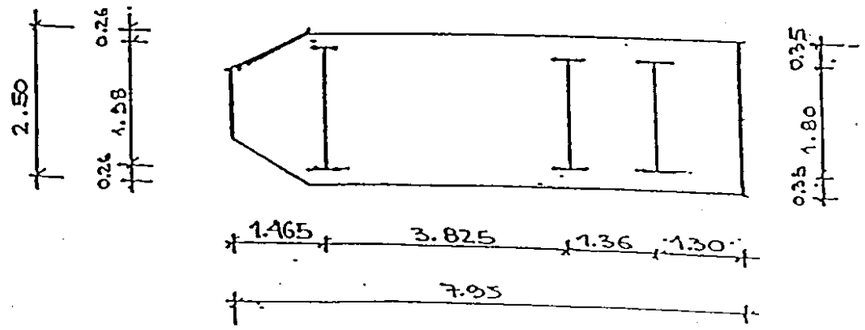
DEFINICION TREN DE CARGAS

CAMION VOLQUETE DE 35 Ton.

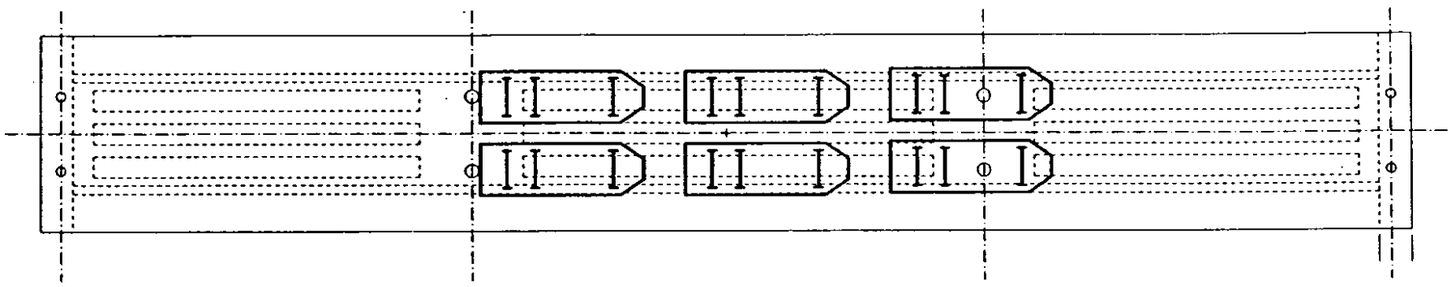




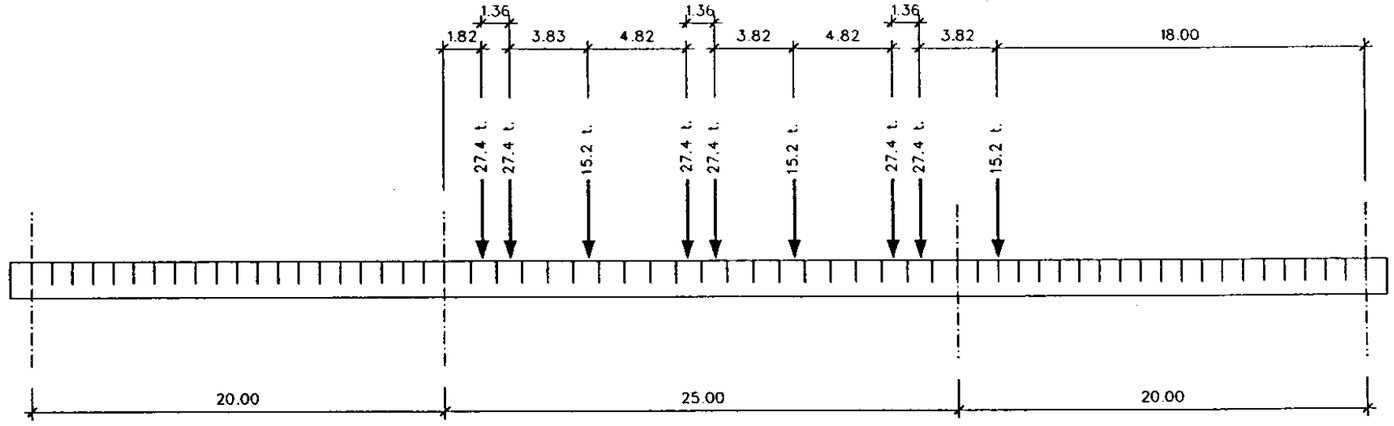
ALZADO



PLANTA



SITUACION EN PLANTA DE CAMIONES EN PRUEBA DE CARGA

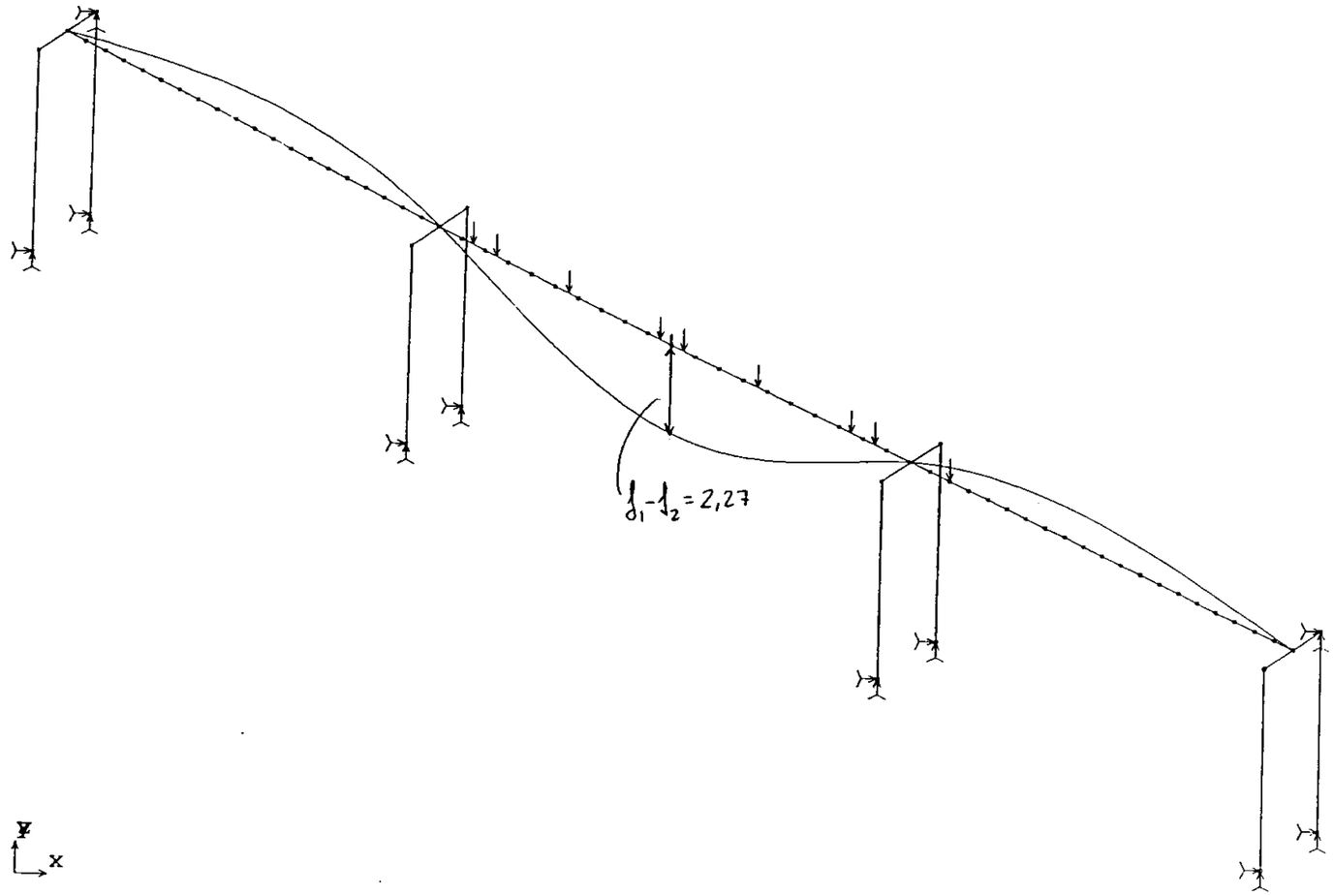


SITUACION EN ALZADO DE EJES DE CAMIONES

ED2-1.8

DESPLAZAMIENTOS VERICALES EN NODOS (mm.)

Node	UZ	Node	UZ
1	0.00	41	0.30
2	0.00	42	0.02
3	-0.11	43	-0.17
4	-0.22	44	-0.33
5	-0.32	45	-0.47
6	-0.42	46	-0.57
7	-0.51	47	-0.66
8	-0.59	48	-0.71
9	-0.67	49	-0.75
10	-0.73	50	-0.77
11	-0.78	51	-0.77
12	-0.81	52	-0.76
13	-0.83	53	-0.72
14	-0.83	54	-0.68
15	-0.81	55	-0.62
16	-0.77	56	-0.55
17	-0.71	57	-0.47
18	-0.62	58	-0.39
19	-0.50	59	-0.30
20	-0.36	60	-0.20
21	-0.19	61	-0.10
22	0.02	62	0.00
23	0.31	63	0.00
24	0.62	64	0.00
25	0.94	65	0.02
26	1.24	66	0.02
27	1.53	67	0.02
28	1.78	68	0.02
29	1.98	69	0.00
30	2.14	70	0.00
31	2.23	71	0.00
32	2.27	72	0.00
33	2.23	73	0.00
34	2.13	74	0.00
35	1.97	75	0.00
36	1.75	76	0.00
37	1.50	77	0.00
38	1.22	78	0.00
39	0.91		
40	0.60		



ED2 - 1.8

PRUEBA DE CARGA DINAMICA

El objeto de la prueba de carga dinámica es el de obtener el valor de los principales parámetros dinámicos de cálculo que presenta la estructura. Es el caso de las frecuencias propias de vibración libre.

La valoración del período o frecuencia de vibración vertical correspondiente al modo fundamental, tiene especial repercusión en el coeficiente de amplificación dinámico al paso de la sobrecarga, utilizado en el cálculo.

Para la obtención de estos parámetros es necesaria la excitación dinámica de la estructura. Esto se obtiene mediante el paso de un camión, a distintas velocidades, sobre un obstáculo colocado en el tablero. Las características del mismo serán las de un tablón de forma redondeada de 50cm por 300cm con un espesor de 6 cm.

Se utilizará un solo vehículo pudiendo ser un camión de 2 o 3 ejes con un peso total suficiente para provocar la respuesta de la estructura con la debida amplitud.

El ensayo consistirá en efectuar algunas pasadas a muy baja velocidad, e ir incrementando la velocidad en escalones de 10 km/h.

La instrumentación a disponer consistirá en anillos extensométricos, para la medida de flechas, para registrar los desplazamientos de cada vano y en dos acelerómetros piezoeléctricos, para la medida de vibraciones, colocados en una de los centros de vanos del puente, de manera de determinar las frecuencias principales de vibración vertical, que deberán coincidir con los valores calculados a continuación.

FUENTE ED2-1.8

```
**********************************************************
**********************************************************
**                              **
**                              **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS   / M    M **
** C   C  O  O  S     MM  MM  O  O  S     /  MM  MM **
** C      O  O  SSSS  M MM M  O  O  SSSS  /  M MM M **
** C   C  O  O     S  M    M  O  O     S  /   M    M **
** CCCC  OOOO  SSSS  M    M  OOOO  SSSS  /    M    M **
**                              **
**                              **
**            VERSION: 2.00              **
**           DISTRIBUTED BY:             **
**   STRUCTURAL RESEARCH AND ANALYSIS CORPORATION    **
**        12121 WILSHIRE BLVD. SUITE 700         **
**       LOS ANGELES,  CALIFORNIA  90025         **
**         TEL. NO.  (310) 207-2800              **
**         COPYRIGHT 1988  S. R. A. C.           **
**                              **
**********************************************************
**********************************************************
Problem name: COEF-I-BC
Date     : 09/11/1998   Time.  18:28:42
Title    :                                        |
Subtitle :

 CONTROL INFORMATION
  NUMBER OF LOAD CASES ..... (NLCASE) =     1
  SOLUTION MODE ..... (MODEX) =     2
    EQ. 0, STATIC ANALYSIS
    EQ. 1, BUCKLING ANALYSIS
    EQ. 2, DYNAMIC ANALYSIS
 THERMAL LOADING FLAG ..... (ITHERM) =     0
    EQ. 0, NO THERMAL EFFECTS CONSIDERED
    EQ. 1, ADD TEMPERATURE EFFECT
 GRAVITY LOADING FLAG ..... (IGRAV) =     0
    EQ. 0, NO GRAVITY LOADING CONSIDERED
    EQ. 1, ADD GRAVITY LOADING EFFECT
 CENTRIFUGAL LOADING FLAG ..... (ICNTRF) =     0
    EQ. 0, NO CENTRIFUGAL LOADING CONSIDERED
    EQ. 1, ADD CENTRIFUGAL LOADING EFFECT
 IN-PLANE STIFFENING FLAG ..... (INPLN) =     0
    EQ. 0, NO IN-PLANE EFFECTS CONSIDERED
    EQ. 1, IN-PLANE EFFECTS CONSIDERED
 SOFT SPRING ADDITION FLAG ..... (ISOFT) =     0
    EQ. 0, NO SOFT SPRING OPTION
    EQ. 1, SOFT SPRING ADDED

 SAVE DECOMPOSED STIFFNESS MATRIX FLAG ... (ISAVK) =     0
    EQ. 0, DO NOT SAVE DECOMPOSED K
    EQ. 1, SAVE DECOMPOSED K
 FORM STIFFNESS MATRIX FLAG ..... (IFORMK) =     0
    EQ. 0, FORM STIFFNESS MATRIX
    EQ. 1, USE EXISTING DECOMPOSED STIFFNESS MATRIX

 SPIN SOFTENING FLAG ..... (ISPIN) =     0
    EQ. 0, NO SPIN SOFTENING EFFECTS CONSIDERED
    EQ. 1, SPIN SOFTENING EFFECTS CONSIDERED
 INERTIA RELIEF FLAG ..... (IFORMK) =     0
    EQ. 0, NO INERITA RELIEF EFFECTS CONSIDERED
    EQ. 1, INERITA RELIEF EFFECTS CONSIDERED
 RIGID CONNECTIONS FLAG ..... (IRIGID) =     0
    EQ. 0, HINGE CONNECTIONS BETWEEN SOLIDS & SHELLS
```

EQ. 1, RIGID CONNECTIONS BETWEEN SOLIDS & SHELLS

```
 TOTAL SYSTEM DATA
  NUMBER OF EQUATIONS ..... (NEQ) =     389
  NUMBER OF MATRIX ELEMENTS ..... (NWK) =    3624
  MAXIMUM HALF BANDWIDTH ..... (MK ) =      18
  MEAN HALF BANDWIDTH ..... (MM ) =       9
  NUMBER OF ELEMENTS..... (NUME) =      68
  NUMBER OF NODAL POINTS..... (NUMNP)=      70
  ADJUSTED BLOCK SIZE ..... (MTBLK)=    3625
  EXTRA MEMORY AVAILABLE (in 8-byte words) . . (XMTBLK)=  4666927
  NUMBER OF STIFFNESS BLOCKS..... (NBLK) =       1


  MAXIMUM DIAGONAL STIFFNESS MATRIX VALUE =  .163732E+11 (   137)
  MINIMUM DIAGONAL STIFFNESS MATRIX VALUE =  .238694E+08 (   237)
1

 ------------------------------------------------------
 |      MASS MOMENT INFORMATION                       |
 |----------------------------------------------------|
 |MASS    .130785E+03 |VOLUME  .149118E+05 |WEIGHT  .000000E+00 |
 |----------------------------------------------------|
 | MASS MOMENT OF INERTIA W.R.T. C.G.                 |
 |----------------------------------------------------|
 |IX     .178872E+05 |IY     .281723E+05 |IZ     .466401E+05 |
 |----------------------------------------------------|
 | MASS PRODUCT OF INERTIA W.R.T. C.G.                |
 |----------------------------------------------------|
 |PXY    -.221198E+05 |PXZ    .000000E+00 |PYZ    .000000E+00 |
 |----------------------------------------------------|
 | RADII OF GYRATION W.R.T. C.G.                      |
 |----------------------------------------------------|
 |RX     .116948E+02 |RY     .146768E+02 |RZ     .188843E+02 |
 |----------------------------------------------------|
 | CENTER OF GRAVITY                                  |
 |----------------------------------------------------|
 |CGx    .225734E+04 |CGy    .584104E+04 |CGz    .000000E+00 |
 |----------------------------------------------------|
 | PRINCIPAL MASS MOMENT OF INERTIA                   |
 |----------------------------------------------------|
 |P1     .466401E+05 |P2     .457395E+05 |P3     .320058E+03 |
 |----------------------------------------------------|
 | PRINCIPAL RADII OF GYRATION                        |
 |----------------------------------------------------|
 |R1     .188843E+02 |R2     .187011E+02 |R3     .156435E+01 |
 |----------------------------------------------------|
 | PRINCIPAL AXES (DIRECTION COSINES IN ROWS W.R.T C.G)|
 |----------------------------------------------------|
 |N_11   .640893E+00 |N_12   .767631E+00 |N_13   .000000E+00 |
 |----------------------------------------------------|
 |N_21   .621913E+00 |N_22   .783086E+00 |N_23   .000000E+00 |
 |----------------------------------------------------|
 |N_31   .000000E+00 |N_32   .000000E+00 |N_33   .244742E-01 |
 ------------------------------------------------------
```

Note: In the above table, WEIGHT is computed based on the user defined acceleration for the first active Load Case

```
 SOLUTION PARAMETERS
  NUMBER OF EIGENVALUES..... (NFR)=       2
  MASS TYPE: 1-LUMPED,2-CONSISTENT.... (MASS)=       1
  MODE SHAPE PRINT FLAG..... (MPRNT)=       1
  INTERMEDIATE SOLUTION PRINT FLAG .... (IFPR)=       0
  STURM SEQUENCE CHECK FLAG..... (IFSS)=       0
  MAXIMUM NUMBER OF ITERATIONS ..... (ITMAX)=      16
  FREQUENCY SHIFT FLAG ..... (IFRSH)=       0
  FREQUENCY SHIFT..... (FRSH)=  .0000000E+00
  CONVERGENCE TOLERANCE..... (RTOL)=  .1000000E-04
  COMPOSITE MODAL DAMPING CALC. FLAG . . (IMDC)=       0
  MODAL ACCELERATION FLAG..... (IMAM)=       0


 SUBSPACE ITERATION

  ITERATION NUMBER   1

  ITERATION NUMBER   2

  ITERATION NUMBER   3

  ITERATION NUMBER   4

  ITERATION NUMBER   5

 CONVERGENCE REACHED FOR RTOL  .1000E-04


 FREQUENCY ANALYSIS
         by
 SUBSPACE ALGORITHM


   FREQUENCY     FREQUENCY     FREQUENCY     PERIOD
    NUMBER       (RAD/SEC)   (CYCLES/SEC)  (SECONDS)

       1      .3922237E+02   .6242434E+01  .1601939E+00
       2      .5995821E+02   .9542645E+01  .1047928E+00


  MODE SHAPE NO.  1

    NODE  X-DISPLACEMENT  Y-DISPLACEMENT  Z-DISPLACEMENT  X - ROTATION
 Y - ROTATION   Z - ROTATION

       1  .0000000E+00   .0000000E+00   .0000000E+00   .0000000E+00   .0000000E+00
 .0000000E+00
       2  .7791574E-08  -.1866058E-07  -.4896766E-05   .8771424E-02   .1076603E-01
 .4981846E-07
       3  .1660941E-05   .1976013E-05  -.1384079E-01   .8698961E-02   .1064598E-01
 .4932039E-05
       4  .6036582E-05   .7223726E-05  -.2739438E-01   .8439463E-02   .1030218E-01
 .8529444E-05
       5  .1227164E-04   .1470585E-04  -.4036306E-01   .7983329E-02   .9723398E-02
 .1074855E-04
```

6 .1954135E-04 .2343843E-04 -.5246553E-01 .7350589E-02 .8933433E-02 .1177410E-04
7 .2711311E-04 .3252962E-04 -.6342377E-01 .6553926E-02 .7947030E-02 .1171003E-04
8 .3430994E-04 .4119712E-04 -.7298886E-01 .5608604E-02 .6783289E-02 .1068434E-04
9 .4060090E-04 .4875711E-04 -.8095727E-01 .4531529E-02 .5460570E-02 .8856034E-05
10 .4549017E-04 .5465912E-04 -.8712290E-01 .3343873E-02 .4006590E-02 .6394196E-05
11 .4865897E-04 .5849087E-04 -.9134370E-01 .2065347E-02 .2443130E-02 .3488978E-05
12 .4987504E-04 .5998414E-04 -.9348809E-01 .7206125E-03 .8014358E-03 .3409510E-06
13 .4905707E-04 .5902830E-04 -.9347343E-01 -.6683530E-03 -.8932796E-03 -.2842484E-05
14 .4625608E-04 .5568282E-04 -.9125291E-01 -.2074014E-02 -.2607937E-02 -.5841943E-05
15 .4165458E-04 .5015872E-04 -.8681522E-01 -.3475600E-02 -.4316548E-02 -.8458061E-05
16 .3555659E-04 .4282453E-04 -.8017900E-01 -.4850622E-02 -.5992812E-02 -.1048686E-04
17 .2840968E-04 .3422686E-04 -.7141963E-01 -.6174408E-02 -.7607448E-02 -.1173339E-04
18 .2076712E-04 .2502451E-04 -.6062820E-01 -.7428899E-02 -.9137979E-02 -.1203158E-04
19 .1327593E-04 .1599513E-04 -.4791393E-01 -.8598558E-02 -.1056533E-01 -.1123286E-04
20 .6681357E-05 .8045405E-05 -.3343550E-01 -.9668063E-02 -.1187111E-01 -.9213922E-05
21 .1908315E-05 .2286874E-05 -.1737837E-01 -.1058925E-01 -.1299624E-01 -.5520323E-05
22 .5601600E-08 .6066616E-08 .1430927E-04 -.1136589E-01 -.1394559E-01 -.1999068E-06
23 -.6802795E-05 -.8359761E-05 .2322579E-01 -.1203951E-01 -.1474261E-01 -.1634492E-04
24 -.2475336E-04 -.3031890E-04 .4729123E-01 -.1224173E-01 -.1496574E-01 -.2829998E-04
25 -.5047741E-04 -.6174226E-04 .7126308E-01 -.1195879E-01 -.1459806E-01 -.3592086E-04
26 -.8053590E-04 -.9850355E-04 .9417772E-01 -.1121442E-01 -.1366930E-01 -.3940434E-04
27 -.1117971E-03 -.1367671E-03 .1151706E+00 -.1005067E-01 -.1222988E-01 -.3912086E-04
28 -.1415270E-03 -.1731645E-03 .1335010E+00 -.8516984E-02 -.1033931E-01 -.3552802E-04
29 -.1672103E-03 -.2047039E-03 .1484600E+00 -.6677055E-02 -.8077060E-02 -.2917325E-04
30 -.1869995E-03 -.2290322E-03 .1595401E+00 -.4597920E-02 -.5522153E-02 -.2067184E-04
31 -.1994158E-03 -.2443675E-03 .1663255E+00 -.2357788E-02 -.2771770E-02 -.1071136E-04
32 -.2036040E-03 -.2496451E-03 .1685830E+00 -.3513198E-04 .7699263E-04 -.3845829E-08
33 -.1992846E-03 -.2444881E-03 .1662328E+00 .2286054E-02 .2923952E-02 .1070122E-04
34 -.1867767E-03 -.2292594E-03 .1593661E+00 .4522982E-02 .5665222E-02 .2066168E-04
35 -.1669321E-03 -.2050304E-03 .1482248E+00 .6596606E-02 .8206597E-02 .2916031E-04
36 -.1412100E-03 -.1734815E-03 .1331971E+00 .8434306E-02 .1045438E-01 .3552901E-04
37 -.1115227E-03 -.1370839E-03 .1148453E+00 .9962680E-02 .1232217E-01 .3912586E-04
38 -.8030926E-04 -.9871258E-04 .9382748E-01 .1112387E-01 .1373566E-01 .3941457E-04
39 -.5034462E-04 -.6186859E-04 .7094092E-01 .1186564E-01 .1463137E-01 .3593134E-04
40 -.2474184E-04 -.3035768E-04 .4704256E-01 .1214864E-01 .1495989E-01 .2831160E-04
41 -.6838620E-05 -.8346750E-05 .2307978E-01 .1194972E-01 .1469322E-01 .1635645E-04
42 .4989357E-08 .7526055E-08 -.4805180E-05 .1128194E-01 .1384746E-01 .1983919E-06
43 .1804254E-05 .2263524E-05 -.1724869E-01 .1049395E-01 .1287494E-01 .5357443E-05
44 .6342628E-05 .7930648E-05 -.3313876E-01 .9570094E-02 .1173548E-01 .8947696E-05
45 .1263806E-04 .1577509E-04 -.4746032E-01 .8508849E-02 .1042482E-01 .1094804E-04
46 .1979693E-04 .2470277E-04 -.6001008E-01 .7353140E-02 .8997786E-02 .1174839E-04
47 .2711323E-04 .3382606E-04 -.7065681E-01 .6116256E-02 .7469882E-02 .1147259E-04
48 .3394649E-04 .4235821E-04 -.7927754E-01 .4815193E-02 .5863005E-02 .1026574E-04
49 .3977613E-04 .4965129E-04 -.8579816E-01 .3466274E-02 .4197651E-02 .8292501E-05
50 .4417963E-04 .5516725E-04 -.9015215E-01 .2091851E-02 .2500518E-02 .5741265E-05
51 .4685276E-04 .5853037E-04 -.9231541E-01 .7141460E-03 .8004187E-03 .2808245E-05
52 .4762688E-04 .5952353E-04 -.9230224E-01 -.6461481E-03 -.8781532E-03 -.3044365E-06
53 .4645459E-04 .5808737E-04 -.9016168E-01 -.1962542E-02 -.2501750E-02 -.3382455E-05
54 .4342565E-04 .5431405E-04 -.8597595E-01 -.3216664E-02 -.4044680E-02 -.6234164E-05
55 .3873521E-04 .4847833E-04 -.7986882E-01 -.4382976E-02 -.5479534E-02 -.8647066E-05
56 .3274081E-04 .4098616E-04 -.7200609E-01 -.5441620E-02 -.6777823E-02 -.1044275E-04
57 .2585375E-04 .3237813E-04 -.6255424E-01 -.6375549E-02 -.7919932E-02 -.1145014E-04
58 .1863622E-04 .2334004E-04 -.5174600E-01 -.7166553E-02 -.8882100E-02 -.1151765E-04
59 .1170358E-04 .1465954E-04 -.3981660E-01 -.7800779E-02 -.9647497E-02 -.1051629E-04
60 .5756098E-05 .7204798E-05 -.2701711E-01 -.8267398E-02 -.1020202E-01 -.8342255E-05
61 .1586203E-05 .1979278E-05 -.1366067E-01 -.8547306E-02 -.1052279E-01 -.4835112E-05
62 -.5926977E-08 -.7718191E-08 -.1572774E-05 -.8648027E-02 -.1061916E-01 -.5215003E-07
63 .0000000E+00 .0000000E+00 .0000000E+00 .8771809E-02 .1076571E-01 .0000000E+00
64 .0000000E+00 .0000000E+00 .0000000E+00 .8771015E-02 .1076636E-01 -.3976943E-07
65 .0000000E+00 .0000000E+00 .0000000E+00 -.1136632E-01 -.1394524E-01 .1003810E-06
66 .0000000E+00 .0000000E+00 .0000000E+00 -.1136543E-01 -.1394596E-01 .9953179E-07
67 .0000000E+00 .0000000E+00 .0000000E+00 .1128149E-01 .1384782E-01 -.9993252E-07
68 .0000000E+00 .0000000E+00 .0000000E+00 .1128240E-01 .1384708E-01 -.9845650E-07
69 .0000000E+00 .0000000E+00 .0000000E+00 -.8647643E-02 -.1061947E-01 .2630697E-07
70 .0000000E+00 .0000000E+00 .0000000E+00 -.8648431E-02 -.1061883E-01 .2584351E-07

MODE SHAPE NO. 2

NODE X-DISPLACEMENT Y-DISPLACEMENT Z-DISPLACEMENT X-ROTATION Y-ROTATION Z-ROTATION

1 .0000000E+00 .0000000E+00 .0000000E+00 .0000000E+00 .0000000E+00 .0000000E+00
2 -.7550777E-07 .2147984E-07 .1012978E-04 -.1734587E-01 -.2129029E-01 -.2006856E-06
3 -.6677862E-05 -.7976529E-05 .2733788E-01 -.1713396E-01 -.2097938E-01 -.1967794E-04
4 -.2404440E-04 -.2884793E-04 .5390328E-01 -.1642017E-01 -.2006805E-01 -.3376280E-04
5 -.4863738E-04 -.5840237E-04 .7890489E-01 -.1519035E-01 -.1854007E-01 -.4230466E-04
6 -.7711779E-04 -.9264721E-04 .1016102E+00 -.1351545E-01 -.1647994E-01 -.4595149E-04
7 -.1064897E-03 -.1279499E-03 .1213442E+00 -.1145186E-01 -.1395399E-01 -.4517744E-04
8 -.1340431E-03 -.1611518E-03 .1375445E+00 -.9067549E-02 -.1104581E-01 -.4057026E-04
9 -.1576582E-03 -.1895676E-03 .1497951E+00 -.6438925E-02 -.7842247E-02 -.3282738E-04
10 -.1754559E-03 -.2110688E-03 .1577588E+00 -.3655717E-02 -.4456603E-02 -.2271028E-04
11 -.1862584E-03 -.2241587E-03 .1612827E+00 -.8060302E-03 -.9903900E-03 -.1102983E-04
12 -.1893095E-03 -.2279403E-03 .1603330E+00 .2010337E-02 .2432735E-02 .1354655E-05
13 -.1844481E-03 -.2221897E-03 .1550328E+00 .4700330E-02 .5703120E-02 .1359620E-04
14 -.1720623E-03 -.2073695E-03 .1456743E+00 .7162510E-02 .8698703E-02 .2482171E-04
15 -.1530606E-03 -.1845240E-03 .1326690E+00 .9312188E-02 .1131542E-01 .3425471E-04
16 -.1287980E-03 -.1553101E-03 .1165609E+00 .1106572E-01 .1345329E-01 .4114585E-04
17 -.1011544E-03 -.1220296E-03 .9806878E-01 .1234411E-01 .1501758E-01 .4481203E-04
18 -.7237539E-04 -.8734939E-04 .7797686E-01 .1308517E-01 .1593247E-01 .4469230E-04
19 -.4500888E-04 -.5433058E-04 .5714865E-01 .1323674E-01 .1613431E-01 .4031368E-04
20 -.2190661E-04 -.2644774E-04 .3656515E-01 .1275793E-01 .1557314E-01 .3131674E-04
21 -.5976825E-05 -.7193422E-05 .1719340E-01 .1166457E-01 .1426775E-01 .1785511E-04
22 .4733099E-07 .5797427E-07 -.9577953E-05 .9988289E-02 .1225531E-01 .2306591E-06
23 .1887036E-05 .2345394E-05 -.1736588E-01 .7576495E-02 .9298517E-02 .4160597E-05
24 .5850277E-05 .7212274E-05 -.2998143E-01 .5188037E-02 .6373122E-02 .5612203E-05
25 .1007412E-04 .1240396E-04 -.3792885E-01 .2858274E-02 .3518032E-02 .4883373E-05
26 .1327692E-04 .1634822E-04 -.4143933E-01 .7120265E-03 .8884879E-03 .3105197E-05
27 .1478906E-04 .1822765E-04 -.4092629E-01 -.1205207E-02 -.1460860E-02 .6857059E-06

28 .1426811E-04 .1762750E-04 -.3688224E-01 -.2848935E-02 -.3476654E-02 -.1958397E-05
29 .1170861E-04 .1451624E-04 -.2990308E-01 -.4171751E-02 -.5098665E-02 -.4430510E-05
30 .7370423E-05 .9233196E-05 -.2064565E-01 -.5137087E-02 -.6283837E-02 -.6389327E-05
31 .1784162E-05 .2407536E-05 -.9861461E-02 -.5714416E-02 -.6993965E-02 -.7575397E-05
32 -.4364659E-05 -.5139248E-05 .1669814E-02 -.5887137E-02 -.7207946E-02 -.7833541E-05
33 -.1033259E-04 -.1246425E-04 .1313962E-01 -.5650512E-02 -.6919858E-02 -.7120523E-05
34 -.1535899E-04 -.1865900E-04 .2373697E-01 -.5013678E-02 -.6140881E-02 -.5512454E-05
35 -.1882734E-04 -.2293233E-04 .3270001E-01 -.3997939E-02 -.4896181E-02 -.3198649E-05
36 -.2026705E-04 -.2474320E-04 .3931001E-01 -.2633802E-02 -.3225000E-02 -.4590422E-06
37 -.1950606E-04 -.2383664E-04 .4291095E-01 -.9659010E-03 -.1178946E-02 .2327973E-05
38 -.1665721E-04 -.2036933E-04 .4294865E-01 .9613839E-03 .1184373E-02 .4753543E-05
39 -.1218888E-04 -.1490444E-04 .3896148E-01 .3096431E-02 .3803700E-02 .6373818E-05
40 -.6896288E-05 -.8423148E-05 .3058017E-01 .5394618E-02 .6622651E-02 .6776941E-05
41 -.2192468E-05 -.2661414E-05 .1760638E-01 .7731910E-02 .9490609E-02 .4825058E-05
42 -.4699137E-07 -.5697167E-07 -.7244277E-05 .1007703E-01 .1236856E-01 .2351531E-06
43 .5800713E-05 .7244095E-05 -.1729952E-01 .1165441E-01 .1434083E-01 .1771393E-04
44 .2127148E-04 .2654095E-04 -.3666499E-01 .1265635E-01 .1559743E-01 .3097045E-04
45 .4368878E-04 .5443320E-04 -.5717272E-01 .1305892E-01 .1611081E-01 .3977253E-04
46 .7014764E-04 .8739519E-04 -.7783245E-01 .1285534E-01 .1587151E-01 .4403221E-04
47 .9794516E-04 .1220205E-03 -.9772064E-01 .1208570E-01 .1492881E-01 .4411126E-04
48 .1245572E-03 .1552175E-03 -.1159599E+00 .1080229E-01 .1334799E-01 .4047531E-04
49 .1478704E-03 .1843604E-03 -.1318093E+00 .9065151E-02 .1120352E-01 .3367998E-04
50 .1661115E-03 .2071830E-03 -.1445849E+00 .6948312E-02 .8585904E-02 .2438626E-04
51 .1779221E-03 .2220202E-03 -.1537390E+00 .4533065E-02 .5598045E-02 .1332909E-04
52 .1824780E-03 .2278007E-03 -.1588759E+00 .1902493E-02 .2341107E-02 .1282586E-05
53 .1794128E-03 .2240721E-03 -.1597148E+00 -.8456965E-03 -.1062187E-02 -.1089386E-04
54 .1689136E-03 .2110256E-03 -.1561413E+00 -.3627592E-02 -.4501547E-02 -.2239634E-04
55 .1516547E-03 .1895600E-03 -.1481827E+00 -.6343430E-02 -.7862415E-02 -.3234879E-04
56 .1289326E-03 .1611888E-03 -.1360294E+00 -.8906382E-02 -.1102754E-01 -.3996015E-04
57 .1023509E-03 .1279893E-03 -.1199597E+00 -.1123827E-01 -.1390342E-01 -.4448493E-04
58 .7413061E-04 .9268646E-04 -.1004372E+00 -.1326118E-01 -.1639000E-01 -.4524000E-04
59 .4676804E-04 .5846020E-04 -.7800064E-01 -.1491195E-01 -.1840951E-01 -.4164332E-04
60 .2312635E-04 .2887148E-04 -.5327092E-01 -.1614026E-01 -.1989747E-01 -.3321911E-04
61 .6442321E-05 .8004012E-05 -.2703766E-01 -.1687894E-01 -.2077159E-01 -.1939491E-04
62 .1929115E-07 .2293481E-07 -.3558091E-05 -.1713712E-01 -.2104315E-01 -.2109463E-06
63 .0000000E+00 .0000000E+00 .0000000E+00 -.1734693E-01 -.2128943E-01 .0000000E+00
64 .0000000E+00 .0000000E+00 .0000000E+00 -.1734478E-01 -.2129118E-01 .1604382E-06
65 .0000000E+00 .0000000E+00 .0000000E+00 .9986729E-02 .1225658E-01 -.1152509E-06
66 .0000000E+00 .0000000E+00 .0000000E+00 .9989818E-02 .1225407E-01 -.1153557E-06
67 .0000000E+00 .0000000E+00 .0000000E+00 .1007855E-01 .1236733E-01 -.1179584E-06
68 .0000000E+00 .0000000E+00 .0000000E+00 .1007554E-01 .1236977E-01 -.1172157E-06
69 .0000000E+00 .0000000E+00 .0000000E+00 -.1713607E-01 -.2104401E-01 .1058685E-06
70 .0000000E+00 .0000000E+00 .0000000E+00 -.1713820E-01 -.2104227E-01 .1050755E-06

SOLUTION TIME LOG (sec)

INPUT PHASE	2
ASSEMBLAGE OF THE STIFFNESS MATRIX	0
ASSEMBLAGE OF THE MASS MATRIX	0
DECOMPOSITION OF THE STIFFNESS MATRIX	0
EIGENVALUE SOLUTION	0
OUTPUT PHASE	0
TOTAL SOLUTION TIME	2

ANEXO 1

COMPROBACION DEL ESTADO LIMITE ULTIMO DE FATIGA EN PUENTES DE FERROCARRIL.

Se ha realizado una comprobación del Estado Limite Ultimo de Fatiga según lo indicado en el articulo 4.3.7 del Eurocodigo 2 parte 2.

Esta comprobación se ha realizado en las estructuras E-1502.0 y E-1508.5 El resultado de la comprobación es que los puentes verifican holgadamente este Estado Limite.

Las estructuras seleccionadas para la comprobación representan al conjunto de puentes proyectados, ya que son las que tienen mayores luces dentro de su tipología.

COMPROBACION DEL ESTADO LIMITE DE FATIGA SEGÚN ENV-2:1992

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

SECCION CENTRAL DE VANO INTERMEDIO

Los esfuerzos actuantes son los siguientes:

Hipotesis	N(t.)	M(m.t.)
Peso propio	0	604
Carga muerta	0	289
Pretensado t=inf.	2559	-1187
Valor. frec. gradiente	0	116
Carga trafico LM71	0	748

Calculos auxiliares :

Distancia de c.d.g a fibra sup. v(m.)= 0.69

		Familia 1	Familia 2
Dist. de pretensado a fibra sup.	dp,sup(m.)=	1.28	
Area de tendones	Ap(cm2)=	212.8	
	N,t=inf	2559	
Predeformacion de pretensado	t=inf.	0.0063	
Momento isostatico pret.	Misos,t=inf	-1510	

Momento isostatico total Misos= -1510 m.t.
Momento hiperestatico total Mhip= 323 m.t.

Esfuerzos a introducir en el programa FAGUS:

Hipotesis	N(t.)	M(m.t.)
Combinacion sin SC trafico	2559	1332
Combinacion con SC trafico	2559	2080

Comprobación del hormigón:

Sc,max= 5.39 N/mm2
Sc,min= 4.64 N/mm2
Fcd= 26.7 N/mm2

Sx,max/Fcd= 0.20
0.5 + 0.45*Sc,min/Fcd= 0.58

Sx,max/Fcd < 0.5 + 0.45*Sc,min/Fcd vale
0.5 + 0.45*Sc,min/Fcd < 0.9 vale

Comprobación del acero activo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

Hay que comprobar :

$\Delta\sigma s,equ < \Delta\sigma rsk(N^*)/ \gamma s,fat$

$\Delta\sigma rsk(N^*)$= 120 N/mm2 para tendones en curvos en vaina de acero
$\gamma s,fat$= 1.15
$\Delta\sigma s,equ = \lambda . \Delta\sigma,71$

$\Delta\sigma,71$ = rango tensional del acero producido por el tren tipo LM71
$\lambda = \lambda 1 . \lambda 2 . \lambda 3 . \lambda 4$

$\lambda 1$ = 0.65 $\lambda 3$ = 1.00
$\lambda 2$= 1.00 $\lambda 4$= 1.00

$\Delta\sigma,71$= 11 N/mm2
$\Delta\sigma s,equ$ = 7.2 N/mm2

Entonces $\Delta\sigma s,equ < \Delta\sigma rsk(N^*)$ vale

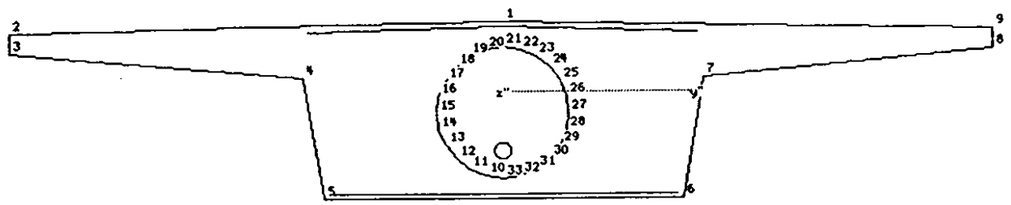
Comprobación del acero pasivo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

$\Delta\sigma s$ = 4 N/mm2

Como $\Delta\sigma s < 70$ N/mm2 la resistencia a fatiga es suficiente

Mstb. 1 : 60.0



Sección :"VANO1-11" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			
Puntos aligeramiento: 10			-16.82	-152.78	
11	-32.50	-146.29	12	-45.96	-135.96
13	-56.29	-122.50	14	-62.78	-106.82
15	-65.00	-90.00	16	-62.78	-73.18
17	-56.29	-57.50	18	-45.96	-44.04
19	-32.50	-33.71	20	-16.82	-27.21
21	0.00	-25.00	22	16.82	-27.21
23	32.50	-33.71	24	45.96	-44.04
25	56.29	-57.50	26	62.78	-73.18
27	65.00	-90.00	28	62.78	-106.82
29	56.29	-122.50	30	45.96	-135.96
31	32.50	-146.29	32	16.82	-152.78
33	0.00	-155.00			

Características mecánicas de la sección:
Area : Ax= 7.173 [m2]
Momentos de inercia : Iy= 2.029 [m4] Iz= 28.311 [m4]
Inercia a torsión : Ix= 8.188 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.691547 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.960	0.831
dch.	Iz	4.750	5.960	-0.831
abajo	Iy	-1.058	-1.917	0.409
arriba	Iy	0.692	2.935	-0.267

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	212.80	0.00	-128.00		
2	AEH500	(2)	114.30	-170.00	-170.00	170.00	-170.00
3	AEH500	(2)	40.80	-190.00	-10.00	0.00	-5.00

4	AEH500	(2)	40.80	190.00	-10.00	0.00	-5.00

Total: 408.70 Cuantía de armadura: 0.570 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	6.300E-0003				

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [N/mm2]	0.85*fcd,fyd [N/mm2]	eps-fc [o/oo]	fct [N/mm2]	fcv [N/mm2]	fcw,mín [N/mm2]
"H400"	38000.0	-22.660	-2.000	0.0	0.817000	40.000
"AEH500"	210000.0	443.470				
"A1900"	200000.0	1554.000				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Comprobación de las tensiones en el estado II: Viga "VANO1-11"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				1332.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	175.00	-175.00	-0.122	-4.643	-5.020	"H400"
Armadura-Min	170.00	-170.00	-0.121	-25.388		"AEH500"
Hormigón-Max	-0.00	0.00	-0.077	-2.941	-2.901	"H400"
Armadura-Max	-0.00	-5.00	-0.079	-16.522		"AEH500"

Esfuerzos : Rigideces secantes: Deformaciones:

N =	0.000 [t]	*EAx=	--1--	[t]	-9.509188E-05
My=	1332.000 [tm]	Ely=	--1--	[tm2]	-2.558919E-05 [1/m]
Mz=	0.000 [tm]	*Elz=	--1--	[tm2]	3.709376E-21 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
2	-170.000	-170.000	-0.121	-25.39
	170.000	-170.000	-0.121	-25.39
3	-190.000	-10.000	-0.080	-16.79
	0.000	-5.000	-0.079	-16.52
4	190.000	-10.000	-0.080	-16.79
	0.000	-5.000	-0.079	-16.52

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -2681.280 [t] Myp= -1577.806 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-128.000	6.300	-0.110	6.190	-22.030	1237.970

Comprobación de las tensiones en el estado II: Viga "VANO1-11"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				2080.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	-0.00	0.00	-0.142	-5.397	-5.450	"H400"
Armadura-Min	-0.00	-5.00	-0.139	-29.132		"AEH500"
Hormigón-Max	-175.00	-175.00	-0.026	-1.005	-1.119	"H400"
Armadura-Max	-170.00	-170.00	-0.030	-6.248		"AEH500"

Esfuerzos : Rigideces secantes: Deformaciones:

N =	0.000 [t]	*EAx=	--1--	[t]	-9.635373E-05
My=	2080.000 [tm]	Ely=	--1--	[tm2]	6.604421E-05 [1/m]
Mz=	0.000 [tm]	*Elz=	--1--	[tm2]	-1.865099E-21 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
2	-170.000	-170.000	-0.030	-6.25
	170.000	-170.000	-0.030	-6.25
3	-190.000	-10.000	-0.135	-28.44
	0.000	-5.000	-0.139	-29.13
4	190.000	-10.000	-0.135	-28.44
	0.000	-5.000	-0.139	-29.13

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -2681.280 [t] Myp= -1577.806 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-128.000	6.300	-0.057	6.243	-11.498	1248.502

COMPROBACION DEL ESTADO LIMITE DE FATIGA SEGÚN ENV-2:1992

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

VANO 2. SECCION DE APOYOS

Los esfuerzos actuantes son los siguientes:

Hipotesis	N(t.)	M(m.t.)
Peso propio	0	-1000
Carga muerta	0	-499
Pretensado t=inf.	2479	1457
Valor. frec. gradiente	0	0
Carga trafico LM71	0	-911

Calculos auxiliares :

Distancia de c.d.g a fibra sup. v(m.)= 0.727

		Familia 1	Familia 2
Dist. de pretensado a fibra sup.	dp,sup(m.)=	0.4	
Area de tendones	Ap(cm2)=	212.8	
	N,t=inf	2479	
Predeformacion de pretensado	t=inf.	0.0061	
Momento isostatico pret.	Misos,t=inf	811	

Momento isostatico total Misos= 811 m.t.
Momento hiperestatico total Mhip= 646 m.t.

Esfuerzos a introducir en el programa FAGUS:

Hipotesis	N(t.)	M(m.t.)
Combinacion sin SC trafico	2479	-852
Combinacion con SC trafico	2479	-1763

Comprobación del hormigón:

Sc,max= 7.09 N/mm2
Sc,min= 3.03 N/mm2
Fcd= 26.7 N/mm2

Sx,max/Fcd= 0.27
0.5 + 0.45*Sc,min/Fcd= 0.55

Sx,max/Fcd < 0.5 + 0.45*Sc,min/Fcd vale
0.5 + 0.45*Sc,min/Fcd < 0.9 vale

Comprobación del acero activo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

Hay que comprobar :

$\Delta\sigma s,equ < \Delta\sigma rsk(N^*)/ \gamma s,fat$

$\Delta\sigma rsk(N^*)$= 120 N/mm2 para tendones en curvos en vaina de acero
$\gamma s,fat$= 1.15
$\Delta\sigma s,equ = \lambda . \Delta\sigma,71$

$\Delta\sigma,71$ = rango tensional del acero producido por el tren tipo LM71
$\lambda = \lambda 1 . \lambda 2 . \lambda 3 . \lambda 4$

$\lambda 1$ = 0.7 $\lambda 3$ = 1.00
$\lambda 2$= 1.00 $\lambda 4$= 1.00

$\Delta\sigma,71$= 7 N/mm2
$\Delta\sigma s,equ$ = 4.9 N/mm2

Entonces $\Delta\sigma s,equ < \Delta\sigma rsk(N^*)$ vale

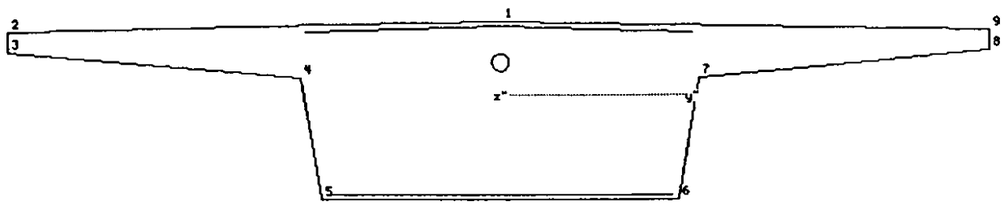
Comprobación del acero pasivo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

$\Delta\sigma s$ = 21.4 N/mm2

Como $\Delta\sigma s$ < 70 N/mm2 la resistencia a fatiga es suficiente

Mstb. 1 : 60.0



Sección :"APOYO-P1" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			

Características mecánicas de la sección:
Area : Ax= 8.485 [m2]
Momentos de inercia : Iy= 2.215 [m4] Iz= 28.448 [m4]
Inercia a torsión : Ix= 11.458 [m4] (de un círculo del mismo área)
Posición del centro de gravedad: ys= 0.000 [m] zs=-0.723786 [m]

I:		R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.989	0.706
dch.	Iz	4.750	5.989	-0.706
abajo	Iy	-1.026	-2.158	0.361
arriba	Iy	0.724	3.060	-0.254

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	212.80	0.00	-40.00		
2	AEH500	(2)	114.30	-170.00	-170.00	170.00	-170.00
3	AEH500	(2)	40.80	-190.00	-10.00	0.00	-5.00
4	AEH500	(2)	40.80	190.00	-10.00	0.00	-5.00
	Total:		408.70	Cuantía de armadura: 0.482 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	6.100E-0003				

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [N/mm2]	0.85*fcd,fyd [N/mm2]	eps-fc [o/oo]	fct [N/mm2]	fcv [N/mm2]	fcw,min [N/mm2]
"H400"	38000.0	-22.660	-2.000	0.0	0.817000	40.000
"AEH500"	210000.0	443.470				
"A1900"	200000.0	1554.000				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Comprobación de las tensiones en el estado II: Viga "APOYO-P1"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				-852.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	-175.00	-175.00	-0.080	-3.038	-3.113	"H400"
Armadura-Min	-170.00	-170.00	-0.080	-16.775		"AEH500"
Hormigón-Max	-0.00	0.00	-0.077	-2.943	-3.023	"H400"
Armadura-Max	-0.00	-5.00	-0.078	-16.279		"AEH500"

Esfuerzos		: Rigideces secantes:		Deformaciones:	
N =	0.000 [t]	*EAx=	--1-- [t]	-7.848417E-05	
My=	-852.000 [tm]	*EIy=	--1-- [tm2]	-1.432597E-06	[1/m]
Mz=	0.000 [tm]	*EIz=	--1-- [tm2]	-1.087836E-21	[1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
2	-170.000	-170.000	-0.080	-16.78
	170.000	-170.000	-0.080	-16.78
3	-190.000	-10.000	-0.078	-16.29
	0.000	-5.000	-0.078	-16.28
4	190.000	-10.000	-0.078	-16.29
	0.000	-5.000	-0.078	-16.28

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -2596.160 [t] Myp= 840.599 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-40.000	6.100	-0.078	6.022	-15.604	1204.396

Comprobación de las tensiones en el estado II: Viga "APOYO-P1"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				-1763.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	-175.00	-175.00	-0.187	-7.095	-7.334	"H400"
Armadura-Min	-170.00	-170.00	-0.181	-38.102		"AEH500"
Hormigón-Max	0.00	0.00	-0.002	-0.084808	-0.045173	"H400"
Armadura-Max	-0.00	-5.00	-0.008	-1.576		"AEH500"

Esfuerzos		: Rigideces secantes:		Deformaciones:	
N =	0.000 [t]	*EAx=	--1-- [t]	-7.853025E-05	
My=	-1763.000 [tm]	EIy=	--1-- [tm2]	-1.054158E-04	[1/m]
Mz=	0.000 [tm]	*EIz=	--1-- [tm2]	5.910055E-22	[1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
2	-170.000	-170.000	-0.181	-38.10
	170.000	-170.000	-0.181	-38.10
3	-190.000	-10.000	-0.013	-2.68
	0.000	-5.000	-0.008	-1.58
4	190.000	-10.000	-0.013	-2.68
	0.000	-5.000	-0.008	-1.58

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -2596.160 [t] Myp= 840.599 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-40.000	6.100	-0.044	6.056	-8.880	1211.120

COMPROBACION DEL ESTADO LIMITE DE FATIGA SEGÚN ENV-2:1992

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

SECCION DE CENTRO DE VANO 2

Los esfuerzos actuantes son los siguientes:

Hipotesis	N(t.)	M(m.t.)
Peso propio	0	558
Carga muerta	0	256
Pretensado t=inf.	2390	-1063
Valor. frec. gradiente	0	230
Carga trafico LM71	0	738

Calculos auxiliares :

Distancia de c.d.g a fibra sup. v(m.)= 0.691

		Familia 1
Dist. de pretensado a fibra sup.	dp,sup(m.)=	1.4
Area de tendones	Ap(cm2)=	212.8
	N,t=inf	2390
Predeformacion de pretensado	t=inf.	0.0059
Momento isostatico pret.	Misos,t=inf	-1695

Momento isostatico total	Misos=	-1695	m.t.
Momento hiperestatico total	Mhip=	632	m.t.

Esfuerzos a introducir en el programa FAGUS:

Hipotesis	N(t.)	M(m.t.)
Combinacion sin SC trafico	2390	1676
Combinacion con SC trafico	2390	2414

Comprobación del hormigón:

Sc,max= 5.59 N/mm2
Sc,min= 3.7 N/mm2
Fcd= 26.7 N/mm2

Sx,max/Fcd= 0.21
0.5 + 0.45*Sc,min/Fcd= 0.56

Sx,max/Fcd < 0.5 + 0.45*Sc,min/Fcd vale
0.5 + 0.45*Sc,min/Fcd < 0.9 vale

Comprobación del acero activo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

Hay que comprobar :

$\Delta\sigma s,equ < \Delta\sigma rsk(N^*)/ \gamma s,fat$

$\Delta\sigma rsk(N^*)$= 120 N/mm2 para tendones en curvos en vaina de acero
$\gamma s,fat$= 1.15
$\Delta\sigma s,equ = \lambda . \Delta\sigma,71$

$\Delta\sigma,71$ = rango tensional del acero producido por el tren tipo LM71
$\lambda = \lambda 1 . \lambda 2 . \lambda 3 . \lambda 4$

$\lambda 1$ =	0.55	$\lambda 3$ =	1.00
$\lambda 2$=	1.00	$\lambda 4$=	1.00

$\Delta\sigma,71$= 12 N/mm2
$\Delta\sigma s,equ$ = 6.6 N/mm2

Entonces $\Delta\sigma s,equ < \Delta\sigma rsk(N^*)$ vale

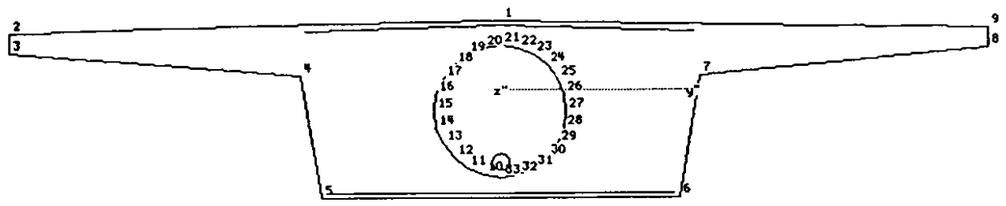
Comprobación del acero pasivo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

$\Delta\sigma s$ = 9.8 N/mm2

Como $\Delta\sigma s < 70$ N/mm2 la resistencia a fatiga es suficiente

Mstb. 1 : 60.0



Sección :"VANO2-11" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-475.00	-9.50
3	-475.00	-29.50	4	-195.00	-54.50
5	-175.00	-175.00	6	175.00	-175.00
7	195.00	-54.50	8	475.00	-29.50
9	475.00	-9.50			
Puntos aligeramiento: 10			-16.82	-152.78	
11	-32.50	-146.29	12	-45.96	-135.96
13	-56.29	-122.50	14	-62.78	-106.82
15	-65.00	-90.00	16	-62.78	-73.18
17	-56.29	-57.50	18	-45.96	-44.04
19	-32.50	-33.71	20	-16.82	-27.21
21	0.00	-25.00	22	16.82	-27.21
23	32.50	-33.71	24	45.96	-44.04
25	56.29	-57.50	26	62.78	-73.18
27	65.00	-90.00	28	62.78	-106.82
29	56.29	-122.50	30	45.96	-135.96
31	32.50	-146.29	32	16.82	-152.78
33	0.00	-155.00			

Características mecánicas de la sección:
Area : Ax= 7.173 [m2]
Momentos de inercia : Iy= 2.029 [m4] Iz= 28.311 [m4]
Inercia a torsión : Ix= 8.188 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.691547 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-4.750	-5.960	0.831
dch.	Iz	4.750	5.960	-0.831
abajo	Iy	-1.058	-1.917	0.409
arriba	Iy	0.692	2.935	-0.267

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	212.80	0.00	-140.00		
2	AEH500	(2)	114.30	-170.00	-170.00	170.00	-170.00
3	AEH500	(2)	40.80	-190.00	-10.00	0.00	-5.00

4	AEH500	(2)	40.80	190.00	-10.00	0.00	-5.00

Total: 408.70 Cuantía de armadura: 0.570 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	5.900E-0003				

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [N/mm2]	0.85*fcd,fyd [N/mm2]	eps-fc [o/oo]	fct [N/mm2]	fcv [N/mm2]	fcw,mín [N/mm2]
"H400"	38000.0	-22.660	-2.000	0.0	0.817000	40.000
"AEH500"	210000.0	443.470				
"A1900"	200000.0	1554.000				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Comprobación de las tensiones en el estado II: Viga "VANO2-11"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				1676.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	175.00	-175.00	-0.097	-3.704	-4.038	"H400"
Armadura-Min	170.00	-170.00	-0.097	-20.388		"AEH500"
Hormigón-Max	-0.00	0.00	-0.084	-3.188	-3.150	"H400"
Armadura-Max	-0.00	-5.00	-0.084	-17.700		"AEH500"

Esfuerzos		: Rigideces secantes:		Deformaciones:	
N =	0.000 [t]	*EAx=	--1--	[t]	-8.926341E-05
My=	1676.000 [tm]	*EIy=	--1--	[tm2]	-7.755446E-06 [1/m]
Mz=	0.000 [tm]	*EIz=	--1--	[tm2]	6.326570E-22 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
2	-170.000	-170.000	-0.097	-20.39
	170.000	-170.000	-0.097	-20.39
3	-190.000	-10.000	-0.085	-17.78
	0.000	-5.000	-0.084	-17.70
4	190.000	-10.000	-0.085	-17.78
	0.000	-5.000	-0.084	-17.70

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -2511.040 [t] Myp= -1778.953 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-140.000	5.900	-0.095	5.805	-18.952	1161.048

Comprobación de las tensiones en el estado II: Viga "VANO2-11"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				2414.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	-0.00	0.00	-0.147	-5.598	-5.665	"H400"
Armadura-Min	-0.00	-5.00	-0.143	-30.079		"AEH500"
Hormigón-Max	-175.00	-175.00	-0.004	-0.149355	-0.188726	"H400"
Armadura-Max	-170.00	-170.00	-0.008	-1.686		"AEH500"

Esfuerzos		: Rigideces secantes:		Deformaciones:	
N =	0.000 [t]	*EAx=	--1--	[t]	-9.066166E-05
My=	2414.000 [tm]	EIy=	--1--	[tm2]	8.194157E-05 [1/m]
Mz=	0.000 [tm]	*EIz=	--1--	[tm2]	1.739316E-21 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
2	-170.000	-170.000	-0.008	-1.69
	170.000	-170.000	-0.008	-1.69
3	-190.000	-10.000	-0.139	-29.22
	0.000	-5.000	-0.143	-30.08
4	190.000	-10.000	-0.139	-29.22
	0.000	-5.000	-0.143	-30.08

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -2511.040 [t] Myp= -1778.953 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-140.000	5.900	-0.033	5.867	-6.522	1173.478

COMPROBACION DEL ESTADO LIMITE DE FATIGA SEGÚN ENV-2:1992

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1502.0

SECCION CENTRAL DE TRAVIESAS

Los esfuerzos actuantes son los siguientes:

Hipotesis	N(t.)	M(m.t.)
Peso propio	0	2607
Carga muerta	0	911
Pretensado t=inf.	4277	-3831
Valor. frec. gradiente	0	0
Carga trafico LM71	0	1666

Calculos auxiliares :

Distancia de c.d.g a fibra sup.	v(m.)=	0.95
		Familia 1
Dist. de pretensado a fibra sup.	dp,sup(m.)=	1.75
Area de tendones	Ap(cm2)=	378
	N,t=inf	4277
Predeformacion de pretensado	t=inf.	0.0060
Momento isostatico pret.	Misos,t=inf	-3422

Momento isostatico total	Misos=	-3422	m.t.
Momento hiperestatico total	Mhip=	-409	m.t.

Esfuerzos a introducir en el programa FAGUS:

Hipotesis	N(t.)	M(m.t.)
Combinacion sin SC trafico	4277	3109
Combinacion con SC trafico	4277	4775

Comprobación del hormigón:

Sc,max=	10.9	N/mm2
Sc,min=	6.1	N/mm2
Fcd=	26.7	N/mm2

Sx,max/Fcd=	0.41
0.5 + 0.45*Sc,min/Fcd=	0.60

Sx,max/Fcd < 0.5 + 0.45*Sc,min/Fcd vale
0.5 + 0.45*Sc,min/Fcd < 0.9 vale

Comprobación de tendones:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

Hay que comprobar :

$\Delta\sigma s,equ < \Delta\sigma rsk(N^*)/ \gamma s,fat$

$\Delta\sigma rsk(N^*)$= 120 N/mm2 para tendones en curvos en vaina de acero
$\gamma s,fat$= 1.15
$\Delta\sigma s,equ = \lambda . \Delta\sigma,71$

$\Delta\sigma,71$ = rango tensional del acero producido por el tren tipo LM71
$\lambda = \lambda 1 . \lambda 2 . \lambda 3 . \lambda 4$

$\lambda 1$ =	0.7	$\lambda 3$ =	1.00
$\lambda 2$=	1.00	$\lambda 4$=	1.00

$\Delta\sigma,71$=	22	N/mm2
$\Delta\sigma s,equ$ =	15.4	N/mm2

Entonces $\Delta\sigma s,equ < \Delta\sigma rsk(N^*)$ vale

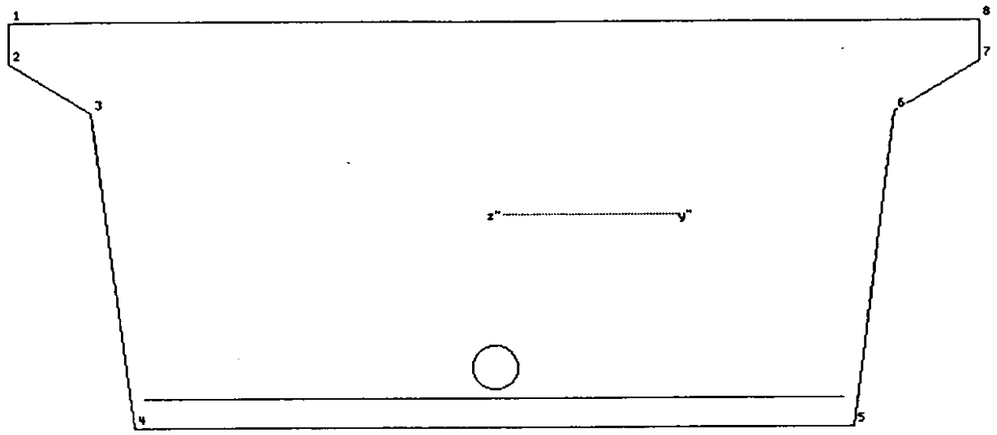
Comprobación del acero pasivo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

$\Delta\sigma s$ = 34 N/mm2

Como $\Delta\sigma s$ < 70 N/mm2 la resistencia a fatiga es suficiente

Mstb.: 1 : 30.0



Sección :"TRAVIESA" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	-235.00	0.00	2	-235.00	-20.00
3	-195.00	-45.00	4	-175.00	-200.00
5	175.00	-200.00	6	195.00	-45.00
7	235.00	-20.00	8	235.00	0.00

Características mecánicas de la sección:
Area : Ax= 7.750 [m2]
Momentos de inercia : Iy= 2.651 [m4] Iz= 9.963 [m4]
Inercia a torsión : Ix= 9.559 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.952839 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-2.350	-4.240	0.547
dch.	Iz	2.350	4.240	-0.547
abajo	Iy	-1.047	-2.531	0.359
arriba	Iy	0.953	2.782	-0.327

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	378.00	0.00	-170.00		
2	AEH500	(2)	171.50	-170.00	-185.00	170.00	-185.00
	Total:		549.50	Cuantía de armadura: 0.709 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada

Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	6.000E-0003				

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [N/mm2]	0.85*fcd,fyd [N/mm2]	eps-fc [o/oo]	fct [N/mm2]	fcv [N/mm2]	fcw,mín [N/mm2]
"H400"	38000.0	-22.660	-2.000	0.0	0.817000	40.000
"AEH500"	210000.0	443.470				
"A1900"	200000.0	1554.000				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Comprobación de las tensiones en el estado II: Viga "TRAVIESA"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				3109.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	175.00	-200.00	-0.162	-6.173	-6.959	"H400"
Armadura-Min	170.00	-185.00	-0.160	-33.678		"AEH500"
Hormigón-Max	-235.00	0.00	-0.135	-5.125	-4.846	"H400"

Esfuerzos	: Rigideces secantes:		Deformaciones:	
N =	0.000 [t]	*EAx=	--1-- [t]	-1.479989E-04
My=	3109.000 [tm]	EIy=	--1-- [tm2]	-1.378819E-05 [1/m]
Mz=	0.000 [tm]	*EIz=	--1-- [tm2]	1.546591E-21 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
2	-170.000	-185.000	-0.160	-33.68
	170.000	-185.000	-0.160	-33.68

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -4536.000 [t] Myp= -3389.124 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-170.000	6.000	-0.158	5.842	-31.660	1168.340

Comprobación de las tensiones en el estado II: Viga "TRAVIESA"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				4775.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	235.00	0.00	-0.287	-10.902	-10.834	"H400"
Hormigón-Max	-175.00	-200.00	-0.005	-0.181971	-0.378208	"H400"
Armadura-Max	-170.00	-185.00	-0.026	-5.449		"AEH500"

Esfuerzos	: Rigideces secantes:		Deformaciones:	
N =	0.000 [t]	*EAx=	--1-- [t]	-1.524972E-04
My=	4775.000 [tm]	EIy=	--1-- [tm2]	1.410561E-04 [1/m]
Mz=	0.000 [tm]	*EIz=	--1-- [tm2]	2.924702E-21 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
2	-170.000	-185.000	-0.026	-5.45
	170.000	-185.000	-0.026	-5.45

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -4536.000 [t] Myp= -3389.124 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-170.000	6.000	-0.047	5.953	-9.421	1190.579

COMPROBACION DEL ESTADO LIMITE DE FATIGA SEGÚN ENV-2:1992

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1508.5

SECCION DE APOYO DE PILA 2

Los esfuerzos actuantes son los siguientes:

Hipotesis	N(t.)	M(m.t.)	V(t.)
Peso propio	0	-2673	526
Carga muerta	0	-983	186
Pretensado t=inf.	7247	3912	-1
Valor. frec. gradiente	0	0	0
Carga trafico LM71	0	-2329	421

Calculos auxiliares :

Distancia de c.d.g a fibra sup. v(m.)= 0.93

		Familia 1	Familia 2
Dist. de pretensado a fibra sup.	dp,sup(m.)=	0.7	0.25
Area de tendones	Ap(cm2)=	520.8	100.8
	N,t=inf	6072	1175
Predeformacion de pretensado	t=inf.	0.0061	0.0061
Momento isostatico pret.	Misos,t=inf	1397	799

Momento isostatico total	Misos=	2196	m.t.
Momento hiperestatico total	Mhip=	1716	m.t.

Esfuerzos a introducir en el programa FAGUS:

Hipotesis	N(t.)	M(m.t.)	V(t.)
Combinacion sin SC trafico	7247	-1939	711
Combinacion con SC trafico	7247	-4268	1132

Comprobación del hormigón:

Sc,max=	4.3	N/mm2
Sc,min=	0.7	N/mm2
Fcd=	26.7	N/mm2

Sx,max/Fcd=	0.16
0.5 + 0.45*Sc,min/Fcd=	0.51

Sx,max/Fcd < 0.5 + 0.45*Sc,min/Fcd vale
0.5 + 0.45*Sc,min/Fcd < 0.9 vale

Comprobación del acero activo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

Hay que comprobar :

$\Delta\sigma s,equ < \Delta\sigma rsk(N^*)/\gamma s,fat$

$\Delta\sigma rsk(N^*)$= 120 N/mm2 para tendones en curvos en vaina de acero
$\gamma s,fat$= 1.15
$\Delta\sigma s,equ = \lambda \cdot \Delta\sigma,71$

$\Delta\sigma,71$ = rango tensional del acero producido por el tren tipo LM71
$\lambda = \lambda 1 \cdot \lambda 2 \cdot \lambda 3 \cdot \lambda 4$

$\lambda 1$ =	0.7	$\lambda 3$ =	1.00
$\lambda 2$=	1.00	$\lambda 4$=	1.00

$\Delta\sigma,71$= 13 N/mm2

$\Delta\sigma s,equ$ = 9.1 N/mm2

Entonces $\Delta\sigma s,equ < \Delta\sigma rsk(N^*)$ vale

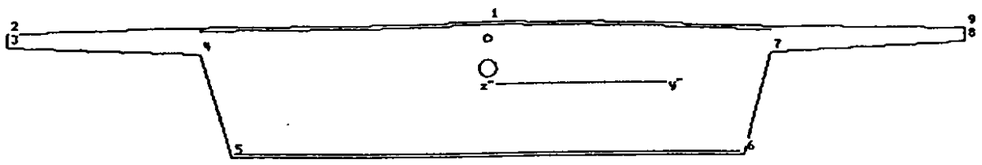
Comprobación del acero pasivo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

$\Delta\sigma s$ = 14.3 N/mm2

Como $\Delta\sigma s$ < 70 N/mm2 la resistencia a fatiga es suficiente

Mstb. 1 : 90.0



Sección :"APOYO-P2" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-700.00	-14.00
3	-700.00	-34.00	4	-420.00	-49.00
5	-378.00	-200.00	6	378.00	-200.00
7	420.00	-49.00	8	700.00	-34.00
9	700.00	-14.00			

Características mecánicas de la sección:
Area : Ax= 17.510 [m2]
Momentos de inercia : Iy= 5.874 [m4] Iz= 136.518 [m4]
Inercia a torsión : Ix= 48.796 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.930482 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-7.000	-19.503	1.114
dch.	Iz	7.000	19.503	-1.114
abajo	Iy	-1.070	-5.492	0.361
arriba	Iy	0.930	6.313	-0.314

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	520.80	0.00	-70.00		
2	A1900	(0)	100.80	0.00	-25.00		
3	AEH500	(2)	158.00	-373.00	-195.00	373.00	-195.00
4	AEH500	(2)	87.80	-420.00	-14.00	0.00	-5.00
5	AEH500	(2)	87.80	420.00	-14.00	0.00	-5.00
Total:			955.20	Cuantía de armadura: 0.546 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	6.100E-0003	2	6.100E-0003		

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [N/mm2]	0.85*fcd,fyd [N/mm2]	eps-fc [o/oo]	fct [N/mm2]	fcv [N/mm2]	fcw,mín [N/mm2]
"H400"	38000.0	-22.660	-2.000	0.0	0.817000	40.000
"AEH500"	210000.0	443.470				
"A1900"	190000.0	1554.000				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Comprobación de las tensiones en el estado II: Viga "APOYO-P2"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				-1939.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	-0.00	0.00	-0.114	-4.326	-4.506	"H400"
Armadura-Min	-0.00	-5.00	-0.113	-23.808		"AEH500"
Hormigón-Max	-378.00	-200.00	-0.095	-3.625	-3.664	"H400"
Armadura-Max	-373.00	-195.00	-0.096	-20.129		"AEH500"

Esfuerzos	: Rigideces secantes:		Deformaciones:
N = 0.000 [t]	*EAx=	--1-- [t]	-1.052534E-04
My= -1939.000 [tm]	*Ely=	--1-- [tm2]	9.220166E-06 [1/m]
Mz= 0.000 [tm]	*Elz=	--1-- [tm2]	3.788180E-21 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
3	-373.000	-195.000	-0.096	-20.13
	373.000	-195.000	-0.096	-20.13
4	-420.000	-14.000	-0.113	-23.63
	0.000	-5.000	-0.113	-23.81
5	420.000	-14.000	-0.113	-23.63
	0.000	-5.000	-0.113	-23.81

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -7204.344 [t] Myp= 2186.197 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-70.000	6.100	-0.107	5.993	-20.402	1138.598
2	0.000	-25.000	6.100	-0.112	5.988	-21.190	1137.810

Programa F A G U S - 2 V.1.32
GINPROSA Ingenieros Consultores 31.07.98

Comprobación de las tensiones en el estado II: Viga "APOYO-P2"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				-4268.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	-378.00	-200.00	-0.204	-7.748	-7.905	"H400"
Armadura-Min	-373.00	-195.00	-0.199	-41.852		"AEH500"
Hormigón-Max	0.00	0.00	-0.020	-0.773289	-0.816563	"H400"
Armadura-Max	0.00	-5.00	-0.025	-5.237		"AEH500"

Esfuerzos	: Rigideces secantes:		Deformaciones:
N = 0.000 [t]	*EAx=	--1-- [t]	-1.057379E-04
My= -4268.000 [tm]	Ely=	--1-- [tm2]	-9.176764E-05 [1/m]
Mz= 0.000 [tm]	*Elz=	--1-- [tm2]	8.721669E-22 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
3	-373.000	-195.000	-0.199	-41.85
	373.000	-195.000	-0.199	-41.85
4	-420.000	-14.000	-0.033	-6.97
	0.000	-5.000	-0.025	-5.24
5	420.000	-14.000	-0.033	-6.97
	0.000	-5.000	-0.025	-5.24

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -7204.344 [t] Myp= 2186.197 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-70.000	6.100	-0.085	6.015	-16.072	1142.928
2	0.000	-25.000	6.100	-0.043	6.057	-8.225	1150.775

COMPROBACION DEL ESTADO LIMITE DE FATIGA SEGÚN ENV-2:1992

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1508.5

VANO 2. SECCION CENTRAL

Los esfuerzos actuantes son los siguientes:

Hipotesis	N(t.)	M(m.t.)	V(t.)
Peso propio	0	1308	-5
Carga muerta	0	486	-2
Pretensado t=inf.	6797	-2405	-18
Valor. frec. gradiente	0	508	-4
Carga trafico LM71	0	1904	14

Calculos auxiliares :

Distancia de c.d.g a fibra sup. v(m.)= 0.88

		Familia 1	Familia 2
Dist. de pretensado a fibra sup.	dp,sup(m.)=	1.74	0.25
Area de tendones	Ap(cm2)=	520.8	100.8
	N,t=inf	5695	1102
Predeformacion de pretensado	t=inf.	0.0058	0.0058
Momento isostatico pret.	Misos,t=inf	-4898	694

Momento isostatico total Misos= -4203 m.t.
Momento hiperestatico total Mhip= 1798 m.t.

Esfuerzos a introducir en el programa FAGUS:

Hipotesis	N(t.)	M(m.t.)	V(t.)
Combinacion sin SC trafico	6797	4100	-28
Combinacion con SC trafico	6797	6004	-14

Comprobación del hormigón:

Sc,max= 5 N/mm2
Sc,min= 1.3 N/mm2
Fcd= 26.7 N/mm2

Sx,max/Fcd= 0.19
0.5 + 0.45*Sc,min/Fcd= 0.52

Sx,max/Fcd < 0.5 + 0.45*Sc,min/Fcd vale
0.5 + 0.45*Sc,min/Fcd < 0.9 vale

Comprobación del acero activo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

Hay que comprobar :

$\Delta\sigma s,equ < \Delta\sigma rsk(N^*)/ \gamma s,fat$

$\Delta\sigma rsk(N^*)$= 120 N/mm2 para tendones en curvos en vaina de acero
$\gamma s,fat$= 1.15
$\Delta\sigma s,equ = \lambda . \Delta\sigma,71$

$\Delta\sigma,71$ = rango tensional del acero producido por el tren tipo LM71
$\lambda = \lambda 1 . \lambda 2 . \lambda 3 . \lambda 4$

$\lambda 1$ = 0.55 $\lambda 3$ = 1.00
$\lambda 2$= 1.00 $\lambda 4$= 1.00

$\Delta\sigma,71$= 14 N/mm2
$\Delta\sigma s,equ$ = 7.7 N/mm2

Entonces $\Delta\sigma s,equ < \Delta\sigma rsk(N^*)$ vale

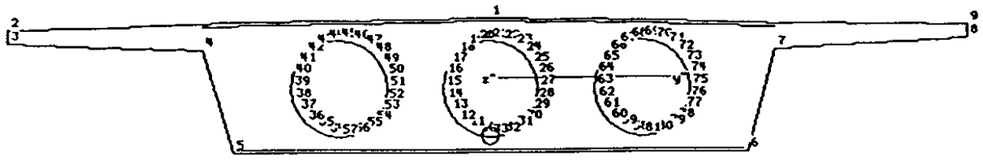
Comprobación del acero pasivo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

$\Delta\sigma s$ = 19.67 N/mm2

Como $\Delta\sigma s$ < 70 N/mm2 la resistencia a fatiga es suficiente

Mstb. 1 : 90.0



Sección :"VANO2-11" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-700.00	-14.00
3	-700.00	-34.00	4	-420.00	-49.00
5	-378.00	-200.00	6	378.00	-200.00
7	420.00	-49.00	8	700.00	-34.00
9	700.00	-14.00			
Puntos aligeramiento: 10			-18.12	-172.61	
11	-35.00	-165.62	12	-49.50	-154.50
13	-60.62	-140.00	14	-67.61	-123.12
15	-70.00	-105.00	16	-67.61	-86.88
17	-60.62	-70.00	18	-49.50	-55.50
19	-35.00	-44.38	20	-18.12	-37.39
21	0.00	-35.00	22	18.12	-37.39
23	35.00	-44.38	24	49.50	-55.50
25	60.62	-70.00	26	67.61	-86.88
27	70.00	-105.00	28	67.61	-123.12
29	60.62	-140.00	30	49.50	-154.50
31	35.00	-165.62	32	18.12	-172.61
33	0.00	-175.00			
Puntos aligeramiento: 34			-242.12	-172.61	
35	-259.00	-165.62	36	-273.50	-154.50
37	-284.62	-140.00	38	-291.62	-123.12
39	-294.00	-105.00	40	-291.62	-86.88
41	-284.62	-70.00	42	-273.50	-55.50
43	-259.00	-44.38	44	-242.12	-37.39
45	-224.00	-35.00	46	-205.88	-37.39
47	-189.00	-44.38	48	-174.50	-55.50
49	-163.38	-70.00	50	-156.39	-86.88
51	-154.00	-105.00	52	-156.39	-123.12
53	-163.38	-140.00	54	-174.50	-154.50
55	-189.00	-165.62	56	-205.88	-172.61
57	-224.00	-175.00			
Puntos aligeramiento: 58			205.88	-172.61	
59	189.00	-165.62	60	174.50	-154.50
61	163.38	-140.00	62	156.39	-123.12
63	154.00	-105.00	64	156.39	-86.88
65	163.38	-70.00	66	174.50	-55.50
67	189.00	-44.38	68	205.88	-37.39
69	224.00	-35.00	70	242.12	-37.39
71	259.00	-44.38	72	273.50	-55.50
73	284.62	-70.00	74	291.62	-86.88
75	294.00	-105.00	76	291.62	-123.12
77	284.62	-140.00	78	273.50	-154.50

79	259.00	-165.62	80	242.12	-172.61
81	224.00	-175.00			

Características mecánicas de la sección:
Area : Ax= 12.944 [m2]
Momentos de inercia : Iy= 5.233 [m4] Iz= 120.693 [m4]
Inercia a torsión : Ix= 26.667 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.888327 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-7.000	-17.242	1.332
dch.	Iz	7.000	17.242	-1.332
abajo	Iy	-1.112	-4.707	0.455
arriba	Iy	0.888	5.890	-0.364

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	520.80	0.00	-174.00		
2	A1900	(0)	100.80	0.00	-25.00		
3	AEH500	(2)	158.00	-373.00	-195.00	373.00	-195.00
4	AEH500	(2)	87.80	-420.00	-14.00	0.00	-5.00
5	AEH500	(2)	87.80	420.00	-14.00	0.00	-5.00

Total: 955.20 Cuantía de armadura: 0.738 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	5.800E-0003	2	5.800E-0003		

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [N/mm2]	0.85*fcd,fyd [N/mm2]	eps-fc [o/oo]	fct [N/mm2]	fcv [N/mm2]	fcw,mín [N/mm2]
"H400"	38000.0	-22.660	-2.000	0.0	0.817000	40.000
"AEH500"	210000.0	443.470				
"A1900"	190000.0	1554.000				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Comprobación de las tensiones en el estado II: Viga "VANO2-11"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				4100.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	-0.00	0.00	-0.135	-5.139	-5.158	"H400"
Armadura-Min	-0.00	-5.00	-0.135	-28.385		"AEH500"
Hormigón-Max	378.00	-200.00	-0.133	-5.047	-5.460	"H400"
Armadura-Max	373.00	-195.00	-0.133	-27.901		"AEH500"

Esfuerzos	: Rigideces secantes:		Deformaciones:	
N =	0.000 [t]	*EAx=	--1-- [t]	-1.341499E-04
My=	4100.000 [tm]	*EIy=	--1-- [tm2]	1.211763E-06 [1/m]
Mz=	0.000 [tm]	*EIz=	--1-- [tm2]	-2.712297E-21 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
3	-373.000	-195.000	-0.133	-27.90
	373.000	-195.000	-0.133	-27.90
4	-420.000	-14.000	-0.135	-28.36
	0.000	-5.000	-0.135	-28.38
5	420.000	-14.000	-0.135	-28.36
	0.000	-5.000	-0.135	-28.38

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -6850.032 [t] Myp= -4178.872 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-174.000	5.800	-0.133	5.667	-25.292	1076.708
2	0.000	-25.000	5.800	-0.135	5.665	-25.635	1076.365

Programa F A G U S - 2 V.1.32
GINPROSA Ingenieros Consultores 31.07.98

Comprobación de las tensiones en el estado II: Viga "VANO2-11"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				6004.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	0.00	0.00	-0.216	-8.212	-8.390	"H400"
Armadura-Min	-0.00	-5.00	-0.212	-44.428		"AEH500"
Hormigón-Max	-378.00	-200.00	-0.035	-1.318	-1.414	"H400"
Armadura-Max	-373.00	-195.00	-0.039	-8.234		"AEH500"

Esfuerzos	: Rigideces secantes:		Deformaciones:	
N =	0.000 [t]	*EAx=	--1-- [t]	-1.355172E-04
My=	6004.000 [tm]	EIy=	--1-- [tm2]	9.071164E-05 [1/m]
Mz=	0.000 [tm]	*EIz=	--1-- [tm2]	1.174984E-21 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
3	-373.000	-195.000	-0.039	-8.23
	373.000	-195.000	-0.039	-8.23
4	-420.000	-14.000	-0.203	-42.71
	0.000	-5.000	-0.212	-44.43
5	420.000	-14.000	-0.203	-42.71
	0.000	-5.000	-0.212	-44.43

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -6850.032 [t] Myp= -4178.872 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-174.000	5.800	-0.058	5.742	-11.070	1090.930
2	0.000	-25.000	5.800	-0.193	5.607	-36.750	1065.250

COMPROBACION DEL ESTADO LIMITE DE FATIGA SEGÚN ENV-2:1992

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1508.5

SECCION CENTRAL DE VANO INTERMEDIO

Los esfuerzos actuantes son los siguientes:

Hipotesis	N(t.)	M(m.t.)	V(t.)
Peso propio	0	1121	-100
Carga muerta	0	399	-39
Pretensado t=inf.	8113	-2116	182
Valor. frec. gradiente	0	287	0
Carga trafico LM71	0	1680	-23

Calculos auxiliares :

Distancia de c.d.g a fibra sup. v(m.)= 0.888

		Familia 1	Familia 2
Dist. de pretensado a fibra sup.	dp,sup(m.)=	1.48	0.25
Area de tendones	Ap(cm2)=	520.8	100.8
	N,t=inf	6797	1316
Predeformacion de pretensado	t=inf.	0.0069	0.0069
Momento isostatico pret.	Misos,t=inf	-4024	839

Momento isostatico total Misos= -3185 m.t.
Momento hiperestatico total Mhip= 1069 m.t.

Esfuerzos a introducir en el programa FAGUS:

Hipotesis	N(t)	M(m.t.)	V(t.)
Combinacion sin SC trafico	8113	2876	43
Combinacion con SC trafico	8113	4556	20

Comprobación del hormigón:

Sc,max= 6.5 N/mm2
Sc,min= 8.4 N/mm2
Fcd= 26.7 N/mm2

Sx,max/Fcd= 0.24
0.5 + 0.45*Sc,min/Fcd= 0.64

Sx,max/Fcd < 0.5 + 0.45*Sc,min/Fcd vale
0.5 + 0.45*Sc,min/Fcd < 0.9 vale

Comprobación del acero activo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

Hay que comprobar :

$\Delta\sigma s,equ < \Delta\sigma rsk(N^*)/ \gamma s,fat$

$\Delta\sigma rsk(N^*)$= 120 N/mm2 para tendones en curvos en vaina de acero
$\gamma s,fat$= 1.15
$\Delta\sigma s,equ = \lambda . \Delta\sigma,71$

$\Delta\sigma,71$ = rango tensional del acero producido por el tren tipo LM71
$\lambda = \lambda 1 . \lambda 2 . \lambda 3 . \lambda 4$

$\lambda 1$ = 0.55 $\lambda 3$ = 1.00
$\lambda 2$= 1.00 $\lambda 4$= 1.00

$\Delta\sigma,71$= 9 N/mm2
$\Delta\sigma s,equ$ = 5.0 N/mm2

Entonces $\Delta\sigma s,equ < \Delta\sigma rsk(N^*)$ vale

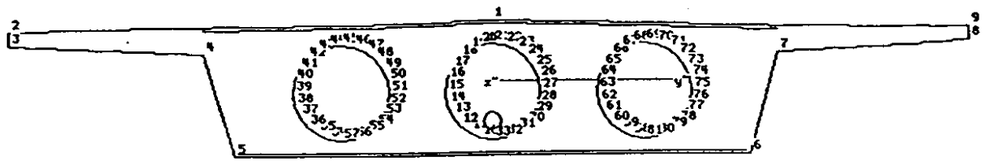
Comprobación del acero pasivo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

$\Delta\sigma s$ = 17.7 N/mm2

Como $\Delta\sigma s$ < 70 N/mm2 la resistencia a fatiga es suficiente

Mstb. 1 : 90.0



Sección :"VANO1-11" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-700.00	-14.00
3	-700.00	-34.00	4	-420.00	-49.00
5	-378.00	-200.00	6	378.00	-200.00
7	420.00	-49.00	8	700.00	-34.00
9	700.00	-14.00			
Puntos aligeramiento: 10			-18.12	-172.61	
11	-35.00	-165.62	12	-49.50	-154.50
13	-60.62	-140.00	14	-67.61	-123.12
15	-70.00	-105.00	16	-67.61	-86.88
17	-60.62	-70.00	18	-49.50	-55.50
19	-35.00	-44.38	20	-18.12	-37.39
21	0.00	-35.00	22	18.12	-37.39
23	35.00	-44.38	24	49.50	-55.50
25	60.62	-70.00	26	67.61	-86.88
27	70.00	-105.00	28	67.61	-123.12
29	60.62	-140.00	30	49.50	-154.50
31	35.00	-165.62	32	18.12	-172.61
33	0.00	-175.00			
Puntos aligeramiento: 34			-242.12	-172.61	
35	-259.00	-165.62	36	-273.50	-154.50
37	-284.62	-140.00	38	-291.62	-123.12
39	-294.00	-105.00	40	-291.62	-86.88
41	-284.62	-70.00	42	-273.50	-55.50
43	-259.00	-44.38	44	-242.12	-37.39
45	-224.00	-35.00	46	-205.88	-37.39
47	-189.00	-44.38	48	-174.50	-55.50
49	-163.38	-70.00	50	-156.39	-86.88
51	-154.00	-105.00	52	-156.39	-123.12
53	-163.38	-140.00	54	-174.50	-154.50
55	-189.00	-165.62	56	-205.88	-172.61
57	-224.00	-175.00			
Puntos aligeramiento: 58			205.88	-172.61	
59	189.00	-165.62	60	174.50	-154.50
61	163.38	-140.00	62	156.39	-123.12
63	154.00	-105.00	64	156.39	-86.88
65	163.38	-70.00	66	174.50	-55.50
67	189.00	-44.38	68	205.88	-37.39
69	224.00	-35.00	70	242.12	-37.39
71	259.00	-44.38	72	273.50	-55.50
73	284.62	-70.00	74	291.62	-86.88
75	294.00	-105.00	76	291.62	-123.12
77	284.62	-140.00	78	273.50	-154.50

79	259.00	-165.62	80	242.12	-172.61
81	224.00	-175.00			

Características mecánicas de la sección:
Area : Ax= 12.944 [m2]
Momentos de inercia : Iy= 5.233 [m4] Iz= 120.693 [m4]
Inercia a torsión : Ix= 26.667 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.888327 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-7.000	-17.242	1.332
dch.	Iz	7.000	17.242	-1.332
abajo	Iy	-1.112	-4.707	0.455
arriba	Iy	0.888	5.890	-0.364

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	520.80	0.00	-148.00		
2	A1900	(0)	100.80	0.00	-25.00		
3	AEH500	(2)	158.00	-373.00	-195.00	373.00	-195.00
4	AEH500	(2)	87.80	-420.00	-14.00	0.00	-5.00
5	AEH500	(2)	87.80	420.00	-14.00	0.00	-5.00
Total:			955.20	Cuantía de armadura: 0.738 [o/o]			

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	6.900E-0003	2	6.900E-0003		

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [kp/cm2]	0.85*fcd,fyd [kp/cm2]	eps-fc [o/oo]	fct [kp/cm2]	fcv [kp/cm2]	fcw,mín [kp/cm2]
"H400"	380000.0	-226.600	-2.000	0.0	8.170	400.000
"AEH500"	2.10E+06	4434.700				
"A1900"	2.00E+06	15540.0				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Comprobación de las tensiones en el estado II: Viga "VANO1-11"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				2876.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	-378.00	-200.00	-0.172	-6.538	-6.976	"H400"
Armadura-Min	-373.00	-195.00	-0.171	-36.010		"AEH500"
Hormigón-Max	-0.00	0.00	-0.149	-5.677	-5.752	"H400"
Armadura-Max	-0.00	-5.00	-0.150	-31.492		"AEH500"

Esfuerzos	: Rigideces secantes:		Deformaciones:
N = 0.000 [t]	*EAx=	--1-- [t]	-1.594541E-04
My= 2876.000 [tm]	Ely=	--1-- [tm2]	-1.132397E-05 [1/m]
Mz= 0.000 [tm]	*Elz=	--1-- [tm2]	-1.879718E-21 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
3	-373.000	-195.000	-0.171	-36.01
	373.000	-195.000	-0.171	-36.01
4	-420.000	-14.000	-0.151	-31.71
	0.000	-5.000	-0.150	-31.49
5	420.000	-14.000	-0.151	-31.71
	0.000	-5.000	-0.150	-31.49

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -8149.176 [t] Myp= -3196.218 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-148.000	6.900	-0.166	6.734	-31.569	1279.431
2	0.000	-25.000	6.900	-0.152	6.748	-28.923	1282.077

Comprobación de las tensiones en el estado II: Viga "VANO1-11"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				4556.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	-0.00	0.00	-0.222	-8.421	-8.604	"H400"
Armadura-Min	0.00	-5.00	-0.218	-45.810		"AEH500"
Hormigón-Max	-378.00	-200.00	-0.084	-3.175	-3.407	"H400"
Armadura-Max	-373.00	-195.00	-0.087	-18.269		"AEH500"

Esfuerzos	: Rigideces secantes:		Deformaciones:
N = 0.000 [t]	*EAx=	--1-- [t]	-1.602769E-04
My= 4556.000 [tm]	Ely=	--1-- [tm2]	6.902420E-05 [1/m]
Mz= 0.000 [tm]	*Elz=	--1-- [tm2]	-5.828789E-22 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
3	-373.000	-195.000	-0.087	-18.27
	373.000	-195.000	-0.087	-18.27
4	-420.000	-14.000	-0.212	-44.51
	0.000	-5.000	-0.218	-45.81
5	420.000	-14.000	-0.212	-44.51
	0.000	-5.000	-0.218	-45.81

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -8149.176 [t] Myp= -3196.218 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-148.000	6.900	-0.119	6.781	-22.693	1288.307
2	0.000	-25.000	6.900	-0.204	6.696	-38.824	1272.176

COMPROBACION DEL ESTADO LIMITE DE FATIGA SEGÚN ENV-2:1992

PROYECTO : L.A.V. MADRID - ZARAGOZA. SUBTRAMO XV
ESTRUCTURA : E-1508.5

SECCION DE ACOPLADORES VANO 2 (seccion 7)

Los esfuerzos actuantes son los siguientes:

Hipotesis	N(t.)	M(m.t.)
Peso propio	0	719
Carga muerta	0	266
Pretensado t=inf.	5807	-977
Valor. frec. gradiente	0	534
Carga trafico LM71	0	1334

(*) Se ha reducido el pretensado por un factor de 0.85

Calculos auxiliares :

Distancia de c.d.g a fibra sup. v(m.)= 0.888

		Familia 1	Familia 2
Dist. de pretensado a fibra sup.	dp,sup(m.)=	1.43	0.25
Area de tendones	Ap(cm2)=	520.8	100.8
	N,t=inf	4865	942
Predeformacion de pretensado	t=inf.	0.0049	0.0049
Momento isostatico pret.	Misos,t=inf	-2637	601

Momento isostatico total Misos= -2036 m.t.
Momento hiperestatico total Mhip= 1060 m.t.

Esfuerzos a introducir en el programa FAGUS:

Hipotesis	N(t.)	M(m.t.)
Combinacion sin SC trafico	5807	2579
Combinacion con SC trafico	5807	3913

Comprobación del hormigón:

Sc,max= 7.47 N/mm2
Sc,min= 5.3 N/mm2
Fcd= 26.7 N/mm2

Sx,max/Fcd= 0.28
0.5 + 0.45*Sc,min/Fcd= 0.59

Sx,max/Fcd < 0.5 + 0.45*Sc,min/Fcd vale
0.5 + 0.45*Sc,min/Fcd < 0.9 vale

Comprobación de acopladores:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

Hay que comprobar :

$\Delta\sigma s,equ < \Delta\sigma rsk(N^*)/ \gamma s,fat$

$\Delta\sigma rsk(N^*)$= 80 N/mm2 para acopladores
$\gamma s,fat$= 1.15
$\Delta\sigma s,equ = \lambda . \Delta\sigma,71$

$\Delta\sigma,71$ = rango tensional del acero producido por el tren tipo LM71
$\lambda = \lambda 1 . \lambda 2 . \lambda 3 . \lambda 4$

$\lambda 1$ = 0.55 $\lambda 3$ = 1.00
$\lambda 2$= 1.00 $\lambda 4$= 1.00

$\Delta\sigma,71$= 6 N/mm2

$\Delta\sigma s,equ$ = 3.3 N/mm2

Entonces $\Delta\sigma s,equ < \Delta\sigma rsk(N^*)$ vale

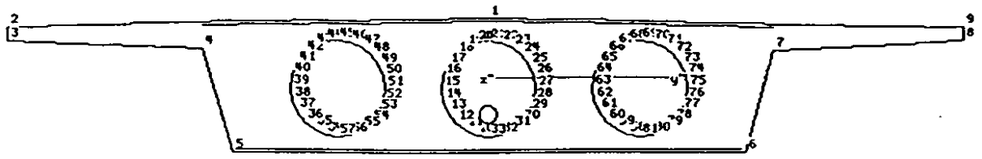
Comprobación del acero pasivo:

Se ha supuesto para todas las comprobaciones el trafico mixto definido el el anejo F de la ENV 1991-3:1995

$\Delta\sigma s$ = 14.3 N/mm2

Como $\Delta\sigma s$ < 70 N/mm2 la resistencia a fatiga es suficiente

Mstb. 1 : 90.0



Sección :"VANO2-7" Armadura :"B1"
Tipo : tipo viga/ Genérico Unidades :[cm]

Sección parcial 1: Hormigón = H400

Pto	Coord-Y	Coord-Z	Pto	Coord-Y	Coord-Z
1	0.00	0.00	2	-700.00	-14.00
3	-700.00	-34.00	4	-420.00	-49.00
5	-378.00	-200.00	6	378.00	-200.00
7	420.00	-49.00	8	700.00	-34.00
9	700.00	-14.00			
Puntos aligeramiento: 10			-18.12	-172.61	
11	-35.00	-165.62	12	-49.50	-154.50
13	-60.62	-140.00	14	-67.61	-123.12
15	-70.00	-105.00	16	-67.61	-86.88
17	-60.62	-70.00	18	-49.50	-55.50
19	-35.00	-44.38	20	-18.12	-37.39
21	0.00	-35.00	22	18.12	-37.39
23	35.00	-44.38	24	49.50	-55.50
25	60.62	-70.00	26	67.61	-86.88
27	70.00	-105.00	28	67.61	-123.12
29	60.62	-140.00	30	49.50	-154.50
31	35.00	-165.62	32	18.12	-172.61
33	0.00	-175.00			
Puntos aligeramiento: 34			-242.12	-172.61	
35	-259.00	-165.62	36	-273.50	-154.50
37	-284.62	-140.00	38	-291.62	-123.12
39	-294.00	-105.00	40	-291.62	-86.88
41	-284.62	-70.00	42	-273.50	-55.50
43	-259.00	-44.38	44	-242.12	-37.39
45	-224.00	-35.00	46	-205.88	-37.39
47	-189.00	-44.38	48	-174.50	-55.50
49	-163.38	-70.00	50	-156.39	-86.88
51	-154.00	-105.00	52	-156.39	-123.12
53	-163.38	-140.00	54	-174.50	-154.50
55	-189.00	-165.62	56	-205.88	-172.61
57	-224.00	-175.00			
Puntos aligeramiento: 58			205.88	-172.61	
59	189.00	-165.62	60	174.50	-154.50
61	163.38	-140.00	62	156.39	-123.12
63	154.00	-105.00	64	156.39	-86.88
65	163.38	-70.00	66	174.50	-55.50
67	189.00	-44.38	68	205.88	-37.39
69	224.00	-35.00	70	242.12	-37.39
71	259.00	-44.38	72	273.50	-55.50
73	284.62	-70.00	74	291.62	-86.88
75	294.00	-105.00	76	291.62	-123.12
77	284.62	-140.00	78	273.50	-154.50

79	259.00	-165.62	80	242.12	-172.61
81	224.00	-175.00			

Características mecánicas de la sección:
Area : Ax= 12.944 [m2]
Momentos de inercia : Iy= 5.233 [m4] Iz= 120.693 [m4]
Inercia a torsión : Ix= 26.667 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 0.000 [m] zs=-0.888327 [m]

	I:	R=dist.borde [m]	W=I/R [m3]	W/Ax [m]
izq.	Iz	-7.000	-17.242	1.332
dch.	Iz	7.000	17.242	-1.332
abajo	Iy	-1.112	-4.707	0.455
arriba	Iy	0.888	5.890	-0.364

Armadura: "B1"

Nº	Nom.mat	Cod.dim.	Area [cm2]	y1 [cm]	z1 [cm]	y2 [cm]	z2 [cm]
1	A1900	(0)	520.80	0.00	-143.00		
2	A1900	(0)	100.80	0.00	-25.00		
3	AEH500	(2)	158.00	-373.00	-195.00	373.00	-195.00
4	AEH500	(2)	87.80	-420.00	-14.00	0.00	-5.00
5	AEH500	(2)	87.80	420.00	-14.00	0.00	-5.00

Total: 955.20 Cuantía de armadura: 0.738 [o/o]

Cód. dimensionamiento: (0) = As constante
Cód. dimensionamiento: (1) = Aumentar As en zonas comprimida y traccionada
Cód. dimensionamiento: (2) = Aumentar As solo en zona traccionada

Armaduras pretensadas :

Nº	Def.Impuesta	Nº	Def.Impuesta	Nº	Def.Impuesta
1	4.900E-0003	2	4.900E-0003		

¡No se han definido valores para el cálculo a cortante!

Características del material:

Nom.Mat.	Módulo E [N/mm2]	0.85*fcd,fyd [N/mm2]	eps-fc [o/oo]	fct [N/mm2]	fcv [N/mm2]	fcw,mín [N/mm2]
"H400"	38000.0	-22.660	-2.000	0.0	0.817000	40.000
"AEH500"	210000.0	443.470				
"A1900"	190000.0	1554.000				

Leyenda:
fcd,fyd resistencia de cálculo del hormigón,acero
eps-fc deformación al final de la parábola (fig.2.3, cap.2.2)
fct resistencia de cálculo a tracción del hormigón
fcv resistencia virtual de cálculo del hormigón a esfuerzo cortante

Comprobación de las tensiones en el estado II: Viga "VANO2-7"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				2579.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	0.00	0.00	-0.139	-5.296	-5.407	"H400"
Armadura-Min	0.00	-5.00	-0.138	-28.963		"AEH500"
Hormigón-Max	-378.00	-200.00	-0.081	-3.090	-3.299	"H400"
Armadura-Max	-373.00	-195.00	-0.083	-17.382		"AEH500"

Esfuerzos		: Rigideces secantes:		Deformaciones:
N =	0.000 [t]	*EAx=	--1-- [t]	-1.135870E-04
My=	2579.000 [tm]	EIy=	--1-- [tm2]	2.902604E-05 [1/m]
Mz=	0.000 [tm]	*EIz=	--1-- [tm2]	2.265664E-21 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
3	-373.000	-195.000	-0.083	-17.38
	373.000	-195.000	-0.083	-17.38
4	-420.000	-14.000	-0.135	-28.41
	0.000	-5.000	-0.138	-28.96
5	420.000	-14.000	-0.135	-28.41
	0.000	-5.000	-0.138	-28.96

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -5787.096 [t] Myp= -2027.345 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-143.000	4.900	-0.098	4.802	-18.594	912.406
2	0.000	-25.000	4.900	-0.132	4.768	-25.102	905.898

Comprobación de las tensiones en el estado II: Viga "VANO2-7"/"B1"

Esfuerzos (E.L.S.) Unidades : [tm]

N	Vy	Vz	Mx	My	Mz
				3913.000	

Deformaciones y tensiones extremas:

3	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Estado-II [N/mm2]	Estado-I [N/mm2]	
Hormigón-Min	-0.00	0.00	-0.197	-7.478	-7.672	"H400"
Armadura-Min	0.00	-5.00	-0.192	-40.349		"AEH500"
Hormigón-Max	-378.00	-200.00	-0.011	-0.410403	-0.464643	"H400"
Armadura-Max	-373.00	-195.00	-0.015	-3.244		"AEH500"

Esfuerzos		: Rigideces secantes:		Deformaciones:
N =	0.000 [t]	*EAx=	--1-- [t]	-1.141800E-04
My=	3913.000 [tm]	EIy=	--1-- [tm2]	9.299492E-05 [1/m]
Mz=	0.000 [tm]	*EIz=	--1-- [tm2]	5.766222E-21 [1/m]

Aviso: --1-- Sección pretensada !

Deformaciones y tensiones de la armadura pasiva (Estado II):

Nº	Coordenadas y [cm]	z [cm]	Eps [o/oo]	Sigma-s [N/mm2]
3	-373.000	-195.000	-0.015	-3.24
	373.000	-195.000	-0.015	-3.24
4	-420.000	-14.000	-0.184	-38.59
	0.000	-5.000	-0.192	-40.35
5	420.000	-14.000	-0.184	-38.59
	0.000	-5.000	-0.192	-40.35

Suma fuerzas de pretensado iniciales (usado en cálculo estado I)
Np= -5787.096 [t] Myp= -2027.345 [tm] Mzp= -0.000 [tm]

Deformaciones y tensiones de armadura de pretensado:

Nº	Coordenadas y [cm]	z [cm]	Eps-0 [o/oo]	D-Eps [o/oo]	Eps-tot [o/oo]	D-Sigma-p [N/mm2]	Sigma-p [N/mm2]
1	0.000	-143.000	4.900	-0.064	4.836	-12.123	918.877
2	0.000	-25.000	4.900	-0.174	4.726	-32.973	898.027

ANEXO 2

APERTURA DE JUNTAS EN PUENTES DE FERROCARRIL

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES. Hipótesis y datos generales.

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.

HIPOTESIS DE CALCULO

Se calcula el movimiento horizontal longitudinal de los tableros de los puentes para los siguientes supuestos :

1º Finalización de las obras en el mes de Enero (temperatura media mensual más baja del año).

2º Finalización de las obras en el mes de Abril.

3º Finalización de las obras en el mes de Julio (temperatura media mensual más alta del año).

4º Finalización de las obras en el mes de Octubre.

Para cada uno de estos supuestos se calcula el movimiento para los meses de Enero y Julio.

Las hipótesis de cálculo de movimientos son por lo tanto :

1ª Finalización obras en Enero. Calculo movimientos en Enero.

2ª Finalización obras en Enero. Calculo movimientos en Julio.

3ª Finalización obras en Abril. Calculo movimientos en Enero.

4ª Finalización obras en Abril. Calculo movimientos en Julio.

5ª Finalización obras en Julio. Calculo movimientos en Enero.

6ª Finalización obras en Julio. Calculo movimientos en Julio.

7ª Finalización obras en Octubre. Calculo movimientos en Enero.

8ª Finalización obras en Octubre. Calculo movimientos en Julio.

En el cálculo de los movimientos se ha tenido en cuenta los efectos térmicos, la retracción y la fluencia.

Para los efectos térmicos se ha tomado la variación uniforme de la temperatura que da la norma I.A.P. suponiendo que esta se produce entre los meses de Enero y Julio (mes más frio y mes más caluroso). Para los meses de Abril y Octubre se supone la misma temperatura ambiente de valor el promedio entre la de Enero y la de Julio (dicho supuesto se adapta bastante bien a los datos del anejo nº 5 de climatoligía e hidrologia en su punto "1.4.Temperatura"). Los valores calculados son con las temperaturas medias mensuales por lo que no se incluye el movimiento diario por variación térmica.

Para los efectos de la retracción y la fluencia se ha seguido la norma EP-93.

El signo de los movimientos es positivo si se produce la apertura de la junta y negativo si se cierra.

Los valores calculados (nombrados unas veces como movimientos y otras como apertura de junta) son siempre según el eje de la estructura.

DATOS GENERALES

Retracción y fluencia

Coeficiente α retracción y fluencia :	1.50
Valor total retracción (mm/m) :	0.30
Tiempo pretensado estructura (dias) :	7
Coeficiente $\beta a(j)$ fluencia :	0.45
Coeficiente $\varphi o1$ fluencia:	2.00

Efectos térmicos

Zona climática (en número árabe) :	4
Coeficiente dilatación térmica hormigón armado (1/ºC)	0.000010

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1502.0

DATOS ESTRUCTURA

	Zona maciza	Zona aligerada	Total estructura
Longitud (m) :	18.00	56.24	74.24
Canto medio (m) :	1.73	1.73	—
Seccion transversal (m²) :	8.49	7.16	—
Perímetro (m) :	21.47	21.47	—
Espesor ficticio (cm) :	118.58	100.02	—

Estribo movil :	**E-2**

(el estribo contrario no tiene apertura de junta pues el tablero está anclado a él)

Axil medio (KN) :	38135.82
Resistencia hormigón (N/mm²) :	40.00

HIPOTESIS DE CALCULO Nº 1. Enero - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.00	0.0

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente β_t :	—	—	0.17	0.20	0.28	0.32	0.36	0.42	0.43	0.49	0.49	0.55	0.54	0.59	0.58	0.63	0.62	0.67	0.65	0.70	0.77	0.81	0.84	0.87	0.89	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.05	0.06	0.08	0.10	0.11	0.12	0.13	0.15	0.15	0.16	0.16	0.18	0.17	0.19	0.19	0.20	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.06		0.09		0.12		0.14		0.16		0.17		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**4.3**		**7.0**		**9.0**		**10.6**		**11.8**		**12.9**		**13.8**		**14.6**		**15.3**		**17.8**		**19.2**		**20.1**		**20.7**		**21.4**		**21.8**		**22.0**		**22.1**		**22.2**		**22.2**		**22.2**	

Coeficiente $\varphi o2$:	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente $\beta t(t)$:	0.00	0.00	0.53	0.55	0.62	0.65	0.68	0.71	0.72	0.75	0.76	0.78	0.79	0.81	0.81	0.83	0.84	0.85	0.86	0.87	0.94	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta t(i)$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente $\beta t\text{-}i$:	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.01	0.00	1.63	1.70	1.89	1.97	2.04	2.12	2.15	2.22	2.23	2.31	2.31	2.38	2.37	2.44	2.43	2.49	2.49	2.55	2.68	2.73	2.77	2.81	2.81	2.84	2.82	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.00	0.00	0.19	0.20	0.22	0.23	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.30	0.29	0.30	0.32	0.32	0.33	0.33	0.33	0.34	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Mov.fluencia (mm/m) :	0.00		0.20		0.23		0.25		0.26		0.27		0.28		0.29		0.29		0.30		0.32		0.33		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34	
Mov.fluencia (mm) :	**0.0**		**14.8**		**17.2**		**18.5**		**19.4**		**20.1**		**20.7**		**21.3**		**21.8**		**22.3**		**23.9**		**24.6**		**24.9**		**25.0**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**	

Mov.TOTAL (mm/m) :	0.00		0.26		0.33		0.37		0.40		0.43		0.45		0.47		0.49		0.51		0.56		0.59		0.61		0.62		0.63		0.63		0.63		0.64		0.64		0.64		0.64	
Mov.TOTAL (mm) :	**0.0**		**19.1**		**24.1**		**27.4**		**29.9**		**32.0**		**33.7**		**35.1**		**36.4**		**37.6**		**41.6**		**43.8**		**45.0**		**45.7**		**46.5**		**46.9**		**47.1**		**47.2**		**47.3**		**47.3**		**47.4**	

HIPOTESIS DE CALCULO Nº 2. Enero - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
34.9	34.8	34.8	-0.3	**-25.9**

Retracción y fluencia (el resto de los valores hasta el Año 99 se representan en el gráfico)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	181	546	911	1276	1641	2006	2371	2736	3101	3466	5291	7116	8941	10766	14416	18066	21716	25366	29016	32666	36316

Coeficiente βt :	0.10	0.12	0.23	0.27	0.32	0.37	0.40	0.45	0.46	0.52	0.52	0.57	0.56	0.61	0.60	0.65	0.64	0.69	0.67	0.71	0.78	0.81	0.85	0.87	0.89	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.04	0.07	0.08	0.10	0.11	0.12	0.14	0.14	0.16	0.15	0.17	0.17	0.18	0.18	0.20	0.19	0.21	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.08		0.11		0.13		0.15		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**2.5**		**5.7**		**8.0**		**9.8**		**11.2**		**12.4**		**13.4**		**14.3**		**15.0**		**15.6**		**17.9**		**19.3**		**20.2**		**20.7**		**21.4**		**21.8**		**22.0**		**22.1**		**22.2**		**22.2**		**22.2**	

Coeficiente $\varphi o2$:	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente $\beta t(t)$:	0.43	0.45	0.58	0.61	0.65	0.68	0.70	0.73	0.74	0.76	0.77	0.79	0.80	0.82	0.82	0.84	0.85	0.86	0.87	0.88	0.94	0.95	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta t(i)$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente $\beta t\text{-}i$:	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.35	1.41	1.78	1.86	1.97	2.05	2.10	2.17	2.19	2.27	2.27	2.34	2.34	2.41	2.40	2.47	2.46	2.52	2.51	2.57	2.70	2.74	2.78	2.81	2.81	2.84	2.83	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.16	0.17	0.21	0.22	0.23	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.28	0.29	0.29	0.30	0.30	0.30	0.32	0.32	0.33	0.33	0.33	0.34	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Mov.fluencia (mm/m) :	0.17		0.22		0.24		0.26		0.27		0.28		0.28		0.29		0.30		0.30		0.32		0.33		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34	
Mov.fluencia (mm) :	**12.3**		**16.2**		**17.9**		**19.0**		**19.8**		**20.4**		**21.0**		**21.6**		**22.0**		**22.5**		**24.0**		**24.6**		**24.9**		**25.0**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**	

Mov.TOTAL (mm/m) :	-0.15		-0.05		0.00		0.04		0.07		0.09		0.12		0.13		0.15		0.16		0.22		0.24		0.26		0.27		0.28		0.28		0.29		0.29		0.29		0.29		0.29	
Mov.TOTAL (mm) :	**-11.1**		**-3.9**		**0.0**		**2.9**		**5.1**		**7.0**		**8.6**		**9.9**		**11.2**		**12.2**		**16.0**		**18.1**		**19.2**		**19.9**		**20.7**		**21.0**		**21.3**		**21.4**		**21.4**		**21.5**		**21.5**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1502.0

HIPOTESIS DE CALCULO Nº 3. Abril - Enero

Efectos térmicos

ΔT (ºC) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.4	-17.4	0.2	**12.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	275	640	1005	1370	1735	2100	2465	2830	3195	3560	5385	7210	9035	10860	14510	18160	21810	25460	29110	32760	36410

Coeficiente βt :	0.13	0.16	0.25	0.30	0.34	0.40	0.42	0.47	0.48	0.53	0.53	0.58	0.57	0.62	0.61	0.66	0.64	0.69	0.67	0.72	0.78	0.82	0.85	0.87	0.89	0.91	0.92	0.94	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00
Mov. (mm/m) :	0.04	0.05	0.08	0.09	0.10	0.12	0.12	0.14	0.14	0.16	0.16	0.17	0.17	0.19	0.18	0.20	0.19	0.21	0.20	0.22	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.05		0.09		0.11		0.14		0.16		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**3.5**		**6.4**		**8.5**		**10.2**		**11.6**		**12.7**		**13.6**		**14.5**		**15.2**		**15.8**		**18.0**		**19.3**		**20.2**		**20.8**		**21.4**		**21.8**		**22.0**		**22.1**		**22.2**		**22.2**	

Coeficiente $\varphi o2$:	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente $\beta t(t)$:	0.49	0.51	0.60	0.63	0.67	0.69	0.71	0.74	0.75	0.77	0.78	0.80	0.81	0.83	0.83	0.85	0.85	0.87	0.87	0.89	0.95	0.95	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta t(i)$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente $\beta t\text{-}i$:	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.52	1.59	1.84	1.92	2.01	2.09	2.12	2.20	2.21	2.29	2.29	2.36	2.36	2.42	2.42	2.48	2.48	2.53	2.53	2.58	2.70	2.74	2.78	2.81	2.81	2.84	2.83	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87
Movimiento (mm/m) :	0.18	0.19	0.22	0.23	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.31	0.32	0.32	0.33	0.33	0.33	0.34	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Mov.fluencia (mm/m) :	0.19		0.23		0.25		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.32		0.33		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34	
Mov.fluencia (mm) :	**13.8**		**16.7**		**18.2**		**19.2**		**19.9**		**20.6**		**21.2**		**21.7**		**22.2**		**22.6**		**24.0**		**24.7**		**24.9**		**25.0**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**	

Mov.TOTAL (mm/m) :	0.41		0.49		0.53		0.57		0.60		0.62		0.64		0.66		0.68		0.69		0.74		0.77		0.78		0.79		0.80		0.81		0.81		0.81		0.81		0.81	
Mov.TOTAL (mm) :	**30.2**		**36.1**		**39.6**		**42.3**		**44.4**		**46.2**		**47.7**		**49.1**		**50.3**		**51.3**		**55.0**		**56.9**		**58.0**		**58.7**		**59.5**		**59.9**		**60.1**		**60.2**		**60.2**		**60.3**	

HIPOTESIS DE CALCULO Nº 4. Abril - Julio

Efectos térmicos

ΔT (ºC) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.4	17.4	-0.2	**-12.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	91	456	821	1186	1551	1916	2281	2646	3011	3376	5201	7026	8851	10676	14326	17976	21626	25276	28926	32576	36226

Coeficiente βt :	0.05	0.07	0.20	0.24	0.30	0.35	0.38	0.44	0.45	0.50	0.50	0.56	0.55	0.60	0.59	0.64	0.63	0.68	0.66	0.71	0.78	0.81	0.84	0.87	0.89	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00
Mov. (mm/m) :	0.02	0.02	0.06	0.07	0.09	0.10	0.11	0.13	0.13	0.15	0.15	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.02		0.07		0.10		0.13		0.15		0.16		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**1.4**		**5.1**		**7.5**		**9.4**		**10.9**		**12.1**		**13.2**		**14.1**		**14.8**		**15.5**		**17.8**		**19.2**		**20.1**		**20.7**		**21.4**		**21.8**		**22.0**		**22.1**		**22.2**		**22.2**	

Coeficiente $\varphi o2$:	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente $\beta t(t)$:	0.34	0.36	0.56	0.58	0.64	0.67	0.69	0.72	0.73	0.76	0.76	0.79	0.79	0.81	0.82	0.84	0.84	0.86	0.86	0.88	0.94	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta t(i)$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente $\beta t\text{-}i$:	0.67		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.09	1.13	1.72	1.79	1.94	2.01	2.07	2.15	2.17	2.24	2.25	2.32	2.32	2.39	2.39	2.45	2.45	2.51	2.50	2.56	2.69	2.73	2.78	2.81	2.81	2.84	2.83	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87
Movimiento (mm/m) :	0.13	0.13	0.20	0.21	0.23	0.24	0.25	0.25	0.26	0.27	0.27	0.28	0.28	0.28	0.28	0.29	0.29	0.30	0.30	0.30	0.32	0.32	0.33	0.33	0.33	0.34	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Mov.fluencia (mm/m) :	0.13		0.21		0.24		0.25		0.26		0.27		0.28		0.29		0.30		0.30		0.32		0.33		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34	
Mov.fluencia (mm) :	**9.9**		**15.6**		**17.5**		**18.7**		**19.6**		**20.3**		**20.9**		**21.4**		**21.9**		**22.4**		**23.9**		**24.6**		**24.9**		**25.0**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**	

Mov.TOTAL (mm/m) :	-0.02		0.10		0.16		0.20		0.24		0.26		0.28		0.30		0.32		0.34		0.39		0.42		0.43		0.44		0.45		0.46		0.46		0.46		0.46		0.46	
Mov.TOTAL (mm) :	**-1.6**		**7.7**		**12.1**		**15.2**		**17.5**		**19.5**		**21.1**		**22.6**		**23.8**		**24.9**		**28.8**		**30.9**		**32.1**		**32.8**		**33.6**		**34.0**		**34.2**		**34.3**		**34.4**		**34.4**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1502.0

HIPOTESIS DE CALCULO Nº 5. Julio - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-34.9	-34.8	-34.8	0.3	**25.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	184	549	914	1279	1644	2009	2374	2739	3104	3469	5294	7119	8944	10769	14419	18069	21719	25369	29019	32669	36319

Coeficiente βt :	0.10	0.12	0.23	0.27	0.32	0.37	0.40	0.45	0.46	0.52	0.52	0.57	0.56	0.61	0.60	0.65	0.64	0.69	0.67	0.71	0.78	0.81	0.85	0.87	0.89	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.04	0.07	0.08	0.10	0.11	0.12	0.14	0.14	0.16	0.15	0.17	0.17	0.18	0.18	0.20	0.19	0.21	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.08		0.11		0.13		0.15		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**2.5**		**5.8**		**8.0**		**9.8**		**11.2**		**12.4**		**13.4**		**14.3**		**15.0**		**15.6**		**17.9**		**19.3**		**20.2**		**20.7**		**21.4**		**21.8**		**22.0**		**22.1**		**22.2**		**22.2**		**22.2**	

Coeficiente $\varphi o2$:	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente $\beta t(t)$:	0.43	0.45	0.58	0.61	0.66	0.68	0.70	0.73	0.74	0.76	0.77	0.79	0.80	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.94	0.95	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta t(j)$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente $\beta t\text{-}j$:	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.36	1.42	1.79	1.86	1.97	2.05	2.10	2.17	2.19	2.27	2.27	2.34	2.34	2.41	2.40	2.47	2.46	2.52	2.51	2.57	2.70	2.74	2.78	2.81	2.81	2.84	2.83	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.16	0.17	0.21	0.22	0.23	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.28	0.29	0.29	0.30	0.30	0.30	0.32	0.32	0.33	0.33	0.33	0.34	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Mov.fluencia (mm/m) :	0.17		0.22		0.24		0.26		0.27		0.28		0.28		0.29		0.30		0.30		0.32		0.33		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34	
Mov.fluencia (mm) :	**12.3**		**16.2**		**17.9**		**19.0**		**19.8**		**20.4**		**21.0**		**21.6**		**22.0**		**22.5**		**24.0**		**24.6**		**24.9**		**25.0**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**	

Mov.TOTAL (mm/m) :	0.55		0.64		0.70		0.74		0.77		0.79		0.81		0.83		0.85		0.86		0.91		0.94		0.96		0.96		0.98		0.98		0.98		0.98		0.99		0.99		0.99	
Mov.TOTAL (mm) :	**40.8**		**47.8**		**51.8**		**54.6**		**56.9**		**58.7**		**60.3**		**61.7**		**62.9**		**64.0**		**67.8**		**69.8**		**70.9**		**71.6**		**72.4**		**72.8**		**73.0**		**73.1**		**73.2**		**73.2**		**73.2**	

HIPOTESIS DE CALCULO Nº 6. Julio - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.0	**0.0**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente βt :	—	—	0.17	0.20	0.28	0.32	0.36	0.42	0.43	0.49	0.49	0.55	0.54	0.59	0.58	0.63	0.62	0.67	0.65	0.70	0.77	0.81	0.84	0.87	0.89	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.05	0.06	0.08	0.10	0.11	0.12	0.13	0.15	0.15	0.16	0.16	0.18	0.17	0.19	0.19	0.20	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.06		0.09		0.12		0.14		0.16		0.17		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**4.3**		**7.0**		**9.0**		**10.6**		**11.8**		**12.9**		**13.8**		**14.6**		**15.3**		**17.8**		**19.2**		**20.1**		**20.7**		**21.4**		**21.8**		**22.0**		**22.1**		**22.2**		**22.2**		**22.2**	

Coeficiente $\varphi o2$:	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente $\beta t(t)$:	0.00	0.00	0.53	0.55	0.62	0.65	0.68	0.71	0.72	0.75	0.76	0.78	0.79	0.81	0.81	0.83	0.84	0.85	0.86	0.87	0.94	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta t(j)$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente $\beta t\text{-}j$:	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.01	0.00	1.63	1.70	1.89	1.97	2.04	2.12	2.15	2.22	2.23	2.31	2.31	2.38	2.37	2.44	2.43	2.49	2.49	2.55	2.68	2.73	2.77	2.81	2.81	2.84	2.82	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.00	0.00	0.19	0.20	0.22	0.23	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.30	0.29	0.30	0.32	0.32	0.33	0.33	0.33	0.34	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Mov.fluencia (mm/m) :	0.00		0.20		0.23		0.25		0.26		0.27		0.28		0.29		0.29		0.30		0.32		0.33		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34	
Mov.fluencia (mm) :	**0.0**		**14.8**		**17.2**		**18.5**		**19.4**		**20.1**		**20.7**		**21.3**		**21.8**		**22.3**		**23.9**		**24.6**		**24.9**		**25.0**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**	

Mov.TOTAL (mm/m) :	0.00		0.26		0.33		0.37		0.40		0.43		0.45		0.47		0.49		0.51		0.56		0.59		0.61		0.62		0.63		0.63		0.63		0.64		0.64		0.64		0.64	
Mov.TOTAL (mm) :	**0.0**		**19.1**		**24.1**		**27.4**		**29.9**		**32.0**		**33.7**		**35.1**		**36.4**		**37.6**		**41.6**		**43.8**		**45.0**		**45.7**		**46.5**		**46.9**		**47.1**		**47.2**		**47.3**		**47.3**		**47.4**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1502.0

HIPOTESIS DE CALCULO Nº 7. Octubre - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.4	-17.4	0.2	**12.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	92	457	822	1187	1552	1917	2282	2647	3012	3377	5202	7027	8852	10677	14327	17977	21627	25277	28927	32577	36227

Coeficiente β_t :	0.06	0.07	0.20	0.24	0.30	0.35	0.38	0.44	0.45	0.50	0.50	0.56	0.55	0.60	0.59	0.64	0.63	0.68	0.66	0.71	0.78	0.81	0.84	0.87	0.89	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.02	0.06	0.07	0.09	0.10	0.11	0.13	0.13	0.15	0.15	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.02		0.07		0.10		0.13		0.15		0.16		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**1.5**		**5.1**		**7.5**		**9.4**		**10.9**		**12.1**		**13.2**		**14.1**		**14.8**		**15.5**		**17.8**		**19.2**		**20.1**		**20.7**		**21.4**		**21.8**		**22.0**		**22.1**		**22.2**		**22.2**		**22.2**	

Coeficiente φ_{o2} :	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente $\beta_{t(t)}$:	0.34	0.36	0.56	0.58	0.64	0.67	0.69	0.72	0.73	0.76	0.76	0.79	0.79	0.81	0.82	0.84	0.84	0.86	0.86	0.88	0.94	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-i} :	0.68		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.09	1.14	1.72	1.79	1.94	2.01	2.07	2.15	2.17	2.25	2.25	2.32	2.32	2.39	2.39	2.45	2.45	2.51	2.50	2.56	2.69	2.73	2.78	2.81	2.81	2.84	2.83	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.13	0.13	0.20	0.21	0.23	0.24	0.25	0.25	0.26	0.27	0.27	0.28	0.28	0.28	0.28	0.29	0.29	0.30	0.30	0.30	0.32	0.32	0.33	0.33	0.33	0.34	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Mov.fluencia (mm/m) :	0.13		0.21		0.24		0.25		0.26		0.27		0.28		0.29		0.30		0.30		0.32		0.33		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34	
Mov.fluencia (mm) :	**9.9**		**15.6**		**17.5**		**18.7**		**19.6**		**20.3**		**20.9**		**21.4**		**21.9**		**22.4**		**23.9**		**24.6**		**24.9**		**25.0**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**	

Mov.TOTAL (mm/m) :	0.33		0.45		0.51		0.55		0.58		0.61		0.63		0.65		0.67		0.68		0.74		0.76		0.78		0.79		0.80		0.81		0.81		0.81		0.81		0.81		0.81	
Mov.TOTAL (mm) :	**24.3**		**33.6**		**38.0**		**41.1**		**43.4**		**45.4**		**47.0**		**48.4**		**49.7**		**50.8**		**54.7**		**56.8**		**58.0**		**58.7**		**59.5**		**59.8**		**60.1**		**60.2**		**60.2**		**60.3**		**60.3**	

HIPOTESIS DE CALCULO Nº 8. Octubre - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.4	17.4	-0.2	**-12.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	273	638	1003	1368	1733	2098	2463	2828	3193	3558	5383	7208	9033	10858	14508	18158	21808	25458	29108	32758	36408

Coeficiente β_t :	0.13	0.16	0.25	0.30	0.34	0.39	0.42	0.47	0.48	0.53	0.53	0.58	0.57	0.62	0.61	0.66	0.64	0.69	0.67	0.72	0.78	0.82	0.85	0.87	0.89	0.91	0.92	0.94	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.04	0.05	0.08	0.09	0.10	0.12	0.12	0.14	0.14	0.16	0.16	0.17	0.17	0.19	0.18	0.20	0.19	0.21	0.20	0.22	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.05		0.09		0.11		0.14		0.16		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**3.5**		**6.4**		**8.5**		**10.2**		**11.5**		**12.7**		**13.6**		**14.5**		**15.2**		**15.8**		**18.0**		**19.3**		**20.2**		**20.8**		**21.4**		**21.8**		**22.0**		**22.1**		**22.2**		**22.2**		**22.2**	

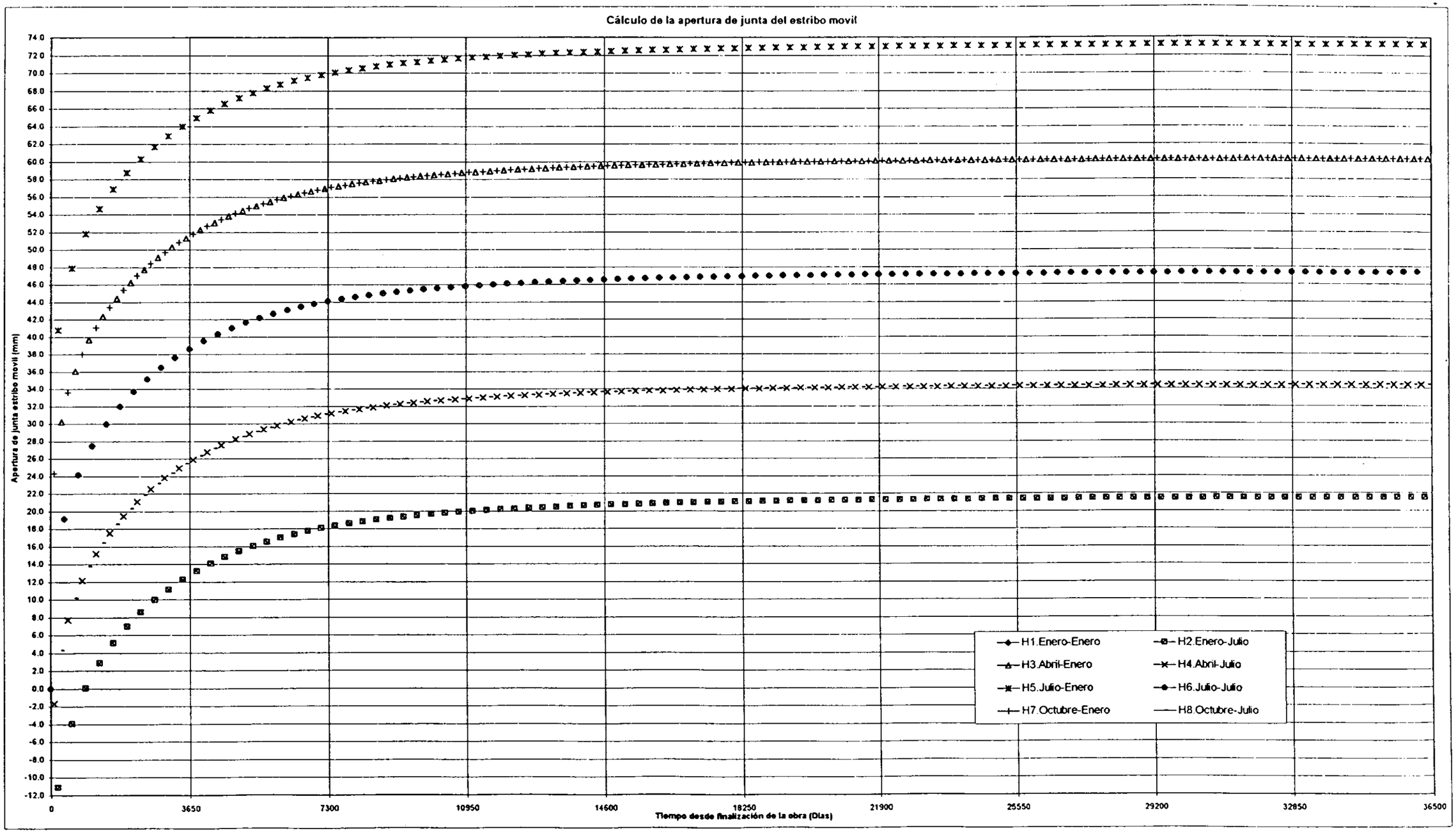
Coeficiente φ_{o2} :	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente $\beta_{t(t)}$:	0.49	0.51	0.60	0.63	0.67	0.69	0.71	0.74	0.75	0.77	0.78	0.80	0.81	0.83	0.83	0.85	0.85	0.87	0.87	0.89	0.95	0.95	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-i} :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.52	1.58	1.84	1.92	2.01	2.09	2.12	2.20	2.21	2.29	2.29	2.36	2.36	2.42	2.42	2.48	2.47	2.53	2.53	2.58	2.70	2.74	2.78	2.81	2.81	2.84	2.83	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.18	0.19	0.22	0.23	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.31	0.32	0.32	0.33	0.33	0.33	0.34	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Mov.fluencia (mm/m) :	0.19		0.23		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.32		0.33		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34		0.34	
Mov.fluencia (mm) :	**13.8**		**16.7**		**18.2**		**19.2**		**19.9**		**20.6**		**21.2**		**21.7**		**22.2**		**22.6**		**24.0**		**24.7**		**24.9**		**25.0**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**		**25.1**	

Mov.TOTAL (mm/m) :	0.06		0.14		0.19		0.22		0.25		0.27		0.29		0.31		0.33		0.34		0.39		0.42		0.43		0.44		0.45		0.46		0.46		0.46		0.46		0.46		0.46	
Mov.TOTAL (mm) :	**4.3**		**10.2**		**13.8**		**16.4**		**18.6**		**20.3**		**21.9**		**23.2**		**24.4**		**25.4**		**29.1**		**31.1**		**32.2**		**32.9**		**33.6**		**34.0**		**34.2**		**34.3**		**34.4**		**34.4**		**34.4**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1502.0

RESUMEN TOTAL



CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA Subtramo XV.
OBRA :	E-1502.8

DATOS ESTRUCTURA

	Zona maciza	Zona aligerada	Total estructura
Longitud (m) :	30.35	59.95	90.29
Canto medio (m) :	1.36	1.36	—
Seccion transversal (m²) :	12.69	9.54	—
Perimetro (m) :	29.53	29.53	—
Espesor ficticio (cm) :	128.87	96.96	—

Estribo movil :	E-2

(el estribo contrario no tiene apertura de junta pues el tablero está anclado a él)

Axil medio (KN) :	66015.30
Resistencia hormigón (N/mm²) :	40.00

HIPOTESIS DE CALCULO Nº 1. Enero - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.00	0.0

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente β_t :	—	—	0.15	0.21	0.26	0.33	0.34	0.43	0.41	0.50	0.46	0.56	0.51	0.60	0.56	0.64	0.59	0.68	0.63	0.71	0.75	0.81	0.83	0.87	0.88	0.91	0.91	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.05	0.06	0.08	0.10	0.10	0.13	0.12	0.15	0.14	0.17	0.15	0.18	0.17	0.19	0.18	0.20	0.19	0.21	0.23	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.06		0.09		0.12		0.14		0.16		0.17		0.18		0.20		0.20		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**5.1**		**8.3**		**10.7**		**12.6**		**14.2**		**15.5**		**16.6**		**17.6**		**18.5**		**21.4**		**23.2**		**24.3**		**25.1**		**26.0**		**26.5**		**26.7**		**26.9**		**27.0**		**27.0**		**27.0**	

Coeficiente φ_{o2} :	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26
Coeficiente $\beta_{t(t)}$:	0.00	0.00	0.51	0.56	0.61	0.65	0.67	0.71	0.71	0.75	0.74	0.78	0.78	0.81	0.80	0.83	0.83	0.86	0.85	0.88	0.93	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-i} :	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.01	-0.01	1.60	1.72	1.85	1.98	2.00	2.13	2.11	2.24	2.20	2.32	2.27	2.39	2.34	2.45	2.40	2.51	2.46	2.56	2.66	2.73	2.76	2.81	2.80	2.84	2.81	2.86	2.82	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87
Movimiento (mm/m) :	0.00	0.00	0.22	0.24	0.25	0.27	0.27	0.29	0.29	0.31	0.30	0.32	0.31	0.33	0.32	0.34	0.33	0.34	0.34	0.35	0.37	0.37	0.38	0.39	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Mov.fluencia (mm/m) :	0.00		0.23		0.27		0.29		0.30		0.31		0.32		0.33		0.34		0.35		0.37		0.38		0.39		0.39		0.39		0.39		0.39		0.39		0.39		0.39		0.39	
Mov.fluencia (mm) :	**0.0**		**20.8**		**24.0**		**25.9**		**27.2**		**28.2**		**29.1**		**29.9**		**30.6**		**31.3**		**33.6**		**34.6**		**35.0**		**35.2**		**35.3**		**35.3**		**35.4**		**35.4**		**35.4**		**35.4**		**35.4**	

Mov.TOTAL (mm/m) :	0.00		0.29		0.36		0.41		0.44		0.47		0.49		0.52		0.53		0.55		0.61		0.64		0.66		0.67		0.68		0.68		0.69		0.69		0.69		0.69		0.69	
Mov.TOTAL (mm) :	**0.0**		**25.9**		**32.4**		**36.6**		**39.8**		**42.4**		**44.6**		**46.5**		**48.2**		**49.7**		**55.0**		**57.8**		**59.4**		**60.3**		**61.3**		**61.8**		**62.1**		**62.2**		**62.3**		**62.4**		**62.4**	

HIPOTESIS DE CALCULO Nº 2. Enero - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
34.9	35.4	35.2	-0.4	-31.8

Retracción y fluencia (el resto de los valores hasta el Año 99 se representan en el gráfico)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	181	546	911	1276	1641	2006	2371	2736	3101	3466	5291	7116	8941	10766	14416	18066	21716	25366	29016	32666	36316

Coeficiente β_t :	0.09	0.12	0.21	0.28	0.30	0.38	0.37	0.46	0.44	0.53	0.49	0.58	0.54	0.62	0.58	0.66	0.61	0.69	0.64	0.72	0.76	0.82	0.83	0.88	0.88	0.91	0.91	0.94	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.04	0.06	0.08	0.09	0.11	0.11	0.14	0.13	0.16	0.15	0.17	0.16	0.19	0.17	0.20	0.18	0.21	0.19	0.22	0.23	0.25	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.08		0.11		0.13		0.15		0.16		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**3.0**		**6.8**		**9.6**		**11.7**		**13.5**		**14.9**		**16.1**		**17.1**		**18.0**		**18.8**		**21.7**		**23.3**		**24.4**		**25.2**		**26.0**		**26.5**		**26.7**		**26.9**		**27.0**		**27.0**		**27.0**	

Coeficiente φ_{o2} :	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26
Coeficiente $\beta_{t(t)}$:	0.42	0.46	0.57	0.61	0.64	0.69	0.69	0.73	0.73	0.77	0.76	0.80	0.79	0.82	0.82	0.85	0.84	0.87	0.86	0.89	0.94	0.95	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-i} :	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.32	1.42	1.75	1.87	1.94	2.07	2.06	2.19	2.15	2.28	2.23	2.35	2.31	2.42	2.37	2.48	2.43	2.53	2.49	2.58	2.68	2.74	2.76	2.82	2.80	2.84	2.81	2.86	2.82	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87
Movimiento (mm/m) :	0.18	0.19	0.24	0.26	0.27	0.28	0.28	0.30	0.30	0.31	0.31	0.32	0.32	0.33	0.33	0.34	0.33	0.35	0.34	0.35	0.37	0.38	0.38	0.39	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Mov.fluencia (mm/m) :	0.19		0.25		0.28		0.29		0.31		0.32		0.33		0.33		0.34		0.35		0.37		0.38		0.39		0.39		0.39		0.39		0.39		0.39		0.39		0.39		0.39	
Mov.fluencia (mm) :	**17.2**		**22.7**		**25.0**		**26.6**		**27.7**		**28.7**		**29.5**		**30.2**		**30.9**		**31.6**		**33.7**		**34.6**		**35.0**		**35.2**		**35.3**		**35.3**		**35.4**		**35.4**		**35.4**		**35.4**		**35.4**	

Mov.TOTAL (mm/m) :	-0.13		-0.03		0.03		0.07		0.10		0.13		0.15		0.17		0.19		0.21		0.26		0.29		0.31		0.32		0.33		0.33		0.34		0.34		0.34		0.34		0.34	
Mov.TOTAL (mm) :	**-11.6**		**-2.3**		**2.8**		**6.5**		**9.3**		**11.7**		**13.8**		**15.6**		**17.2**		**18.6**		**23.5**		**26.2**		**27.7**		**28.5**		**29.5**		**30.0**		**30.3**		**30.4**		**30.5**		**30.6**		**30.6**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1502.8

HIPOTESIS DE CALCULO Nº 3. Abril - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.7	-17.6	0.2	15.9

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	275	640	1005	1370	1735	2100	2465	2830	3195	3560	5385	7210	9035	10860	14510	18160	21810	25460	29110	32760	36410

Coeficiente β_t :	0.12	0.17	0.23	0.31	0.32	0.41	0.39	0.48	0.45	0.54	0.50	0.59	0.55	0.63	0.59	0.67	0.62	0.70	0.65	0.73	0.77	0.82	0.84	0.88	0.88	0.91	0.92	0.94	0.95	0.97	0.97	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.04	0.05	0.07	0.09	0.10	0.12	0.12	0.14	0.13	0.16	0.15	0.18	0.16	0.19	0.18	0.20	0.19	0.21	0.20	0.22	0.23	0.25	0.25	0.26	0.27	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.05		0.08		0.11		0.14		0.15		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**4.2**		**7.6**		**10.2**		**12.2**		**13.8**		**15.2**		**16.4**		**17.4**		**18.3**		**19.0**		**21.8**		**23.4**		**24.5**		**25.2**		**26.1**		**26.5**		**26.7**		**26.9**		**27.0**		**27.0**			

Coeficiente φ_{o2} :	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26
Coeficiente $\beta_{t(t)}$:	0.47	0.52	0.59	0.64	0.66	0.70	0.70	0.74	0.74	0.78	0.77	0.80	0.80	0.83	0.82	0.85	0.85	0.87	0.87	0.89	0.94	0.95	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-i} :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00			
Coeficiente de fluencia :	1.49	1.60	1.81	1.94	1.97	2.10	2.09	2.21	2.18	2.30	2.25	2.37	2.32	2.44	2.39	2.49	2.45	2.54	2.50	2.59	2.68	2.75	2.77	2.82	2.80	2.85	2.81	2.86	2.82	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87
Movimiento (mm/m) :	0.20	0.22	0.25	0.27	0.27	0.29	0.29	0.30	0.30	0.32	0.31	0.33	0.32	0.33	0.33	0.34	0.34	0.35	0.34	0.36	0.37	0.38	0.38	0.39	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Mov.fluencia (mm/m) :	0.21		0.26		0.28		0.30		0.31		0.32		0.33		0.34		0.34		0.35		0.37		0.38		0.39		0.39		0.39		0.39		0.39		0.39		0.39		0.39			
Mov.fluencia (mm) :	**19.3**		**23.4**		**25.5**		**26.9**		**28.0**		**28.9**		**29.7**		**30.4**		**31.1**		**31.7**		**33.8**		**34.7**		**35.0**		**35.2**		**35.3**		**35.3**		**35.4**		**35.4**		**35.4**		**35.4**			

Mov.TOTAL (mm/m) :	0.44		0.52		0.57		0.61		0.64		0.66		0.69		0.71		0.72		0.74		0.79		0.82		0.84		0.85		0.86		0.86		0.86		0.87		0.87		0.87			
Mov.TOTAL (mm) :	**39.4**		**47.0**		**51.6**		**55.0**		**57.7**		**60.0**		**62.0**		**63.7**		**65.3**		**66.6**		**71.4**		**74.0**		**75.4**		**76.3**		**77.3**		**77.8**		**78.0**		**78.2**		**78.2**		**78.3**			

HIPOTESIS DE CALCULO Nº 4. Abril - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.7	17.6	-0.2	-15.9

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	91	456	821	1186	1551	1916	2281	2646	3011	3376	5201	7026	8851	10676	14326	17976	21626	25276	28926	32576	36226

Coeficiente β_t :	0.05	0.07	0.18	0.24	0.28	0.36	0.36	0.45	0.42	0.51	0.48	0.57	0.52	0.61	0.57	0.65	0.60	0.69	0.64	0.71	0.76	0.82	0.83	0.87	0.88	0.91	0.91	0.94	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.01	0.02	0.05	0.07	0.08	0.11	0.11	0.13	0.13	0.15	0.14	0.17	0.16	0.18	0.17	0.20	0.18	0.21	0.19	0.21	0.23	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.02		0.07		0.10		0.12		0.14		0.16		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**1.7**		**6.0**		**9.0**		**11.2**		**13.1**		**14.6**		**15.8**		**16.9**		**17.8**		**18.6**		**21.5**		**23.3**		**24.4**		**25.1**		**26.0**		**26.5**		**26.7**		**26.9**		**27.0**		**27.0**			

Coeficiente φ_{o2} :	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26
Coeficiente $\beta_{t(t)}$:	0.34	0.36	0.54	0.59	0.63	0.67	0.68	0.72	0.72	0.76	0.75	0.79	0.78	0.82	0.81	0.84	0.83	0.86	0.86	0.88	0.94	0.95	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-i} :	0.67		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00			
Coeficiente de fluencia :	1.07	1.14	1.68	1.80	1.90	2.03	2.03	2.16	2.13	2.26	2.22	2.34	2.29	2.40	2.36	2.46	2.42	2.52	2.47	2.57	2.67	2.74	2.76	2.81	2.80	2.84	2.81	2.86	2.82	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87
Movimiento (mm/m) :	0.15	0.16	0.23	0.25	0.26	0.28	0.28	0.30	0.29	0.31	0.30	0.32	0.31	0.33	0.32	0.34	0.33	0.35	0.34	0.35	0.37	0.38	0.38	0.39	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Mov.fluencia (mm/m) :	0.15		0.24		0.27		0.29		0.30		0.31		0.32		0.33		0.34		0.35		0.37		0.38		0.39		0.39		0.39		0.39		0.39		0.39		0.39		0.39			
Mov.fluencia (mm) :	**13.8**		**21.8**		**24.6**		**26.2**		**27.4**		**28.4**		**29.3**		**30.1**		**30.8**		**31.4**		**33.6**		**34.6**		**35.0**		**35.2**		**35.3**		**35.3**		**35.4**		**35.4**		**35.4**		**35.4**			

Mov.TOTAL (mm/m) :	0.00		0.13		0.20		0.24		0.27		0.30		0.32		0.34		0.36		0.38		0.43		0.47		0.48		0.49		0.50		0.51		0.51		0.51		0.51		0.51			
Mov.TOTAL (mm) :	**-0.4**		**12.0**		**17.6**		**21.6**		**24.6**		**27.1**		**29.2**		**31.0**		**32.7**		**34.1**		**39.3**		**42.0**		**43.5**		**44.4**		**45.4**		**45.9**		**46.2**		**46.3**		**46.4**		**46.5**			

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1502.8

HIPOTESIS DE CALCULO Nº 5. Julio - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-34.9	-35.4	-35.2	0.4	31.8

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	184	549	914	1279	1644	2009	2374	2739	3104	3469	5294	7119	8944	10769	14419	18069	21719	25369	29019	32669	36319

Coeficiente βt :	0.09	0.12	0.21	0.28	0.30	0.38	0.37	0.46	0.44	0.53	0.49	0.58	0.54	0.62	0.58	0.66	0.61	0.69	0.64	0.72	0.76	0.82	0.83	0.88	0.88	0.91	0.91	0.94	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.04	0.06	0.08	0.09	0.11	0.11	0.14	0.13	0.16	0.15	0.17	0.16	0.19	0.17	0.20	0.18	0.21	0.19	0.22	0.23	0.25	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.08		0.11		0.13		0.15		0.16		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**3.0**		**6.9**		**9.6**		**11.7**		**13.5**		**14.9**		**16.1**		**17.1**		**18.0**		**18.8**		**21.7**		**23.3**		**24.4**		**25.2**		**26.0**		**26.5**		**26.7**		**26.9**		**27.0**		**27.0**			

Coeficiente $\varphi o2$:	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26
Coeficiente $\beta t(t)$:	0.42	0.46	0.57	0.61	0.64	0.69	0.69	0.73	0.73	0.77	0.76	0.80	0.79	0.82	0.82	0.85	0.84	0.87	0.86	0.89	0.94	0.95	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta t(j)$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente $\beta t-j$:	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00			
Coeficiente de fluencia :	1.33	1.43	1.75	1.88	1.94	2.07	2.06	2.19	2.15	2.28	2.24	2.35	2.31	2.42	2.37	2.48	2.43	2.53	2.49	2.58	2.68	2.74	2.76	2.82	2.80	2.84	2.81	2.86	2.82	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87
Movimiento (mm/m) :	0.18	0.20	0.24	0.26	0.27	0.28	0.28	0.30	0.30	0.31	0.31	0.32	0.32	0.33	0.33	0.34	0.33	0.35	0.34	0.35	0.37	0.38	0.38	0.39	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Mov.fluencia (mm/m) :	0.19		0.25		0.28		0.29		0.31		0.32		0.33		0.34		0.34		0.35		0.37		0.38		0.39		0.39		0.39		0.39		0.39		0.39		0.39		0.39			
Mov.fluencia (mm) :	**17.3**		**22.7**		**25.1**		**26.6**		**27.7**		**28.7**		**29.5**		**30.3**		**30.9**		**31.6**		**33.7**		**34.7**		**35.0**		**35.2**		**35.3**		**35.3**		**35.4**		**35.4**		**35.4**		**35.4**			

Mov.TOTAL (mm/m) :	0.58		0.68		0.74		0.78		0.81		0.83		0.86		0.88		0.89		0.91		0.97		0.99		1.01		1.02		1.03		1.04		1.04		1.04		1.04		1.04			
Mov.TOTAL (mm) :	**52.1**		**61.4**		**66.5**		**70.1**		**73.0**		**75.4**		**77.4**		**79.2**		**80.8**		**82.2**		**87.2**		**89.8**		**91.3**		**92.2**		**93.2**		**93.7**		**93.9**		**94.1**		**94.1**		**94.2**			

HIPOTESIS DE CALCULO Nº 6. Julio - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.0	**0.0**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente βt :	---	---	0.15	0.21	0.26	0.33	0.34	0.43	0.41	0.50	0.46	0.56	0.51	0.60	0.56	0.64	0.59	0.68	0.63	0.71	0.75	0.81	0.83	0.87	0.88	0.91	0.91	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	---	---	0.05	0.06	0.08	0.10	0.10	0.13	0.12	0.15	0.14	0.17	0.15	0.18	0.17	0.19	0.18	0.20	0.19	0.21	0.23	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.06		0.09		0.12		0.14		0.16		0.17		0.18		0.20		0.20		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**0.0**		**5.1**		**8.3**		**10.7**		**12.6**		**14.2**		**15.5**		**16.6**		**17.6**		**18.5**		**21.4**		**23.2**		**24.3**		**25.1**		**26.0**		**26.5**		**26.7**		**26.9**		**27.0**		**27.0**			

Coeficiente $\varphi o2$:	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26
Coeficiente $\beta t(t)$:	0.00	0.00	0.51	0.56	0.61	0.65	0.67	0.71	0.71	0.75	0.74	0.78	0.78	0.81	0.80	0.83	0.83	0.86	0.85	0.88	0.93	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta t(j)$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente $\beta t-j$:	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00			
Coeficiente de fluencia :	0.01	-0.01	1.60	1.72	1.85	1.98	2.00	2.13	2.11	2.24	2.20	2.32	2.27	2.39	2.34	2.45	2.40	2.51	2.46	2.56	2.66	2.73	2.76	2.81	2.80	2.84	2.81	2.86	2.82	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87
Movimiento (mm/m) :	0.00	0.00	0.22	0.24	0.25	0.27	0.27	0.29	0.29	0.31	0.30	0.32	0.31	0.33	0.32	0.34	0.33	0.34	0.34	0.35	0.37	0.37	0.38	0.39	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Mov.fluencia (mm/m) :	0.00		0.23		0.27		0.29		0.30		0.31		0.32		0.33		0.34		0.35		0.37		0.38		0.39		0.39		0.39		0.39		0.39		0.39		0.39		0.39			
Mov.fluencia (mm) :	**0.0**		**20.8**		**24.0**		**25.9**		**27.2**		**28.2**		**29.1**		**29.9**		**30.6**		**31.3**		**33.6**		**34.6**		**35.0**		**35.2**		**35.3**		**35.3**		**35.4**		**35.4**		**35.4**		**35.4**			

Mov.TOTAL (mm/m) :	0.00		0.29		0.36		0.41		0.44		0.47		0.49		0.52		0.53		0.55		0.61		0.64		0.66		0.67		0.68		0.68		0.69		0.69		0.69		0.69			
Mov.TOTAL (mm) :	**0.0**		**25.9**		**32.4**		**36.6**		**39.8**		**42.4**		**44.6**		**46.5**		**48.2**		**49.7**		**55.0**		**57.8**		**59.4**		**60.3**		**61.3**		**61.8**		**62.1**		**62.2**		**62.3**		**62.4**			

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA	E-1502.8

HIPOTESIS DE CALCULO Nº 7. Octubre - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.7	-17.6	0.2	**15.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	92	457	822	1187	1552	1917	2282	2647	3012	3377	5202	7027	8852	10677	14327	17977	21627	25277	28927	32577	36227

Coeficiente β_t :	0.05	0.07	0.18	0.24	0.28	0.36	0.36	0.45	0.42	0.51	0.48	0.57	0.52	0.61	0.57	0.65	0.60	0.69	0.64	0.71	0.76	0.82	0.83	0.87	0.88	0.91	0.91	0.94	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.01	0.02	0.05	0.07	0.08	0.11	0.11	0.13	0.13	0.15	0.14	0.17	0.16	0.18	0.17	0.20	0.18	0.21	0.19	0.21	0.23	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.02		0.07		0.10		0.12		0.14		0.16		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**1.7**		**6.0**		**9.0**		**11.2**		**13.1**		**14.6**		**15.8**		**16.9**		**17.8**		**18.6**		**21.5**		**23.3**		**24.4**		**25.1**		**26.0**		**26.5**		**26.7**		**26.9**		**27.0**		**27.0**			

Coeficiente φ_{02} :	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26
Coeficiente $\beta_{t(t)}$:	0.34	0.37	0.54	0.59	0.63	0.67	0.68	0.72	0.72	0.76	0.75	0.79	0.78	0.82	0.81	0.84	0.83	0.86	0.86	0.88	0.94	0.95	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-j} :	0.68		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00			
Coeficiente de fluencia :	1.07	1.14	1.68	1.81	1.90	2.03	2.03	2.16	2.13	2.26	2.22	2.34	2.29	2.40	2.36	2.46	2.42	2.52	2.47	2.57	2.67	2.74	2.76	2.81	2.80	2.84	2.81	2.86	2.82	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87
Movimiento (mm/m) :	0.15	0.16	0.23	0.25	0.26	0.28	0.28	0.30	0.29	0.31	0.30	0.32	0.31	0.33	0.32	0.34	0.33	0.35	0.34	0.35	0.37	0.38	0.38	0.39	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Mov.fluencia (mm/m) :	0.15		0.24		0.27		0.29		0.30		0.31		0.32		0.33		0.34		0.35		0.37		0.38		0.39		0.39		0.39		0.39		0.39		0.39		0.39		0.39			
Mov.fluencia (mm) :	**13.9**		**21.8**		**24.6**		**26.2**		**27.4**		**28.4**		**29.3**		**30.1**		**30.8**		**31.4**		**33.6**		**34.6**		**35.0**		**35.2**		**35.3**		**35.3**		**35.4**		**35.4**		**35.4**		**35.4**			

Mov.TOTAL (mm/m) :	0.35		0.49		0.55		0.59		0.62		0.65		0.68		0.70		0.71		0.73		0.79		0.82		0.83		0.84		0.86		0.86		0.86		0.87		0.87		0.87			
Mov.TOTAL (mm) :	**31.5**		**43.8**		**49.5**		**53.4**		**56.4**		**58.9**		**61.0**		**62.9**		**64.5**		**66.0**		**71.1**		**73.8**		**75.3**		**76.2**		**77.2**		**77.7**		**78.0**		**78.1**		**78.2**		**78.3**			

HIPOTESIS DE CALCULO Nº 8. Octubre - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.7	17.6	-0.2	**-15.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	273	638	1003	1368	1733	2098	2463	2828	3193	3558	5383	7208	9033	10858	14508	18158	21808	25458	29108	32758	36408

Coeficiente β_t :	0.12	0.17	0.23	0.31	0.32	0.40	0.39	0.48	0.45	0.54	0.50	0.59	0.55	0.63	0.59	0.67	0.62	0.70	0.65	0.73	0.77	0.82	0.84	0.88	0.88	0.91	0.92	0.94	0.95	0.97	0.97	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.04	0.05	0.07	0.09	0.10	0.12	0.12	0.14	0.13	0.16	0.15	0.18	0.16	0.19	0.18	0.20	0.19	0.21	0.20	0.22	0.23	0.25	0.25	0.26	0.27	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.05		0.08		0.11		0.14		0.15		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**4.1**		**7.6**		**10.2**		**12.2**		**13.8**		**15.2**		**16.4**		**17.4**		**18.3**		**19.0**		**21.8**		**23.4**		**24.5**		**25.2**		**26.1**		**26.5**		**26.7**		**26.9**		**27.0**		**27.0**			

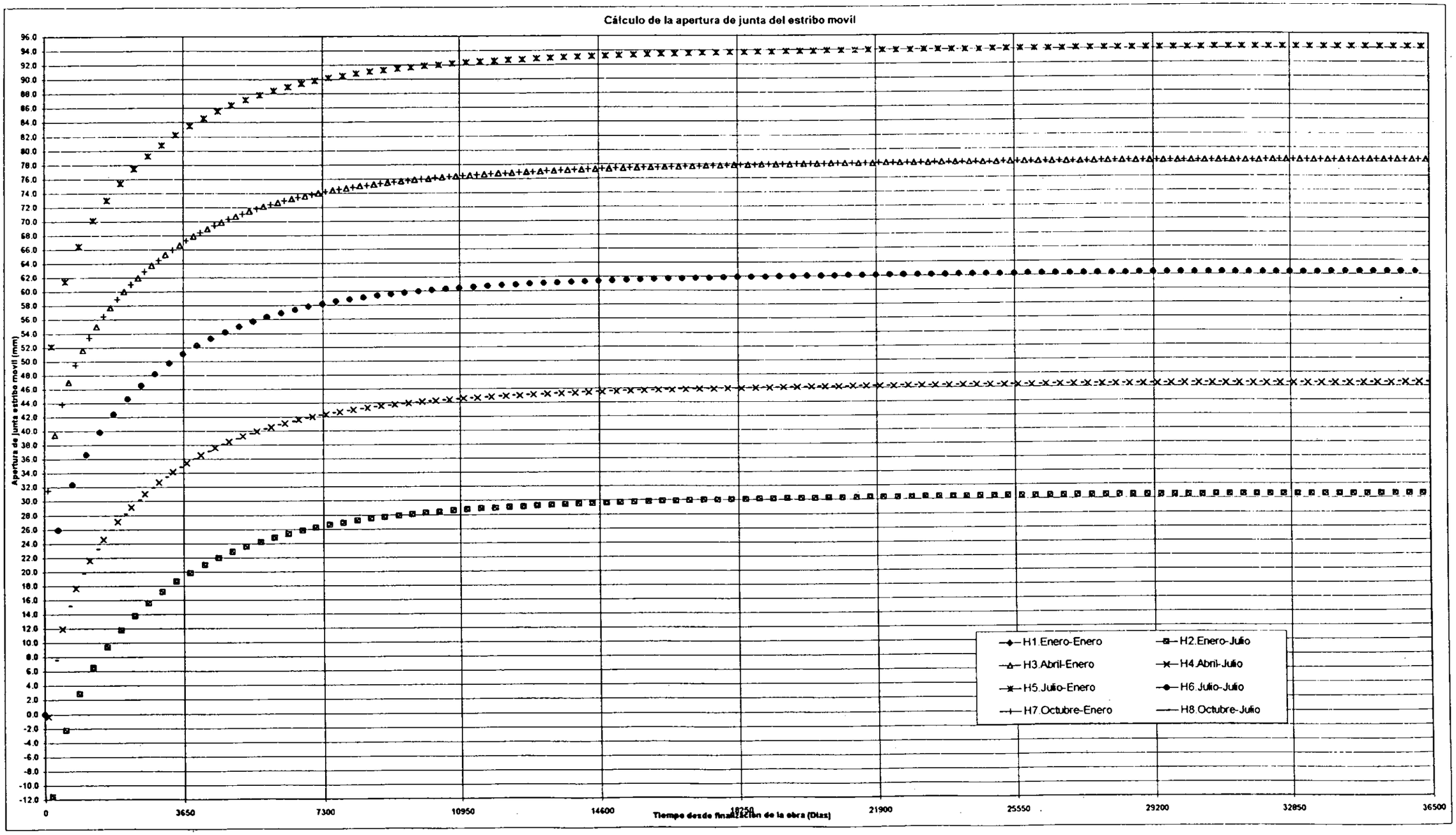
Coeficiente φ_{02} :	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26	1.23	1.26
Coeficiente $\beta_{t(t)}$:	0.47	0.51	0.59	0.64	0.66	0.70	0.70	0.74	0.74	0.78	0.77	0.80	0.80	0.83	0.82	0.85	0.85	0.87	0.87	0.89	0.94	0.95	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-j} :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00			
Coeficiente de fluencia :	1.48	1.60	1.81	1.93	1.97	2.10	2.08	2.21	2.18	2.30	2.25	2.37	2.32	2.44	2.39	2.49	2.45	2.54	2.50	2.59	2.68	2.75	2.77	2.82	2.80	2.85	2.81	2.86	2.82	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87	2.83	2.87
Movimiento (mm/m) :	0.20	0.22	0.25	0.27	0.27	0.29	0.29	0.30	0.30	0.32	0.31	0.33	0.32	0.33	0.33	0.34	0.34	0.35	0.34	0.36	0.37	0.38	0.38	0.39	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Mov.fluencia (mm/m) :	0.21		0.26		0.28		0.30		0.31		0.32		0.33		0.34		0.34		0.35		0.37		0.38		0.39		0.39		0.39		0.39		0.39		0.39		0.39		0.39			
Mov.fluencia (mm) :	**19.3**		**23.4**		**25.5**		**26.9**		**28.0**		**28.9**		**29.7**		**30.4**		**31.1**		**31.7**		**33.8**		**34.7**		**35.0**		**35.2**		**35.3**		**35.3**		**35.4**		**35.4**		**35.4**		**35.4**			

Mov.TOTAL (mm/m) :	0.08		0.17		0.22		0.26		0.29		0.31		0.33		0.35		0.37		0.39		0.44		0.47		0.48		0.49		0.50		0.51		0.51		0.51		0.51		0.51			
Mov.TOTAL (mm) :	**7.5**		**15.1**		**19.7**		**23.2**		**25.9**		**28.2**		**30.1**		**31.9**		**33.4**		**34.8**		**39.6**		**42.2**		**43.6**		**44.5**		**45.5**		**45.9**		**46.2**		**46.3**		**46.4**		**46.5**			

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1502.8

RESUMEN TOTAL



CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	EVN1-1.4

DATOS ESTRUCTURA

	Zona maciza	Zona aligerada	Total estructura
Longitud (m) :	64.88	0.00	64.88
Canto medio (m) :	1.07	1.07	—
Seccion transversal (m²) :	9.38	9.38	—
Perimetro (m) :	26.83	26.83	—
Espesor ficticio (cm) :	104.92	104.92	—

Estribo movil :	E-1

(el estribo contrario no tiene apertura de junta pues el tablero está anclado a él)

Axil medio (KN) :	59878.27
Resistencia hormigón (N/mm²) :	40.00

HIPOTESIS DE CALCULO Nº 1. Enero - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.00	0.0

Retracción y fluencia (los valores no incluídos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente βt :	—	—	0.19	0.19	0.31	0.31	0.40	0.40	0.47	0.47	0.53	0.53	0.58	0.58	0.62	0.62	0.66	0.66	0.69	0.69	0.80	0.80	0.86	0.86	0.90	0.90	0.93	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.06	0.06	0.09	0.09	0.12	0.12	0.14	0.14	0.16	0.16	0.17	0.17	0.19	0.19	0.20	0.20	0.21	0.21	0.24	0.24	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.06		0.09		0.12		0.14		0.16		0.17		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**3.7**		**6.1**		**7.8**		**9.2**		**10.3**		**11.3**		**12.1**		**12.8**		**13.4**		**15.5**		**16.7**		**17.5**		**18.1**		**18.7**		**19.0**		**19.2**		**19.3**		**19.4**		**19.4**		**19.4**	

Coeficiente φo2 :	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Coeficiente βt(t) :	0.00	0.00	0.54	0.54	0.64	0.64	0.70	0.70	0.74	0.74	0.77	0.77	0.80	0.80	0.83	0.83	0.85	0.85	0.87	0.87	0.94	0.94	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(i) :	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Coeficiente βt-j :	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.00	0.00	1.68	1.68	1.95	1.95	2.10	2.10	2.20	2.20	2.28	2.28	2.36	2.36	2.42	2.42	2.48	2.48	2.53	2.53	2.71	2.71	2.80	2.80	2.83	2.83	2.84	2.84	2.85	2.85	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86
Movimiento (mm/m) :	0.00	0.00	0.28	0.28	0.33	0.33	0.35	0.35	0.37	0.37	0.38	0.38	0.40	0.40	0.41	0.41	0.42	0.42	0.43	0.43	0.46	0.46	0.47	0.47	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Mov.fluencia (mm/m) :	0.00		0.28		0.33		0.35		0.37		0.38		0.40		0.41		0.42		0.43		0.46		0.47		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48	
Mov.fluencia (mm) :	**0.0**		**18.4**		**21.3**		**22.9**		**24.0**		**24.9**		**25.7**		**26.4**		**27.0**		**27.6**		**29.6**		**30.5**		**30.9**		**31.0**		**31.1**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**	

Mov.TOTAL (mm/m) :	0.00		0.34		0.42		0.47		0.51		0.54		0.57		0.59		0.61		0.63		0.70		0.73		0.75		0.76		0.77		0.77		0.78		0.78		0.78		0.78		0.78	
Mov.TOTAL (mm) :	**0.0**		**22.1**		**27.3**		**30.7**		**33.2**		**35.2**		**37.0**		**38.5**		**39.8**		**41.0**		**45.1**		**47.3**		**48.4**		**49.1**		**49.8**		**50.2**		**50.4**		**50.5**		**50.5**		**50.6**		**50.6**	

HIPOTESIS DE CALCULO Nº 2. Enero - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
35.5	36.9	35.5	-0.4	**-23.0**

Retracción y fluencia (el resto de los valores hasta el Año 99 se representan en el gráfico)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	181	546	911	1276	1641	2006	2371	2736	3101	3466	5291	7116	8941	10766	14416	18066	21716	25366	29016	32666	36316

Coeficiente βt :	0.11	0.11	0.26	0.26	0.36	0.36	0.44	0.44	0.50	0.50	0.56	0.56	0.60	0.60	0.64	0.64	0.67	0.67	0.70	0.70	0.80	0.80	0.87	0.87	0.90	0.90	0.93	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.03	0.08	0.08	0.11	0.11	0.13	0.13	0.15	0.15	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.24	0.24	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.08		0.11		0.13		0.15		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**2.2**		**5.0**		**7.0**		**8.5**		**9.8**		**10.8**		**11.7**		**12.4**		**13.1**		**13.6**		**15.6**		**16.8**		**17.6**		**18.1**		**18.7**		**19.0**		**19.2**		**19.3**		**19.4**		**19.4**		**19.4**	

Coeficiente φo2 :	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Coeficiente βt(t) :	0.45	0.45	0.60	0.60	0.67	0.67	0.72	0.72	0.76	0.76	0.79	0.79	0.81	0.81	0.84	0.84	0.86	0.86	0.88	0.88	0.95	0.95	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(i) :	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Coeficiente βt-j :	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.39	1.39	1.84	1.84	2.03	2.03	2.15	2.15	2.24	2.24	2.32	2.32	2.39	2.39	2.45	2.45	2.50	2.50	2.55	2.55	2.73	2.73	2.80	2.80	2.83	2.83	2.84	2.84	2.85	2.85	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86
Movimiento (mm/m) :	0.23	0.23	0.31	0.31	0.34	0.34	0.36	0.36	0.38	0.38	0.39	0.39	0.40	0.40	0.41	0.41	0.42	0.42	0.43	0.43	0.46	0.46	0.47	0.47	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Mov.fluencia (mm/m) :	0.23		0.31		0.34		0.36		0.38		0.39		0.40		0.41		0.42		0.43		0.46		0.47		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48	
Mov.fluencia (mm) :	**15.2**		**20.1**		**22.1**		**23.5**		**24.5**		**25.3**		**26.1**		**26.7**		**27.3**		**27.9**		**29.7**		**30.6**		**30.9**		**31.0**		**31.1**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**	

Mov.TOTAL (mm/m) :	-0.09		0.03		0.09		0.14		0.17		0.20		0.23		0.25		0.27		0.28		0.34		0.38		0.39		0.40		0.41		0.42		0.42		0.42		0.42		0.43		0.43	
Mov.TOTAL (mm) :	**-5.6**		**2.0**		**6.1**		**9.0**		**11.2**		**13.1**		**14.7**		**16.1**		**17.4**		**18.5**		**22.4**		**24.4**		**25.5**		**26.1**		**26.8**		**27.2**		**27.4**		**27.5**		**27.5**		**27.6**		**27.6**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	EVN1-1.4

HIPOTESIS DE CALCULO Nº 3. Abril - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.7	-18.5	-17.7	0.2	11.5

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	275	640	1005	1370	1735	2100	2465	2830	3195	3560	5385	7210	9035	10860	14510	18160	21810	25460	29110	32760	36410

Coeficiente β_t :	0.15	0.15	0.28	0.28	0.38	0.38	0.46	0.46	0.52	0.52	0.57	0.57	0.61	0.61	0.65	0.65	0.68	0.68	0.71	0.71	0.81	0.81	0.87	0.87	0.91	0.91	0.93	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.05	0.05	0.09	0.09	0.11	0.11	0.14	0.14	0.15	0.15	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.24	0.24	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.05		0.09		0.11		0.14		0.15		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**3.0**		**5.5**		**7.4**		**8.9**		**10.1**		**11.0**		**11.9**		**12.6**		**13.2**		**13.8**		**15.7**		**16.9**		**17.6**		**18.1**		**18.7**		**19.0**		**19.2**		**19.3**		**19.4**		**19.4**		**19.4**	

Coeficiente φ_{o2} :	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Coeficiente $\beta_{t(t)}$:	0.50	0.50	0.62	0.62	0.69	0.69	0.73	0.73	0.77	0.77	0.79	0.79	0.82	0.82	0.84	0.84	0.87	0.87	0.88	0.88	0.95	0.95	0.98	0.98	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Coeficiente β_{t-i} :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.57	1.57	1.90	1.90	2.07	2.07	2.18	2.18	2.27	2.27	2.34	2.34	2.40	2.40	2.46	2.46	2.52	2.52	2.57	2.57	2.73	2.73	2.80	2.80	2.83	2.83	2.84	2.84	2.85	2.85	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86
Movimiento (mm/m) :	0.26	0.26	0.32	0.32	0.35	0.35	0.37	0.37	0.38	0.38	0.39	0.39	0.40	0.40	0.41	0.41	0.42	0.42	0.43	0.43	0.46	0.46	0.47	0.47	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Mov.fluencia (mm/m) :	0.26		0.32		0.35		0.37		0.38		0.39		0.40		0.41		0.42		0.43		0.46		0.47		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48	
Mov.fluencia (mm) :	**17.1**		**20.7**		**22.5**		**23.8**		**24.7**		**25.5**		**26.2**		**26.9**		**27.5**		**28.0**		**29.8**		**30.6**		**30.9**		**31.0**		**31.1**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**	

Mov.TOTAL (mm/m) :	0.49		0.58		0.64		0.68		0.71		0.74		0.77		0.79		0.80		0.82		0.88		0.91		0.93		0.94		0.95		0.95		0.95		0.96		0.96		0.96		0.96	
Mov.TOTAL (mm) :	**31.6**		**37.8**		**41.5**		**44.1**		**46.3**		**48.1**		**49.6**		**51.0**		**52.2**		**53.3**		**57.0**		**59.0**		**60.1**		**60.7**		**61.4**		**61.7**		**61.9**		**62.0**		**62.1**		**62.1**		**62.1**	

HIPOTESIS DE CALCULO Nº 4. Abril - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.7	18.5	17.7	-0.2	-11.5

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	91	456	821	1186	1551	1916	2281	2646	3011	3376	5201	7026	8851	10676	14326	17976	21626	25276	28926	32576	36226

Coeficiente β_t :	0.06	0.06	0.23	0.23	0.34	0.34	0.42	0.42	0.49	0.49	0.54	0.54	0.59	0.59	0.63	0.63	0.66	0.66	0.69	0.69	0.80	0.80	0.86	0.86	0.90	0.90	0.93	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.02	0.07	0.07	0.10	0.10	0.13	0.13	0.15	0.15	0.16	0.16	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.24	0.24	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.02		0.07		0.10		0.13		0.15		0.16		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**1.2**		**4.4**		**6.5**		**8.2**		**9.5**		**10.6**		**11.5**		**12.3**		**12.9**		**13.5**		**15.6**		**16.8**		**17.6**		**18.1**		**18.7**		**19.0**		**19.2**		**19.3**		**19.4**		**19.4**		**19.4**	

Coeficiente φ_{o2} :	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Coeficiente $\beta_{t(t)}$:	0.36	0.36	0.58	0.58	0.66	0.66	0.71	0.71	0.75	0.75	0.78	0.78	0.81	0.81	0.83	0.83	0.85	0.85	0.87	0.87	0.95	0.95	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Coeficiente β_{t-i} :	0.67		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.12	1.12	1.77	1.77	1.99	1.99	2.13	2.13	2.22	2.22	2.30	2.30	2.37	2.37	2.43	2.43	2.49	2.49	2.54	2.54	2.72	2.72	2.80	2.80	2.83	2.83	2.84	2.84	2.85	2.85	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86
Movimiento (mm/m) :	0.19	0.19	0.30	0.30	0.33	0.33	0.36	0.36	0.37	0.37	0.39	0.39	0.40	0.40	0.41	0.41	0.42	0.42	0.43	0.43	0.46	0.46	0.47	0.47	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Mov.fluencia (mm/m) :	0.19		0.30		0.33		0.36		0.37		0.39		0.40		0.41		0.42		0.43		0.46		0.47		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48	
Mov.fluencia (mm) :	**12.2**		**19.3**		**21.7**		**23.2**		**24.3**		**25.1**		**25.9**		**26.6**		**27.2**		**27.7**		**29.7**		**30.5**		**30.9**		**31.0**		**31.1**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**	

Mov.TOTAL (mm/m) :	0.03		0.19		0.26		0.31		0.34		0.37		0.40		0.42		0.44		0.46		0.52		0.55		0.57		0.58		0.59		0.60		0.60		0.60		0.60		0.60		0.60	
Mov.TOTAL (mm) :	**1.9**		**12.2**		**16.7**		**19.8**		**22.2**		**24.2**		**25.8**		**27.3**		**28.6**		**29.7**		**33.7**		**35.8**		**36.9**		**37.6**		**38.3**		**38.7**		**38.9**		**39.0**		**39.0**		**39.1**		**39.1**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	EVN1-1.4

HIPOTESIS DE CALCULO Nº 5. Julio - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-35.5	-36.9	-35.5	0.4	**23.0**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	184	549	914	1279	1644	2009	2374	2739	3104	3469	5294	7119	8944	10769	14419	18069	21719	25369	29019	32669	36319

Coeficiente β_t :	0.11	0.11	0.26	0.26	0.36	0.36	0.44	0.44	0.50	0.50	0.56	0.56	0.60	0.60	0.64	0.64	0.67	0.67	0.70	0.70	0.80	0.80	0.87	0.87	0.90	0.90	0.93	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.03	0.08	0.08	0.11	0.11	0.13	0.13	0.15	0.15	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.24	0.24	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.08		0.11		0.13		0.15		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**2.2**		**5.0**		**7.0**		**8.5**		**9.8**		**10.8**		**11.7**		**12.4**		**13.1**		**13.6**		**15.6**		**16.8**		**17.6**		**18.1**		**18.7**		**19.0**		**19.2**		**19.3**		**19.4**		**19.4**		**19.4**	

Coeficiente φ_{02} :	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Coeficiente $\beta_{t(t)}$:	0.45	0.45	0.60	0.60	0.67	0.67	0.72	0.72	0.76	0.76	0.79	0.79	0.81	0.81	0.84	0.84	0.86	0.86	0.88	0.88	0.95	0.95	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Coeficiente β_{t-i} :	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.40	1.40	1.84	1.84	2.03	2.03	2.15	2.15	2.25	2.25	2.32	2.32	2.39	2.39	2.45	2.45	2.50	2.50	2.55	2.55	2.73	2.73	2.80	2.80	2.83	2.83	2.84	2.84	2.85	2.85	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86
Movimiento (mm/m) :	0.24	0.24	0.31	0.31	0.34	0.34	0.36	0.36	0.38	0.38	0.39	0.39	0.40	0.40	0.41	0.41	0.42	0.42	0.43	0.43	0.46	0.46	0.47	0.47	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Mov.fluencia (mm/m) :	0.24		0.31		0.34		0.36		0.38		0.39		0.40		0.41		0.42		0.43		0.46		0.47		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48	
Mov.fluencia (mm) :	**15.3**		**20.1**		**22.2**		**23.5**		**24.5**		**25.3**		**26.1**		**26.7**		**27.3**		**27.9**		**29.7**		**30.6**		**30.9**		**31.0**		**31.1**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**	

Mov.TOTAL (mm/m) :	0.62		0.74		0.80		0.85		0.88		0.91		0.94		0.96		0.98		0.99		1.05		1.09		1.10		1.11		1.12		1.13		1.13		1.13		1.13		1.13		1.13	
Mov.TOTAL (mm) :	**40.5**		**48.1**		**52.2**		**55.0**		**57.3**		**59.2**		**60.8**		**62.2**		**63.4**		**64.5**		**68.4**		**70.4**		**71.5**		**72.2**		**72.9**		**73.2**		**73.4**		**73.5**		**73.6**		**73.6**		**73.6**	

HIPOTESIS DE CALCULO Nº 6. Julio - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.0	**0.0**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente β_t :	—	—	0.19	0.19	0.31	0.31	0.40	0.40	0.47	0.47	0.53	0.53	0.58	0.58	0.62	0.62	0.66	0.66	0.69	0.69	0.80	0.80	0.86	0.86	0.90	0.90	0.93	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.06	0.06	0.09	0.09	0.12	0.12	0.14	0.14	0.16	0.16	0.17	0.17	0.19	0.19	0.20	0.20	0.21	0.21	0.24	0.24	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.06		0.09		0.12		0.14		0.16		0.17		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**3.7**		**6.1**		**7.8**		**9.2**		**10.3**		**11.3**		**12.1**		**12.8**		**13.4**		**15.5**		**16.7**		**17.5**		**18.1**		**18.7**		**19.0**		**19.2**		**19.3**		**19.4**		**19.4**		**19.4**	

Coeficiente φ_{02} :	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Coeficiente $\beta_{t(t)}$:	0.00	0.00	0.54	0.54	0.64	0.64	0.70	0.70	0.74	0.74	0.77	0.77	0.80	0.80	0.83	0.83	0.85	0.85	0.87	0.87	0.94	0.94	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Coeficiente β_{t-i} :	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.00	0.00	1.68	1.68	1.95	1.95	2.10	2.10	2.20	2.20	2.28	2.28	2.36	2.36	2.42	2.42	2.48	2.48	2.53	2.53	2.71	2.71	2.80	2.80	2.83	2.83	2.84	2.84	2.85	2.85	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86
Movimiento (mm/m) :	0.00	0.00	0.28	0.28	0.33	0.33	0.35	0.35	0.37	0.37	0.38	0.38	0.40	0.40	0.41	0.41	0.42	0.42	0.43	0.43	0.46	0.46	0.47	0.47	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Mov.fluencia (mm/m) :	0.00		0.28		0.33		0.35		0.37		0.38		0.40		0.41		0.42		0.43		0.46		0.47		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48	
Mov.fluencia (mm) :	**0.0**		**18.4**		**21.3**		**22.9**		**24.0**		**24.9**		**25.7**		**26.4**		**27.0**		**27.6**		**29.6**		**30.5**		**30.9**		**31.0**		**31.1**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**	

Mov.TOTAL (mm/m) :	0.00		0.34		0.42		0.47		0.51		0.54		0.57		0.59		0.61		0.63		0.70		0.73		0.75		0.76		0.77		0.77		0.78		0.78		0.78		0.78		0.78	
Mov.TOTAL (mm) :	**0.0**		**22.1**		**27.3**		**30.7**		**33.2**		**35.2**		**37.0**		**38.5**		**39.8**		**41.0**		**45.1**		**47.3**		**48.4**		**49.1**		**49.8**		**50.2**		**50.4**		**50.5**		**50.5**		**50.6**		**50.6**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	EVN1-1.4

HIPOTESIS DE CALCULO Nº 7. Octubre - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.7	-18.5	-17.7	0.2	**11.5**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	92	457	822	1187	1552	1917	2282	2647	3012	3377	5202	7027	8852	10677	14327	17977	21627	25277	28927	32577	36227

Coeficiente βt :	0.06	0.06	0.23	0.23	0.34	0.34	0.42	0.42	0.49	0.49	0.54	0.54	0.59	0.59	0.63	0.63	0.66	0.66	0.69	0.69	0.80	0.80	0.86	0.86	0.90	0.90	0.93	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.02	0.07	0.07	0.10	0.10	0.13	0.13	0.15	0.15	0.16	0.16	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.24	0.24	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.02		0.07		0.10		0.13		0.15		0.16		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**1.3**		**4.4**		**6.5**		**8.2**		**9.5**		**10.6**		**11.5**		**12.3**		**12.9**		**13.5**		**15.6**		**16.8**		**17.6**		**18.1**		**18.7**		**19.0**		**19.2**		**19.3**		**19.4**		**19.4**		**19.4**	

Coeficiente $\varphi o2$:	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Coeficiente $\beta t(t)$:	0.36	0.36	0.58	0.58	0.66	0.66	0.71	0.71	0.75	0.75	0.78	0.78	0.81	0.81	0.83	0.83	0.85	0.85	0.87	0.87	0.95	0.95	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta t(i)$:	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Coeficiente $\beta t\text{-}i$:	0.68		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.12	1.12	1.77	1.77	1.99	1.99	2.13	2.13	2.22	2.22	2.30	2.30	2.37	2.37	2.44	2.44	2.49	2.49	2.54	2.54	2.72	2.72	2.80	2.80	2.83	2.83	2.84	2.84	2.85	2.85	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86
Movimiento (mm/m) :	0.19	0.19	0.30	0.30	0.34	0.34	0.36	0.36	0.37	0.37	0.39	0.39	0.40	0.40	0.41	0.41	0.42	0.42	0.43	0.43	0.46	0.46	0.47	0.47	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Mov.fluencia (mm/m) :	0.19		0.30		0.34		0.36		0.37		0.39		0.40		0.41		0.42		0.43		0.46		0.47		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48	
Mov.fluencia (mm) :	**12.3**		**19.3**		**21.7**		**23.2**		**24.3**		**25.1**		**25.9**		**26.6**		**27.2**		**27.7**		**29.7**		**30.5**		**30.9**		**31.0**		**31.1**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**	

Mov.TOTAL (mm/m) :	0.39		0.54		0.61		0.66		0.70		0.73		0.75		0.78		0.80		0.81		0.87		0.91		0.92		0.93		0.95		0.95		0.96		0.96		0.96		0.96		0.96	
Mov.TOTAL (mm) :	**25.0**		**35.2**		**39.8**		**42.9**		**45.3**		**47.2**		**48.9**		**50.3**		**51.6**		**52.8**		**56.8**		**58.8**		**60.0**		**60.6**		**61.4**		**61.7**		**61.9**		**62.0**		**62.1**		**62.1**		**62.1**	

HIPOTESIS DE CALCULO Nº 8. Octubre - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.7	18.5	17.7	-0.2	**-11.5**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	273	638	1003	1368	1733	2098	2463	2828	3193	3558	5383	7208	9033	10858	14508	18158	21808	25458	29108	32758	36408

Coeficiente βt :	0.15	0.15	0.28	0.28	0.38	0.38	0.46	0.46	0.52	0.52	0.57	0.57	0.61	0.61	0.65	0.65	0.68	0.68	0.71	0.71	0.81	0.81	0.87	0.87	0.91	0.91	0.93	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.05	0.05	0.09	0.09	0.11	0.11	0.14	0.14	0.15	0.15	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.24	0.24	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.05		0.09		0.11		0.14		0.15		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**3.0**		**5.5**		**7.4**		**8.9**		**10.0**		**11.0**		**11.9**		**12.6**		**13.2**		**13.8**		**15.7**		**16.9**		**17.6**		**18.1**		**18.7**		**19.0**		**19.2**		**19.3**		**19.4**		**19.4**		**19.4**	

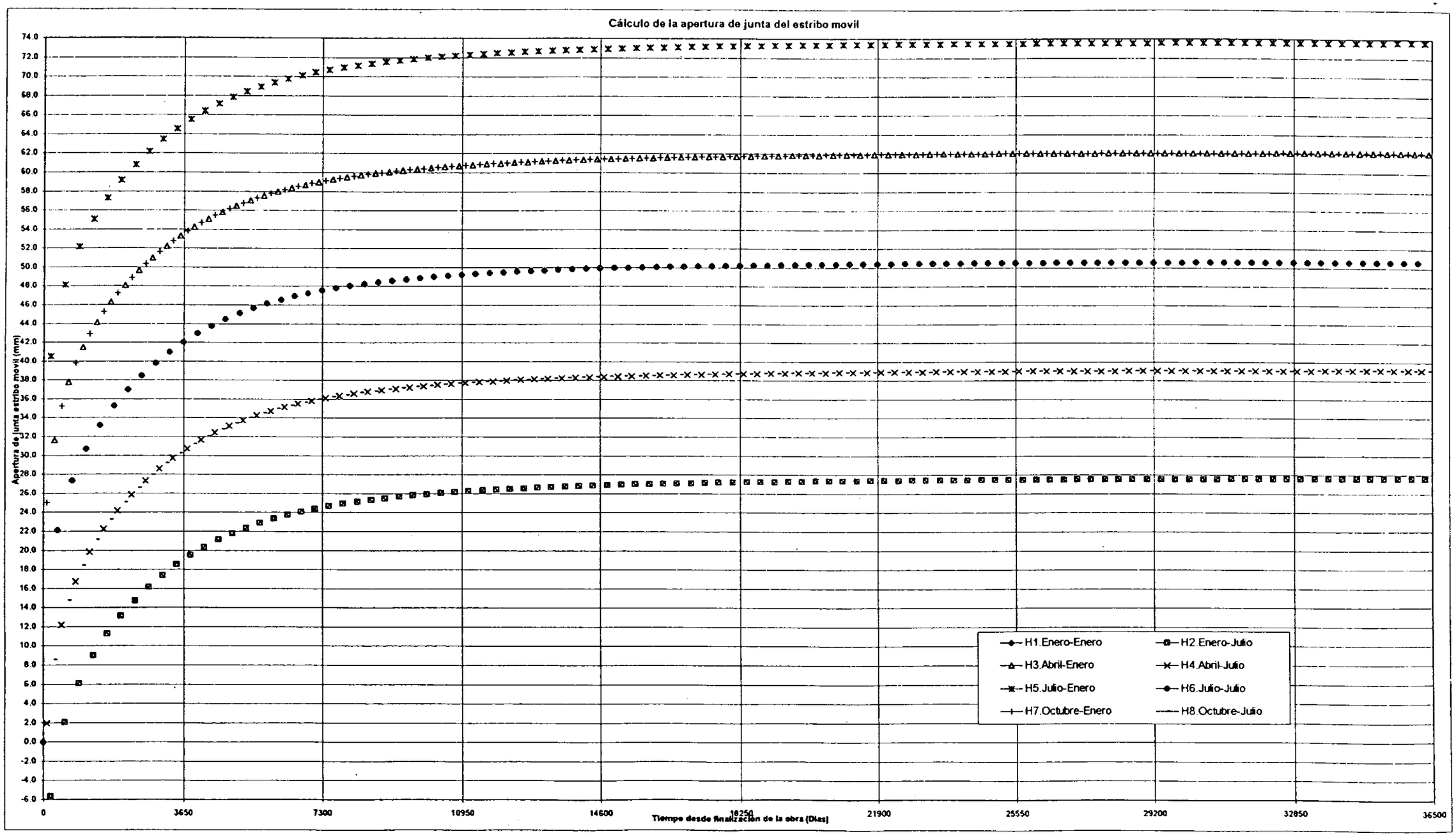
Coeficiente $\varphi o2$:	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Coeficiente $\beta t(t)$:	0.50	0.50	0.62	0.62	0.69	0.69	0.73	0.73	0.77	0.77	0.79	0.79	0.82	0.82	0.84	0.84	0.86	0.86	0.88	0.88	0.95	0.95	0.98	0.98	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta t(i)$:	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Coeficiente $\beta t\text{-}i$:	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.56	1.56	1.90	1.90	2.06	2.06	2.18	2.18	2.27	2.27	2.34	2.34	2.40	2.40	2.46	2.46	2.52	2.52	2.57	2.57	2.73	2.73	2.80	2.80	2.83	2.83	2.84	2.84	2.85	2.85	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86
Movimiento (mm/m) :	0.26	0.26	0.32	0.32	0.35	0.35	0.37	0.37	0.38	0.38	0.39	0.39	0.40	0.40	0.41	0.41	0.42	0.42	0.43	0.43	0.46	0.46	0.47	0.47	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Mov.fluencia (mm/m) :	0.26		0.32		0.35		0.37		0.38		0.39		0.40		0.41		0.42		0.43		0.46		0.47		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48		0.48	
Mov.fluencia (mm) :	**17.1**		**20.7**		**22.5**		**23.8**		**24.7**		**25.5**		**26.2**		**26.9**		**27.5**		**28.0**		**29.8**		**30.6**		**30.9**		**31.0**		**31.1**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**		**31.2**	

Mov.TOTAL (mm/m) :	0.13		0.23		0.28		0.33		0.36		0.39		0.41		0.43		0.45		0.47		0.52		0.55		0.57		0.58		0.59		0.60		0.60		0.60		0.60		0.60		0.60	
Mov.TOTAL (mm) :	**8.5**		**14.7**		**18.4**		**21.1**		**23.2**		**25.0**		**26.6**		**28.0**		**29.2**		**30.2**		**34.0**		**36.0**		**37.0**		**37.7**		**38.4**		**38.7**		**38.9**		**39.0**		**39.0**		**39.1**		**39.1**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO:	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA:	EVN1-1.4

RESUMEN TOTAL



CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1508.5. Tablero izquierdo

DATOS ESTRUCTURA

	Zona maciza	Zona aligerada	Total estructura
Longitud (m) :	50.60	92.40	143.00
Canto medio (m) :	2.07	2.07	—
Seccion transversal (m²) :	11.87	8.80	—
Perimetro (m) :	19.98	19.98	—
Espesor ficticio (cm) :	178.34	132.10	—

Estribo movil :	E-2

(el estribo contrario no tiene apertura de junta pues el tablero está anclado a él)

Axil medio (KN) :	51108.17
Resistencia hormigón (N/mm²) :	40.00

HIPOTESIS DE CALCULO Nº 1. Enero - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.00	0.0

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente β_t :	---	---	0.10	0.15	0.18	0.25	0.25	0.33	0.31	0.40	0.36	0.46	0.41	0.50	0.45	0.55	0.49	0.59	0.53	0.62	0.67	0.75	0.77	0.82	0.83	0.88	0.88	0.91	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	---	0.03	0.04	0.05	0.07	0.07	0.10	0.09	0.12	0.11	0.14	0.12	0.15	0.14	0.16	0.15	0.18	0.16	0.19	0.20	0.22	0.23	0.25	0.25	0.26	0.26	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.04		0.07		0.09		0.11		0.13		0.14		0.15		0.17		0.18		0.22		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**5.7**		**9.7**		**12.9**		**15.7**		**18.1**		**20.2**		**22.1**		**23.7**		**25.2**		**30.9**		**34.5**		**36.9**		**38.6**		**40.6**		**41.6**		**42.2**		**42.5**		**42.6**		**42.7**		**42.8**	

Coeficiente φ_{o2} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.00	0.00	0.47	0.51	0.56	0.61	0.62	0.66	0.66	0.71	0.70	0.74	0.73	0.77	0.76	0.80	0.79	0.83	0.82	0.85	0.92	0.93	0.96	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.02	0.01	1.47	1.59	1.71	1.84	1.85	1.99	1.96	2.10	2.05	2.19	2.13	2.26	2.20	2.33	2.27	2.39	2.34	2.45	2.58	2.66	2.70	2.75	2.74	2.79	2.76	2.81	2.78	2.82	2.78	2.82	2.78	2.82	2.79	2.82	2.79	2.82	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.00	0.00	0.17	0.18	0.19	0.21	0.21	0.23	0.22	0.24	0.23	0.25	0.24	0.26	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.30	0.31	0.31	0.31	0.32	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Mov.fluencia (mm/m) :	0.00		0.18		0.20		0.22		0.23		0.24		0.25		0.26		0.27		0.27		0.30		0.31		0.31		0.32		0.32		0.32		0.32		0.32		0.32		0.32	
Mov.fluencia (mm) :	**0.3**		**25.1**		**29.1**		**31.5**		**33.2**		**34.7**		**35.9**		**37.1**		**38.1**		**39.1**		**42.7**		**44.3**		**45.0**		**45.3**		**45.5**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**	

Mov.TOTAL (mm/m) :	0.00	0.22	0.27	0.31	0.34	0.37	0.39	0.41	0.43	0.45	0.51	0.55	0.57	0.59	0.60	0.61	0.61	0.62	0.62	0.62	0.62
Mov.TOTAL (mm) :	**0.3**	**30.8**	**38.8**	**44.4**	**48.9**	**52.8**	**56.1**	**59.1**	**61.9**	**64.3**	**73.5**	**78.8**	**81.9**	**83.9**	**86.1**	**87.2**	**87.7**	**88.0**	**88.2**	**88.3**	**88.4**

HIPOTESIS DE CALCULO Nº 2. Enero - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
34.9	34.8	34.9	-0.3	-49.8

Retracción y fluencia (el resto de los valores hasta el Año 99 se representan en el gráfico)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	181	546	911	1276	1641	2006	2371	2736	3101	3466	5291	7116	8941	10766	14416	18066	21716	25366	29016	32666	36316

Coeficiente β_t :	0.06	0.08	0.15	0.20	0.22	0.29	0.28	0.37	0.34	0.43	0.39	0.48	0.43	0.53	0.47	0.57	0.51	0.60	0.55	0.64	0.68	0.76	0.77	0.83	0.84	0.88	0.88	0.91	0.94	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.03	0.04	0.06	0.07	0.09	0.08	0.11	0.10	0.13	0.12	0.14	0.13	0.16	0.14	0.17	0.15	0.18	0.16	0.19	0.20	0.23	0.23	0.25	0.25	0.26	0.26	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.02		0.05		0.08		0.10		0.12		0.13		0.15		0.16		0.17		0.18		0.22		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**3.2**		**7.8**		**11.4**		**14.4**		**16.9**		**19.2**		**21.2**		**22.9**		**24.5**		**25.9**		**31.3**		**34.8**		**37.1**		**38.7**		**40.6**		**41.6**		**42.2**		**42.5**		**42.6**		**42.7**		**42.8**	

Coeficiente φ_{o2} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.38	0.42	0.52	0.57	0.59	0.64	0.64	0.69	0.68	0.72	0.71	0.76	0.74	0.79	0.77	0.81	0.80	0.84	0.83	0.86	0.92	0.94	0.97	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.22	1.32	1.61	1.74	1.79	1.92	1.91	2.05	2.01	2.14	2.09	2.22	2.17	2.30	2.24	2.36	2.31	2.42	2.37	2.48	2.60	2.67	2.70	2.76	2.75	2.79	2.77	2.81	2.78	2.82	2.78	2.82	2.78	2.82	2.79	2.82	2.79	2.82	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.14	0.15	0.18	0.20	0.20	0.22	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.25	0.27	0.26	0.27	0.27	0.28	0.29	0.30	0.31	0.31	0.31	0.32	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Mov.fluencia (mm/m) :	0.15		0.19		0.21		0.23		0.24		0.25		0.26		0.26		0.27		0.28		0.30		0.31		0.32		0.32		0.32		0.32		0.32		0.32		0.32		0.32	
Mov.fluencia (mm) :	**20.8**		**27.4**		**30.4**		**32.4**		**34.0**		**35.3**		**36.5**		**37.6**		**38.6**		**39.6**		**42.9**		**44.4**		**45.1**		**45.3**		**45.5**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**	

Mov.TOTAL (mm/m) :	-0.18	-0.10	-0.06	-0.02	0.01	0.03	0.05	0.07	0.09	0.11	0.17	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.27	0.27	0.27
Mov.TOTAL (mm) :	**-25.8**	**-14.6**	**-8.1**	**-3.1**	**1.1**	**4.6**	**7.8**	**10.7**	**13.3**	**15.6**	**24.4**	**29.4**	**32.3**	**34.2**	**36.3**	**37.3**	**37.9**	**38.2**	**38.4**	**38.5**	**38.6**

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1508.5. Tablero izquierdo

HIPOTESIS DE CALCULO Nº 3. Abril - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.4	-17.4	0.2	**24.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	275	640	1005	1370	1735	2100	2465	2830	3195	3560	5385	7210	9035	10860	14510	18160	21810	25460	29110	32760	36410

Coeficiente β_t :	0.08	0.12	0.16	0.23	0.23	0.31	0.29	0.38	0.35	0.44	0.40	0.49	0.44	0.54	0.48	0.58	0.52	0.61	0.55	0.64	0.69	0.76	0.78	0.83	0.84	0.88	0.88	0.91	0.94	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99
Mov. (mm/m) :	0.02	0.04	0.05	0.07	0.07	0.09	0.09	0.11	0.10	0.13	0.12	0.15	0.13	0.16	0.14	0.17	0.16	0.18	0.17	0.19	0.21	0.23	0.23	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.06		0.09		0.11		0.12		0.14		0.15		0.16		0.17		0.18		0.22		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30	
Mov.retracción (mm) :	**4.5**		**8.8**		**12.2**		**15.1**		**17.5**		**19.7**		**21.6**		**23.3**		**24.9**		**26.3**		**31.5**		**34.9**		**37.2**		**38.8**		**40.7**		**41.6**		**42.2**		**42.5**		**42.7**		**42.7**		**42.8**

Coeficiente φ_{02} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.43	0.47	0.54	0.59	0.60	0.65	0.65	0.70	0.69	0.73	0.72	0.76	0.75	0.79	0.78	0.82	0.81	0.84	0.83	0.86	0.93	0.94	0.97	0.97	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.37	1.48	1.66	1.80	1.82	1.96	1.93	2.07	2.03	2.16	2.11	2.24	2.19	2.31	2.26	2.38	2.32	2.44	2.38	2.49	2.60	2.68	2.71	2.76	2.75	2.80	2.77	2.81	2.78	2.82	2.78	2.82	2.78	2.82	2.79	2.82	2.79	2.82
Movimiento (mm/m) :	0.16	0.17	0.19	0.20	0.21	0.22	0.22	0.24	0.23	0.25	0.24	0.25	0.25	0.26	0.26	0.27	0.26	0.28	0.27	0.28	0.30	0.30	0.31	0.31	0.31	0.32	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Mov.fluencia (mm/m) :	0.16		0.20		0.22		0.23		0.24		0.25		0.26		0.26		0.27		0.28		0.30		0.31		0.32		0.32		0.32		0.32		0.32		0.32		0.32		0.32	
Mov.fluencia (mm) :	**23.4**		**28.4**		**31.0**		**32.8**		**34.3**		**35.6**		**36.8**		**37.9**		**38.9**		**39.8**		**43.0**		**44.5**		**45.1**		**45.3**		**45.5**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**

Mov.TOTAL (mm/m) :	0.37	0.43	0.48	0.51	0.54	0.56	0.58	0.60	0.62	0.64	0.70	0.73	0.75	0.76	0.78	0.78	0.79	0.79	0.79	0.79	0.79																	
Mov.TOTAL (mm) :	**52.8**	**62.1**	**68.1**	**72.8**	**76.8**	**80.2**	**83.3**	**86.1**	**88.7**	**91.0**	**99.5**	**104.3**	**107.2**	**109.0**	**111.1**	**112.1**	**112.7**	**113.0**	**113.2**	**113.3**	**113.3**																	

HIPOTESIS DE CALCULO Nº 4. Abril - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.4	17.4	-0.2	**-24.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	91	456	821	1186	1551	1916	2281	2646	3011	3376	5201	7026	8851	10676	14326	17976	21626	25276	28926	32576	36226

Coeficiente β_t :	0.03	0.05	0.13	0.18	0.20	0.27	0.26	0.35	0.32	0.41	0.37	0.47	0.42	0.52	0.46	0.56	0.50	0.60	0.54	0.63	0.68	0.75	0.77	0.83	0.84	0.88	0.88	0.91	0.94	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99
Mov. (mm/m) :	0.01	0.01	0.04	0.05	0.06	0.08	0.08	0.10	0.10	0.12	0.11	0.14	0.13	0.15	0.14	0.17	0.15	0.18	0.16	0.19	0.20	0.23	0.23	0.25	0.25	0.26	0.26	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.01		0.05		0.07		0.10		0.11		0.13		0.14		0.16		0.17		0.18		0.22		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30	
Mov.retracción (mm) :	**1.8**		**6.8**		**10.6**		**13.7**		**16.3**		**18.7**		**20.7**		**22.5**		**24.1**		**25.6**		**31.1**		**34.6**		**37.0**		**38.6**		**40.6**		**41.6**		**42.2**		**42.5**		**42.6**		**42.7**		**42.8**

Coeficiente φ_{02} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.31	0.33	0.50	0.54	0.57	0.62	0.63	0.68	0.67	0.72	0.70	0.75	0.74	0.78	0.77	0.81	0.80	0.83	0.82	0.85	0.92	0.94	0.96	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.67		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.00	1.06	1.55	1.67	1.75	1.89	1.88	2.02	1.98	2.12	2.07	2.20	2.15	2.28	2.22	2.35	2.29	2.41	2.35	2.46	2.59	2.67	2.70	2.76	2.75	2.79	2.77	2.81	2.78	2.82	2.78	2.82	2.78	2.82	2.79	2.82	2.79	2.82
Movimiento (mm/m) :	0.11	0.12	0.18	0.19	0.20	0.21	0.21	0.23	0.22	0.24	0.23	0.25	0.24	0.26	0.25	0.27	0.26	0.27	0.27	0.28	0.29	0.30	0.31	0.31	0.31	0.32	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Mov.fluencia (mm/m) :	0.12		0.18		0.21		0.22		0.24		0.24		0.25		0.26		0.27		0.28		0.30		0.31		0.31		0.32		0.32		0.32		0.32		0.32		0.32		0.32	
Mov.fluencia (mm) :	**16.8**		**26.4**		**29.8**		**32.0**		**33.6**		**35.0**		**36.2**		**37.3**		**38.4**		**39.3**		**42.8**		**44.4**		**45.0**		**45.3**		**45.5**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**

Mov.TOTAL (mm/m) :	-0.04	0.06	0.11	0.14	0.17	0.20	0.22	0.24	0.26	0.28	0.34	0.38	0.40	0.41	0.43	0.44	0.44	0.44	0.44	0.44	0.44
Mov.TOTAL (mm) :	**-6.3**	**8.2**	**15.4**	**20.7**	**25.0**	**28.7**	**32.0**	**34.9**	**37.6**	**40.0**	**49.0**	**54.1**	**57.1**	**59.0**	**61.2**	**62.2**	**62.8**	**63.1**	**63.3**	**63.4**	**63.5**

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1508.5. Tablero izquierdo

HIPOTESIS DE CALCULO Nº 5. Julio - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-34.9	-34.8	-34.9	0.3	**49.8**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	184	549	914	1279	1644	2009	2374	2739	3104	3469	5294	7119	8944	10769	14419	18069	21719	25369	29019	32669	36319

Coeficiente β_t :	0.06	0.09	0.15	0.20	0.22	0.29	0.28	0.37	0.34	0.43	0.39	0.48	0.43	0.53	0.47	0.57	0.51	0.60	0.55	0.64	0.68	0.76	0.77	0.83	0.84	0.88	0.88	0.91	0.94	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov (mm/m) :	0.02	0.03	0.04	0.06	0.07	0.09	0.08	0.11	0.10	0.13	0.12	0.14	0.13	0.16	0.14	0.17	0.15	0.18	0.16	0.19	0.20	0.23	0.23	0.25	0.25	0.26	0.26	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov retracción (mm/m) :	0.02		0.05		0.08		0.10		0.12		0.13		0.15		0.16		0.17		0.18		0.22		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**3.3**		**7.8**		**11.4**		**14.4**		**17.0**		**19.2**		**21.2**		**22.9**		**24.5**		**25.9**		**31.3**		**34.8**		**37.1**		**38.7**		**40.6**		**41.6**		**42.2**		**42.5**		**42.6**		**42.7**		**42.8**	

Coeficiente φ_{o2} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.38	0.42	0.52	0.57	0.59	0.64	0.64	0.69	0.68	0.72	0.71	0.76	0.74	0.79	0.77	0.81	0.80	0.84	0.83	0.86	0.92	0.94	0.97	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.23	1.32	1.61	1.74	1.79	1.93	1.91	2.05	2.01	2.14	2.09	2.22	2.17	2.30	2.24	2.36	2.31	2.42	2.37	2.48	2.60	2.67	2.70	2.76	2.75	2.79	2.77	2.81	2.78	2.82	2.78	2.82	2.78	2.82	2.79	2.82	2.79	2.82	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.14	0.15	0.18	0.20	0.20	0.22	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.25	0.27	0.26	0.27	0.27	0.28	0.29	0.30	0.31	0.31	0.31	0.32	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Mov.fluencia (mm/m) :	0.15		0.19		0.21		0.23		0.24		0.25		0.26		0.26		0.27		0.28		0.30		0.31		0.32		0.32		0.32		0.32		0.32		0.32		0.32		0.32		0.32	
Mov.fluencia (mm) :	**20.9**		**27.5**		**30.4**		**32.4**		**34.0**		**35.3**		**36.5**		**37.6**		**38.6**		**39.6**		**42.9**		**44.4**		**45.1**		**45.3**		**45.5**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**	

Mov.TOTAL (mm/m) :	0.52	0.60	0.64	0.68	0.70	0.73	0.75	0.77	0.79	0.81	0.87	0.90	0.92	0.94	0.95	0.96	0.96	0.96	0.97	0.97	0.97
Mov.TOTAL (mm) :	**74.0**	**85.1**	**91.7**	**96.7**	**100.8**	**104.3**	**107.5**	**110.4**	**113.0**	**115.3**	**124.1**	**129.1**	**132.0**	**133.9**	**136.0**	**137.0**	**137.6**	**137.9**	**138.1**	**138.2**	**138.2**

HIPOTESIS DE CALCULO Nº 6. Julio - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.0	**0.0**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente β_t :	—	—	0.10	0.15	0.18	0.25	0.25	0.33	0.31	0.40	0.36	0.46	0.41	0.50	0.45	0.55	0.49	0.59	0.53	0.62	0.67	0.75	0.77	0.82	0.83	0.88	0.88	0.91	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.03	0.04	0.05	0.07	0.07	0.10	0.09	0.12	0.11	0.14	0.12	0.15	0.14	0.16	0.15	0.18	0.16	0.19	0.20	0.22	0.23	0.25	0.25	0.26	0.26	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.04		0.07		0.09		0.11		0.13		0.14		0.15		0.17		0.18		0.22		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**5.7**		**9.7**		**12.9**		**15.7**		**18.1**		**20.2**		**22.1**		**23.7**		**25.2**		**30.9**		**34.5**		**36.9**		**38.6**		**40.6**		**41.6**		**42.2**		**42.5**		**42.6**		**42.7**		**42.8**	

Coeficiente φ_{o2} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.00	0.00	0.47	0.51	0.56	0.61	0.62	0.66	0.66	0.71	0.70	0.74	0.73	0.77	0.76	0.80	0.79	0.83	0.82	0.85	0.92	0.93	0.96	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.02	0.01	1.47	1.59	1.71	1.84	1.85	1.99	1.96	2.10	2.05	2.19	2.13	2.26	2.20	2.33	2.27	2.39	2.34	2.45	2.58	2.66	2.70	2.75	2.74	2.79	2.76	2.81	2.78	2.82	2.78	2.82	2.78	2.82	2.79	2.82	2.79	2.82	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.00	0.00	0.17	0.18	0.19	0.21	0.21	0.23	0.22	0.24	0.23	0.25	0.24	0.26	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.30	0.31	0.31	0.31	0.32	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Mov.fluencia (mm/m) :	0.00		0.18		0.20		0.22		0.23		0.24		0.25		0.26		0.27		0.27		0.30		0.31		0.31		0.32		0.32		0.32		0.32		0.32		0.32		0.32		0.32	
Mov.fluencia (mm) :	**0.3**		**25.1**		**29.1**		**31.5**		**33.2**		**34.7**		**35.9**		**37.1**		**38.1**		**39.1**		**42.7**		**44.3**		**45.0**		**45.3**		**45.5**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**	

Mov.TOTAL (mm/m) :	0.00	0.22	0.27	0.31	0.34	0.37	0.39	0.41	0.43	0.45	0.51	0.55	0.57	0.59	0.60	0.61	0.61	0.62	0.62	0.62	0.62
Mov.TOTAL (mm) :	**0.3**	**30.8**	**38.8**	**44.4**	**48.9**	**52.8**	**56.1**	**59.1**	**61.9**	**64.3**	**73.5**	**78.8**	**81.9**	**83.9**	**86.1**	**87.2**	**87.7**	**88.0**	**88.2**	**88.3**	**88.4**

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA Subtramo XV.
OBRA :	E-1508.5. Tablero izquierdo

HIPOTESIS DE CALCULO Nº 7. Octubre - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.4	-17.4	0.2	**24.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	92	457	822	1187	1552	1917	2282	2647	3012	3377	5202	7027	8852	10677	14327	17977	21627	25277	28927	32577	36227

Coeficiente β_t :	0.03	0.05	0.13	0.18	0.20	0.27	0.27	0.35	0.32	0.41	0.37	0.47	0.42	0.52	0.46	0.56	0.50	0.60	0.54	0.63	0.68	0.75	0.77	0.83	0.84	0.88	0.88	0.91	0.94	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.01	0.01	0.04	0.05	0.06	0.08	0.08	0.10	0.10	0.12	0.11	0.14	0.13	0.15	0.14	0.17	0.15	0.18	0.16	0.19	0.20	0.23	0.23	0.25	0.25	0.26	0.26	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.01		0.05		0.07		0.10		0.11		0.13		0.14		0.16		0.17		0.18		0.22		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**1.8**		**6.8**		**10.6**		**13.7**		**16.3**		**18.7**		**20.7**		**22.5**		**24.1**		**25.6**		**31.1**		**34.6**		**37.0**		**38.6**		**40.6**		**41.6**		**42.2**		**42.5**		**42.6**		**42.7**		**42.8**	

Coeficiente φ_{02} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.31	0.33	0.50	0.54	0.57	0.62	0.63	0.68	0.67	0.72	0.70	0.75	0.74	0.78	0.77	0.81	0.80	0.83	0.82	0.85	0.92	0.94	0.96	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.68		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.00	1.07	1.55	1.67	1.75	1.89	1.88	2.02	1.98	2.12	2.07	2.21	2.15	2.28	2.22	2.35	2.29	2.41	2.35	2.46	2.59	2.67	2.70	2.76	2.75	2.79	2.77	2.81	2.78	2.82	2.78	2.82	2.78	2.82	2.79	2.82	2.79	2.82	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.11	0.12	0.18	0.19	0.20	0.21	0.21	0.23	0.22	0.24	0.23	0.25	0.24	0.26	0.25	0.27	0.26	0.27	0.27	0.28	0.29	0.30	0.31	0.31	0.31	0.32	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Mov.fluencia (mm/m) :	0.12		0.18		0.21		0.22		0.24		0.24		0.25		0.26		0.27		0.28		0.30		0.31		0.31		0.32		0.32		0.32		0.32		0.32		0.32		0.32		0.32	
Mov.fluencia (mm) :	**16.9**		**26.4**		**29.8**		**32.0**		**33.6**		**35.0**		**36.2**		**37.3**		**38.4**		**39.3**		**42.8**		**44.4**		**45.0**		**45.3**		**45.5**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**	

Mov.TOTAL (mm/m) :	0.31		0.41		0.46		0.49		0.52		0.55		0.57		0.59		0.61		0.63		0.69		0.73		0.75		0.76		0.78		0.78		0.79		0.79		0.79		0.79		0.79	
Mov.TOTAL (mm) :	**43.7**		**58.1**		**65.3**		**70.6**		**74.9**		**78.6**		**81.8**		**84.8**		**87.4**		**89.8**		**98.8**		**103.9**		**107.0**		**108.9**		**111.0**		**112.1**		**112.7**		**113.0**		**113.2**		**113.3**		**113.3**	

HIPOTESIS DE CALCULO Nº 8. Octubre - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.4	17.4	-0.2	**-24.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	273	638	1003	1368	1733	2098	2463	2828	3193	3558	5383	7208	9033	10858	14508	18158	21808	25458	29108	32758	36408

Coeficiente β_t :	0.08	0.12	0.16	0.23	0.23	0.31	0.29	0.38	0.35	0.44	0.40	0.49	0.44	0.54	0.48	0.58	0.52	0.61	0.55	0.64	0.69	0.76	0.78	0.83	0.84	0.88	0.88	0.91	0.94	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.04	0.05	0.07	0.07	0.09	0.09	0.11	0.10	0.13	0.12	0.15	0.13	0.16	0.14	0.17	0.16	0.18	0.17	0.19	0.21	0.23	0.23	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.06		0.09		0.11		0.12		0.14		0.15		0.16		0.17		0.18		0.22		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**4.5**		**8.8**		**12.2**		**15.1**		**17.5**		**19.7**		**21.6**		**23.3**		**24.9**		**26.3**		**31.5**		**34.9**		**37.2**		**38.8**		**40.7**		**41.6**		**42.2**		**42.5**		**42.7**		**42.7**		**42.8**	

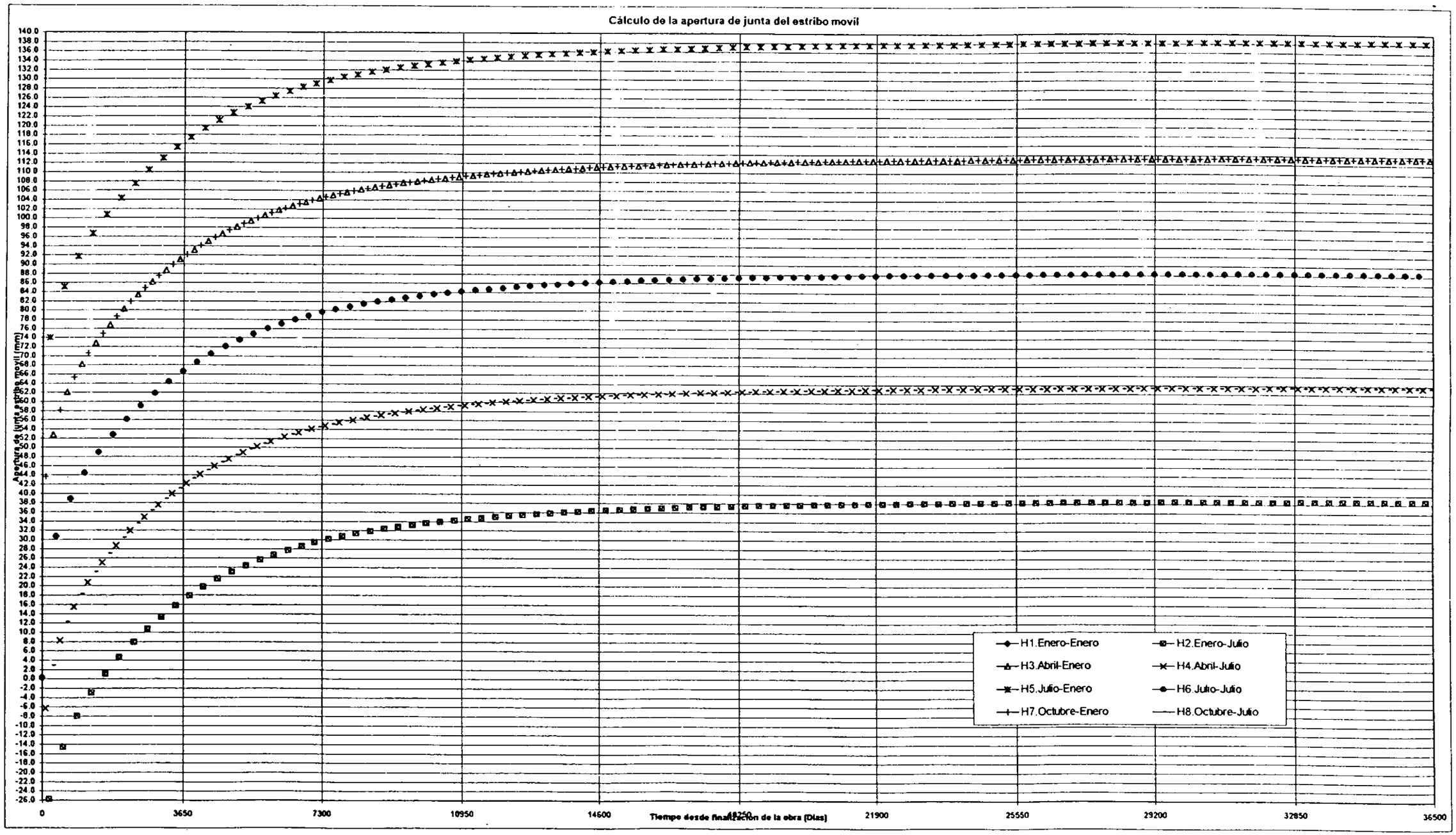
Coeficiente φ_{02} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.43	0.47	0.54	0.59	0.60	0.65	0.65	0.70	0.69	0.73	0.72	0.76	0.75	0.79	0.78	0.82	0.81	0.84	0.83	0.86	0.93	0.94	0.97	0.97	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.37	1.48	1.66	1.79	1.82	1.96	1.93	2.07	2.03	2.16	2.11	2.24	2.19	2.31	2.26	2.38	2.32	2.44	2.38	2.49	2.60	2.68	2.71	2.76	2.75	2.80	2.77	2.81	2.78	2.82	2.78	2.82	2.78	2.82	2.79	2.82	2.79	2.82	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.16	0.17	0.19	0.20	0.21	0.22	0.22	0.24	0.23	0.25	0.24	0.25	0.25	0.26	0.26	0.27	0.26	0.28	0.27	0.28	0.30	0.30	0.31	0.31	0.31	0.32	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Mov.fluencia (mm/m) :	0.16		0.20		0.22		0.23		0.24		0.25		0.26		0.26		0.27		0.28		0.30		0.31		0.32		0.32		0.32		0.32		0.32		0.32		0.32		0.32		0.32	
Mov.fluencia (mm) :	**23.3**		**28.3**		**31.0**		**32.8**		**34.3**		**35.6**		**36.8**		**37.9**		**38.9**		**39.8**		**43.0**		**44.5**		**45.1**		**45.3**		**45.5**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**		**45.6**	

Mov.TOTAL (mm/m) :	0.02		0.09		0.13		0.16		0.19		0.21		0.23		0.25		0.27		0.29		0.35		0.38		0.40		0.41		0.43		0.44		0.44		0.44		0.44		0.44		0.44	
Mov.TOTAL (mm) :	**2.9**		**12.2**		**18.2**		**23.0**		**26.9**		**30.4**		**33.5**		**36.3**		**38.8**		**41.1**		**49.6**		**54.5**		**57.3**		**59.2**		**61.3**		**62.3**		**62.8**		**63.1**		**63.3**		**63.4**		**63.5**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1508.5. Tablero izquierdo

RESUMEN TOTAL



CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1508.5. Tablero derecho

DATOS ESTRUCTURA

	Zona maciza	Zona aligerada	Total estructura
Longitud (m) :	36.60	106.40	143.00
Canto medio (m) :	1.96	1.96	---
Seccion transversal (m²) :	17.51	12.89	---
Perimetro (m) :	30.71	30.71	---
Espesor ficticio (cm) :	171.08	125.95	---

Estribo movil :	E-2

(el estribo contrario no tiene apertura de junta pues el tablero está anclado a él)

Axil medio (KN) :	76964.09
Resistencia hormigón (N/mm²) :	40.00

HIPOTESIS DE CALCULO Nº 1. Enero - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.00	0.0

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente β_t :	—	—	0.11	0.16	0.19	0.26	0.26	0.34	0.32	0.41	0.37	0.47	0.42	0.52	0.47	0.56	0.51	0.60	0.54	0.64	0.68	0.76	0.78	0.83	0.84	0.88	0.88	0.91	0.94	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.03	0.05	0.06	0.08	0.08	0.10	0.10	0.12	0.11	0.14	0.13	0.16	0.14	0.17	0.15	0.18	0.16	0.19	0.20	0.23	0.23	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.04		0.07		0.10		0.12		0.13		0.15		0.16		0.17		0.18		0.22		0.25		0.26		0.27		0.28		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**6.2**		**10.4**		**13.8**		**16.7**		**19.1**		**21.2**		**23.1**		**24.7**		**26.2**		**31.7**		**35.1**		**37.3**		**38.9**		**40.7**		**41.7**		**42.2**		**42.5**		**42.7**		**42.8**		**42.8**	

Coeficiente φ_{o2} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.00	0.00	0.47	0.52	0.56	0.61	0.62	0.67	0.67	0.71	0.70	0.75	0.74	0.78	0.77	0.81	0.79	0.83	0.82	0.85	0.92	0.94	0.96	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(ti)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.02	0.01	1.49	1.61	1.73	1.86	1.87	2.01	1.98	2.12	2.07	2.21	2.15	2.28	2.22	2.35	2.29	2.41	2.35	2.47	2.59	2.67	2.70	2.76	2.75	2.80	2.77	2.82	2.78	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.00	0.00	0.17	0.19	0.20	0.22	0.22	0.23	0.23	0.25	0.24	0.26	0.25	0.26	0.26	0.27	0.27	0.28	0.27	0.29	0.30	0.31	0.31	0.32	0.32	0.32	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33
Mov.fluencia (mm/m) :	0.00		0.18		0.21		0.23		0.24		0.25		0.26		0.27		0.28		0.28		0.31		0.32		0.32		0.32		0.33		0.33		0.33		0.33		0.33		0.33		0.33	
Mov.fluencia (mm) :	**0.2**		**26.1**		**30.3**		**32.7**		**34.5**		**36.0**		**37.2**		**38.4**		**39.4**		**40.4**		**43.9**		**45.5**		**46.2**		**46.4**		**46.6**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**	

Mov.TOTAL (mm/m) :	0.00		0.23		0.29		0.33		0.36		0.39		0.41		0.43		0.45		0.47		0.53		0.56		0.58		0.60		0.61		0.62		0.62		0.62		0.63		0.63		0.63	
Mov.TOTAL (mm) :	**0.2**		**32.3**		**40.8**		**46.6**		**51.2**		**55.1**		**58.5**		**61.5**		**64.2**		**66.6**		**75.6**		**80.6**		**83.5**		**85.3**		**87.4**		**88.4**		**88.9**		**89.2**		**89.4**		**89.5**		**89.5**	

HIPOTESIS DE CALCULO Nº 2. Enero - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
34.9	34.8	34.8	-0.3	-49.8

Retracción y fluencia (el resto de los valores hasta el Año 99 se representan en el gráfico)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	181	546	911	1276	1641	2006	2371	2736	3101	3466	5291	7116	8941	10766	14416	18066	21716	25366	29016	32666	36316

Coeficiente β_t :	0.06	0.09	0.15	0.21	0.23	0.30	0.29	0.38	0.35	0.44	0.40	0.50	0.44	0.54	0.49	0.58	0.52	0.62	0.56	0.65	0.69	0.77	0.78	0.84	0.84	0.89	0.89	0.92	0.94	0.95	0.97	0.97	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.03	0.05	0.06	0.07	0.09	0.09	0.11	0.10	0.13	0.12	0.15	0.13	0.16	0.15	0.17	0.16	0.19	0.17	0.20	0.21	0.23	0.23	0.25	0.25	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.02		0.06		0.09		0.11		0.13		0.14		0.16		0.17		0.18		0.19		0.22		0.25		0.26		0.27		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**3.5**		**8.4**		**12.2**		**15.3**		**17.9**		**20.2**		**22.2**		**23.9**		**25.5**		**26.9**		**32.1**		**35.3**		**37.5**		**39.0**		**40.8**		**41.7**		**42.2**		**42.5**		**42.7**		**42.8**		**42.8**	

Coeficiente φ_{o2} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.39	0.42	0.53	0.57	0.60	0.65	0.65	0.69	0.68	0.73	0.72	0.76	0.75	0.79	0.78	0.82	0.81	0.84	0.83	0.86	0.92	0.94	0.97	0.97	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(ti)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.24	1.33	1.63	1.76	1.81	1.95	1.93	2.07	2.02	2.16	2.11	2.24	2.19	2.32	2.26	2.38	2.32	2.44	2.38	2.49	2.61	2.68	2.71	2.77	2.75	2.80	2.77	2.82	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.14	0.15	0.19	0.20	0.21	0.23	0.22	0.24	0.23	0.25	0.24	0.26	0.25	0.27	0.26	0.28	0.27	0.28	0.28	0.29	0.30	0.31	0.31	0.32	0.32	0.32	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33
Mov.fluencia (mm/m) :	0.15		0.20		0.22		0.24		0.25		0.26		0.26		0.27		0.28		0.29		0.31		0.32		0.32		0.32		0.33		0.33		0.33		0.33		0.33		0.33		0.33	
Mov.fluencia (mm) :	**21.6**		**28.6**		**31.6**		**33.7**		**35.3**		**36.6**		**37.8**		**38.9**		**39.9**		**40.8**		**44.1**		**45.6**		**46.2**		**46.5**		**46.6**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**	

Mov.TOTAL (mm/m) :	-0.17		-0.09		-0.04		-0.01		0.02		0.05		0.07		0.09		0.11		0.13		0.18		0.22		0.24		0.25		0.26		0.27		0.27		0.28		0.28		0.28		0.28	
Mov.TOTAL (mm) :	**-24.7**		**-12.8**		**-6.0**		**-0.8**		**3.4**		**7.0**		**10.2**		**13.0**		**15.6**		**17.9**		**26.4**		**31.1**		**33.9**		**35.6**		**37.6**		**38.6**		**39.1**		**39.4**		**39.6**		**39.7**		**39.7**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1508.5. Tablero derecho

HIPOTESIS DE CALCULO Nº 3. Abril - Enero

Efectos térmicos

Δ T (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.4	-17.4	0.2	**24.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	275	640	1005	1370	1735	2100	2465	2830	3195	3560	5385	7210	9035	10860	14510	18160	21810	25460	29110	32760	36410

Coeficiente β_t :	0.09	0.13	0.17	0.24	0.24	0.33	0.31	0.40	0.36	0.46	0.41	0.51	0.46	0.55	0.50	0.59	0.53	0.63	0.57	0.66	0.70	0.77	0.79	0.84	0.85	0.89	0.89	0.92	0.94	0.96	0.97	0.97	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.04	0.05	0.07	0.07	0.10	0.09	0.12	0.11	0.14	0.12	0.15	0.14	0.17	0.15	0.18	0.16	0.19	0.17	0.20	0.21	0.23	0.24	0.25	0.25	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.07		0.09		0.11		0.13		0.15		0.16		0.17		0.18		0.19		0.23		0.25		0.26		0.27		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**5.0**		**9.5**		**13.1**		**16.0**		**18.6**		**20.7**		**22.7**		**24.4**		**25.9**		**27.2**		**32.3**		**35.5**		**37.6**		**39.1**		**40.8**		**41.7**		**42.2**		**42.5**		**42.7**		**42.8**		**42.8**	

Coeficiente φ_{o2} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.44	0.48	0.55	0.60	0.61	0.66	0.66	0.70	0.69	0.74	0.73	0.77	0.76	0.80	0.79	0.82	0.81	0.85	0.84	0.87	0.93	0.94	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.38	1.50	1.68	1.82	1.84	1.98	1.95	2.10	2.05	2.19	2.13	2.26	2.20	2.33	2.27	2.40	2.34	2.45	2.40	2.51	2.62	2.69	2.71	2.77	2.76	2.80	2.77	2.82	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.16	0.17	0.19	0.21	0.21	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.26	0.28	0.27	0.28	0.28	0.29	0.30	0.31	0.31	0.32	0.32	0.32	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33
Mov.fluencia (mm/m) :	0.17		0.21		0.23		0.24		0.25		0.26		0.27		0.27		0.28		0.29		0.31		0.32		0.32		0.33		0.33		0.33		0.33		0.33		0.33		0.33		0.33	
Mov.fluencia (mm) :	**24.3**		**29.5**		**32.2**		**34.1**		**35.6**		**36.9**		**38.1**		**39.2**		**40.2**		**41.1**		**44.2**		**45.6**		**46.2**		**46.5**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**	

Mov.TOTAL (mm/m) :	0.38		0.45		0.49		0.52		0.55		0.58		0.60		0.62		0.64		0.65		0.71		0.74		0.76		0.77		0.79		0.79		0.80		0.80		0.80		0.80		0.80	
Mov.TOTAL (mm) :	**54.2**		**63.9**		**70.2**		**75.1**		**79.1**		**82.6**		**85.7**		**88.4**		**90.9**		**93.2**		**101.4**		**106.0**		**108.8**		**110.5**		**112.4**		**113.3**		**113.9**		**114.1**		**114.3**		**114.4**		**114.5**	

HIPOTESIS DE CALCULO Nº 4. Abril - Julio

Efectos térmicos

Δ T (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.4	17.4	-0.2	**-24.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	91	456	821	1186	1551	1916	2281	2646	3011	3376	5201	7026	8851	10676	14326	17976	21626	25276	28926	32576	36226

Coeficiente β_t :	0.03	0.05	0.13	0.19	0.21	0.28	0.28	0.36	0.33	0.43	0.39	0.48	0.43	0.53	0.48	0.57	0.51	0.61	0.55	0.64	0.69	0.76	0.78	0.84	0.84	0.88	0.89	0.92	0.94	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.01	0.02	0.04	0.06	0.06	0.09	0.08	0.11	0.10	0.13	0.12	0.15	0.13	0.16	0.14	0.17	0.15	0.18	0.17	0.19	0.21	0.23	0.23	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.01		0.05		0.08		0.10		0.12		0.14		0.15		0.16		0.18		0.19		0.22		0.25		0.26		0.27		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**2.0**		**7.4**		**11.4**		**14.6**		**17.3**		**19.7**		**21.7**		**23.5**		**25.1**		**26.6**		**31.9**		**35.2**		**37.4**		**38.9**		**40.8**		**41.7**		**42.2**		**42.5**		**42.7**		**42.8**		**42.8**	

Coeficiente φ_{o2} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.31	0.34	0.50	0.55	0.58	0.63	0.63	0.68	0.68	0.72	0.71	0.76	0.74	0.79	0.77	0.81	0.80	0.84	0.83	0.86	0.92	0.94	0.97	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.67		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.00	1.07	1.56	1.69	1.77	1.91	1.90	2.04	2.00	2.14	2.09	2.23	2.17	2.30	2.24	2.36	2.31	2.43	2.37	2.48	2.60	2.68	2.71	2.77	2.75	2.80	2.77	2.82	2.78	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.12	0.12	0.18	0.20	0.20	0.22	0.22	0.24	0.23	0.25	0.24	0.26	0.25	0.27	0.26	0.27	0.27	0.28	0.27	0.29	0.30	0.31	0.31	0.32	0.32	0.32	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33
Mov.fluencia (mm/m) :	0.12		0.19		0.22		0.23		0.24		0.25		0.26		0.27		0.28		0.28		0.31		0.32		0.32		0.32		0.33		0.33		0.33		0.33		0.33		0.33		0.33	
Mov.fluencia (mm) :	**17.5**		**27.5**		**31.0**		**33.2**		**34.9**		**36.3**		**37.5**		**38.6**		**39.7**		**40.6**		**44.0**		**45.6**		**46.2**		**46.5**		**46.6**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**	

Mov.TOTAL (mm/m) :	-0.04		0.07		0.12		0.16		0.19		0.22		0.24		0.26		0.28		0.30		0.36		0.39		0.41		0.42		0.44		0.44		0.45		0.45		0.45		0.45		0.45	
Mov.TOTAL (mm) :	**-5.4**		**9.9**		**17.5**		**22.9**		**27.3**		**31.0**		**34.3**		**37.2**		**39.9**		**42.3**		**51.0**		**55.9**		**58.7**		**60.5**		**62.5**		**63.5**		**64.0**		**64.3**		**64.5**		**64.6**		**64.6**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1508.5. Tablero derecho

HIPOTESIS DE CALCULO Nº 5. Julio - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-34.9	-34.8	-34.8	0.3	**49.8**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	184	549	914	1279	1644	2009	2374	2739	3104	3469	5294	7119	8944	10769	14419	18069	21719	25369	29019	32669	36319

Coeficiente β_t :	0.06	0.09	0.15	0.21	0.23	0.31	0.29	0.38	0.35	0.44	0.40	0.50	0.44	0.54	0.49	0.58	0.52	0.62	0.56	0.65	0.69	0.77	0.78	0.84	0.84	0.89	0.89	0.92	0.94	0.95	0.97	0.97	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.03	0.05	0.06	0.07	0.09	0.09	0.11	0.10	0.13	0.12	0.15	0.13	0.16	0.15	0.17	0.16	0.19	0.17	0.20	0.21	0.23	0.23	0.25	0.25	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.06		0.09		0.11		0.13		0.14		0.16		0.17		0.18		0.19		0.22		0.25		0.26		0.27		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**3.6**		**8.5**		**12.2**		**15.3**		**18.0**		**20.2**		**22.2**		**24.0**		**25.5**		**26.9**		**32.1**		**35.4**		**37.5**		**39.0**		**40.8**		**41.7**		**42.2**		**42.5**		**42.7**		**42.8**		**42.8**	

Coeficiente φ_{o2} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.39	0.42	0.53	0.57	0.60	0.65	0.65	0.69	0.68	0.73	0.72	0.76	0.75	0.79	0.78	0.82	0.81	0.84	0.83	0.86	0.92	0.94	0.97	0.97	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(j)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-j} :	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.24	1.34	1.63	1.76	1.81	1.95	1.93	2.07	2.03	2.16	2.11	2.24	2.19	2.32	2.26	2.38	2.32	2.44	2.39	2.49	2.61	2.68	2.71	2.77	2.75	2.80	2.77	2.82	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.14	0.15	0.19	0.20	0.21	0.23	0.22	0.24	0.23	0.25	0.24	0.26	0.25	0.27	0.26	0.28	0.27	0.28	0.28	0.29	0.30	0.31	0.31	0.32	0.32	0.32	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33
Mov fluencia (mm/m) :	0.15		0.20		0.22		0.24		0.25		0.26		0.26		0.27		0.28		0.29		0.31		0.32		0.32		0.32		0.33		0.33		0.33		0.33		0.33		0.33		0.33	
Mov.fluencia (mm) :	**21.7**		**28.6**		**31.7**		**33.7**		**35.3**		**36.6**		**37.8**		**38.9**		**39.9**		**40.8**		**44.1**		**45.6**		**46.2**		**46.5**		**46.6**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**	

Mov TOTAL (mm/m) :	0.53		0.61		0.66		0.69		0.72		0.75		0.77		0.79		0.81		0.82		0.88		0.91		0.93		0.95		0.96		0.97		0.97		0.97		0.97		0.97		0.97	
Mov.TOTAL (mm) :	**75.2**		**86.9**		**93.7**		**98.9**		**103.1**		**106.7**		**109.8**		**112.7**		**115.3**		**117.6**		**126.0**		**130.8**		**133.6**		**135.3**		**137.3**		**138.2**		**138.8**		**139.1**		**139.2**		**139.3**		**139.4**	

HIPOTESIS DE CALCULO Nº 6. Julio - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.0	**0.0**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente β_t :	—	—	0.11	0.16	0.19	0.26	0.26	0.34	0.32	0.41	0.37	0.47	0.42	0.52	0.47	0.56	0.51	0.60	0.54	0.64	0.68	0.76	0.78	0.83	0.84	0.88	0.88	0.91	0.94	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.03	0.05	0.06	0.08	0.08	0.10	0.10	0.12	0.11	0.14	0.13	0.16	0.14	0.17	0.15	0.18	0.16	0.19	0.20	0.23	0.23	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.04		0.07		0.10		0.12		0.13		0.15		0.16		0.17		0.18		0.22		0.25		0.26		0.27		0.28		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**6.2**		**10.4**		**13.8**		**16.7**		**19.1**		**21.2**		**23.1**		**24.7**		**26.2**		**31.7**		**35.1**		**37.3**		**38.9**		**40.7**		**41.7**		**42.2**		**42.5**		**42.7**		**42.8**		**42.8**	

Coeficiente φ_{o2} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.00	0.00	0.47	0.52	0.56	0.61	0.62	0.67	0.67	0.71	0.70	0.75	0.74	0.78	0.77	0.81	0.79	0.83	0.82	0.85	0.92	0.94	0.96	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(j)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-j} :	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.02	0.01	1.49	1.61	1.73	1.86	1.87	2.01	1.98	2.12	2.07	2.21	2.15	2.28	2.22	2.35	2.29	2.41	2.35	2.47	2.59	2.67	2.70	2.76	2.75	2.80	2.77	2.82	2.78	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.00	0.00	0.17	0.19	0.20	0.22	0.22	0.23	0.23	0.25	0.24	0.26	0.25	0.26	0.26	0.27	0.27	0.28	0.27	0.29	0.30	0.31	0.31	0.32	0.32	0.32	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33
Mov.fluencia (mm/m) :	0.00		0.18		0.21		0.23		0.24		0.25		0.26		0.27		0.28		0.28		0.31		0.32		0.32		0.32		0.33		0.33		0.33		0.33		0.33		0.33		0.33	
Mov.fluencia (mm) :	**0.2**		**26.1**		**30.3**		**32.7**		**34.5**		**36.0**		**37.2**		**38.4**		**39.4**		**40.4**		**43.9**		**45.5**		**46.2**		**46.4**		**46.6**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**	

Mov.TOTAL (mm/m) :	0.00		0.23		0.29		0.33		0.36		0.39		0.41		0.43		0.45		0.47		0.53		0.56		0.58		0.60		0.61		0.62		0.62		0.62		0.63		0.63		0.63	
Mov.TOTAL (mm) :	**0.2**		**32.3**		**40.8**		**46.6**		**51.2**		**55.1**		**58.5**		**61.5**		**64.2**		**66.6**		**75.6**		**80.6**		**83.5**		**85.3**		**87.4**		**88.4**		**88.9**		**89.2**		**89.4**		**89.5**		**89.5**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV
OBRA :	E-1508.5. Tablero derecho

HIPOTESIS DE CALCULO Nº 7. Octubre - Enero

Efectos térmicos

ΔT (ºC) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.4	-17.4	0.2	**24.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	92	457	822	1187	1552	1917	2282	2647	3012	3377	5202	7027	8852	10677	14327	17977	21627	25277	28927	32577	36227

Coeficiente βt :	0.03	0.05	0.13	0.19	0.21	0.28	0.28	0.36	0.33	0.43	0.39	0.48	0.43	0.53	0.48	0.57	0.51	0.61	0.55	0.64	0.69	0.76	0.78	0.84	0.84	0.88	0.89	0.92	0.94	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.01	0.02	0.04	0.06	0.06	0.09	0.08	0.11	0.10	0.13	0.12	0.15	0.13	0.16	0.14	0.17	0.15	0.18	0.17	0.19	0.21	0.23	0.23	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.01		0.05		0.08		0.10		0.12		0.14		0.15		0.16		0.18		0.19		0.22		0.25		0.26		0.27		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**2.0**		**7.4**		**11.4**		**14.6**		**17.3**		**19.7**		**21.7**		**23.5**		**25.1**		**26.6**		**31.9**		**35.2**		**37.4**		**38.9**		**40.8**		**41.7**		**42.2**		**42.5**		**42.7**		**42.8**		**42.8**	

Coeficiente φo2 :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente βt(t) :	0.31	0.34	0.50	0.55	0.58	0.63	0.63	0.68	0.68	0.72	0.71	0.76	0.74	0.79	0.77	0.81	0.80	0.84	0.83	0.86	0.92	0.94	0.97	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(j) :	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente βt-j :	0.68		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.01	1.08	1.56	1.69	1.77	1.91	1.90	2.04	2.00	2.14	2.09	2.23	2.17	2.30	2.24	2.36	2.31	2.43	2.37	2.48	2.60	2.68	2.71	2.77	2.75	2.80	2.77	2.82	2.78	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.12	0.12	0.18	0.20	0.20	0.22	0.22	0.24	0.23	0.25	0.24	0.26	0.25	0.27	0.26	0.27	0.27	0.28	0.27	0.29	0.30	0.31	0.31	0.32	0.32	0.32	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33
Mov.fluencia (mm/m) :	0.12		0.19		0.22		0.23		0.24		0.25		0.26		0.27		0.28		0.28		0.31		0.32		0.32		0.32		0.33		0.33		0.33		0.33		0.33		0.33		0.33	
Mov.fluencia (mm) :	**17.5**		**27.5**		**31.0**		**33.2**		**34.9**		**36.3**		**37.5**		**38.6**		**39.7**		**40.6**		**44.0**		**45.6**		**46.2**		**46.5**		**46.6**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**	

Mov.TOTAL (mm/m) :	0.31		0.42		0.47		0.51		0.54		0.57		0.59		0.61		0.63		0.64		0.70		0.74		0.76		0.77		0.79		0.79		0.80		0.80		0.80		0.80		0.80	
Mov.TOTAL (mm) :	**44.5**		**59.8**		**67.3**		**72.8**		**77.2**		**80.9**		**84.2**		**87.1**		**89.7**		**92.1**		**100.8**		**105.7**		**108.5**		**110.3**		**112.3**		**113.3**		**113.8**		**114.1**		**114.3**		**114.4**		**114.5**	

HIPOTESIS DE CALCULO Nº 8. Octubre - Julio

Efectos térmicos

ΔT (ºC) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.4	17.4	-0.2	**-24.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	273	638	1003	1368	1733	2098	2463	2828	3193	3558	5383	7208	9033	10858	14508	18158	21808	25458	29108	32758	36408

Coeficiente βt :	0.09	0.12	0.17	0.24	0.24	0.33	0.31	0.40	0.36	0.46	0.41	0.51	0.46	0.55	0.50	0.59	0.53	0.63	0.57	0.66	0.70	0.77	0.79	0.84	0.85	0.89	0.89	0.92	0.94	0.96	0.97	0.97	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.04	0.05	0.07	0.07	0.10	0.09	0.12	0.11	0.14	0.12	0.15	0.14	0.17	0.15	0.18	0.16	0.19	0.17	0.20	0.21	0.23	0.24	0.25	0.25	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.07		0.09		0.11		0.13		0.14		0.16		0.17		0.18		0.19		0.23		0.25		0.26		0.27		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**4.9**		**9.5**		**13.1**		**16.0**		**18.5**		**20.7**		**22.7**		**24.4**		**25.9**		**27.2**		**32.3**		**35.5**		**37.6**		**39.1**		**40.8**		**41.7**		**42.2**		**42.5**		**42.7**		**42.8**		**42.8**	

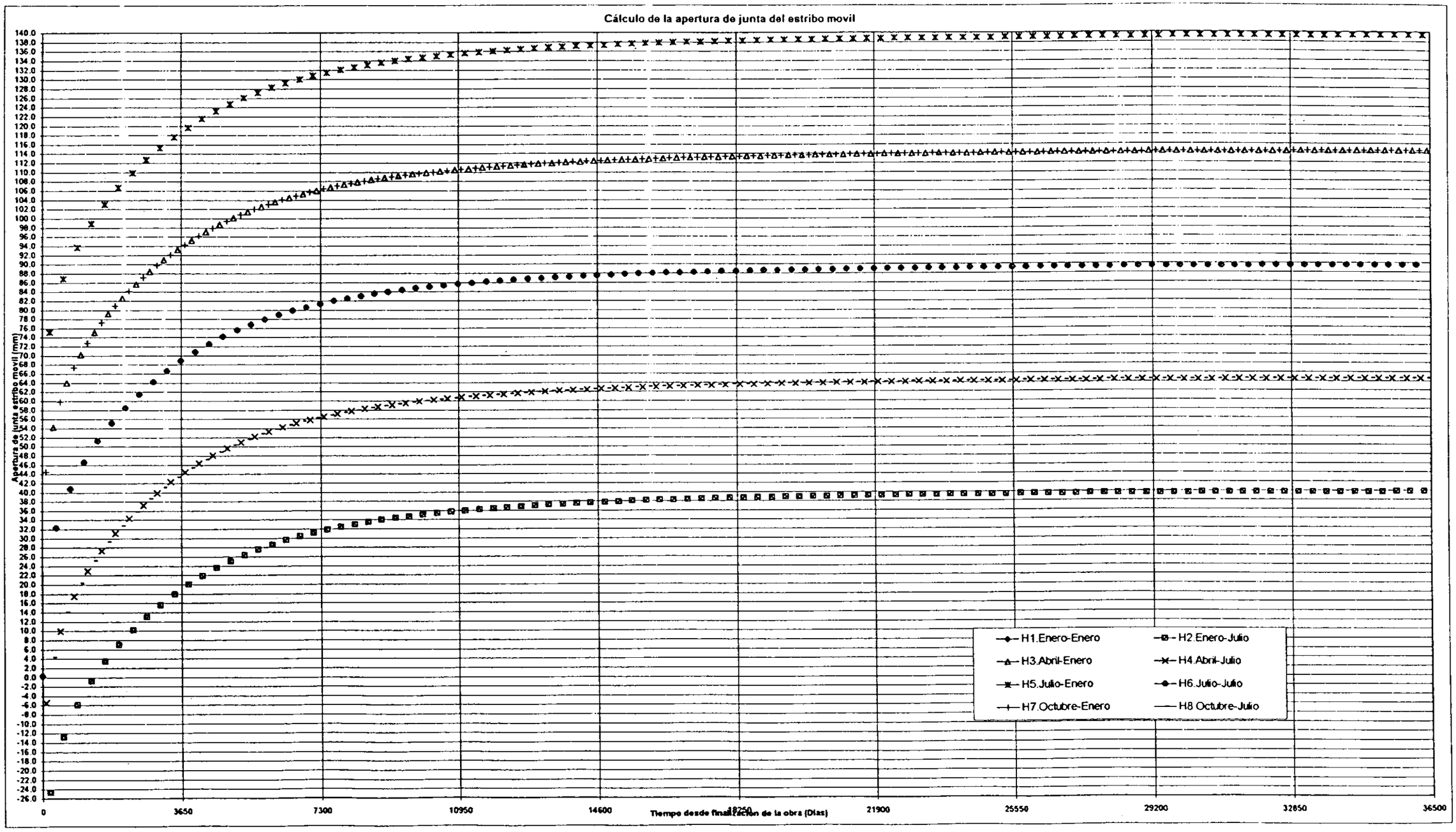
Coeficiente φo2 :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente βt(t) :	0.44	0.48	0.55	0.59	0.61	0.66	0.66	0.70	0.69	0.74	0.73	0.77	0.76	0.80	0.79	0.82	0.81	0.85	0.84	0.87	0.93	0.94	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(j) :	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente βt-j :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.38	1.49	1.68	1.82	1.84	1.98	1.95	2.10	2.05	2.19	2.13	2.26	2.20	2.33	2.27	2.40	2.34	2.45	2.40	2.51	2.62	2.69	2.71	2.77	2.76	2.80	2.77	2.82	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.16	0.17	0.19	0.21	0.21	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.26	0.28	0.27	0.28	0.28	0.29	0.30	0.31	0.31	0.32	0.32	0.32	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33
Mov.fluencia (mm/m) :	0.17		0.21		0.23		0.24		0.25		0.26		0.27		0.27		0.28		0.29		0.31		0.32		0.32		0.33		0.33		0.33		0.33		0.33		0.33		0.33		0.33	
Mov.fluencia (mm) :	**24.3**		**29.5**		**32.2**		**34.1**		**35.6**		**36.9**		**38.1**		**39.2**		**40.2**		**41.1**		**44.2**		**45.6**		**46.2**		**46.5**		**46.6**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**		**46.7**	

Mov.TOTAL (mm/m) :	0.03		0.10		0.14		0.18		0.20		0.23		0.25		0.27		0.29		0.30		0.36		0.39		0.41		0.42		0.44		0.44		0.45		0.45		0.45		0.45		0.45	
Mov.TOTAL (mm) :	**4.3**		**14.1**		**20.3**		**25.2**		**29.2**		**32.7**		**35.8**		**38.6**		**41.1**		**43.4**		**51.6**		**56.2**		**58.9**		**60.6**		**62.6**		**63.5**		**64.0**		**64.3**		**64.5**		**64.6**		**64.6**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1508.5. Tablero derecho

RESUMEN TOTAL



CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA Subtramo XV.
OBRA :	E-1518.3

DATOS ESTRUCTURA

	Zona maciza	Zona aligerada	Total estructura
Longitud (m) :	16.00	38.80	54.80
Canto medio (m) :	1.73	1.73	—
Seccion transversal (m²) :	8.49	7.16	—
Perimetro (m) :	21.47	21.47	—
Espesor ficticio (cm) :	118.58	100.02	—

Estribo movil :	E-2

(el estribo contrario no tiene apertura de junta pues el tablero está anclado a él)

Axil medio (KN) :	34073.54
Resistencia hormigón (N/mm²) :	40.00

HIPOTESIS DE CALCULO Nº 1. Enero - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.00	0.0

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente βt :	—	—	0.17	0.20	0.28	0.32	0.36	0.42	0.43	0.49	0.49	0.55	0.54	0.59	0.58	0.63	0.62	0.67	0.65	0.70	0.77	0.81	0.84	0.87	0.89	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.05	0.06	0.08	0.10	0.11	0.12	0.13	0.15	0.15	0.16	0.16	0.18	0.17	0.19	0.19	0.20	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.06		0.09		0.12		0.14		0.16		0.17		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**3.2**		**5.1**		**6.6**		**7.7**		**8.7**		**9.5**		**10.2**		**10.8**		**11.3**		**13.1**		**14.1**		**14.8**		**15.3**		**15.8**		**16.1**		**16.2**		**16.3**		**16.4**		**16.4**		**16.4**	

Coeficiente φo2 :	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente βt(t) :	0.00	0.00	0.53	0.55	0.62	0.65	0.68	0.71	0.72	0.75	0.76	0.78	0.79	0.81	0.81	0.83	0.84	0.85	0.86	0.87	0.94	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(ti) :	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente βt-i :	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.01	0.00	1.63	1.70	1.89	1.97	2.04	2.12	2.15	2.22	2.23	2.31	2.31	2.38	2.37	2.44	2.43	2.49	2.49	2.55	2.68	2.73	2.77	2.81	2.81	2.84	2.82	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.00	0.00	0.17	0.18	0.20	0.21	0.22	0.22	0.23	0.24	0.24	0.24	0.24	0.25	0.25	0.26	0.26	0.26	0.26	0.27	0.28	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.fluencia (mm/m) :	0.00		0.18		0.21		0.22		0.23		0.24		0.25		0.26		0.26		0.27		0.29		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30	
Mov.fluencia (mm) :	**0.0**		**9.8**		**11.3**		**12.2**		**12.8**		**13.2**		**13.7**		**14.0**		**14.4**		**14.7**		**15.7**		**16.2**		**16.4**		**16.5**		**16.5**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**	

Mov.TOTAL (mm/m) :	0.00		0.24		0.30		0.34		0.37		0.40		0.42		0.44		0.46		0.47		0.53		0.55		0.57		0.58		0.59		0.60		0.60		0.60		0.60		0.60		0.60	
Mov.TOTAL (mm) :	**0.0**		**12.9**		**16.4**		**18.7**		**20.5**		**21.9**		**23.2**		**24.2**		**25.1**		**25.9**		**28.8**		**30.3**		**31.2**		**31.8**		**32.3**		**32.6**		**32.8**		**32.9**		**32.9**		**33.0**		**33.0**	

HIPOTESIS DE CALCULO Nº 2. Enero - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
34.9	34.8	34.9	-0.3	-19.1

Retracción y fluencia (el resto de los valores hasta el Año 99 se representan en el gráfico)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	181	546	911	1276	1641	2006	2371	2736	3101	3466	5291	7116	8941	10766	14416	18066	21716	25366	29016	32666	36316

Coeficiente βt :	0.10	0.12	0.23	0.27	0.32	0.37	0.40	0.45	0.46	0.52	0.52	0.57	0.56	0.61	0.60	0.65	0.64	0.69	0.67	0.71	0.78	0.81	0.85	0.87	0.89	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.04	0.07	0.08	0.10	0.11	0.12	0.14	0.14	0.16	0.15	0.17	0.17	0.18	0.18	0.20	0.19	0.21	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.08		0.11		0.13		0.15		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**1.8**		**4.2**		**5.8**		**7.2**		**8.2**		**9.1**		**9.9**		**10.5**		**11.0**		**11.5**		**13.2**		**14.2**		**14.9**		**15.3**		**15.8**		**16.1**		**16.2**		**16.3**		**16.4**		**16.4**		**16.4**	

Coeficiente φo2 :	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente βt(t) :	0.43	0.45	0.58	0.61	0.65	0.68	0.70	0.73	0.74	0.76	0.77	0.79	0.80	0.82	0.82	0.84	0.85	0.86	0.87	0.88	0.94	0.95	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(ti) :	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{H} :	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.35	1.41	1.78	1.86	1.97	2.05	2.10	2.17	2.19	2.27	2.27	2.34	2.34	2.41	2.40	2.47	2.46	2.52	2.51	2.57	2.70	2.74	2.78	2.81	2.81	2.84	2.83	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.14	0.15	0.19	0.20	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.25	0.25	0.26	0.26	0.27	0.27	0.27	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.fluencia (mm/m) :	0.15		0.19		0.21		0.23		0.24		0.25		0.25		0.26		0.26		0.27		0.29		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30	
Mov.fluencia (mm) :	**8.1**		**10.7**		**11.8**		**12.5**		**13.0**		**13.5**		**13.8**		**14.2**		**14.5**		**14.8**		**15.8**		**16.2**		**16.4**		**16.5**		**16.5**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**	

Mov.TOTAL (mm/m) :	-0.17		-0.08		-0.03		0.01		0.04		0.06		0.08		0.10		0.12		0.13		0.18		0.21		0.22		0.23		0.24		0.25		0.25		0.25		0.25		0.25		0.25	
Mov.TOTAL (mm) :	**-9.2**		**-4.2**		**-1.4**		**0.6**		**2.2**		**3.5**		**4.6**		**5.6**		**6.4**		**7.2**		**9.9**		**11.4**		**12.2**		**12.7**		**13.3**		**13.5**		**13.7**		**13.8**		**13.8**		**13.9**		**13.9**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1518.3

HIPOTESIS DE CALCULO Nº 3. Abril - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.4	-17.4	0.2	9.5

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	275	640	1005	1370	1735	2100	2465	2830	3195	3560	5385	7210	9035	10860	14510	18160	21810	25460	29110	32760	36410

Coeficiente βt :	0.13	0.16	0.25	0.30	0.34	0.40	0.42	0.47	0.48	0.53	0.53	0.58	0.57	0.62	0.61	0.66	0.64	0.69	0.67	0.72	0.78	0.82	0.85	0.87	0.89	0.91	0.92	0.94	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.04	0.05	0.08	0.09	0.10	0.12	0.12	0.14	0.14	0.16	0.16	0.17	0.17	0.19	0.18	0.20	0.19	0.21	0.20	0.22	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.05		0.09		0.11		0.14		0.15		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**2.5**		**4.7**		**6.3**		**7.5**		**8.5**		**9.3**		**10.0**		**10.6**		**11.2**		**11.6**		**13.3**		**14.3**		**14.9**		**15.3**		**15.8**		**16.1**		**16.2**		**16.3**		**16.4**		**16.4**		**16.4**	

Coeficiente φo2 :	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente βt(t) :	0.49	0.51	0.60	0.63	0.67	0.69	0.71	0.74	0.75	0.77	0.78	0.80	0.81	0.83	0.83	0.85	0.85	0.87	0.87	0.89	0.95	0.95	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(i) :	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente βt-i :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.52	1.59	1.84	1.92	2.01	2.09	2.12	2.20	2.21	2.29	2.29	2.36	2.36	2.42	2.42	2.48	2.48	2.53	2.53	2.58	2.70	2.74	2.78	2.81	2.81	2.84	2.83	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.16	0.17	0.20	0.20	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.fluencia (mm/m) :	0.17		0.20		0.22		0.23		0.24		0.25		0.25		0.26		0.27		0.27		0.29		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30	
Mov.fluencia (mm) :	**9.1**		**11.0**		**12.0**		**12.6**		**13.1**		**13.6**		**13.9**		**14.3**		**14.6**		**14.9**		**15.8**		**16.3**		**16.4**		**16.5**		**16.5**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**	

Mov.TOTAL (mm/m) :	0.39		0.46		0.51		0.54		0.57		0.59		0.61		0.63		0.64		0.66		0.71		0.73		0.75		0.75		0.77		0.77		0.77		0.77		0.78		0.78		0.78	
Mov.TOTAL (mm) :	**21.2**		**25.2**		**27.8**		**29.7**		**31.2**		**32.4**		**33.5**		**34.5**		**35.3**		**36.0**		**38.7**		**40.1**		**40.9**		**41.4**		**41.9**		**42.2**		**42.4**		**42.4**		**42.5**		**42.5**		**42.5**	

HIPOTESIS DE CALCULO Nº 4. Abril - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.4	17.4	-0.2	-9.5

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	91	456	821	1186	1551	1916	2281	2646	3011	3376	5201	7026	8851	10676	14326	17976	21626	25276	28926	32576	36226

Coeficiente βt :	0.05	0.07	0.20	0.24	0.30	0.35	0.38	0.44	0.45	0.50	0.50	0.56	0.55	0.60	0.59	0.64	0.63	0.68	0.66	0.71	0.78	0.81	0.84	0.87	0.89	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.02	0.06	0.07	0.09	0.10	0.11	0.13	0.13	0.15	0.15	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.02		0.07		0.10		0.13		0.15		0.16		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**1.1**		**3.7**		**5.5**		**6.9**		**8.0**		**8.9**		**9.7**		**10.3**		**10.9**		**11.4**		**13.1**		**14.2**		**14.8**		**15.3**		**15.8**		**16.1**		**16.2**		**16.3**		**16.4**		**16.4**		**16.4**	

Coeficiente φo2 :	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente βt(t) :	0.34	0.36	0.56	0.58	0.64	0.67	0.69	0.72	0.73	0.76	0.76	0.79	0.79	0.81	0.82	0.84	0.84	0.86	0.86	0.88	0.94	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(i) :	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente βt-i :	0.67		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.09	1.13	1.72	1.79	1.94	2.01	2.07	2.15	2.17	2.24	2.25	2.32	2.32	2.39	2.39	2.45	2.45	2.51	2.50	2.56	2.69	2.73	2.78	2.81	2.81	2.84	2.83	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.12	0.12	0.18	0.19	0.20	0.21	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.25	0.25	0.26	0.26	0.27	0.26	0.27	0.28	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.fluencia (mm/m) :	0.12		0.19		0.21		0.22		0.24		0.24		0.25		0.26		0.26		0.27		0.29		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30	
Mov.fluencia (mm) :	**6.5**		**10.3**		**11.5**		**12.3**		**12.9**		**13.4**		**13.8**		**14.1**		**14.4**		**14.7**		**15.8**		**16.2**		**16.4**		**16.5**		**16.5**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**	

Mov.TOTAL (mm/m) :	-0.04		0.08		0.14		0.18		0.21		0.23		0.25		0.27		0.29		0.30		0.35		0.38		0.40		0.41		0.42		0.42		0.42		0.43		0.43		0.43		0.43	
Mov.TOTAL (mm) :	**-2.0**		**4.4**		**7.5**		**9.7**		**11.3**		**12.7**		**13.9**		**14.9**		**15.8**		**16.6**		**19.4**		**20.9**		**21.7**		**22.2**		**22.8**		**23.1**		**23.2**		**23.3**		**23.4**		**23.4**		**23.4**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1518.3

HIPOTESIS DE CALCULO Nº 5. Julio - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-34.9	-34.8	-34.9	0.3	**19.1**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	184	549	914	1279	1644	2009	2374	2739	3104	3469	5294	7119	8944	10769	14419	18069	21719	25369	29019	32669	36319

Coeficiente βt :	0.10	0.12	0.23	0.27	0.32	0.37	0.40	0.45	0.46	0.52	0.52	0.57	0.56	0.61	0.60	0.65	0.64	0.69	0.67	0.71	0.78	0.81	0.85	0.87	0.89	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.04	0.07	0.08	0.10	0.11	0.12	0.14	0.14	0.16	0.15	0.17	0.17	0.18	0.18	0.20	0.19	0.21	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.08		0.11		0.13		0.15		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**1.9**		**4.2**		**5.9**		**7.2**		**8.2**		**9.1**		**9.9**		**10.5**		**11.0**		**11.5**		**13.2**		**14.2**		**14.9**		**15.3**		**15.8**		**16.1**		**16.2**		**16.3**		**16.4**		**16.4**		**16.4**	

Coeficiente φo2 :	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente βt(t) :	0.43	0.45	0.58	0.61	0.66	0.68	0.70	0.73	0.74	0.76	0.77	0.79	0.80	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.94	0.95	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(i) :	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente βt-i :	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.36	1.42	1.79	1.86	1.97	2.05	2.10	2.17	2.19	2.27	2.27	2.34	2.34	2.41	2.40	2.47	2.46	2.52	2.51	2.57	2.70	2.74	2.78	2.81	2.81	2.84	2.83	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.14	0.15	0.19	0.20	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.25	0.25	0.26	0.26	0.27	0.27	0.27	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.fluencia (mm/m) :	0.15		0.19		0.21		0.23		0.24		0.25		0.25		0.26		0.26		0.27		0.29		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30	
Mov.fluencia (mm) :	**8.1**		**10.7**		**11.8**		**12.5**		**13.0**		**13.5**		**13.9**		**14.2**		**14.5**		**14.8**		**15.8**		**16.2**		**16.4**		**16.5**		**16.5**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**	

Mov.TOTAL (mm/m) :	0.53		0.62		0.67		0.71		0.74		0.76		0.78		0.80		0.81		0.83		0.88		0.90		0.92		0.93		0.94		0.94		0.95		0.95		0.95		0.95		0.95	
Mov.TOTAL (mm) :	**29.1**		**34.0**		**36.8**		**38.8**		**40.4**		**41.7**		**42.8**		**43.8**		**44.7**		**45.4**		**48.1**		**49.6**		**50.4**		**50.9**		**51.5**		**51.7**		**51.9**		**52.0**		**52.0**		**52.1**		**52.1**	

HIPOTESIS DE CALCULO Nº 6. Julio - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.0	**0.0**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente βt :	—	—	0.17	0.20	0.28	0.32	0.36	0.42	0.43	0.49	0.49	0.55	0.54	0.59	0.58	0.63	0.62	0.67	0.65	0.70	0.77	0.81	0.84	0.87	0.89	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.05	0.06	0.08	0.10	0.11	0.12	0.13	0.15	0.15	0.16	0.16	0.18	0.17	0.19	0.19	0.20	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.06		0.09		0.12		0.14		0.16		0.17		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**3.2**		**5.1**		**6.6**		**7.7**		**8.7**		**9.5**		**10.2**		**10.8**		**11.3**		**13.1**		**14.1**		**14.8**		**15.3**		**15.8**		**16.1**		**16.2**		**16.3**		**16.4**		**16.4**		**16.4**	

Coeficiente φo2 :	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente βt(t) :	0.00	0.00	0.53	0.55	0.62	0.65	0.68	0.71	0.72	0.75	0.76	0.78	0.79	0.81	0.81	0.83	0.84	0.85	0.86	0.87	0.94	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(i) :	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente βt-i :	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.01	0.00	1.63	1.70	1.89	1.97	2.04	2.12	2.15	2.22	2.23	2.31	2.31	2.38	2.37	2.44	2.43	2.49	2.49	2.55	2.68	2.73	2.77	2.81	2.81	2.84	2.82	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.00	0.00	0.17	0.18	0.20	0.21	0.22	0.22	0.23	0.24	0.24	0.24	0.24	0.25	0.25	0.26	0.26	0.26	0.26	0.27	0.28	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.fluencia (mm/m) :	0.00		0.18		0.21		0.22		0.23		0.24		0.25		0.26		0.26		0.27		0.29		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30	
Mov.fluencia (mm) :	**0.0**		**9.8**		**11.3**		**12.2**		**12.8**		**13.2**		**13.7**		**14.0**		**14.4**		**14.7**		**15.7**		**16.2**		**16.4**		**16.5**		**16.5**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**	

Mov.TOTAL (mm/m) :	0.00		0.24		0.30		0.34		0.37		0.40		0.42		0.44		0.46		0.47		0.53		0.55		0.57		0.58		0.59		0.60		0.60		0.60		0.60		0.60		0.60	
Mov.TOTAL (mm) :	**0.0**		**12.9**		**16.4**		**18.7**		**20.5**		**21.9**		**23.2**		**24.2**		**25.1**		**25.9**		**28.8**		**30.3**		**31.2**		**31.8**		**32.3**		**32.6**		**32.8**		**32.9**		**32.9**		**33.0**		**33.0**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1518.3

HIPOTESIS DE CALCULO Nº 7. Octubre - Enero

Efectos térmicos

ΔT (ºC) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.4	-17.4	0.2	9.5

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	92	457	822	1187	1552	1917	2282	2647	3012	3377	5202	7027	8852	10677	14327	17977	21627	25277	28927	32577	36227

Coeficiente βt :	0.06	0.07	0.20	0.24	0.30	0.35	0.38	0.44	0.45	0.50	0.50	0.56	0.55	0.60	0.59	0.64	0.63	0.68	0.66	0.71	0.78	0.81	0.84	0.87	0.89	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.02	0.06	0.07	0.09	0.10	0.11	0.13	0.13	0.15	0.15	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.02		0.07		0.10		0.13		0.15		0.16		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**1.1**		**3.7**		**5.5**		**6.9**		**8.0**		**8.9**		**9.7**		**10.3**		**10.9**		**11.4**		**13.1**		**14.2**		**14.8**		**15.3**		**15.8**		**16.1**		**16.2**		**16.3**		**16.4**		**16.4**		**16.4**	

Coeficiente φo2 :	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente βt(t) :	0.34	0.36	0.56	0.58	0.64	0.67	0.69	0.72	0.73	0.76	0.76	0.79	0.79	0.81	0.82	0.84	0.84	0.86	0.86	0.88	0.94	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(i) :	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente βt-i :	0.68		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.09	1.14	1.72	1.79	1.94	2.01	2.07	2.15	2.17	2.25	2.25	2.32	2.32	2.39	2.39	2.45	2.45	2.51	2.50	2.56	2.69	2.73	2.78	2.81	2.81	2.84	2.83	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.12	0.12	0.18	0.19	0.20	0.21	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.25	0.25	0.26	0.26	0.27	0.26	0.27	0.28	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.fluencia (mm/m) :	0.12		0.19		0.21		0.22		0.24		0.24		0.25		0.26		0.26		0.27		0.29		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30	
Mov.fluencia (mm) :	**6.5**		**10.3**		**11.5**		**12.3**		**12.9**		**13.4**		**13.8**		**14.1**		**14.4**		**14.7**		**15.8**		**16.2**		**16.4**		**16.5**		**16.5**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**	

Mov.TOTAL (mm/m) :	0.31		0.43		0.49		0.53		0.56		0.58		0.60		0.62		0.64		0.65		0.70		0.73		0.74		0.75		0.76		0.77		0.77		0.77		0.78		0.78		0.78	
Mov.TOTAL (mm) :	**17.1**		**23.5**		**26.6**		**28.8**		**30.4**		**31.8**		**33.0**		**34.0**		**34.9**		**35.7**		**38.5**		**40.0**		**40.8**		**41.3**		**41.9**		**42.2**		**42.3**		**42.4**		**42.5**		**42.5**		**42.5**	

HIPOTESIS DE CALCULO Nº 8. Octubre - Julio

Efectos térmicos

ΔT (ºC) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.4	17.4	-0.2	-9.5

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	273	638	1003	1368	1733	2098	2463	2828	3193	3558	5383	7208	9033	10858	14508	18158	21808	25458	29108	32758	36408

Coeficiente βt :	0.13	0.16	0.25	0.30	0.34	0.39	0.42	0.47	0.48	0.53	0.53	0.58	0.57	0.62	0.61	0.66	0.64	0.69	0.67	0.72	0.78	0.82	0.85	0.87	0.89	0.91	0.92	0.94	0.96	0.96	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.04	0.05	0.08	0.09	0.10	0.12	0.12	0.14	0.14	0.16	0.16	0.17	0.17	0.19	0.18	0.20	0.19	0.21	0.20	0.22	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.05		0.09		0.11		0.14		0.15		0.17		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**2.5**		**4.7**		**6.2**		**7.5**		**8.5**		**9.3**		**10.0**		**10.6**		**11.2**		**11.6**		**13.3**		**14.3**		**14.9**		**15.3**		**15.8**		**16.1**		**16.2**		**16.3**		**16.4**		**16.4**		**16.4**	

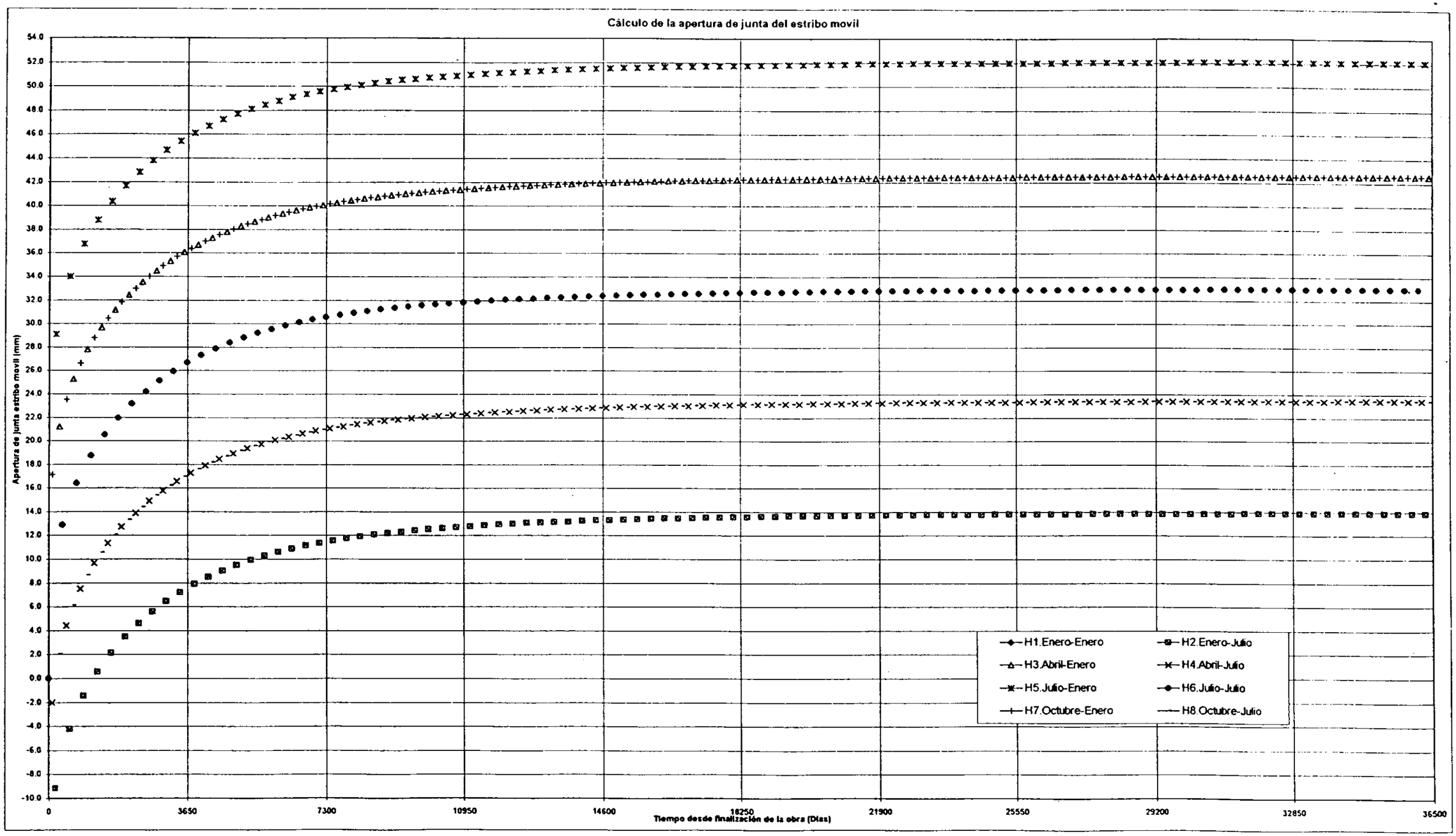
Coeficiente φo2 :	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24	1.25
Coeficiente βt(t) :	0.49	0.51	0.60	0.63	0.67	0.69	0.71	0.74	0.75	0.77	0.78	0.80	0.81	0.83	0.83	0.85	0.85	0.87	0.87	0.89	0.95	0.95	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(i) :	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente βt-i :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.52	1.58	1.84	1.92	2.01	2.09	2.12	2.20	2.21	2.29	2.29	2.36	2.36	2.42	2.42	2.48	2.47	2.53	2.53	2.58	2.70	2.74	2.78	2.81	2.81	2.84	2.83	2.85	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.86	2.84	2.87	2.84	2.87
Movimiento (mm/m) :	0.16	0.17	0.20	0.20	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.fluencia (mm/m) :	0.17		0.20		0.22		0.23		0.24		0.25		0.25		0.26		0.27		0.27		0.29		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30		0.30	
Mov.fluencia (mm) :	**9.1**		**11.0**		**12.0**		**12.6**		**13.1**		**13.6**		**13.9**		**14.3**		**14.6**		**14.9**		**15.8**		**16.3**		**16.4**		**16.5**		**16.5**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**		**16.6**	

Mov.TOTAL (mm/m) :	0.04		0.11		0.16		0.19		0.22		0.24		0.26		0.28		0.30		0.31		0.36		0.38		0.40		0.41		0.42		0.42		0.42		0.43		0.43		0.43		0.43	
Mov.TOTAL (mm) :	**2.1**		**6.1**		**8.7**		**10.5**		**12.1**		**13.3**		**14.4**		**15.4**		**16.2**		**16.9**		**19.6**		**21.0**		**21.8**		**22.3**		**22.8**		**23.1**		**23.3**		**23.3**		**23.4**		**23.4**		**23.4**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	E-1518.3

RESUMEN TOTAL



CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	EVN3-4.4

DATOS ESTRUCTURA

	Zona maciza	Zona aligerada	Total estructura
Longitud (m) :	23.60	84.80	108.40
Canto medio (m) :	1.97	1.97	---
Seccion transversal (m²) :	11.34	8.27	---
Perimetro (m) :	19.78	19.78	---
Espesor ficticio (cm) :	172.09	125.38	---

Estribo movil :	E-2

(el estribo contrario no tiene apertura de junta pues el tablero está anclado a él)

Axil medio (KN) :	37140.30
Resistencia hormigón (N/mm²) :	40.00

HIPOTESIS DE CALCULO Nº 1. Enero - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.00	**0.0**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente β_t :	---	---	0.11	0.16	0.19	0.26	0.26	0.35	0.32	0.41	0.37	0.47	0.42	0.52	0.46	0.56	0.50	0.60	0.54	0.64	0.68	0.76	0.77	0.83	0.84	0.88	0.88	0.91	0.94	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	---	---	0.03	0.05	0.06	0.08	0.08	0.10	0.10	0.12	0.11	0.14	0.13	0.16	0.14	0.17	0.15	0.18	0.16	0.19	0.20	0.23	0.23	0.25	0.25	0.26	0.26	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.04		0.07		0.10		0.12		0.14		0.15		0.16		0.17		0.18		0.22		0.25		0.26		0.27		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**4.8**		**8.0**		**10.6**		**12.8**		**14.6**		**16.2**		**17.7**		**18.9**		**20.0**		**24.1**		**26.7**		**28.4**		**29.5**		**30.9**		**31.6**		**32.0**		**32.2**		**32.3**		**32.4**		**32.5**	

Coeficiente φ_{o2} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.00	0.00	0.47	0.52	0.56	0.61	0.62	0.67	0.66	0.71	0.70	0.75	0.73	0.78	0.76	0.81	0.79	0.83	0.82	0.85	0.92	0.94	0.96	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.02	0.01	1.48	1.61	1.72	1.87	1.87	2.02	1.98	2.12	2.07	2.21	2.15	2.28	2.22	2.35	2.29	2.41	2.35	2.47	2.59	2.67	2.70	2.76	2.75	2.80	2.77	2.82	2.78	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.00	0.00	0.13	0.14	0.15	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.19	0.20	0.20	0.21	0.20	0.21	0.22	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Mov.fluencia (mm/m) :	0.00		0.14		0.16		0.17		0.18		0.19		0.19		0.20		0.21		0.21		0.23		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24	
Mov.fluencia (mm) :	**0.1**		**14.8**		**17.2**		**18.5**		**19.5**		**20.4**		**21.1**		**21.7**		**22.3**		**22.9**		**24.8**		**25.7**		**26.1**		**26.2**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**	

Mov.TOTAL (mm/m) :	0.00		0.18		0.23		0.27		0.30		0.32		0.34		0.36		0.38		0.40		0.45		0.48		0.50		0.51		0.53		0.53		0.54		0.54		0.54		0.54		0.54	
Mov.TOTAL (mm) :	**0.1**		**19.6**		**25.2**		**29.2**		**32.3**		**35.0**		**37.3**		**39.4**		**41.2**		**42.9**		**48.9**		**52.4**		**54.5**		**55.8**		**57.2**		**58.0**		**58.4**		**58.6**		**58.7**		**58.8**		**58.9**	

HIPOTESIS DE CALCULO Nº 2. Enero - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
34.9	34.8	34.8	-0.3	**-37.8**

Retracción y fluencia (el resto de los valores hasta el Año 99 se representan en el gráfico)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	181	546	911	1276	1641	2006	2371	2736	3101	3466	5291	7116	8941	10766	14416	18066	21716	25366	29016	32666	36316

Coeficiente β_t :	0.06	0.09	0.15	0.21	0.23	0.31	0.29	0.38	0.35	0.44	0.40	0.50	0.44	0.54	0.48	0.58	0.52	0.62	0.56	0.65	0.69	0.77	0.78	0.84	0.84	0.89	0.89	0.92	0.94	0.96	0.97	0.97	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.03	0.05	0.06	0.07	0.09	0.09	0.11	0.10	0.13	0.12	0.15	0.13	0.16	0.15	0.18	0.16	0.19	0.17	0.20	0.21	0.23	0.23	0.25	0.25	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.06		0.09		0.11		0.13		0.14		0.16		0.17		0.18		0.19		0.23		0.25		0.26		0.27		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**2.7**		**6.5**		**9.4**		**11.7**		**13.7**		**15.5**		**17.0**		**18.3**		**19.5**		**20.5**		**24.4**		**26.9**		**28.5**		**29.6**		**30.9**		**31.6**		**32.0**		**32.2**		**32.3**		**32.4**		**32.5**	

Coeficiente φ_{o2} :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.39	0.42	0.52	0.57	0.59	0.65	0.64	0.69	0.68	0.73	0.72	0.76	0.75	0.79	0.78	0.82	0.81	0.84	0.83	0.86	0.92	0.94	0.97	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.23	1.33	1.62	1.76	1.80	1.95	1.92	2.07	2.02	2.17	2.11	2.25	2.18	2.32	2.25	2.38	2.32	2.44	2.38	2.49	2.61	2.68	2.71	2.77	2.75	2.80	2.77	2.82	2.78	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.11	0.11	0.14	0.15	0.16	0.17	0.17	0.18	0.17	0.19	0.18	0.19	0.19	0.20	0.19	0.21	0.20	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Mov.fluencia (mm/m) :	0.11		0.15		0.17		0.18		0.18		0.19		0.20		0.20		0.21		0.21		0.23		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24	
Mov.fluencia (mm) :	**12.3**		**16.2**		**17.9**		**19.1**		**20.0**		**20.7**		**21.4**		**22.0**		**22.6**		**23.1**		**24.9**		**25.8**		**26.1**		**26.3**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**	

Mov.TOTAL (mm/m) :	-0.21	-0.14	-0.10	-0.06	-0.04	-0.01	0.01	0.02	0.04	0.05	0.11	0.14	0.16	0.17	0.18	0.19	0.19	0.19	0.19	0.19
Mov.TOTAL (mm) :	**-22.8**	**-15.1**	**-10.5**	**-7.0**	**-4.1**	**-1.6**	**0.6**	**2.5**	**4.3**	**5.8**	**11.6**	**14.9**	**16.8**	**18.1**	**19.5**	**20.2**	**20.6**	**20.8**	**21.0**	**21.1**

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV
OBRA :	EVN3-4.4

HIPOTESIS DE CALCULO Nº 3. Abril - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.4	-17.4	0.2	**18.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	275	640	1005	1370	1735	2100	2465	2830	3195	3560	5385	7210	9035	10860	14510	18160	21810	25460	29110	32760	36410

Coeficiente β_t :	0.09	0.13	0.17	0.24	0.24	0.33	0.30	0.40	0.36	0.46	0.41	0.51	0.45	0.55	0.49	0.59	0.53	0.63	0.56	0.66	0.70	0.77	0.79	0.84	0.85	0.89	0.89	0.92	0.94	0.96	0.97	0.97	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.04	0.05	0.07	0.07	0.10	0.09	0.12	0.11	0.14	0.12	0.15	0.14	0.17	0.15	0.18	0.16	0.19	0.17	0.20	0.21	0.23	0.24	0.25	0.25	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.04		0.07		0.09		0.11		0.13		0.15		0.16		0.17		0.18		0.19		0.23		0.25		0.26		0.27		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**3.8**		**7.3**		**10.0**		**12.3**		**14.2**		**15.9**		**17.3**		**18.6**		**19.7**		**20.8**		**24.6**		**27.0**		**28.6**		**29.7**		**31.0**		**31.6**		**32.0**		**32.2**		**32.3**		**32.4**		**32.5**	

Coeficiente φo2 :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.44	0.48	0.55	0.60	0.61	0.66	0.65	0.70	0.69	0.74	0.73	0.77	0.76	0.80	0.79	0.82	0.81	0.85	0.84	0.87	0.93	0.94	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.38	1.50	1.68	1.82	1.84	1.98	1.95	2.10	2.04	2.19	2.13	2.27	2.20	2.33	2.27	2.40	2.34	2.46	2.40	2.51	2.61	2.69	2.71	2.77	2.75	2.80	2.77	2.82	2.78	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.12	0.13	0.14	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.18	0.20	0.19	0.20	0.20	0.21	0.20	0.21	0.21	0.22	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Mov.fluencia (mm/m) :	0.13		0.15		0.17		0.18		0.19		0.19		0.20		0.20		0.21		0.21		0.23		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24	
Mov.fluencia (mm) :	**13.8**		**16.7**		**18.3**		**19.3**		**20.2**		**20.9**		**21.6**		**22.2**		**22.7**		**23.2**		**25.0**		**25.8**		**26.1**		**26.3**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**	

Mov.TOTAL (mm/m) :	0.34	0.40	0.44	0.47	0.49	0.51	0.53	0.55	0.57	0.58	0.63	0.66	0.68	0.69	0.70	0.71	0.71	0.72	0.72	0.72	0.72
Mov.TOTAL (mm) :	**36.5**	**42.9**	**47.2**	**50.5**	**53.3**	**55.7**	**57.8**	**59.7**	**61.4**	**62.9**	**68.5**	**71.7**	**73.6**	**74.8**	**76.2**	**76.9**	**77.3**	**77.5**	**77.6**	**77.7**	**77.7**

HIPOTESIS DE CALCULO Nº 4. Abril - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.4	17.4	-0.2	**-18.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	91	456	821	1186	1551	1916	2281	2646	3011	3376	5201	7026	8851	10676	14326	17976	21626	25276	28926	32576	36226

Coeficiente β_t :	0.03	0.05	0.13	0.19	0.21	0.29	0.27	0.36	0.33	0.43	0.38	0.49	0.43	0.53	0.47	0.57	0.51	0.61	0.55	0.64	0.69	0.76	0.78	0.84	0.84	0.88	0.88	0.92	0.94	0.95	0.97	0.97	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.01	0.02	0.04	0.06	0.06	0.09	0.08	0.11	0.10	0.13	0.12	0.15	0.13	0.16	0.14	0.17	0.15	0.18	0.16	0.19	0.21	0.23	0.23	0.25	0.25	0.27	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.01		0.05		0.08		0.10		0.12		0.14		0.15		0.17		0.18		0.19		0.22		0.25		0.26		0.27		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**1.5**		**5.7**		**8.7**		**11.2**		**13.3**		**15.1**		**16.6**		**18.0**		**19.2**		**20.3**		**24.3**		**26.8**		**28.4**		**29.6**		**30.9**		**31.6**		**32.0**		**32.2**		**32.3**		**32.4**		**32.5**	

Coeficiente φo2 :	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta_{t(t)}$:	0.31	0.34	0.50	0.55	0.58	0.63	0.63	0.68	0.67	0.72	0.71	0.76	0.74	0.79	0.77	0.81	0.80	0.84	0.83	0.86	0.92	0.94	0.97	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente β_{t-i} :	0.67		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.00	1.07	1.56	1.69	1.77	1.91	1.90	2.04	2.00	2.14	2.09	2.23	2.16	2.30	2.24	2.37	2.30	2.43	2.37	2.48	2.60	2.68	2.71	2.77	2.75	2.80	2.77	2.82	2.78	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.09	0.09	0.13	0.15	0.15	0.16	0.16	0.18	0.17	0.19	0.18	0.19	0.19	0.20	0.19	0.20	0.20	0.21	0.20	0.21	0.22	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Mov.fluencia (mm/m) :	0.09		0.14		0.16		0.17		0.18		0.19		0.20		0.20		0.21		0.21		0.23		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24	
Mov.fluencia (mm) :	**9.9**		**15.6**		**17.6**		**18.8**		**19.8**		**20.5**		**21.2**		**21.9**		**22.4**		**23.0**		**24.9**		**25.7**		**26.1**		**26.2**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**	

Mov.TOTAL (mm/m) :	-0.07	0.02	0.07	0.10	0.13	0.15	0.17	0.19	0.21	0.22	0.28	0.31	0.33	0.34	0.35	0.36	0.36	0.37	0.37	0.37	0.37
Mov.TOTAL (mm) :	**-7.4**	**2.3**	**7.4**	**11.1**	**14.2**	**16.7**	**19.0**	**21.0**	**22.8**	**24.4**	**30.3**	**33.6**	**35.6**	**36.9**	**38.4**	**39.1**	**39.5**	**39.7**	**39.9**	**39.9**	**40.0**

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	EVN3-4.4

HIPOTESIS DE CALCULO Nº 5. Julio - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-34.9	-34.8	-34.8	0.3	**37.8**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	184	549	914	1279	1644	2009	2374	2739	3104	3469	5294	7119	8944	10769	14419	18069	21719	25369	29019	32669	36319

Coeficiente βt :	0.06	0.09	0.15	0.21	0.23	0.31	0.29	0.38	0.35	0.44	0.40	0.50	0.44	0.54	0.48	0.58	0.52	0.62	0.56	0.65	0.69	0.77	0.78	0.84	0.84	0.89	0.89	0.92	0.94	0.96	0.97	0.97	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.03	0.05	0.06	0.07	0.09	0.09	0.11	0.10	0.13	0.12	0.15	0.13	0.16	0.15	0.18	0.16	0.19	0.17	0.20	0.21	0.23	0.23	0.25	0.25	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.06		0.09		0.11		0.13		0.14		0.16		0.17		0.18		0.19		0.23		0.25		0.26		0.27		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**2.8**		**6.5**		**9.4**		**11.8**		**13.8**		**15.5**		**17.0**		**18.3**		**19.5**		**20.5**		**24.4**		**26.9**		**28.5**		**29.6**		**30.9**		**31.6**		**32.0**		**32.2**		**32.3**		**32.4**		**32.5**	

Coeficiente $\varphi o2$:	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta t(t)$:	0.39	0.42	0.53	0.57	0.60	0.65	0.64	0.69	0.68	0.73	0.72	0.76	0.75	0.79	0.78	0.82	0.81	0.84	0.83	0.86	0.92	0.94	0.97	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta t(i)$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente $\beta t\text{-}i$:	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00			
Coeficiente de fluencia :	1.24	1.34	1.63	1.76	1.80	1.95	1.93	2.07	2.02	2.17	2.11	2.25	2.18	2.32	2.25	2.38	2.32	2.44	2.38	2.50	2.61	2.68	2.71	2.77	2.75	2.80	2.77	2.82	2.78	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.11	0.12	0.14	0.15	0.16	0.17	0.17	0.18	0.17	0.19	0.18	0.19	0.19	0.20	0.19	0.21	0.20	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Mov.fluencia (mm/m) :	0.11		0.15		0.17		0.18		0.18		0.19		0.20		0.20		0.21		0.21		0.23		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24			
Mov.fluencia (mm) :	**12.3**		**16.2**		**17.9**		**19.1**		**20.0**		**20.7**		**21.4**		**22.0**		**22.6**		**23.1**		**24.9**		**25.8**		**26.1**		**26.3**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**	

Mov.TOTAL (mm/m) :	0.49		0.56		0.60		0.63		0.66		0.68		0.70		0.72		0.74		0.75		0.80		0.83		0.85		0.86		0.88		0.88		0.89		0.89		0.89		0.89			
Mov.TOTAL (mm) :	**52.9**		**60.5**		**65.1**		**68.6**		**71.5**		**74.0**		**76.2**		**78.1**		**79.8**		**81.4**		**87.1**		**90.4**		**92.4**		**93.6**		**95.1**		**95.8**		**96.2**		**96.4**		**96.5**		**96.6**		**96.6**	

HIPOTESIS DE CALCULO Nº 6. Julio - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.0	**0.0**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente βt :	—	—	0.11	0.16	0.19	0.26	0.26	0.35	0.32	0.41	0.37	0.47	0.42	0.52	0.46	0.56	0.50	0.60	0.54	0.64	0.68	0.76	0.77	0.83	0.84	0.88	0.88	0.91	0.94	0.95	0.97	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.03	0.05	0.06	0.08	0.08	0.10	0.10	0.12	0.11	0.14	0.13	0.16	0.14	0.17	0.15	0.18	0.16	0.19	0.20	0.23	0.23	0.25	0.25	0.26	0.26	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.04		0.07		0.10		0.12		0.14		0.15		0.16		0.17		0.18		0.22		0.25		0.26		0.27		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**0.0**		**4.8**		**8.0**		**10.6**		**12.8**		**14.6**		**16.2**		**17.7**		**18.9**		**20.0**		**24.1**		**26.7**		**28.4**		**29.5**		**30.9**		**31.6**		**32.0**		**32.2**		**32.3**		**32.4**		**32.5**	

Coeficiente $\varphi o2$:	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23	1.20	1.23
Coeficiente $\beta t(t)$:	0.00	0.00	0.47	0.52	0.56	0.61	0.62	0.67	0.66	0.71	0.70	0.75	0.73	0.78	0.76	0.81	0.79	0.83	0.82	0.85	0.92	0.94	0.96	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta t(i)$:	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Coeficiente $\beta t\text{-}i$:	0.09		0.91		0.96		0.99		0.99		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00			
Coeficiente de fluencia :	0.02	0.01	1.48	1.61	1.72	1.87	1.87	2.02	1.98	2.12	2.07	2.21	2.15	2.28	2.22	2.35	2.29	2.41	2.35	2.47	2.59	2.67	2.70	2.76	2.75	2.80	2.77	2.82	2.78	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83	2.79	2.83
Movimiento (mm/m) :	0.00	0.00	0.13	0.14	0.15	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.19	0.20	0.20	0.21	0.20	0.21	0.22	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Mov.fluencia (mm/m) :	0.00		0.14		0.16		0.17		0.18		0.19		0.19		0.20		0.21		0.21		0.23		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24		0.24			
Mov.fluencia (mm) :	**0.1**		**14.8**		**17.2**		**18.5**		**19.5**		**20.4**		**21.1**		**21.7**		**22.3**		**22.9**		**24.8**		**25.7**		**26.1**		**26.2**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**		**26.4**	

Mov.TOTAL (mm/m) :	0.00		0.18		0.23		0.27		0.30		0.32		0.34		0.36		0.38		0.40		0.45		0.48		0.50		0.51		0.53		0.53		0.54		0.54		0.54		0.54			
Mov.TOTAL (mm) :	**0.1**		**19.6**		**25.2**		**29.2**		**32.3**		**35.0**		**37.3**		**39.4**		**41.2**		**42.9**		**48.9**		**52.4**		**54.5**		**55.8**		**57.2**		**58.0**		**58.4**		**58.6**		**58.7**		**58.8**		**58.9**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	EVN3-4.4

HIPOTESIS DE CALCULO Nº 7. Octubre - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.4	-17.4	0.2	**18.9**

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	92	457	822	1187	1552	1917	2282	2647	3012	3377	5202	7027	8852	10677	14327	17977	21627	25277	28927	32577	36227
Coeficiente β_t :	0.03 0.05	0.13 0.19	0.21 0.29	0.27 0.36	0.33 0.43	0.38 0.49	0.43 0.53	0.47 0.57	0.51 0.61	0.55 0.64	0.69 0.76	0.78 0.84	0.84 0.88	0.88 0.92	0.94 0.95	0.97 0.97	0.98 0.99	0.99 0.99	0.99 0.99	1.00 1.00	1.00 1.00
Mov. (mm/m) :	0.01 0.02	0.04 0.06	0.06 0.09	0.08 0.11	0.10 0.13	0.12 0.15	0.13 0.16	0.14 0.17	0.15 0.18	0.16 0.19	0.21 0.23	0.23 0.25	0.25 0.27	0.27 0.27	0.28 0.29	0.29 0.29	0.29 0.30	0.30 0.30	0.30 0.30	0.30 0.30	0.30 0.30
Mov.retracción (mm/m) :	0.01	0.05	0.08	0.10	0.12	0.14	0.15	0.17	0.18	0.19	0.22	0.25	0.26	0.27	0.29	0.29	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm) :	**1.6**	**5.7**	**8.7**	**11.2**	**13.3**	**15.1**	**16.6**	**18.0**	**19.2**	**20.3**	**24.3**	**26.8**	**28.4**	**29.6**	**30.9**	**31.6**	**32.0**	**32.2**	**32.3**	**32.4**	**32.5**
Coeficiente φ_{02} :	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23
Coeficiente $\beta_{t(t)}$:	0.31 0.34	0.50 0.55	0.58 0.63	0.63 0.68	0.67 0.72	0.71 0.76	0.74 0.79	0.77 0.81	0.80 0.84	0.83 0.86	0.92 0.94	0.97 0.97	0.98 0.99	0.99 0.99	1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00
Coeficiente $\beta_{t(i)}$:	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19
Coeficiente β_{t-i} :	0.68	0.93	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente de fluencia :	1.01 1.08	1.56 1.69	1.77 1.91	1.90 2.04	2.00 2.14	2.09 2.23	2.16 2.30	2.24 2.37	2.30 2.43	2.37 2.48	2.60 2.68	2.71 2.77	2.75 2.80	2.77 2.82	2.78 2.83	2.79 2.83	2.79 2.83	2.79 2.83	2.79 2.83	2.79 2.83	2.79 2.83
Movimiento (mm/m) :	0.09 0.09	0.13 0.15	0.15 0.16	0.16 0.18	0.17 0.19	0.18 0.19	0.19 0.20	0.19 0.20	0.20 0.21	0.20 0.21	0.22 0.23	0.23 0.24	0.24 0.24	0.24 0.24	0.24 0.24	0.24 0.24	0.24 0.24	0.24 0.24	0.24 0.24	0.24 0.24	0.24 0.24
Mov.fluencia (mm/m) :	0.09	0.14	0.16	0.17	0.18	0.19	0.20	0.20	0.21	0.21	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Mov.fluencia (mm) :	**9.9**	**15.6**	**17.6**	**18.8**	**19.8**	**20.5**	**21.2**	**21.9**	**22.4**	**23.0**	**24.9**	**25.7**	**26.1**	**26.2**	**26.4**	**26.4**	**26.4**	**26.4**	**26.4**	**26.4**	**26.4**
Mov.TOTAL (mm/m) :	0.28	0.37	0.42	0.45	0.48	0.50	0.52	0.54	0.56	0.57	0.63	0.66	0.68	0.69	0.70	0.71	0.71	0.71	0.72	0.72	0.72
Mov.TOTAL (mm) :	**30.4**	**40.1**	**45.2**	**48.9**	**51.9**	**54.5**	**56.7**	**58.7**	**60.5**	**62.1**	**68.0**	**71.4**	**73.4**	**74.7**	**76.2**	**76.9**	**77.3**	**77.5**	**77.6**	**77.7**	**77.7**

HIPOTESIS DE CALCULO Nº 8. Octubre - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.4	17.4	-0.2	**-18.9**

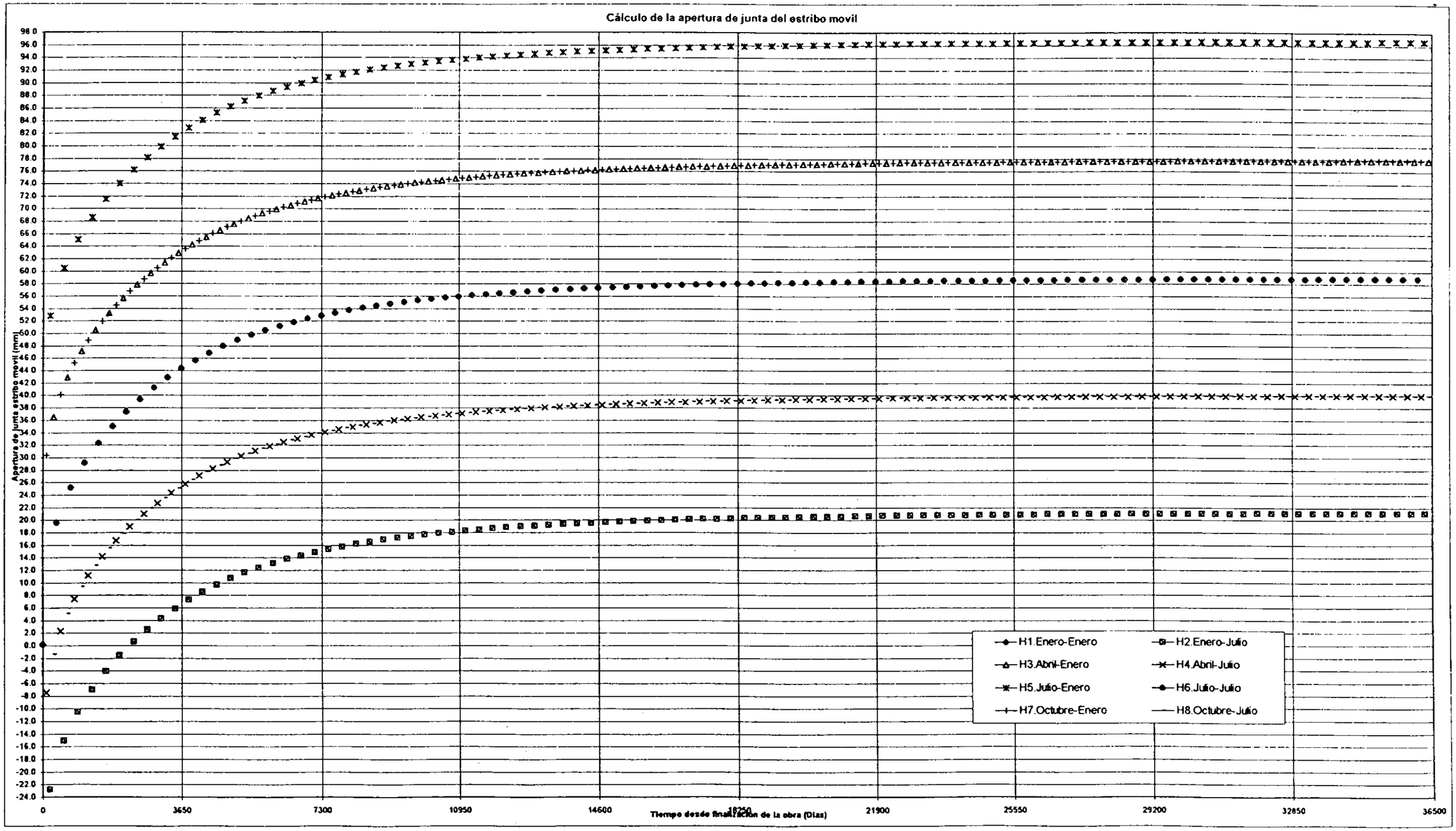
Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	273	638	1003	1368	1733	2098	2463	2828	3193	3558	5383	7208	9033	10858	14508	18158	21808	25458	29108	32758	36408
Coeficiente β_t :	0.09 0.13	0.17 0.24	0.24 0.33	0.30 0.40	0.36 0.46	0.41 0.51	0.45 0.55	0.49 0.59	0.53 0.63	0.56 0.66	0.70 0.77	0.79 0.84	0.85 0.89	0.89 0.92	0.94 0.96	0.97 0.97	0.98 0.99	0.99 0.99	0.99 0.99	1.00 1.00	1.00 1.00
Mov. (mm/m) :	0.03 0.04	0.05 0.07	0.07 0.10	0.09 0.12	0.11 0.14	0.12 0.15	0.14 0.17	0.15 0.18	0.16 0.19	0.17 0.20	0.21 0.23	0.24 0.25	0.25 0.27	0.27 0.28	0.28 0.29	0.29 0.29	0.29 0.30	0.30 0.30	0.30 0.30	0.30 0.30	0.30 0.30
Mov.retracción (mm/m) :	0.04	0.07	0.09	0.11	0.13	0.15	0.16	0.17	0.18	0.19	0.23	0.25	0.26	0.27	0.29	0.29	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm) :	**3.8**	**7.3**	**10.0**	**12.3**	**14.2**	**15.9**	**17.3**	**18.6**	**19.7**	**20.8**	**24.6**	**27.0**	**28.6**	**29.7**	**31.0**	**31.6**	**32.0**	**32.2**	**32.3**	**32.4**	**32.5**
Coeficiente φ_{02} :	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23	1.20 1.23
Coeficiente $\beta_{t(t)}$:	0.44 0.48	0.55 0.60	0.61 0.66	0.65 0.70	0.69 0.74	0.73 0.77	0.76 0.80	0.79 0.82	0.81 0.85	0.84 0.87	0.93 0.94	0.97 0.98	0.99 0.99	0.99 0.99	1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00
Coeficiente $\beta_{t(i)}$:	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19	0.19 0.19
Coeficiente β_{t-i} :	0.87	0.95	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente de fluencia :	1.38 1.49	1.68 1.82	1.84 1.98	1.95 2.10	2.04 2.19	2.13 2.26	2.20 2.33	2.27 2.40	2.34 2.46	2.40 2.51	2.61 2.69	2.71 2.77	2.75 2.80	2.77 2.82	2.78 2.83	2.79 2.83	2.79 2.83	2.79 2.83	2.79 2.83	2.79 2.83	2.79 2.83
Movimiento (mm/m) :	0.12 0.13	0.14 0.16	0.16 0.17	0.17 0.18	0.18 0.19	0.18 0.20	0.19 0.20	0.20 0.21	0.20 0.21	0.21 0.22	0.23 0.23	0.23 0.24	0.24 0.24	0.24 0.24	0.24 0.24	0.24 0.24	0.24 0.24	0.24 0.24	0.24 0.24	0.24 0.24	0.24 0.24
Mov.fluencia (mm/m) :	0.13	0.15	0.17	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Mov.fluencia (mm) :	**13.7**	**16.7**	**18.2**	**19.3**	**20.2**	**20.9**	**21.6**	**22.2**	**22.7**	**23.2**	**25.0**	**25.8**	**26.1**	**26.3**	**26.4**	**26.4**	**26.4**	**26.4**	**26.4**	**26.4**	**26.4**
Mov.TOTAL (mm/m) :	-0.01	0.05	0.09	0.12	0.14	0.16	0.18	0.20	0.22	0.23	0.28	0.31	0.33	0.34	0.35	0.36	0.36	0.37	0.37	0.37	0.37
Mov.TOTAL (mm) :	**-1.3**	**5.1**	**9.4**	**12.7**	**15.5**	**17.9**	**20.0**	**21.9**	**23.6**	**25.1**	**30.7**	**33.9**	**35.8**	**37.0**	**38.4**	**39.1**	**39.5**	**39.7**	**39.9**	**39.9**	**40.0**

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	EVN3-4.4

RESUMEN TOTAL



CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	ED2-1.8

DATOS ESTRUCTURA

	Zona maciza	Zona aligerada	Total estructura
Longitud (m) :	15.20	51.80	67.00
Canto medio (m) :	1.63	1.63	—
Seccion transversal (m²) :	9.89	7.54	—
Perimetro (m) :	21.24	21.24	—
Espesor ficticio (cm) :	139.72	106.45	—

Estribo movil :	E-2

(el estribo contrario no tiene apertura de junta pues el tablero está anclado a él)

Axil medio (KN) :	34121.35
Resistencia hormigón (N/mm²) :	40.00

HIPOTESIS DE CALCULO Nº 1. Enero - Enero

Efectos térmicos

Δ T (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.00	0.0

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente β_t :	—	—	0.14	0.19	0.24	0.31	0.31	0.40	0.38	0.47	0.44	0.53	0.49	0.57	0.53	0.62	0.57	0.65	0.60	0.68	0.73	0.79	0.81	0.86	0.87	0.90	0.90	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.04	0.06	0.07	0.09	0.09	0.12	0.11	0.14	0.13	0.16	0.15	0.17	0.16	0.18	0.17	0.20	0.18	0.20	0.22	0.24	0.24	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.05		0.09		0.11		0.13		0.15		0.17		0.18		0.19		0.20		0.23		0.25		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**0.0**		**3.6**		**5.8**		**7.6**		**9.0**		**10.2**		**11.1**		**12.0**		**12.7**		**13.4**		**15.7**		**17.1**		**17.9**		**18.5**		**19.3**		**19.6**		**19.8**		**19.9**		**20.0**		**20.0**		**20.1**	

Coeficiente φ_{o2} :	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25
Coeficiente $\beta_{t(t)}$:	0.00	0.00	0.50	0.54	0.60	0.64	0.65	0.70	0.70	0.74	0.73	0.77	0.76	0.80	0.79	0.82	0.82	0.85	0.84	0.87	0.93	0.94	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-i} :	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.02	0.00	1.56	1.68	1.82	1.94	1.97	2.09	2.07	2.20	2.16	2.28	2.24	2.35	2.31	2.41	2.37	2.47	2.43	2.53	2.64	2.71	2.74	2.79	2.78	2.83	2.80	2.84	2.81	2.85	2.82	2.85	2.82	2.85	2.82	2.86	2.82	2.86	2.82	2.86	2.82	2.86
Movimiento (mm/m) :	0.00	0.00	0.14	0.15	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.20	0.21	0.21	0.22	0.22	0.22	0.22	0.23	0.24	0.25	0.25	0.25	0.25	0.26	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Mov.fluencia (mm/m) :	0.00		0.15		0.17		0.19		0.20		0.20		0.21		0.22		0.22		0.23		0.24		0.25		0.26		0.26		0.26		0.26		0.26		0.26		0.26		0.26		0.26	
Mov.fluencia (mm) :	**0.0**		**10.1**		**11.7**		**12.6**		**13.2**		**13.7**		**14.2**		**14.6**		**14.9**		**15.2**		**16.4**		**16.9**		**17.2**		**17.2**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**	

Mov.TOTAL (mm/m) :	0.00		0.20		0.26		0.30		0.33		0.36		0.38		0.40		0.41		0.43		0.48		0.51		0.52		0.53		0.55		0.55		0.55		0.56		0.56		0.56	
Mov.TOTAL (mm) :	**0.0**		**13.6**		**17.5**		**20.1**		**22.2**		**23.9**		**25.3**		**26.5**		**27.6**		**28.6**		**32.1**		**34.0**		**35.1**		**35.8**		**36.6**		**36.9**		**37.2**		**37.3**		**37.3**		**37.4**	

HIPOTESIS DE CALCULO Nº 2. Enero - Julio

Efectos térmicos

Δ T (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
34.9	34.8	34.8	-0.3	**-23.3**

Retracción y fluencia (el resto de los valores hasta el Año 99 se representan en el gráfico)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	181	546	911	1276	1641	2006	2371	2736	3101	3466	5291	7116	8941	10766	14416	18066	21716	25366	29016	32666	36316

Coeficiente β_t :	0.08	0.11	0.19	0.25	0.28	0.35	0.35	0.43	0.41	0.50	0.46	0.55	0.51	0.60	0.55	0.63	0.59	0.67	0.62	0.70	0.74	0.80	0.82	0.86	0.87	0.90	0.91	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.03	0.06	0.08	0.08	0.11	0.10	0.13	0.12	0.15	0.14	0.17	0.15	0.18	0.17	0.19	0.18	0.20	0.19	0.21	0.22	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.07		0.10		0.12		0.14		0.16		0.17		0.18		0.19		0.20		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30		0.30	
Mov.retracción (mm) :	**2.1**		**4.8**		**6.8**		**8.3**		**9.6**		**10.7**		**11.6**		**12.4**		**13.1**		**13.7**		**15.8**		**17.2**		**18.0**		**18.6**		**19.3**		**19.6**		**19.8**		**19.9**		**20.0**		**20.0**		**20.1**	

Coeficiente φ_{o2} :	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25
Coeficiente $\beta_{t(t)}$:	0.41	0.44	0.56	0.60	0.63	0.67	0.68	0.72	0.72	0.76	0.75	0.79	0.78	0.81	0.81	0.84	0.83	0.86	0.85	0.88	0.94	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-i} :	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.30	1.39	1.71	1.83	1.90	2.02	2.02	2.15	2.12	2.24	2.20	2.32	2.27	2.38	2.34	2.44	2.40	2.50	2.46	2.55	2.66	2.72	2.75	2.80	2.79	2.83	2.80	2.84	2.81	2.85	2.82	2.85	2.82	2.85	2.82	2.86	2.82	2.86	2.82	2.86	2.82	2.86
Movimiento (mm/m) :	0.12	0.13	0.16	0.17	0.17	0.18	0.18	0.20	0.19	0.20	0.20	0.21	0.21	0.22	0.21	0.22	0.22	0.23	0.22	0.23	0.24	0.25	0.25	0.25	0.25	0.26	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Mov.fluencia (mm/m) :	0.12		0.16		0.18		0.19		0.20		0.21		0.21		0.22		0.23		0.23		0.25		0.25		0.26		0.26		0.26		0.26		0.26		0.26		0.26		0.26		0.26	
Mov.fluencia (mm) :	**8.3**		**11.0**		**12.1**		**12.9**		**13.5**		**13.9**		**14.4**		**14.7**		**15.1**		**15.4**		**16.5**		**17.0**		**17.2**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**	

Mov.TOTAL (mm/m) :	-0.19		-0.11		-0.07		-0.03		0.00		0.02		0.04		0.06		0.07		0.09		0.13		0.16		0.18		0.19		0.20		0.20		0.21		0.21		0.21		0.21	
Mov.TOTAL (mm) :	**-12.9**		**-7.6**		**-4.4**		**-2.1**		**-0.3**		**1.3**		**2.6**		**3.8**		**4.8**		**5.7**		**9.0**		**10.8**		**11.8**		**12.5**		**13.2**		**13.6**		**13.8**		**13.9**		**14.0**		**14.0**		**14.1**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	ED2-1.8

HIPOTESIS DE CALCULO Nº 3. Abril - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.4	-17.4	0.2	11.7

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	275	640	1005	1370	1735	2100	2465	2830	3195	3560	5385	7210	9035	10860	14510	18160	21810	25460	29110	32760	36410

Coeficiente β_t :	0.11	0.15	0.21	0.28	0.30	0.38	0.36	0.45	0.42	0.51	0.48	0.56	0.52	0.61	0.56	0.64	0.60	0.68	0.63	0.70	0.75	0.81	0.82	0.87	0.87	0.90	0.91	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.05	0.06	0.08	0.09	0.11	0.11	0.14	0.13	0.15	0.14	0.17	0.16	0.18	0.17	0.19	0.18	0.20	0.19	0.21	0.22	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.04		0.08		0.11		0.13		0.15		0.16		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**2.9**		**5.3**		**7.2**		**8.7**		**9.9**		**10.9**		**11.8**		**12.6**		**13.2**		**13.8**		**15.9**		**17.2**		**18.0**		**18.6**		**19.3**		**19.6**		**19.8**		**19.9**		**20.0**		**20.0**		**20.1**	

Coeficiente φ_{o2} :	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25
Coeficiente $\beta_{t(t)}$:	0.46	0.50	0.58	0.62	0.64	0.69	0.69	0.73	0.72	0.76	0.76	0.79	0.79	0.82	0.81	0.84	0.84	0.86	0.86	0.88	0.94	0.95	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-i} :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00			
Coeficiente de fluencia :	1.46	1.56	1.77	1.89	1.93	2.06	2.05	2.17	2.14	2.26	2.22	2.33	2.29	2.40	2.36	2.46	2.42	2.51	2.47	2.56	2.67	2.73	2.75	2.80	2.79	2.83	2.80	2.84	2.81	2.85	2.82	2.85	2.82	2.85	2.82	2.86	2.82	2.86	2.82	2.86	2.82	2.86
Movimiento (mm/m) :	0.13	0.14	0.16	0.17	0.18	0.19	0.19	0.20	0.19	0.21	0.20	0.21	0.21	0.22	0.21	0.22	0.22	0.23	0.22	0.23	0.24	0.25	0.25	0.25	0.25	0.26	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Mov.fluencia (mm/m) :	0.14		0.17		0.18		0.19		0.20		0.21		0.22		0.22		0.23		0.23		0.25		0.25		0.26		0.26		0.26		0.26		0.26		0.26		0.26		0.26			
Mov.fluencia (mm) :	**9.4**		**11.4**		**12.4**		**13.1**		**13.6**		**14.1**		**14.5**		**14.8**		**15.2**		**15.5**		**16.5**		**17.0**		**17.2**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**	

Mov.TOTAL (mm/m) :	0.36		0.42		0.47		0.50		0.52		0.55		0.57		0.58		0.60		0.61		0.66		0.68		0.70		0.71		0.72		0.73		0.73		0.73		0.73		0.73			
Mov.TOTAL (mm) :	**23.9**		**28.4**		**31.2**		**33.4**		**35.2**		**36.6**		**37.9**		**39.1**		**40.1**		**40.9**		**44.1**		**45.9**		**46.9**		**47.5**		**48.3**		**48.6**		**48.8**		**48.9**		**49.0**		**49.0**		**49.1**	

HIPOTESIS DE CALCULO Nº 4. Abril - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.4	17.4	-0.2	-11.7

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	91	456	821	1186	1551	1916	2281	2646	3011	3376	5201	7026	8851	10676	14326	17976	21626	25276	28926	32576	36226

Coeficiente β_t :	0.04	0.06	0.17	0.22	0.26	0.33	0.33	0.42	0.40	0.48	0.45	0.54	0.50	0.59	0.54	0.63	0.58	0.66	0.61	0.69	0.74	0.80	0.82	0.86	0.87	0.90	0.91	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.01	0.02	0.05	0.07	0.08	0.10	0.10	0.12	0.12	0.14	0.14	0.16	0.15	0.18	0.16	0.19	0.17	0.20	0.18	0.21	0.22	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.02		0.06		0.09		0.12		0.14		0.16		0.17		0.18		0.19		0.20		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**1.2**		**4.2**		**6.3**		**8.0**		**9.3**		**10.4**		**11.4**		**12.2**		**12.9**		**13.5**		**15.8**		**17.1**		**18.0**		**18.6**		**19.3**		**19.6**		**19.8**		**19.9**		**20.0**		**20.0**		**20.1**	

Coeficiente φ_{o2} :	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25
Coeficiente $\beta_{t(t)}$:	0.33	0.35	0.53	0.57	0.61	0.66	0.67	0.71	0.71	0.75	0.74	0.78	0.77	0.81	0.80	0.83	0.82	0.85	0.85	0.87	0.93	0.94	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-i} :	0.67		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00			
Coeficiente de fluencia :	1.05	1.12	1.65	1.76	1.86	1.99	1.99	2.12	2.10	2.22	2.18	2.30	2.25	2.37	2.32	2.43	2.39	2.49	2.44	2.54	2.65	2.72	2.75	2.80	2.78	2.83	2.80	2.84	2.81	2.85	2.82	2.85	2.82	2.85	2.82	2.86	2.82	2.86	2.82	2.86	2.82	2.86
Movimiento (mm/m) :	0.10	0.10	0.15	0.16	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.20	0.22	0.21	0.22	0.22	0.23	0.22	0.23	0.24	0.25	0.25	0.25	0.25	0.26	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Mov.fluencia (mm/m) :	0.10		0.16		0.18		0.19		0.20		0.21		0.21		0.22		0.22		0.23		0.25		0.25		0.26		0.26		0.26		0.26		0.26		0.26		0.26		0.26			
Mov.fluencia (mm) :	**6.7**		**10.6**		**11.9**		**12.7**		**13.3**		**13.8**		**14.3**		**14.6**		**15.0**		**15.3**		**16.5**		**17.0**		**17.2**		**17.2**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**	

Mov.TOTAL (mm/m) :	-0.06		0.05		0.10		0.13		0.16		0.19		0.21		0.23		0.24		0.26		0.31		0.33		0.35		0.36		0.37		0.38		0.38		0.38		0.38		0.38			
Mov.TOTAL (mm) :	**-3.8**		**3.1**		**6.6**		**9.0**		**11.0**		**12.6**		**13.9**		**15.2**		**16.2**		**17.2**		**20.5**		**22.4**		**23.5**		**24.1**		**24.9**		**25.3**		**25.5**		**25.6**		**25.7**		**25.7**		**25.7**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	ED2-1.8

HIPOTESIS DE CALCULO Nº 5. Julio - Enero

Efectos térmicos

Δ T (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-34.9	-34.8	-34.8	0.3	23.3

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	184	549	914	1279	1644	2009	2374	2739	3104	3469	5294	7119	8944	10769	14419	18069	21719	25369	29019	32669	36319

Coeficiente βt :	0.08	0.11	0.19	0.25	0.28	0.35	0.35	0.43	0.41	0.50	0.46	0.55	0.51	0.60	0.55	0.63	0.59	0.67	0.62	0.70	0.74	0.80	0.82	0.86	0.87	0.90	0.91	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.02	0.03	0.06	0.08	0.08	0.11	0.10	0.13	0.12	0.15	0.14	0.17	0.15	0.18	0.17	0.19	0.18	0.20	0.19	0.21	0.22	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.03		0.07		0.10		0.12		0.14		0.16		0.17		0.18		0.19		0.20		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**2.1**		**4.8**		**6.8**		**8.3**		**9.6**		**10.7**		**11.6**		**12.4**		**13.1**		**13.7**		**15.8**		**17.2**		**18.0**		**18.6**		**19.3**		**19.6**		**19.8**		**19.9**		**20.0**		**20.0**		**20.1**	

Coeficiente φo2 :	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25
Coeficiente βt(t) :	0.41	0.45	0.56	0.60	0.63	0.67	0.68	0.72	0.72	0.76	0.75	0.79	0.78	0.81	0.81	0.84	0.83	0.86	0.85	0.88	0.94	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(i) :	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente βt-i :	0.80		0.94		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.30	1.40	1.71	1.83	1.90	2.02	2.02	2.15	2.12	2.24	2.20	2.32	2.27	2.38	2.34	2.44	2.40	2.50	2.46	2.55	2.66	2.72	2.75	2.80	2.79	2.83	2.80	2.84	2.81	2.85	2.82	2.85	2.82	2.85	2.82	2.86	2.82	2.86	2.82	2.86	2.82	2.86
Movimiento (mm/m) :	0.12	0.13	0.16	0.17	0.17	0.18	0.18	0.20	0.19	0.20	0.20	0.21	0.21	0.22	0.21	0.22	0.22	0.23	0.22	0.23	0.24	0.25	0.25	0.25	0.25	0.26	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Mov.fluencia (mm/m) :	0.12		0.16		0.18		0.19		0.20		0.21		0.21		0.22		0.23		0.23		0.25		0.25		0.26		0.26		0.26		0.26		0.26		0.26		0.26		0.26			
Mov.fluencia (mm) :	**8.4**		**11.0**		**12.2**		**12.9**		**13.5**		**13.9**		**14.4**		**14.7**		**15.1**		**15.4**		**16.5**		**17.0**		**17.2**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**	

Mov.TOTAL (mm/m) :	0.50		0.58		0.63		0.67		0.69		0.72		0.74		0.75		0.77		0.78		0.83		0.86		0.87		0.88		0.89		0.90		0.90		0.90		0.91		0.91		0.91	
Mov.TOTAL (mm) :	**33.8**		**39.2**		**42.3**		**44.6**		**46.4**		**48.0**		**49.3**		**50.5**		**51.5**		**52.4**		**55.7**		**57.5**		**58.5**		**59.2**		**59.9**		**60.3**		**60.5**		**60.6**		**60.7**		**60.7**		**60.7**	

HIPOTESIS DE CALCULO Nº 6. Julio - Julio

Efectos térmicos

Δ T (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
0.0	0.0	0.0	0.0	0.0

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (dias) :	0	365	730	1095	1460	1825	2190	2555	2920	3285	5110	6935	8760	10585	14235	17885	21535	25185	28835	32485	36135

Coeficiente βt :	—	—	0.14	0.19	0.24	0.31	0.31	0.40	0.38	0.47	0.44	0.53	0.49	0.57	0.53	0.62	0.57	0.65	0.60	0.68	0.73	0.79	0.81	0.86	0.87	0.90	0.90	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	—	—	0.04	0.06	0.07	0.09	0.09	0.12	0.11	0.14	0.13	0.16	0.15	0.17	0.16	0.18	0.17	0.20	0.18	0.20	0.22	0.24	0.24	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.00		0.05		0.09		0.11		0.13		0.15		0.17		0.18		0.19		0.20		0.23		0.25		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**0.0**		**3.6**		**5.8**		**7.6**		**9.0**		**10.2**		**11.1**		**12.0**		**12.7**		**13.4**		**15.7**		**17.1**		**17.9**		**18.5**		**19.3**		**19.6**		**19.8**		**19.9**		**20.0**		**20.0**		**20.1**	

Coeficiente φo2 :	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25
Coeficiente βt(t) :	0.00	0.00	0.50	0.54	0.60	0.64	0.65	0.70	0.70	0.74	0.73	0.77	0.76	0.80	0.79	0.82	0.82	0.85	0.84	0.87	0.93	0.94	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente βt(i) :	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente βt-i :	0.09		0.91		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	0.02	0.00	1.56	1.68	1.82	1.94	1.97	2.09	2.07	2.20	2.16	2.28	2.24	2.35	2.31	2.41	2.37	2.47	2.43	2.53	2.64	2.71	2.74	2.79	2.78	2.83	2.80	2.84	2.81	2.85	2.82	2.85	2.82	2.85	2.82	2.86	2.82	2.86	2.82	2.86	2.82	2.86
Movimiento (mm/m) :	0.00	0.00	0.14	0.15	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.20	0.21	0.21	0.22	0.22	0.22	0.22	0.23	0.24	0.25	0.25	0.25	0.25	0.26	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Mov.fluencia (mm/m) :	0.00		0.15		0.17		0.19		0.20		0.20		0.21		0.22		0.22		0.23		0.24		0.25		0.26		0.26		0.26		0.26		0.26		0.26		0.26		0.26			
Mov.fluencia (mm) :	**0.0**		**10.1**		**11.7**		**12.6**		**13.2**		**13.7**		**14.2**		**14.6**		**14.9**		**15.2**		**16.4**		**16.9**		**17.2**		**17.2**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**	

Mov.TOTAL (mm/m) :	0.00		0.20		0.26		0.30		0.33		0.36		0.38		0.40		0.41		0.43		0.48		0.51		0.52		0.53		0.55		0.55		0.55		0.56		0.56		0.56		0.56	
Mov.TOTAL (mm) :	**0.0**		**13.6**		**17.5**		**20.1**		**22.2**		**23.9**		**25.3**		**26.5**		**27.6**		**28.6**		**32.1**		**34.0**		**35.1**		**35.8**		**36.6**		**36.9**		**37.2**		**37.3**		**37.3**		**37.4**		**37.4**	

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	ED2-1.8

HIPOTESIS DE CALCULO Nº 7. Octubre - Enero

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
-17.5	-17.4	-17.4	0.2	11.7

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	92	457	822	1187	1552	1917	2282	2647	3012	3377	5202	7027	8852	10677	14327	17977	21627	25277	28927	32577	36227

Coeficiente β_t :	0.04	0.06	0.17	0.22	0.26	0.33	0.33	0.42	0.40	0.48	0.45	0.54	0.50	0.59	0.54	0.63	0.58	0.66	0.61	0.69	0.74	0.80	0.82	0.86	0.87	0.90	0.91	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.01	0.02	0.05	0.07	0.08	0.10	0.10	0.12	0.12	0.14	0.14	0.16	0.15	0.18	0.16	0.19	0.17	0.20	0.18	0.21	0.22	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.02		0.06		0.09		0.12		0.14		0.16		0.17		0.18		0.19		0.20		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**1.2**		**4.2**		**6.3**		**8.0**		**9.3**		**10.4**		**11.4**		**12.2**		**12.9**		**13.5**		**15.8**		**17.1**		**18.0**		**18.6**		**19.3**		**19.6**		**19.8**		**19.9**		**20.0**		**20.0**		**20.1**	

Coeficiente φ_{o2} :	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25
Coeficiente $\beta_{t(t)}$:	0.33	0.36	0.53	0.57	0.61	0.66	0.67	0.71	0.71	0.75	0.74	0.78	0.77	0.81	0.80	0.83	0.82	0.85	0.85	0.87	0.93	0.95	0.97	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-i} :	0.68		0.93		0.96		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.05	1.12	1.65	1.76	1.86	1.99	1.99	2.12	2.10	2.22	2.18	2.30	2.26	2.37	2.32	2.43	2.39	2.49	2.44	2.54	2.65	2.72	2.75	2.80	2.78	2.83	2.80	2.84	2.81	2.85	2.82	2.85	2.82	2.85	2.82	2.86	2.82	2.86	2.82	2.86	2.82	2.86
Movimiento (mm/m) :	0.10	0.10	0.15	0.16	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.20	0.22	0.21	0.22	0.22	0.23	0.22	0.23	0.24	0.25	0.25	0.25	0.25	0.26	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Mov.fluencia (mm/m) :	0.10		0.16		0.18		0.19		0.20		0.21		0.21		0.22		0.22		0.23		0.25		0.25		0.26		0.26		0.26		0.26		0.26		0.26		0.26		0.26			
Mov.fluencia (mm) :	**6.7**		**10.6**		**11.9**		**12.7**		**13.3**		**13.8**		**14.3**		**14.6**		**15.0**		**15.3**		**16.5**		**17.0**		**17.2**		**17.2**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**	

Mov.TOTAL (mm/m) :	0.29		0.40		0.45		0.48		0.51		0.54		0.56		0.57		0.59		0.60		0.65		0.68		0.70		0.71		0.72		0.73		0.73		0.73		0.73		0.73			
Mov.TOTAL (mm) :	**19.6**		**26.5**		**29.9**		**32.4**		**34.3**		**35.9**		**37.3**		**38.5**		**39.6**		**40.5**		**43.9**		**45.7**		**46.8**		**47.5**		**48.2**		**48.6**		**48.8**		**48.9**		**49.0**		**49.1**			

HIPOTESIS DE CALCULO Nº 8. Octubre - Julio

Efectos térmicos

ΔT (°C) :			Movimiento	
Z. maciza	Z. aligerada	Media	mm/m	mm
17.5	17.4	17.4	-0.2	-11.7

Retracción y fluencia (los valores no incluidos en la tabla se representan en el gráfico resumen)

	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Año 15	Año 20	Año 25	Año 30	Año 40	Año 50	Año 60	Año 70	Año 80	Año 90	Año 100
Tiempo (días) :	273	638	1003	1368	1733	2098	2463	2828	3193	3558	5383	7208	9033	10858	14508	18158	21808	25458	29108	32758	36408

Coeficiente β_t :	0.11	0.15	0.21	0.28	0.30	0.38	0.36	0.45	0.42	0.51	0.47	0.56	0.52	0.61	0.56	0.64	0.60	0.68	0.63	0.70	0.75	0.81	0.82	0.87	0.87	0.90	0.91	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
Mov. (mm/m) :	0.03	0.05	0.06	0.08	0.09	0.11	0.11	0.14	0.13	0.15	0.14	0.17	0.16	0.18	0.17	0.19	0.18	0.20	0.19	0.21	0.22	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Mov.retracción (mm/m) :	0.04		0.08		0.11		0.13		0.15		0.16		0.18		0.19		0.20		0.21		0.24		0.26		0.27		0.28		0.29		0.29		0.30		0.30		0.30		0.30			
Mov.retracción (mm) :	**2.9**		**5.3**		**7.2**		**8.7**		**9.9**		**10.9**		**11.8**		**12.5**		**13.2**		**13.8**		**15.9**		**17.2**		**18.0**		**18.6**		**19.3**		**19.6**		**19.8**		**19.9**		**20.0**		**20.0**		**20.1**	

Coeficiente φ_{o2} :	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25	1.22	1.25
Coeficiente $\beta_{t(t)}$:	0.46	0.50	0.58	0.62	0.64	0.68	0.69	0.73	0.72	0.76	0.76	0.79	0.79	0.82	0.81	0.84	0.84	0.86	0.86	0.88	0.94	0.95	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coeficiente $\beta_{t(i)}$:	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20	0.19	0.20
Coeficiente β_{t-i} :	0.87		0.95		0.97		0.98		0.98		0.99		0.99		0.99		0.99		0.99		0.99		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Coeficiente de fluencia :	1.45	1.56	1.77	1.89	1.93	2.06	2.05	2.17	2.14	2.26	2.22	2.33	2.29	2.40	2.36	2.46	2.42	2.51	2.47	2.56	2.67	2.73	2.75	2.80	2.79	2.83	2.80	2.84	2.81	2.85	2.82	2.85	2.82	2.85	2.82	2.86	2.82	2.86	2.82	2.86	2.82	2.86
Movimiento (mm/m) :	0.13	0.14	0.16	0.17	0.18	0.19	0.19	0.20	0.19	0.21	0.20	0.21	0.21	0.22	0.21	0.22	0.22	0.23	0.22	0.23	0.24	0.25	0.25	0.25	0.25	0.26	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Mov.fluencia (mm/m) :	0.14		0.17		0.18		0.19		0.20		0.21		0.22		0.22		0.23		0.23		0.25		0.25		0.26		0.26		0.26		0.26		0.26		0.26		0.26		0.26			
Mov.fluencia (mm) :	**9.3**		**11.4**		**12.4**		**13.1**		**13.6**		**14.1**		**14.5**		**14.8**		**15.2**		**15.5**		**16.5**		**17.0**		**17.2**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**		**17.3**	

Mov.TOTAL (mm/m) :	0.01		0.07		0.12		0.15		0.18		0.20		0.22		0.23		0.25		0.26		0.31		0.34		0.35		0.36		0.37		0.38		0.38		0.38		0.38		0.38			
Mov.TOTAL (mm) :	**0.5**		**5.0**		**7.9**		**10.0**		**11.8**		**13.3**		**14.6**		**15.7**		**16.7**		**17.6**		**20.8**		**22.5**		**23.5**		**24.2**		**24.9**		**25.3**		**25.5**		**25.6**		**25.7**		**25.7**			

CALCULO MOVIMIENTOS HORIZONTALES LONGITUDINALES DE LOS TABLEROS DE PUENTES

PROYECTO :	L.A.V. MADRID - ZARAGOZA. Subtramo XV.
OBRA :	ED2-1.8

RESUMEN TOTAL

