ANEJO Nº 6. ESTRUCTURAS

4. Cálculos

Estructura E-8 (PK 304+860)

ESTRUCTURA E-8 (PK 307+860)

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LINEA DE ALTA VELOCIDAD

MADRID-BARCELONA-FRONTERA FRANCESA

TRAMO: LLEIDA-MARTORELL, SUBTRAMO:III-A, PLATAFORMA

ESTRUCTURA E-8

P.K. 307+860

Madrid, Octubre1999

PUENTE P.K. 307+860

13+17+13

HA – 30 / P / 20 / II b -H

Acero B500 S

(H-300)

(AEH-500)

- CARACTERISTICAS MECANICAS DE LA SECCION
- CARGAS Y MODELO DE CALCULO DE TABLERO
- DATOS DE ENTRADA SAP 90
- SECCION TRANSVERSAL

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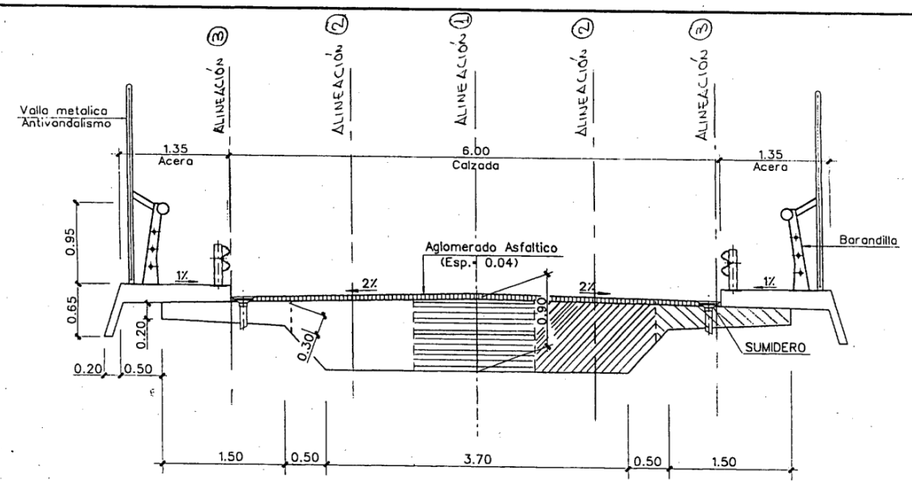
CARACTERISTICAS MECANICAS DE LA SECCION

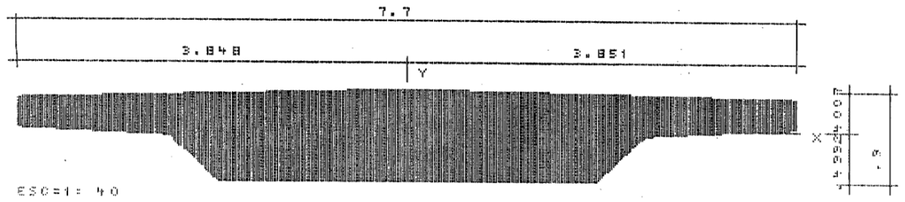


SECCION TRANSVERSAL TIPO

ESCALA 1:50

CARACTERISTICAS MECANICAS

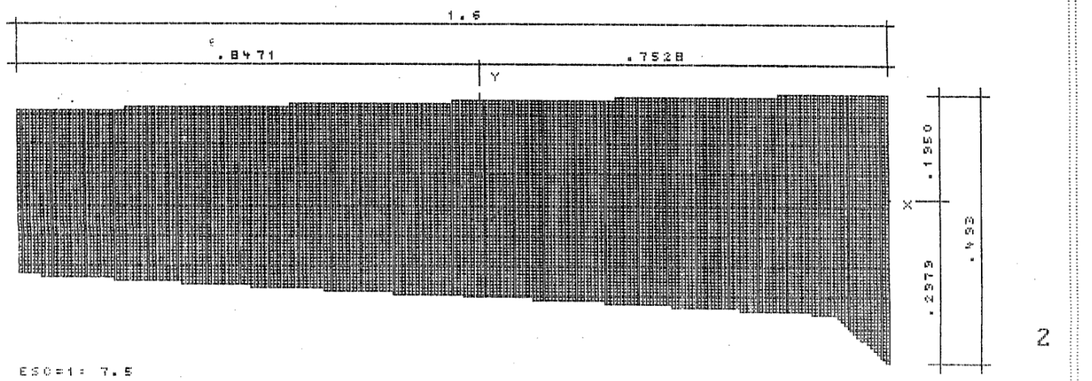
AREA=	4.9444(M2)
XC..=	3.849 (M)
YC..=	0.499 (M)
Ixx =	0.2885(M4)
Iyy =	16.4584(M4)
Izz =	16.7467(M4)
Wxs =	0.7198(M3)
Wxi =	0.5778(M3)



2

CARACTERISTICAS MECANICAS

AREA=	0.5707	(M2)
XC..=	0.847	(M)
YC..=	0.298	(M)
Ixx =	0.0063	(M4)
Iyy =	0.1225	(M4)
Izz =	0.1288	(M4)
Wxs =	0.0324	(M3)
Wxi =	0.0212	(M3)

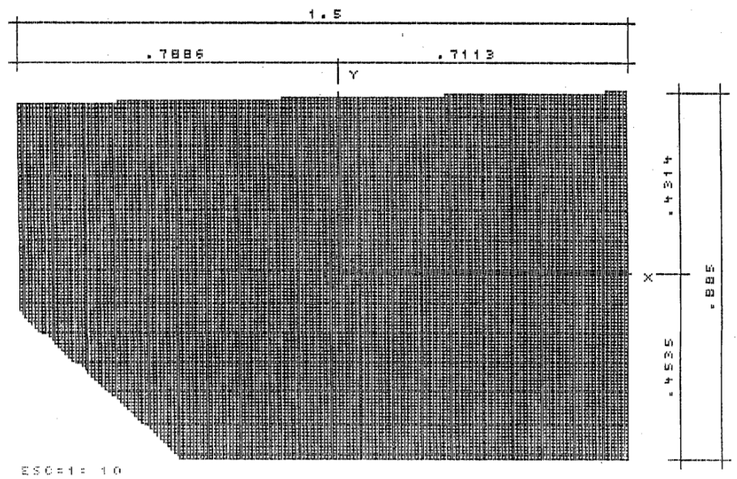


ESC=1: 7.5

2

CARACTERISTICAS MECANICAS

AREA=	1.2290	(M2)
XC..=	0.789	(M)
YC..=	0.454	(M)
Ixx =	0.0740	(M4)
Iyy =	0.2126	(M4)
Izz =	0.2866	(M4)
Wxs =	0.1715	(M3)
Wxi =	0.1632	(M3)

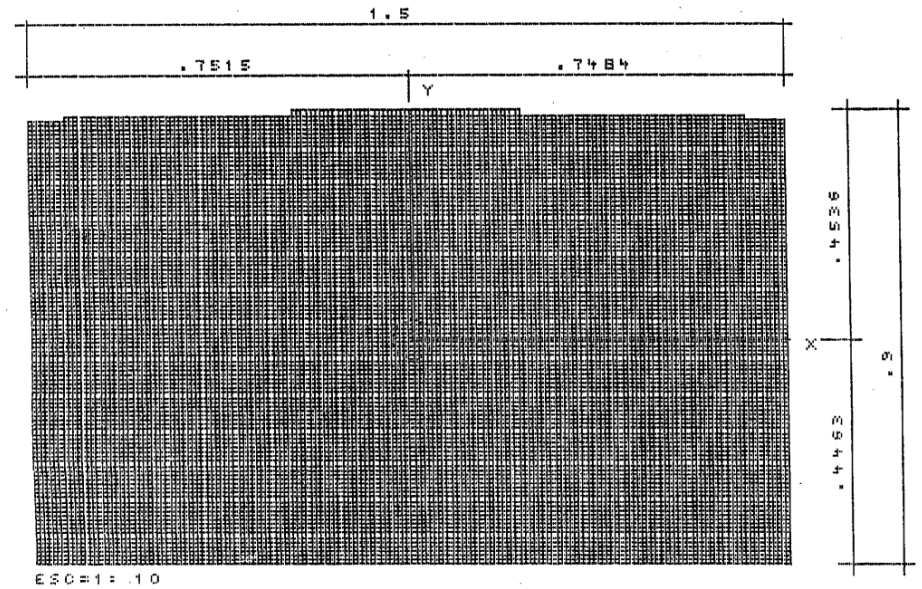


ESC=1: 10

2

CARACTERISTICAS MECANICAS

AREA= 1.3416(M2)
XC..= 0.752 (M)
YC..= 0.446 (M)
Ixx = 0.0891(M4)
Iyy = 0.2515(M4)
Izz = 0.3406(M4)
Wxs = 0.1965(M3)
Wxi = 0.1997(M3)



2

CARGAS Y MODELO DE CALCULO DE TABLERO

CARGAS

PESO PROPIO TABLERO	$4{,}21\ m^2 \times 2{,}50\ t/m^3$	$= 10{,}53\ t/m$
PESO AGLOMERADO	$0{,}04\ m \times 2{,}50\ t/m^3$	$= 0{,}100\ t/m^2$
ACERAS Y BARANDILLAS		$= 1{,}40\ t/m$

SOBRECARGAS

CARRO DE 60 t.

$400\ kg/m^2$

VIENTO

$$V_c = C_t \times C_r \times C_z \times C_g \times V_{ref}$$

$V_{ref} = 28\ m/s$

$C_t = 1{,}1$

$C_r = 1{,}04$

$K_z = 0{,}19 \quad z_0 = 0{,}05 \quad z_{min} = 4 \quad$ (TIPO II)

$z = 9\ m \Rightarrow C_z = K_z \times \ln(z/z_0) = 0{,}987$

$C_g = 1{,}49$

$V_c = 1{,}1 \times 1{,}04 \times 0{,}987 \times 1{,}49 \times 28 = 47\ m/s$

$F = C_D \times \left(\frac{1}{2} \times \rho \times V_c^2\right) \qquad \rho = 1{,}25$

$C_D = 2{,}5 - 0{,}3\ B/h \qquad B = 7{,}7\ m. \qquad h = 2{,}80\ m.$

$C_D = 1{,}675$

$F = 1{,}675 \times (0{,}5 \times 1{,}25 \times 47^2) = 236\ kp/m^2$

Altura expuesta $= 2{,}80\ m.$

$F = 661\ kp/m = 0{,}661\ t/ml$

FRENADO

$$\frac{1}{20} \times (7{,}7 \times 43 \times 0{,}4 + 60\ t) = 9{,}62\ t$$

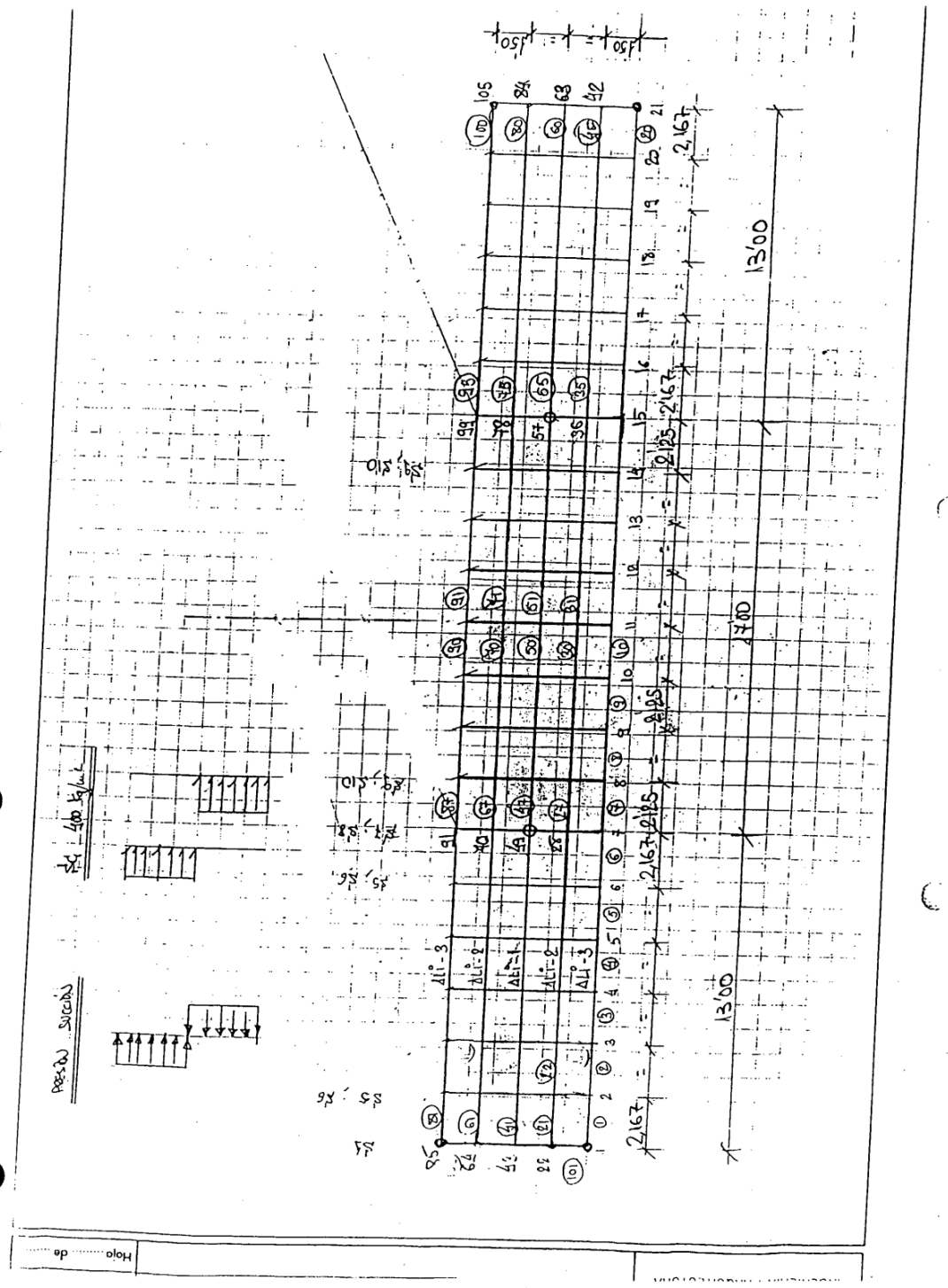
MÍNIMO $= 20 \times 7{,}7 = 15{,}4\ t \Rightarrow F_{FR} = 15{,}4\ t$

PASO DEL FERROCARRIL (Presión, Succión)

EUROCÓDIGO.

$V = 300\ km/h \qquad h_g = 7{,}00\ m$ (tipo) $\rightarrow 65\ kp/m^2$

Vía doble acciones sumables.



DATOS DE ENTRADA SAP 90

```
REPOSICION 307+860. 3 VANOS 13+17+13 PILA=307860
C PUENTE RECTO,canto max. 0.90 m.,ancho tablero 7.70 m.
C HIPOTESIS 7 CENTRO VANO INTERMEDIO: 400 kg/m2 + 60 tn

SYSTEM
L=7

JOINTS
1       X=0.000         Y=0.000         Z=12.000
7       X=13.00                                         G=1,7,1
15      X=30.00                                         G=7,15,1
21      X=43.00                                         G=15,21,1
64      X=0.000         Y=4.500                         G=1,64,1
85      X=0.000         Y=6.000                         F=1,20,4,1,21
C
C NUDOS ARRANQUE DE PILAS
1049    X=13.00         Y=3.000         Z=0.000
1057    X=30.00         Y=3.000         Z=0.000
C
C NUDOS ARRANQUE ESTRIBOS
1001    X=0.000         Y=0.000         Z=11.95
1085    X=0.000         Y=6.000         Z=11.95
1021    X=43.00         Y=0.000         Z=11.95
1109    X=43.00         Y=6.000         Z=11.95

RESTRAINTS
C ARRANQUE DE PILAS
1049    R=1,1,1,1,1,1
1057    R=1,1,1,1,1,1
C ESTRIBOS
1001    R=1,1,1,1,1,1
1021    R=1,1,1,1,1,1
1085    R=1.1,1,1,1,1
1105    R=1,1,1,1,1,1
C
C SPRINGS
C 22 42 20      K=100000,1E6,100000,0,0,0
C 64 84 20      K=100000,1E6,100000,0,0,0

FRAME
NM=12   NL=6    Z=-1,0,0,0,0,0,0    NSEC=3
C SECCION BARRAS LONGITUDINALES
1  A=1.3416  J=.3406  I=.0891,.2515  AS=1.0733,1.0733  E=3500000  W=3.354
2  A=1.2290  J=.2866  I=.0740,.2126  AS=0.9832,0.9832             W=3.0725
3  A=0.5707  J=.1288  I=.0063,.1225  AS=0.4566,0.4566             W=1.42675
C SECCION BARRAS TRANSVERSALES
4  SH=R     T=0.862,1.0835
5  SH=R     T=0.550,2.167
6  SH=R     T=0.878,2.167
7  SH=R     T=0.550,2.146
8  SH=R     T=0.878,2.146
9  SH=R     T=0.550,2.125
10 SH=R     T=0.878,2.125
C SECCION PILAS CIRCULARES
11 SH=P     T=1.00,0.5
C SECCION NEOPRENOS ESTRIBOS
12 SH=R     T=0.40,0.30     E=63000   G=9000
C
C CARGAS
C PESO DE AGLOMERADO  100 KG/M2
1       WG=0,0,-0.150
C PESO DE BARANDILLAS,ACERAS E IMPOSTAS
2       WG=0,0,-1.4
C ACCION TRANSVERSAL DE VIENTO
3       WG=0,0.661,0
C PRESION SUCCION PASO FERROCARRIL 130 KG/M2 (2 VIAS / M. GALIBO V=300KM/H)
C VANO CENTRAL
4       WG=0,0,0.26
5       WG=0,0,-0.28
C SOBRECARGA 400kg/m2 EN CADA BARRA LONGITUDINAL
6       WG=0,0,-0.60
C
C PESO PROPIO TABLERO,AGLOMERADO,IMPOSTA,VIENTO,SUCCION,FRENADO
C
C BARRAS LONGITUDINALES
1    2    M=3  LP=-2,0   NSL=0,1,2,3,0,0,0      G=5,1,1,1
7    8    M=3            NSL=0,1,2,3,0,0,6      G=7,1,1,1
15   16   M=3            NSL=0,1,2,3,0,0,0      G=5,1,1,1
21   22   M=2            NSL=0,1,0,0,0,0,0      G=5,1,1,1
27   28   M=2            NSL=0,1,0,0,0,0,6      G=7,1,1,1
35   36   M=2            NSL=0,1.0.0.0.0.0      G=5,1,1,1
47   49   50   M=1                NSL=0,1,0,0,0,0,6    G=7,1,1,1
56   57   58   M=1                NSL=0,1,0,0,0,0,0    G=5,1,1,1
61   64   65   M=2                NSL=0,1.0.0.0.0.0    G=5,1,1,1
67   70   71   M=2                NSL=0,1,0,0,0,0,6    G=7,1,1,1
75   78   79   M=2                NSL=0,1,0,0,0,0,0    G=5,1,1,1
81   85   86   M=3                NSL=0,1,2,0,0,0,0    G=5,1,1,1
87   91   92   M=3                NSL=0,1,2,0,0,0,6    G=7,1,1,1
95   99  100   M=3                NSL=0,1,2,0,0,0,0    G=5,1,1,1
C BARRAS TRANSVERSALES
101   1   22   M=4  LP=3,0
102   2   23   M=5                                     G=4,1,1,1
107   7   28   M=7                NSL=0,0,0,0,4,0,0
108   8   29   M=9                NSL=0,0,0,0,4,0,0    G=6,1,1,1
115  15   36   M=7                NSL=0,0,0,0,4,0,0
116  16   37   M=5                                     G=4,1,1,1
121  21   42   M=4
C
122  22   43   M=4  LP=3,0
123  23   44   M=6                                     G=4,1,1,1
128  28   49   M=8                NSL=0,0,0,0,4,0,0
129  29   50   M=10               NSL=0,0,0,0,4,0,0    G=6,1,1,1
136  56   57   M=8                NSL=0,0,0,0,4,0,0
137  37   58   M=6                                     G=4,1,1,1
142  42   63   M=4
C
143  43   64   M=4  LP=3,0
144  44   65   M=6                                     G=4,1,1,1
149  49   70   M=8                NSL=0,0,0,0,5,0,0
150  50   71   M=10               NSL=0,0,0,0,5,0,0    G=6,1,1,1
157  57   78   M=8                NSL=0,0,0,0,5,0,0
158  58   79   M=6                                     G=4,1,1,1
163  63   84   M=4
C
164  64   85   M=4  LP=3,0
165  65   86   M=5                                     G=4,1,1,1
170  70   91   M=7                NSL=0,0,0,0,5,0,0
171  71   92   M=9                NSL=0,0,0,0,5,0,0    G=6,1,1,1
178  78   99   M=7                NSL=0,0,0,0,5,0,0
179  79  100   M=5                                     G=4,1,1,1
184  84  105   M=4
C
C BARRAS DE PILARES
5049 1049  49   M=11
5057 1057  57   M=11
C BARRAS DE ESTRIBOS
5001 1001   1   M=12      LR=0,1,0,0,1,0
5021 1021  21   M=12      LR=0,1,0,0,1,0
5085 1085  85   M=12      LR=0,1,0,0,1,0
5105 1105 105   M=12      LR=0,1,0,0,1,0

LOADS
C FRENADO CON CARGA MAXIMA SOBRE TABLERO
53 L=6 F=15.4,0,0,0,0,0
C CARRO 60 TN (Para deformacion centro de vano intermedio)
31 L=7 F=0,0,-3.33,0,0,0
32 L=7 F=0,0,-3.33,0,0,0
33 L=7 F=0,0,-3.33,0,0,0
52 L=7 F=0,0,-13.34,0,0,0
53 L=7 F=0,0,-13.34,0,0,0
54 L=7 F=0,0,-13.34,0,0,0
73 L=7 F=0.0,-3.33,0,0,0
74 L=7 F=0,0,-3.33,0,0,0
75 L=7 F=0,0,-3.33,0,0,0

BRIDGE
NL=6    UP=Z
L=1
        S=1
                F=1,20,1    E=0
L=2
        S=1
                F=21,40,1   E=0
L=3
        S=1
                F=41,60,1   E=0
L=4
        S=1
                F=61,80,1   E=0
L=5
        S=1
                F=81,100,1  E=0
```

```
S=1
                F=61,80,1    E=0.9

VEHICLE
NV=3     NG=3     UNITS=KN,M          TRUCK=QUICK
C CARRIL 1,50 m. * 400 Kg/m2 = 600 Kg/m = 0.60 T/m
V=1      TYPE=LANE                   W=0.60
C CARRIL 1,60 m. * 400 Kg/m2 = 640 Kg/m = 0.64 T/m
V=2      TYPE=LANE                   W=0.64
C CARRO DE 60 T.
V=3      TYPE=TRUCK                  P=20,20,20    D=1.5,1.5
C
G=1      V=1
G=2      V=2
G=3      V=3

MOVING LOAD
NC=1     MK=2
C=1
K=FIX    L=1,2,3,4,5   DIR=B,B,B              G=2,1,1,1,2
K=MIX    L=3,4,6       DIR=B,B,B              G=3

ENVELOPE
C VIENTO ACCION DETERMINANTE
1        C=1,1,1,1,0,0,0      B=0
C PRESION-SUCCION ACCION DETERMINANTE
2        C=1,1,1,0.6,1,0.6,0      B=0.6
C FRENADO DETERMINANTE
3        C=1,1,1,0.6,0.6,1,0      B=0.6
C SC 400 Kp/m2 + CARRO 60 t. DETERMINANTE
4        C=1,1,1,0.6,0.6,0.6,0      B=1
C TOTAL PESO PROPIO + VANO CENTRAL CON CARRO Y SC DE 400 Kp/m2.
5        C=1,1,1,0,0,0,1      B=0
C TOTAL PESO PROPIO
6        C=1,1,1,0,0,0,0      B=0

SELECT
NT=1 ID=1,11,1    SW=1
NT=1 ID=22,32,1   SW=1
NT=1 ID=43,53,1   SW=1
NT=1 ID=64,74,1   SW=1
NT=1 ID=85,95,1   SW=1
NT=5 ID=5049      SW=1
NT=5 ID=1,10,1    SW=1
NT=5 ID=21,30,1   SW=1
NT=5 ID=41,50,1   SW=1
NT=5 ID=61,70,1   SW=1
NT=5 ID=81,90,1   SW=1
NT=5 ID=101,111,1 SW=1
NT=5 ID=122,132,1 SW=1
NT=5 ID=143,153,1 SW=1
NT=5 ID=164,174,1 SW=1
NT=2 ID=1001      SW=1
NT=2 ID=1049      SW=1
NT=2 ID=1085      SW=1
```

SECCION TRANSVERSAL

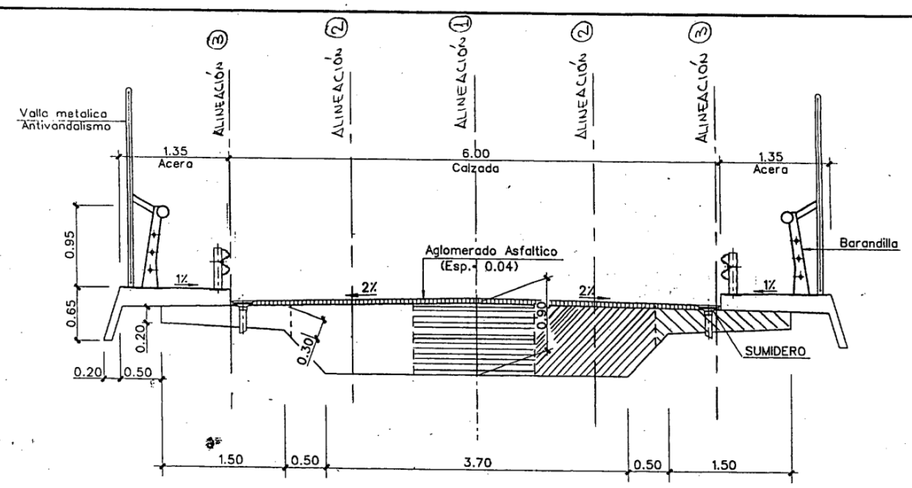
ARMADO LONGITUDINAL

CORTANTE

TORSION

CALCULO DE ESFUERZOS

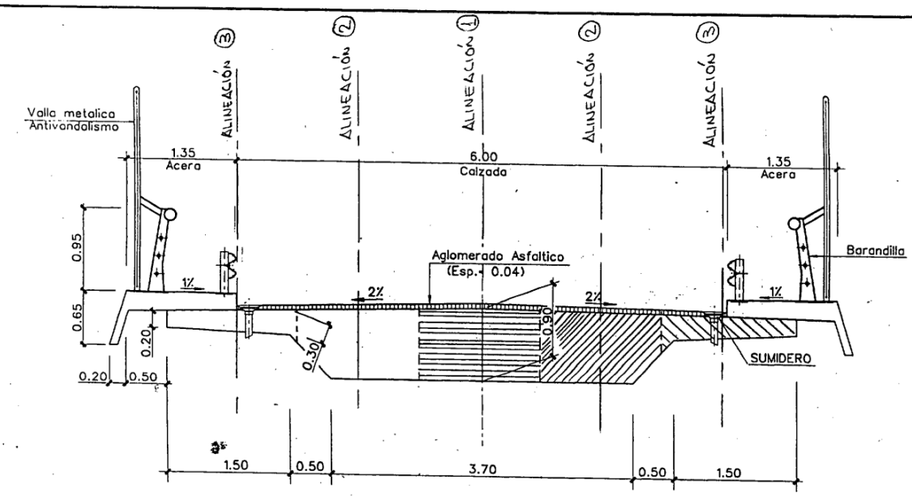
ARMADO TRANSVERSAL



SECCION TRANSVERSAL TIPO CENTRO VANO 13 m

ESCALA 1:50

BARRA	3	23	43	63	83	ESFUERZOS DE CÁLCULO.
M⁺(t×m)	2,63 + 1,73	46,75 + 37,35	57,96 + 47,76	46,75 + 45,19	2,63 + 1,73	451,00
Q (t)	3,00 + 19,73	14,89 + 12,00	18,6 + 30,7	14,9 + 28,42	3,00 + 19,73	260,00



SECCION TRANSVERSAL TIPO SECCIÓN APOYO.

ESCALA 1:50

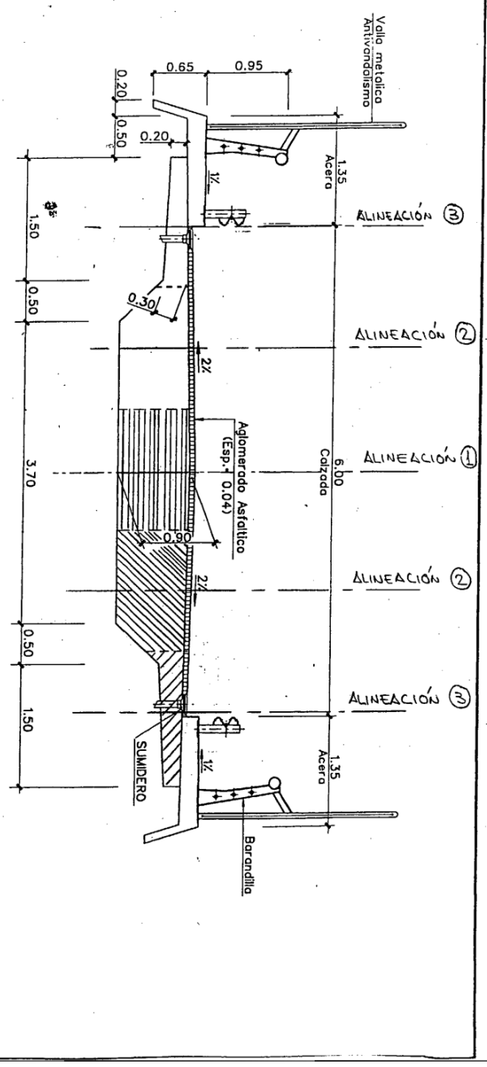
BARRA	7	27	47	67	87	ESFUERZOS DE CÁLCULO.
M⁻(t×m)	4,80 + 2,00	90,8 + 38,7	138,1 + 62,7	90,8 + 38,7	4,84 + 2,28	-725,00
Q (t)	3,66 + 19,73	28,3 + 16,00	56,5 + 40,92	28,3 + 38,54	3,66 + 19,82	392

SECCION TRANSVERSAL TIPO

ESCALA 1:50

CENTRO VANO DE 17 m.

BARRA	10	30	50	70	90	ESFUERZOS DE CÁLCULO.
M+(t×m)	3,00+2,50	57,4+55,00	70,11+67,07	57,4+55,00	3,00+2,50	578,00
Q(t)	3,00+19,23	7,6+8,54	9,00+28,12	7,6+28,44	3,00+19,35	211,00

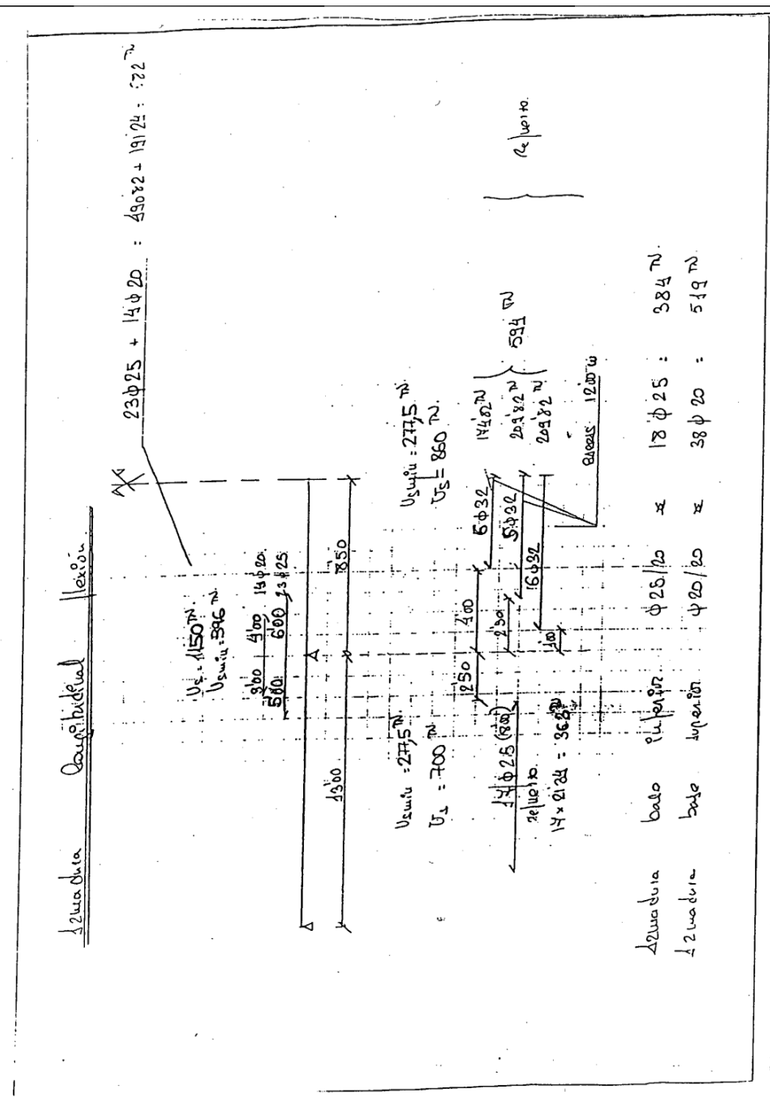



```
SELECTION  INDEXED FROM SURFACE1BDCS
>>SELECTION ER I: H,M,S,UV  3.01  0.25  7.70  3.70
RESISTENCIA caracteristica del hormigon:  300
RECUBRIMIENTO= 4  cms.
MOMENTO : MINIMIXMI =OCC MOCC =  2910.40
```

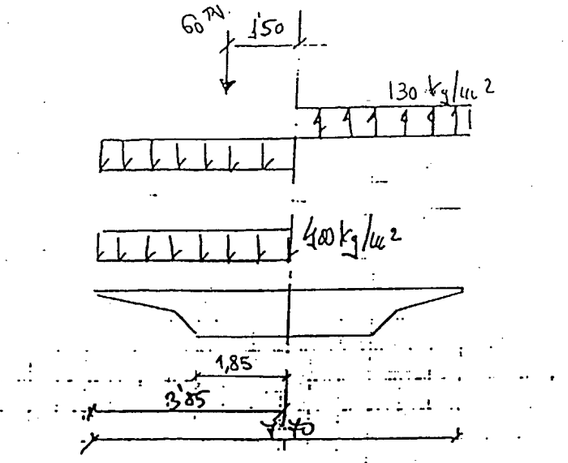
M	Q1	Q2					
0.00	2760.07	0.00	4197.92	0.00			
50.00	2760.07	0.00	4197.92	0.00			
100.00	2745.07	0.00	4197.92	0.00			
150.00	2760.07	0.00	4197.92	0.00			
200.00	2746.07	0.00	4197.92	0.00			
250.00	2730.08	0.00	4197.92	0.00			
300.00	2747.48	0.00	4197.92	0.00			
350.00	2685.28	0.00	4181.15	0.00			
400.00	2535.01	0.00	3790.80	0.00			
450.00	2402.42	0.00	6244.70	0.00			
500.00	2371.73	0.00	6299.93	0.00			
550.00	2341.57	0.00	1776.54	0.00			
600.00	2311.92	0.00	8543.62	0.00			
650.00	2082.82	0.00	9344.26	0.00			
700.00	1954.26	0.00	1015.57	0.00			
750.00	1026.27	0.00	1098.63	0.00			
800.00	1098.86	0.00	1183.58	0.00			
850.00	1172.04	0.00	1270.55	0.00			
900.00	1249.82	0.00	1359.69	0.00			
950.00	1320.23	0.00	1451.17	0.00			
1000.00	1395.28	0.00	1545.19	0.00			
1050.00	1470.97	0.00	1641.76	0.00			
1100.00	1547.34	0.00	1741.75	0.00			
1150.00	1624.49	0.00	1844.8	1.85			
1200.00	1702.17	0.00	1951.66	0.22			
1250.00	1780.64	0.00	2062.15	0.00			
1300.00	1859.92	0.00	2176.05	0.00			
1350.00	1939.92	0.00	2293.8	0.00			

ENDSZH CUMPRESSION= 7.7 ENDSZH CUMPRESSION= 3.7

1400.00	2020.75	0.00	2423.70	[illegible]
1450.00	2102.38	0.00	2492.19	[illegible]
1500.00	2184.85	0.00	2560.69	[illegible]
1550.00	2268.20	0.00	2629.18	[illegible]
1600.00	2352.44	0.00	2697.67	[illegible]
1650.00	2437.62	0.00	2766.17	[illegible]
1700.00	2523.75	0.00	2834.66	[illegible]
1750.00	2610.88	0.00	2903.15	[illegible]
1800.00	2699.04	0.00	2971.65	[illegible]
1850.00	2788.26	0.00	3040.14	[illegible]
1900.00	2878.59	0.00	3108.63	[illegible]
1950.00	2970.06	0.00	3177.13	[illegible]
2000.00	3062.73	0.00	3245.62	[illegible]



TORSIÓN MÁXIMA EN LA SECCIÓN

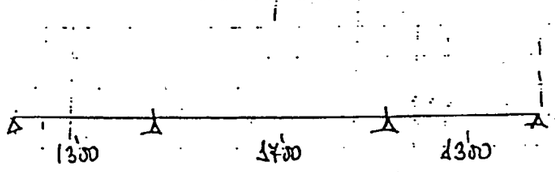


90 kN×m.

1'93 kN×m/m

2'96 kN×m/m

Para sección de apoyo.



$$T_d = 1'60 \times \frac{1}{2}\left(90 + 1'93 \times 20 + 2'96 \times 43\right) = 205 \text{ kN×m}$$

$$h_e = \frac{0,90}{6} = 0,15 \text{ m.}$$

$$T_{u1} = 1'2 \times 0'60 \cdot f_{cd} \cdot \Delta e \cdot h_e \cdot \frac{1}{2}$$

$$\Delta e = (0,90 - 0,15) \times (3,70 - 0,15) = 2,6625 \text{ m}^2$$

$$T_{u1} = 0'36 \times \frac{3000}{1'5} \times 2,6625 \times 0,15 = 287,6 \text{ kN×m.}$$

$$T_d \leq T_{u1} \quad \text{o.k} \checkmark$$

CORTANTE EN SECCIÓN DE APOYO INTERMEDIO

$$V_{rd} = 392 \text{ t}$$

$$V_{u2} = V_{cu} + V_{su}$$

$$V_{cu} = \left[0,10 \cdot \xi \left(100 \cdot \rho_1 \cdot f_{ck}\right)^{1/3} - 0,15\, \sigma'_{cd}\right] b_o\, d\, \beta$$

σ'_{cd} = tensión por axil. Despreciable en el cálculo

$$V_{cu} = 0,10 \times \xi \left(100 \times \frac{A_s}{b_o d} \times f_{ck}\right)^{1/3} \times b_o \times d$$

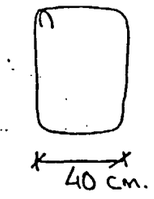
$$V_{cu} = 120,57 \text{ t}$$

$$V_{su} = V_{u2} - V_{cu} = 392 - 120,57 = 271,43 \text{ t}$$

Sección de armadura necesaria:

$$A_s = \frac{271,43 \times 1000}{4200 \times 0,9 \times 85} \times 100 = 84,50 \text{ cm}^2$$

Se disponen 16 estribos ϕ12



SECCIÓN APOYO PILA INTERMEDIA

ARMADURA TRANSVERSAL.

Barra (449)

$Md = 1,35 \times 80,85 + 1,50 \times 41,97 = 172,10$ mxt

$Qd = 1,35 \times 63,00 + 1,50 \times 33,4 = 135,15$ t

Sección tipo 8 ; $2,146 \times 0,878$

Flexión: $U_o = 0,85 \times \frac{3000}{1,5} \times 2,146 \times 0,828 = 3021$ t.

$$U_{s1} = 3021 \left(1 - \sqrt{1 - \frac{2 \times 172,10}{3021 \times 0,828}}\right)$$

$U_{s1} = 216$ t

Cortante: $V_{cu} = 0,10 \times \xi (100 \rho_1 f_{ck})^{1/3} \cdot b_o \cdot d$

$V_{cu} = 58,1$ t

$V_{su} = 135,15 - 58,1 = 77,1$ t

$$A_\alpha = \frac{77,1}{0,90 \times 0,828 \times f_{yk,d}} = 25,3 \text{ cm}^2/\text{ml}$$

$T_{u2} \geq Td \Rightarrow U_c = \frac{Td \cdot s}{2 \cdot A_e} = \frac{205 \times 0'20}{2 \times 2,6625} = 7,70$ TN

$T_{u3} \geq Td \Rightarrow U_t = \frac{Td \cdot u}{2 \cdot A_e} = \frac{205 \times u}{2 \times 2,6625} = 33,1$ TN

$u = (0,90 - 0,15) \times 2 + (3,70 - 0,15) \times 2 = 8,6$ m

Comprobación flexión combinada con cortante

$V_{u1} = 0'60 \cdot f_{cd} \cdot b_o \cdot d \cdot \frac{1}{2} = 1598$ TN

Cortante en apoyo estribo

Debido a peso propio = 6'35 (1) + 19'46 (2) + 14'45 (41) + 14'46 (51) + 6'35 (61) = 65'64 TN

Debido a SC 400 Kg/m² = 7'04 TN

Debido a acero 60 TN ± del lado de la seguridad 30 TN

≈ 103 TN

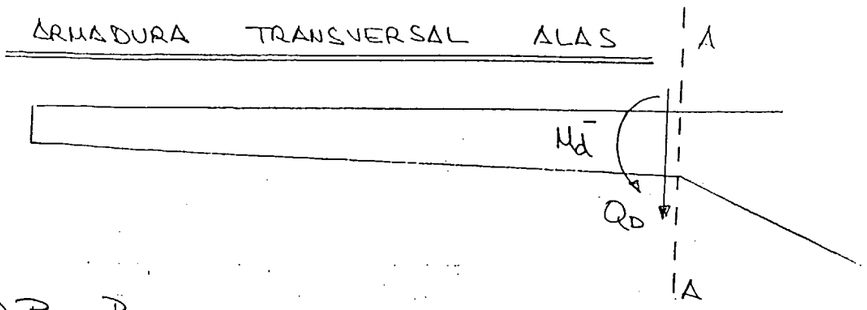
$V_{rd} = 1'5 \cdot 65'64 + 1'6 \times (7'04 + 30) =$

$= 158$ TN

$$\left(\frac{Td}{T_{u1}}\right)^\beta + \left(\frac{V_{rd}}{V_{u1}}\right)^\beta \leq 1 \qquad \beta = 2\left(1 - \frac{h_e}{b}\right) = 2\left(1 - \frac{0,15}{7,70}\right) = 1,96$$

$$\left(\frac{205}{287,6}\right)^{1,96} + \left(\frac{158}{1598}\right)^{1,96} = 0,53 < 1 \quad \text{o.k} \checkmark$$

ARMADURA TRANSVERSAL ALAS



1) Peso Propio:

$Q_A = 0,75 + 0,1875$ t/m $M_A = 0,5625 + 0,094$ txm/m

2) Superestructura (Resto C.P)

$Q_A = 1,40 + 0,07$ t/m $M_A = 2,1 + 0,0245$ mxt/m

3) S.C (Presión - Succión + 400 kp/m² + Carro)

$Q_A = 0,098$ t/m $+ 0,28 + 8,83$

$M_A = 0,073 + 0,098 + 1,765$

$Q_D = 1,35 \times (0,75 + 0,1875 + 1,40 + 0,07) + 1,5 \times (0,098 + 0,28 + 8,83)$

$Q_D = 17,06$ t.

$M_D = 1,35 \times (0,5625 + 0,094 + 2,1 + 0,0245) + 1,5 \times (0,073 + 0,098 + 1,765)$

$M_D = 6,66$ mxt

Flexión

$$U_o = 0,85 \times \frac{3000}{1,5} \times 2,00 \times 0.26 = 442\ t$$

$$U_{s1} = 442 \times \left(1 - \sqrt{1 - \frac{2 \times 6,66}{442 \times 0,26}}\right) = 26,40\ t$$

$\phi 16/20$

Cortante

$$V_{cu} = 0,10 \times \xi \times (100 \times \rho_1 \times f_{ck})^{1/3} \times b_o \times d$$

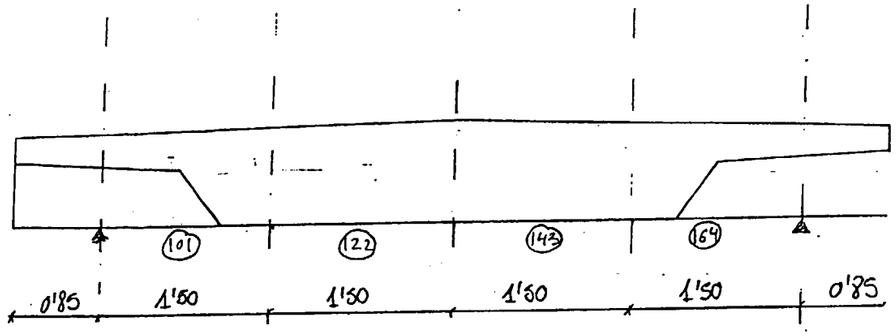
$\xi = 1,877$

$\rho_1 = 0,00386$

$\Rightarrow V_{cu} = 13,52 \Rightarrow V_{su} = 17,06 - 13,52$

$V_{su} = 3,54$ t

VIGA DE ESTRIBO



K = 29+50 ; M = 21+32

Q = 27+41 ; Q = 7+14

H_T = 4+8 ; M_T = 4+8

M_{max} = 1235 TN x M ; Q_D = 106 TN ; M_{TD} = 19 m x Td

Viga de 0'70 m ancho

Flexión

$M_d = 0'85 \times \frac{3000}{1'5} \times 0'90 \times 0{,}825 = 981$ TN

$\mu = \frac{123{,}5}{981 \times 0{,}825} = 0{,}153 \Rightarrow M_s = w \cdot U_0 = 163{,}3$ TN $\rightarrow$ 7 ϕ 32

Cortante

V_d = 106 TN

V_{cu} = 22'4 TN

V_{su} = 106 - 22'4 = 83,6 TN

$83{,}6 = 0{,}90 \times 0{,}825 \times A_\alpha \times 40000$

$A_\alpha = 28{,}2$ cm²/ml 2 ⊓ ϕ 16 cada 15 cm

Torsión

$b/6 = 0'116 = h_e$

$A_e = (0'70 - 0'116) \times (0{,}82 - 0'116) = 0{,}41$ m²

$T_{u1} = 0'85 \times \frac{3000}{1'5} \times 0'116 \times 0{,}41 = 34{,}24$ TNam > Td O.K.

$T_{u2} = \frac{2 \cdot A_e \cdot A_T}{s} \cdot f_{td} = 2 \times \frac{0{,}41 \times 1'57}{0'15} \times 4'20 = 36{,}05$ > Td O.K.

$T_{u3} = \frac{2 \times 0{,}41}{2{,}808} U_s \geq Td \Rightarrow U_s = 65{,}10$ TN

Comprobación torsión - cortante

$$\left(\frac{Td}{T_{u1}}\right)^\beta + \left(\frac{Vd}{V_{u1}}\right)^\beta < 1$$

$\beta = 2 \cdot \left(1 - \frac{h_e}{b}\right) = 2 \cdot \left(1 - \frac{0'116}{0'70}\right) = 1'67$

$V_{u1} = 0'6 \times \frac{3000}{1'5} \times 0'70 \times 0{,}82 \times \frac{1}{2} = 344{,}4$ TN

$\left(\frac{19}{34{,}24}\right)^{1'67} + \left(\frac{106}{344}\right)^{1'67} = 0{,}51 < 1$ O.K.

COMPROBACION ANCHURA DE FISURA

Comprobación anchura fisura

Sección central Vano 17'00 m.

Ambiente: Tipo IIb-H $w_k \leq 0'3$ mm.

Anchura característica de fisura es:

$$w_k = 1'7\, s_m \cdot \varepsilon_{sm}$$

$$s_m = 2c + 0'2\,s + 0'4 k_1 \cdot \frac{\phi}{\rho_{c\,eficaz}}$$

$\frac{s}{2} = 10$ cm $k_1 = \frac{\varepsilon_1 + \varepsilon_2}{2 \cdot \varepsilon_1}$ Barras $k_1 = 0'125$ (Flexión simple)

$\phi = 32$ mm $= 3'2$ cm

$A_{c\,eficaz} = 37'2$ (Ancho) $\times 45 \times 3'2 \cdot 10^{-2} = 0'89\ m^2 = 0'89 \cdot 10^4\ cm^2$

$A_s = 18\,\phi 25 + 18\,\phi 32 = 88'35 + 136'72 = 225'07\ cm^2$

$s_m = 15'33$ cm.

$$\varepsilon_{sm} = \frac{\sigma_s}{E_s}\left(1 - k_2\left(\frac{\sigma_{sr}}{\sigma_s}\right)^2\right] \quad \geq 0{,}4 \cdot \frac{\sigma_s}{E_s}$$

$$= 3{,}6495 \cdot 10^{-4}$$

$E_s = 2.100.000$ kg/cm²

$k_2 = 1{,}0$

$f_{ct,w} = 1{,}5$ $f_{ct,k} = 30{,}47$ kg/cm²

$k_c = 0{,}80$

$A_{s,nec} = \frac{860 \text{ W}}{\frac{5{,}10}{1{,}15}} = 193{,}9$ cm²

$A_{s,real} = A_s = 225{,}07$ cm²

$\sigma_s = \frac{0{,}80 \cdot 5.000}{1{,}15 \cdot 1{,}60} \times \frac{193{,}9}{225{,}07} = 1910{,}3$ kg/cm²

$\sigma_{sr} = \frac{bh^2}{6} \cdot \frac{f_{ct,w}}{0{,}9 \cdot d \cdot A_s} = 792$ kg/cm²

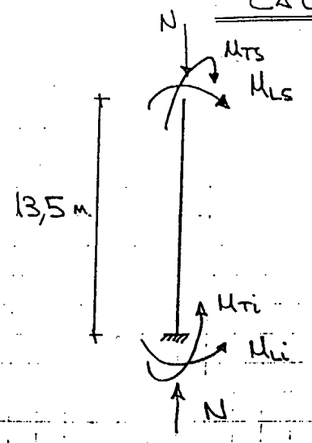
$\varepsilon_{sm} = 7{,}533 \times 10^{-4}$

$w_k = 1{,}70 \cdot s_m \cdot \varepsilon_{sm}$

$w_k = 1{,}70 \cdot 153{,}30 (mm) \cdot 7{,}533 \times 10^{-4}$

$w_k = 0{,}196$ mm $< 0{,}30$ mm ok.

CÁLCULO DE PILAS



$l_o = \alpha \times l = 1 \times 13,5 = 13,50$ m

Esbeltez mecánica:

$$\lambda = \frac{l_p}{i} \leq 60$$

$$i = \sqrt{\frac{I}{A}} = \sqrt{\frac{\pi D^4/64}{\pi D^2/4}} = \sqrt{\frac{D^2}{16}} = 0,25 \text{ m}$$

A) AXIL MÁXIMO

$N_{d\,máx} = 522,56$ t

$M_{dts} = 38,7$ mxt
$M_{dls} = 20,69$ mxt
$\Rightarrow M_{ds} = \sqrt{M_{dts}^2 + M_{dls}^2} = 43,88$ mxt
$e_2 = 0,084$

$M_{dti} = 12,87$ mxt
$M_{dli} = 31,08$ mxt
$\Rightarrow M_{di} = 33,64$ mxt
$e_1 = 0,0644$

$e_{TOT} = e_e + e_a$

$e_e = 0,6\, e_2 + 0,4\, e_1 = 0,07616$

$$e_a = (1 + 0,12\beta)(\varepsilon_y + \varepsilon)\, \frac{h + 20\, e_e}{h + 10\, e_e}\, \frac{l_o^2}{50\, i_c}$$

$\beta = 1,5$ (igualmente repartida)

$\varepsilon_y = \frac{f_{yd}}{E_s} = \frac{5100/1,15}{2,1 \times 10^6} = 2,11 \times 10^{-3}$

$\varepsilon = 0,0045$

$i_c = 0,25$ m.

$e_a = 0,133$ m $\Rightarrow e_{TOT} = 0,07616 + 0,133$

$e_{TOT} = 0,209$ m

Por tanto:

$N_d = 522,56 \times 0,209 = 109,22$ mxt

B) AXIL MÍNIMO

$N_{d\,mín} = 368,37$ t

$M_{ts} = 21,3$ mxt
$M_{ls} = 65,01$ mxt
$\Rightarrow M_s = 68,41$ mxt
$e_2 = 0,186$

$M_{ti} = 14,85$ mxt
$M_{li} = 10,60$ mxt
$\Rightarrow M_i = 18,25$ mxt
$e_1 = 0,050$

$e_e = 0,1316$
$e_a = 0,137$
$\Rightarrow e_{TOT} = 0,269$

$N_d = 0,269 \times 368,37 = 99,1$ mxt

C) MOMENTO MÁXIMO

$M_{ts} = 87,55$ mxt $M_{ls} = 0,00$ → superior $e_2 = 0,183$

$N_d = 298,92 \times 1,6 = 478,27$ t

$M_{ti} = 42,94$ mxt $M_{li} = 0,00$ $e_1 = 0,090$

$e_e = 0,146$
$e_a = 0,139$
$\Rightarrow e_{TOT} = 0,285$

$M_d = 478,27 \times 0,285 = 136,31$ txm

D) ARMADO

$$\upsilon = \frac{Nd}{Ac \cdot fcd} \qquad \mu = \frac{Nd \cdot e_0}{Ac \cdot h \cdot fcd} = \frac{Md}{Ac \cdot h \cdot fcd}$$

D.1) $Nd = 522,56$ $\quad Md = 109,22$

$Ac = \pi \times 1^2/4 = 0,785 \ m^2$ $\quad \upsilon = 0,37$

$fcd = 0,9 \times \frac{3000}{1,5} = 1800 \ t/m^2$ $\quad \mu = 0,086$

$h = 1,00 \ m$ $\quad \omega = 0,10$

D.2) $Nd = 368,37 \ t$ $\quad Md = 99,1 \ m \times t$

$\upsilon = 0,26$ $\quad \mu = 0,078$

$\omega = 0,10$

D.3) $Nd = 478,27$ $\quad Md = 136,31 \ m \times t$

$\upsilon = 0,338$ $\quad \mu = 0,107$

$\omega = 0,10$

$$\omega = \frac{A_{TOT} \times fyd}{Ac \times fcd} \Rightarrow A_{TOT} = \frac{0,1 \times Ac \times fcd}{fyd} = 31,86 \ cm^2$$

$14\phi 25$

COMPROBACIÓN A PUNZONAMIENTO

$u_1 = 4 \times 3,70 = 14,8 \ m.$ $\quad Nd = 523 \ t$

1) ARMADURA NECESARIA

$V_{cu} = 482,28 \ t$

$V_{su} = 523 - 482,28 = 40,72 \ t$

$$A_{sx} = \frac{40,72}{0,9 \times 0,85 \times 41000} = 13,00 \ cm^2/ml$$

- Dirección longitudinal

A_{nec} (cortante) $= 84,50 \ cm^2/ml$

$A_{REAL} = 17 \times 2 \times 1,13 \times 5 = 192,1 \ cm^2/ml$

$A_{REAL} - A_{nec} = 107,6 \ cm^2/ml$

- Dirección transversal

A_{nec} (cortante) $= 25,3 \ cm^2/ml$

$A_{REAL} = 113 \ cm^2/ml$

$A_{REAL} - A_{nec} = 87,7 \ cm^2/ml$

2) COMPROBACIÓN FUERA DEL PERÍMETRO ARMADO A PUNZONAMIENTO.

$$F_{sd,ef} \leq 0,12 \cdot \xi \cdot (100 \cdot \rho_l \cdot f_{ck})^{1/3} \cdot u_{1,ef} \cdot d$$

$u_{1,ef} = 2 \times (6,1 + 3,7) = 19,6 \ m.$

$\rho_l = 0,0054$

$$1{,}15 \times 523 \times 10^4 \leq 0{,}12 \times \left(1 + \sqrt{\frac{200}{850}}\right) \times \left(100 \times 0{,}0054 \times 30\right)^{1/3} \times 19600 \times 850$$

$$6.014.500 \leq 7.512.340 \quad \smile \quad \text{O.K}$$

3) RESISTENCIA MÁXIMA.

$$\frac{F_{sd,ef}}{u_0 \times d} = \frac{1{,}15 \times 523}{\pi \times 1 \times 0{,}85} = 225 \ t/m^2$$

$$f_{lcd} = 0{,}30 \times \frac{3000}{1{,}5} = 600 \ t/m^2$$

} O.K.

CÁLCULO ZAPATA

Tensión admisible = 5 kp/cm²

a) Axil Máximo

N = 326,6 t M_x = 8,04 mxt M_y = 19,425 mxt

b) Momento Máximo

N = 299 t M_x = 0,00 mxt M_y = 26,84 mxt

Zapata cuadrada de 3,00 x 3,00 m x 1,00 m de canto.

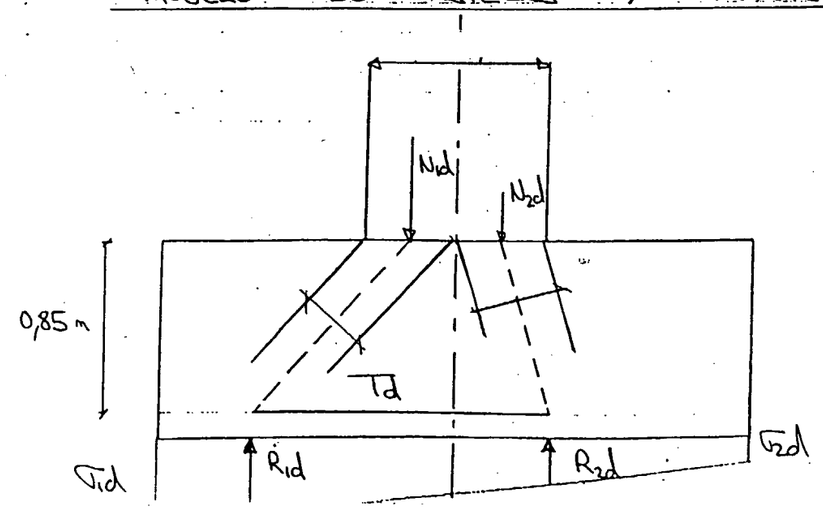
1) TENSIONES EN EL TERRENO.

$\sigma_{máx}$ = 4,64 kp/cm² < 1,25 x σ_{adm}

$\sigma_{mín}$ = 3,32 kp/cm²

σ_{med} = 3,98 kp/cm² < σ_{adm}

MODELO DE BIELAS Y TIRANTES



$$T_d = \frac{R_{1d}}{0{,}85d}\,(x_1 - 0{,}25a)$$

$$\sigma_{1d} = \frac{584{,}85}{9} + \frac{42{,}95 \times 1{,}5}{1/12 \times 3^4} = 74{,}53\ t/m^2$$

$$\sigma_{2d} = \frac{584{,}85}{9} - \frac{42{,}95 \times 1{,}5}{1/12\ 3^4} = 55{,}44\ t/m^2$$

$x_1 = 0{,}767$ m. $\quad a = 1{,}00$ m. $\quad x_2 = 0{,}730$

$R_{1d} = 378$ t

$T_d = 242$ t $\Rightarrow$ ~~ϕ 25 / 175~~

COMPROBACIÓN DE LAS BIELAS:

$A_c = 0{,}40 \times 1{,}00 = 0{,}40\ m^2$

$f_{1cd} = 0{,}85 \times f_{cd} = 0{,}85 \times \frac{2500}{1{,}5} = 1416\ t/m^2$

$R_B = A_c \times f_{1cd} = 566$ t

$C_B = 509$ t

$C_B < R_B$ O.K.

COMPROBACIÓN DE NUDO

NUDO CON TIRANTE ANCLADO

$$\sigma_{c1} = \frac{378}{3 \times 0{,}3} = 420\ t/m^2$$

$f_{2cd} = 0{,}70 \times f_{cd} = 1167\ t/m^2$

$\sigma_{c1} < f_{2cd}$ O.K.

REACCIONES PARA CALCULO DE ESTRIBOS

REACCIONES EN LOS ESTRIBOS

REACCIONES VERTICALES

Peso Propio tablero	49 t
Peso Superestructura (Resto C.P.)	16,68 t
Reacción Hip. de Pretensado	——
Reacción Máxima SC.	62,06 t
Reacción Mínima SC.	−7,91 t
Gradiente térmico.	——
Otras	——

REACCIONES HORIZONTALES LONGITUDINALES

Reacción debida al frenado	7,55 t
Deformaciones impuestas	——
Rozamiento, sismo, otras	——

REACCIONES HORIZONTALES TRANSVERSALES

Reacción viento transversal	13,634 t
Fuerza centrífuga	——
Rozamiento, sismo, otras	——

CALCULO DE ESTRIBOS

P R O G R A M A E S T R I B O S

CALCULO Y ARMADO DE ESTRIBOS DE PUENTE

VERSION Nº 1 FECHA : 12/10/1995

Copyright : J.Diaz del Valle, 1995

E.T.S. de I.C.C. y P. de Santander

DATOS DEL PROYECTO DEL ESTRIBO

PROYECTO : AVE LLEIDA-MARTORELL

REFERENCIA : P.K.307+860. ESTRIBO 1.

FECHA DEL CALCULO : 20-9-99

D A T O S D E L E S T R I B O

ESTRIBO 1.

-Datos geometricos:

H1= 4.95	H2= 0.00	H3= 0.00	H4= 1.00	H5= 0.00 m.
H6= 0.00	H7= 1.00	H8= 0.00	H9= 2.00	H10= 0.00 m.
B1= 1.05	B2= 0.00	B3= 3.25	B4= 0.00	B5= 0.00 m.
B6= 0.50	B7= 0.00	B8= 0.00	B9= 0.00	B9= 0.00 m.
C1= 0.35	C2= 0.45	C3= 0.00	C4= 0.25	C5= 0.25 m.
D1= 0.00	D2= 0.00	D3= 0.95	D4= 0.95	D5= 0.25 m.
D6= 0.25				
A1= 3.05	A2= 0.20	A3= 2.95	A4= 0.60	A5= 1.97 m.
E1= 7.90	E2= 7.70	E3= 0.30	E4= 0.00	E5= 0.30 m.
E6= 0.30	E7= 0.00	E8= 0.00	E9= 0.95	E10= 6.00 m.

-Caracteristicas de los materiales:

Peso especifico del hormigón (t/m3) ..... ¥h = 2.50
Resistencia del hormigon del alzado (Kp/cm²) ..... fck = 250
Resistencia del hormigón de la zapata (Kp/cm²) ..... fck'= 250
Limite elástico del acero (Kp/cm²) ..... fyk = 5100
Recubrimiento de las armaduras (m) ..... c = 0.05
Se incluyen las cuantias geométricas minimas
Coeficiente de minoración resistencia hormigón ..... ¥c = 1.50
Coeficiente de minoración resistencia acero ..... ¥s = 1.15
Coeficiente de mayoración de las acciones ..... ¥f = 1.60

-Caracteristicas del terreno:

Terreno sobre talón:
Peso especifico de las tierras (t/m3) ..... ¥t = 1.80
Angulo de rozamiento interno de las tierras (°) ..... ϕ = 30.00
Angulo de rozamiento entre las tierras y el muro (°) .... δ = 0.00
Coeficiente de empuje activo calculado segun Coulomb ... Kax = 0.333
Cohesión de las tierras (t/m²) ..... c = 0.00
Terreno sobre puntera :
Peso especifico de las tierras (t/m3) ..... ¥t = 1.80
Angulo de rozamiento interno de las tierras (°) ..... ϕ = 30.00
Angulo de rozamiento entre las tierras y el muro (°) .... δ = 0.00
Coeficiente de empuje pasivo de las tierras ..... Kpx = 3.000

Terreno de cimentación :
Coeficiente de rozamiento entre el cimiento y el suelo .. μ = 0.577
Adherencia entre el cimiento y el suelo (t/m²) ..... a = 0.00

Angulo de la superficie del terreno con la horizontal ... β = 0.00°

-Sobrecargas:

Carga por unidad de longitud de talud (t/m²) ..... q = 1.00
No se considera la acción sísmica .....

-Acciones del tablero sobre el estribo :

Reacciones verticales (t) y excentricidades transversales (m) :

Reacción del peso propio del tablero ... Rpp = 49.00 , Exc.= 0.00
Reacción del peso de la superestructura. Rse = 16.88 , Exc.= 0.00
Reacción hiperestática de pretensado ... Rhp = 0.00 , Exc.= 0.00
Reacción máxima de la sobrecarga ..... Rma = 62.06 , Exc.= 0.00
Reacción mínima de la sobrecarga ..... Rmi = -7.91 , Exc.= 0.00
Reacción debida al gradiente térmico ... Rgt = 0.00 , Exc.= 0.00
Reacción debidas a otras acciones ..... Rot = 0.00 , Exc.= 0.00

Reacciones horizontales longitudinales (t) :

Reacción debida al frenado (+ -) ..... Rfx = 7.55
Reacción debida a las deformaciones impuestas ..... Rdx = 0.00
Reacciones debidas a otras causas (Rozam.,sismo,etc) . Rox = 0.00

Reacciones horizontales transversales (t) :

Reaccion debida al viento ..... Rvy = 13.63
Reacción debida a la fuerza centrifuga ..... Rcy = 0.00
Reacciones debidas a otras causas (Rozam.,sismo,etc) . Roy = 0.00

ACCIONES SOBRE EL ESTRIBO

Las acciones actuantes sobre el estribo tienen el siguiente origen:

a) Peso propio del estribo.
b) Acciones del tablero.
c) Empuje y peso de las tierras.

Estas acciones pueden ser verticales Fz ,horizontales longitudinales Fx ,y horizontales transversales Fy. En las tablas que siguen, se recogen las citadas acciones junto con los momentos Ma ,Mx, y My :

Ma : Momento respecto a la puntera del estribo.Se utiliza para la comprobación de seguridad al vuelco.

Mx, My: Momentos respecto al c.d.g de la zapata. Se utilizan para el cálculo de las tensiones sobre el terreno.

a) PESO PROPIO DEL ESTRIBO

Zona	Volumen (m3)	Peso Fz (t)	Ma (txm)	My (txm)
Muro frontal	37.57	93.92	-97.33	128.08
Muro de guarda	1.69	4.22	-6.01	4.11
Muros en vuelta	14.51	36.28	-92.53	-5.44
Aletas en voladizo	2.81	7.01	-40.46	-23.63
Contrafuertes aleta	0.00	0.00	0.00	0.00
Impostas	0.00	0.00	0.00	0.00
Macizos caquejeado	0.00	0.00	0.00	0.00
Zapata	37.92	94.80	-227.52	0.00
TOTAL	94.49	236.23	-463.85	103.12

b) ACCIONES DEL TABLERO

b1) Reacciones verticales:

Se consideran las reacciones del tablero en los siguientes casos:

-Caso permanente: incluye las reacciones del peso propio del ta - blero y de la superestructura, las reacciones hiperestáticas de pretensado y otras acciones permanentes.

-Caso maximo: incluye la suma de las reacciones de las acciones permanentes y las reacciones maximas de las sobrecargas variables.

-Caso minimo: incluye la suma de las reacciones de las acciones permanentes y las reacciones minimas de las sobrecargas variables.

Reaccion	Axil Fz (t)	Ma (txm)	My (txm)
Permanente	65.68	-55.83	101.80
Maxima	127.74	-108.58	198.00
Minima	57.77	-49.10	89.54

b2) Reacciones horizontales longitudinales:

Las reacciones horizontales que ejerce el tablero provienen de movimientos impuestos, frenado,sismo , rozamiento de apoyos y de otras acciones.

El valor maximo considerado para estas acciones es:

Reaccion Longitudinal	Fx (t)	Ma (txm)	My (txm)
Maxima	7.55	44.92	44.92

b3) Reacciones horizontales transversales:

Estas reacciones provienen de dos tipos de fuerzas:

-Fuerzas transversales:

Son debidas a las acciones de viento y sismo, y a la fuerza centrifuga de los vehiculos que circulan por el tablero :

Fy = 13.63 t. ; Mx = 81.12 txm.

-Fuerzas verticales:

Debido a la excentricidad transversal de las reacciones verticales, se produce un momento transversal Mx :

. Para reaccion vertical permanente .. Mx = 0.00 txm.
. Para reaccion vertical maxima ..... Mx = 0.00 txm.
. Para reaccion vertical minima ..... Mx = 0.00 txm.

c) EMPUJE Y PESO DE TIERRAS

c1) Acciones horizontales:

Accion	Fuerza Fx (t)	Ma (txm)	My (txm)
Empuje de tierras.	44.59	159.03	159.03
Empuje de sobrecarga.	12.83	56.47	56.47
Empuje del agua.	0.00	0.00	0.00
Empuje total sobre trasdos.	57.42	215.50	215.50
Empuje pasivo frente puntera.	83.16	55.44	55.44

c2) Acciones verticales:

Accion	Fuerza Fz (t)	Ma (txm)	My (txm)
Peso tierras sobre talon.	244.26	-781.82	-195.80
Peso tierras sobre puntera.	6.39	-1.60	13.74
Sobrecarga sobre terrapien.	23.07	-73.26	-17.88
Rozamiento vertical tierras.	0.00	0.00	0.00
Resultante total vertical.	273.72	-856.68	-199.74

COMPROBACION DE ESTABILIDAD

Se consideran las siguientes hipótesis para las comprobaciones al vuelco y deslizamiento :

Hipótesis 1 : Construcción. Situación de estribo con relleno antes de construir el tablero.

Hipótesis 2 : Construcción. Situación de tablero construido antes del relleno del estribo.

Hipótesis 3 : Servicio. Se considera la hipótesis más desfavorable que corresponde al mínimo valor de la reacción vertical del tablero.

Hipótesis Nº	Coeficientes de seguridad Vuelco	Deslizamiento
1	8.250	11.432
2	11.568	11.178
3	6.682	14.411

El coeficiente de seguridad al vuelco se obtiene a partir de los momentos Ma respecto de la puntera de la zapata.Se distinguen momentos volcadores y estabilizadores.El coeficiente de seguridad se obtiene como cociente entre estos momentos.

El mínimo coeficiente de seguridad al vuelco es mayor que 2, y por tanto se cumple la seguridad al vuelco.

El coeficiente de seguridad al deslizamiento se obtiene como cociente entre la fuerza estabilizadora y la desestabilizadora. La primera es la fuerza de rozamiento obtenida como producto de las fuerzas verticales por un coeficiente de rozamiento igual a

$$\mu = \operatorname{tg} \phi = 0.577$$

en donde ϕ es el ángulo de rozamiento entre la zapata y terreno. Tambien se consideran como fuerzas estabilizadoras,la fuerza de adherencia suelo-zapata, el empuje pasivo frente a puntera, la existencia de tacón y la inclinación de la base de la zapata.

La fuerza desestabilizadora es la resultante de las fuerzas horizontales tanto longitudinales como transversales.

El mínimo coeficiente de seguridad al deslizamiento es mayor que 1.5 ,cumpliendose por tanto la seguridad al deslizamiento.

ESTADO TENSIONAL EN EL TERRENO

Se consideran las siguientes hipótesis para el cálculo de las tensiones en el terreno :

Hipótesis 1 : Construcción. Se supone que el relleno se ejecuta antes que el tablero.

Hipótesis 2 : Construcción. Se supone que el tablero se ejecuta antes que el relleno.

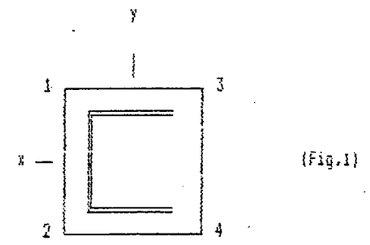
Hipótesis 3 : Servicio, con reacción de tablero mínima y acciones horizontales máximas.

Hipótesis 4 : Servicio, con reacción de tablero mínima y acciones longitudinales nulas.

Hipótesis 5 : Servicio, con reacción de tablero máxima y acciones longitudinales nulas.

Hipótesis 6 : Servicio, con reacción de tablero máxima y acciones horizontales máximas.

Las tensiones $\sigma 1, \sigma 2, \sigma 3, \sigma 4$ del terreno en las 4 esquinas de la base de la zapata (figura 1),



(Fig.1)

se obtienen a partir de la formula de flexocompresión:

$$\sigma = \frac{N}{A} \pm \frac{Mx}{Wx} \pm \frac{My}{Wy}$$

donde N , Mx , My , son los esfuerzos en la base de la zapata , y

A = 37.92 m2 , Wx= 49.93 m3 , Wy = 30.34 m3

La expresión anterior solamente es válida en el caso de que toda la planta resulte comprimida. En otro caso, y dado que el terreno no puede soportar tracción alguna, el programa calcula las tensiones del terreno de manera iterativa.

El proceso iterativo anterior, se detiene cuando la resultante de las tensiones obtenidas, sea sensiblemente igual a los esfuerzos que solicitan a la base de la zapata.

La tensión media, se obtiene según la expresión : $\sigma med = \frac{N}{A}$

Siguiendo esta formulación,resulta la siguiente tabla que resume el estado tensional correspondiente a las 6 hipotesis anteriores :

ESFUERZOS DE ZAPATA Y TENSIONES DEL TERRENO

Hip	N (t)	Mx (txm)	My (txm)	σ1 (t/m²)	σ2 (t/m²)	σ3 (t/m²)	σ4 (t/m²)	σmed (t/m²)
1	551.96	0.00	174.31	20.30	20.30	8.81	8.81	14.56
2	343.91	81.12	249.84	18.93	15.68	2.46	0.00	9.07
3	609.73	81.12	308.78	27.88	24.63	7.53	4.28	16.08
4	609.73	81.12	7.08	17.47	14.22	17.94	14.69	16.08
5	679.70	81.12	101.37	22.89	19.64	16.21	12.96	17.92
6	679.70	81.12	417.23	33.30	30.05	5.80	2.55	17.92

ANALISIS ESTRUCTURAL DEL ESTRIBO COMO EMPARRILLADO ESPACIAL

DIMENSIONES Y CARACTERISTICAS MECANICAS DE LAS BARRAS

Barra Nº	i Nº	j Nº	Long. (m.)	Canto (m.)	Ancho (m.)	Area (m²)	Iner.1 (m4)	Iner.2 (m4)
1	1	2	0.84	1.05	0.46	0.486	0.009	0.045
2	2	3	0.84	1.05	0.46	0.486	0.009	0.045
3	3	4	0.84	1.05	0.46	0.486	0.009	0.045
4	4	5	0.84	1.05	0.46	0.486	0.009	0.045
5	5	6	0.84	1.05	0.46	0.486	0.009	0.045
6	6	7	0.84	1.24	0.46	0.572	0.010	0.073
7	7	8	0.84	0.25	0.46	0.116	0.002	0.001
8	9	10	0.84	1.05	0.92	0.971	0.069	0.089
9	10	11	0.84	1.05	0.92	0.971	0.069	0.089
10	11	12	0.84	1.05	0.92	0.971	0.069	0.089
11	12	13	0.84	1.05	0.92	0.971	0.069	0.089
12	13	14	0.84	1.05	0.92	0.971	0.069	0.089
13	14	15	0.84	1.24	0.92	1.143	0.082	0.145
14	15	16	0.84	0.25	0.92	0.231	0.016	0.001
15	17	18	0.84	1.05	0.92	0.971	0.069	0.089
16	18	19	0.84	1.05	0.92	0.971	0.069	0.089
17	19	20	0.84	1.05	0.92	0.971	0.069	0.089
18	20	21	0.84	1.05	0.92	0.971	0.069	0.089
19	21	22	0.84	1.05	0.92	0.971	0.069	0.089
20	22	23	0.84	1.24	0.92	1.143	0.082	0.145
21	23	24	0.84	0.25	0.92	0.231	0.016	0.001
22	25	26	0.84	1.05	0.92	0.971	0.069	0.089
23	26	27	0.84	1.05	0.92	0.971	0.069	0.089
24	27	28	0.84	1.05	0.92	0.971	0.069	0.089
25	28	29	0.84	1.05	0.92	0.971	0.069	0.089
26	29	30	0.84	1.05	0.92	0.971	0.069	0.089
27	30	31	0.84	1.24	0.92	1.143	0.082	0.145
28	31	32	0.84	0.25	0.92	0.231	0.016	0.001
29	33	34	0.84	1.05	0.46	0.486	0.009	0.045
30	34	35	0.84	1.05	0.46	0.486	0.009	0.045
31	35	36	0.84	1.05	0.46	0.486	0.009	0.045
32	36	37	0.84	1.05	0.46	0.486	0.009	0.045
33	37	38	0.84	1.05	0.46	0.486	0.009	0.045
34	38	39	0.84	1.24	0.46	0.572	0.010	0.073
35	39	40	0.84	1.05	0.46	0.486	0.009	0.045
36	41	42	0.84	0.30	1.02	0.308	0.027	0.002
37	42	43	0.84	0.30	1.02	0.308	0.027	0.002
38	43	44	0.84	0.30	1.02	0.308	0.027	0.002
39	44	45	0.84	0.30	1.02	0.308	0.027	0.002
40	45	46	0.84	0.30	1.02	0.308	0.027	0.002
41	46	47	0.84	0.30	1.02	0.308	0.027	0.002
42	47	48	0.84	0.30	1.02	0.308	0.027	0.002

45	51	52	0.84	0.30	1.78	0.534	0.141	0.004
46	52	53	0.84	0.30	2.15	0.646	0.250	0.005
47	53	54	0.84	0.30	2.15	0.646	0.250	0.005
48	54	55	0.84	0.30	2.15	0.646	0.250	0.005
49	55	56	0.84	0.30	2.15	0.646	0.250	0.005
50	1	9	0.92	1.05	0.42	0.442	0.007	0.041
51	9	17	0.92	1.05	0.42	0.442	0.007	0.041
52	17	25	0.92	1.05	0.42	0.442	0.007	0.041
53	25	33	0.92	1.05	0.42	0.442	0.007	0.041
54	33	41	1.02	0.30	0.42	0.126	0.002	0.001
55	41	49	1.02	0.30	0.42	0.126	0.002	0.001
56	2	10	0.92	1.05	0.84	0.885	0.052	0.081
57	10	18	0.92	1.05	0.84	0.885	0.052	0.081
58	18	26	0.92	1.05	0.84	0.885	0.052	0.081
59	26	34	0.92	1.05	0.84	0.885	0.052	0.081
60	34	42	1.02	0.30	0.84	0.253	0.015	0.002
61	42	50	1.02	0.30	0.84	0.253	0.015	0.002
62	3	11	0.92	1.05	0.84	0.885	0.052	0.081
63	11	19	0.92	1.05	0.84	0.885	0.052	0.081
64	19	27	0.92	1.05	0.84	0.885	0.052	0.081
65	27	35	0.92	1.05	0.84	0.885	0.052	0.081
66	35	43	1.02	0.30	0.84	0.253	0.015	0.002
67	43	51	1.02	0.30	0.84	0.253	0.015	0.002
68	4	12	0.92	1.05	0.84	0.885	0.052	0.081
69	12	20	0.92	1.05	0.84	0.885	0.052	0.081
70	20	28	0.92	1.05	0.84	0.885	0.052	0.081
71	28	36	0.92	1.05	0.84	0.885	0.052	0.081
72	36	44	1.02	0.30	0.84	0.253	0.015	0.002
73	44	52	1.02	0.30	0.84	0.253	0.015	0.002
74	5	13	0.92	1.05	0.84	0.885	0.052	0.081
75	13	21	0.92	1.05	0.84	0.885	0.052	0.081
76	21	29	0.92	1.05	0.84	0.885	0.052	0.081
77	29	37	0.92	1.05	0.84	0.885	0.052	0.081
78	37	45	1.02	0.30	0.84	0.253	0.015	0.002
79	45	53	1.02	0.30	0.84	0.253	0.015	0.002
80	6	14	0.92	1.05	0.84	0.885	0.052	0.081
81	14	22	0.92	1.05	0.84	0.885	0.052	0.081
82	22	30	0.92	1.05	0.84	0.885	0.052	0.081
83	30	38	0.92	1.05	0.84	0.885	0.052	0.081
84	38	46	1.02	0.30	0.84	0.253	0.015	0.002
85	46	54	1.02	0.30	0.84	0.253	0.015	0.002
86	7	15	0.92	0.25	0.84	0.211	0.012	0.001
87	15	23	0.92	0.25	0.84	0.211	0.012	0.001
88	23	31	0.92	0.25	0.84	0.211	0.012	0.001
89	31	39	0.92	0.25	0.84	0.211	0.012	0.001
90	39	47	1.02	0.30	0.84	0.253	0.015	0.002
91	47	55	1.02	0.30	0.84	0.253	0.015	0.002
92	8	16	0.92	0.30	0.42	0.126	0.002	0.001
93	16	24	0.92	0.30	0.42	0.126	0.002	0.001
94	24	32	0.92	0.30	0.42	0.126	0.002	0.001
95	32	40	0.92	0.30	0.42	0.126	0.002	0.001
96	40	48	1.02	0.30	0.42	0.126	0.002	0.001
97	48	56	1.02	0.30	0.42	0.126	0.002	0.001
98	57	58	0.84	0.30	1.49	0.448	0.083	0.003
99	58	59	0.84	0.30	1.49	0.448	0.083	0.003

100	59	60	0.84	0.30	1.49	0.448	0.083	0.003
101	61	62	0.84	0.30	1.49	0.448	0.083	0.003
102	62	63	0.84	0.30	1.49	0.448	0.083	0.003
103	64	65	0.84	0.30	1.49	0.448	0.083	0.003
104	55	57	1.49	0.30	0.84	0.253	0.015	0.002
105	56	58	1.49	0.30	0.84	0.253	0.015	0.002
106	58	61	1.49	0.30	0.84	0.253	0.015	0.002
107	55	59	1.49	0.30	0.84	0.253	0.015	0.002
108	59	62	1.49	0.30	0.84	0.253	0.015	0.002
109	62	64	1.49	0.30	0.84	0.253	0.015	0.002
110	56	60	1.49	0.30	0.42	0.126	0.002	0.001
111	60	63	1.49	0.30	0.42	0.126	0.002	0.001
112	63	65	1.49	0.30	0.42	0.126	0.002	0.001
113	65	66	1.49	0.30	0.42	0.126	0.002	0.001
114	52	57	1.71	0.30	0.84	0.253	0.015	0.002
115	57	61	1.71	0.30	0.84	0.253	0.015	0.002
116	61	64	1.71	0.30	0.84	0.253	0.015	0.002
117	64	66	1.71	0.30	0.84	0.253	0.015	0.002

Hipotesis (1) : Peso propio del muro y aletas del estribo

DESPLAZAMIENTOS DE LOS NUDOS

Nudo Nº	Despl.y (mm)	Despl.x (mm)	Despl.z (mm)	Giro y 1000xrad	Giro x 1000xrad	Giro z 1000xrad
1	0.000	-0.000	0.000	-0.000	-0.000	-0.000
2	0.000	-0.001	0.003	-0.003	0.000	-0.000
3	0.000	-0.006	0.006	-0.006	0.000	-0.000
4	0.000	-0.012	0.008	-0.009	0.000	-0.000
5	-0.000	-0.021	0.010	-0.011	0.000	-0.000
6	-0.000	-0.030	0.011	-0.012	0.000	-0.000
7	-0.000	-0.040	0.011	-0.012	0.000	-0.000
8	-0.000	-0.052	0.012	-0.016	0.000	-0.000
9	0.000	-0.000	0.000	-0.000	-0.000	-0.000
10	0.000	-0.001	0.003	-0.003	-0.000	-0.000
11	0.000	-0.006	0.006	-0.007	0.000	-0.000
12	0.000	-0.012	0.008	-0.009	0.000	-0.000
13	-0.000	-0.021	0.010	-0.011	0.000	-0.001
14	-0.000	-0.031	0.011	-0.012	0.000	-0.001
15	-0.001	-0.041	0.011	-0.012	0.000	-0.001
16	-0.001	-0.053	0.012	-0.016	0.000	-0.002
17	0.000	-0.000	0.000	-0.000	-0.000	0.000
18	0.000	-0.001	0.003	-0.003	-0.000	0.000
19	0.000	-0.006	0.006	-0.007	0.000	-0.000
20	0.000	-0.013	0.008	-0.010	0.000	-0.001
21	-0.000	-0.022	0.009	-0.012	0.000	-0.001
22	-0.001	-0.033	0.010	-0.013	0.001	-0.003
23	-0.001	-0.044	0.011	-0.013	0.001	-0.003
24	-0.002	-0.057	0.011	-0.017	0.001	-0.004
25	0.000	0.000	0.000	-0.000	-0.000	0.000
26	0.000	-0.001	0.003	-0.003	-0.000	0.000
27	0.000	-0.006	0.005	-0.007	0.000	0.000
28	0.000	-0.013	0.007	-0.011	0.000	-0.000
29	-0.000	-0.024	0.009	-0.013	0.001	-0.002
30	-0.001	-0.036	0.010	-0.015	0.001	-0.004
31	-0.002	-0.048	0.010	-0.015	0.001	-0.004
32	-0.002	-0.063	0.010	-0.018	0.001	-0.005
33	0.000	0.000	0.000	-0.000	-0.000	0.000
34	0.000	-0.001	0.003	-0.003	0.000	0.000
35	0.000	-0.006	0.005	-0.007	0.000	0.000
36	0.000	-0.014	0.006	-0.011	0.001	-0.000
37	-0.000	-0.025	0.007	-0.015	0.001	-0.002
38	-0.001	-0.040	0.008	-0.017	0.002	-0.005
39	-0.002	-0.055	0.008	-0.018	0.001	-0.005
40	-0.002	-0.071	0.008	-0.019	0.001	-0.006
41	0.000	0.000	0.000	-0.000	-0.000	-0.000
42	-0.000	-0.001	0.006	-0.003	0.000	-0.000
43	-0.000	-0.005	0.011	-0.006	0.000	-0.001

46	-0.003	-0.041	0.020	-0.012	0.001	-0.001
47	-0.004	-0.057	0.021	-0.013	0.001	-0.001
48	-0.005	-0.073	0.021	-0.016	0.001	-0.001
49	-0.000	0.000	0.000	-0.000	0.000	-0.000
50	-0.000	-0.001	0.009	-0.003	0.000	-0.000
51	-0.001	-0.003	0.018	-0.005	0.001	-0.000
52	-0.001	-0.008	0.026	-0.017	0.001	-0.000
53	-0.002	-0.014	0.031	-0.020	0.001	-0.000
54	-0.003	-0.042	0.034	-0.021	0.001	0.000
55	-0.004	-0.059	0.036	-0.020	0.001	0.000
56	-0.005	-0.077	0.036	-0.021	0.001	0.000
57	-0.002	-0.024	0.075	-0.032	0.001	-0.000
58	-0.003	-0.043	0.076	-0.029	0.001	-0.000
59	-0.004	-0.062	0.077	-0.029	0.001	-0.000
60	-0.005	-0.082	0.078	-0.026	0.001	-0.000
61	-0.003	-0.044	0.124	-0.030	0.001	-0.000
62	-0.004	-0.065	0.125	-0.029	0.001	-0.000
63	-0.005	-0.086	0.125	-0.027	0.001	-0.000
64	-0.005	-0.066	0.169	-0.028	0.001	-0.000
65	-0.006	-0.087	0.169	-0.026	0.001	-0.000
66	-0.006	-0.088	0.208	-0.026	0.001	-0.000

ESFUERZOS EN LAS BARRAS

Barra Nº	i Nº	j Nº	Axil (t.)	Cort.1 (t.)	Cort.2 (t.)	Flec.1i (txm)	Flec.1j (txm)	Flec.2i (txm)	Flec.2j (txm)
1	1	2	5.71	0.30	0.07	-0.00	-0.00	0.58	-0.52
2	2	3	4.77	0.00	0.07	-0.00	-0.00	0.51	-0.45
3	3	4	3.85	-0.00	0.08	0.00	0.00	0.43	-0.36
4	4	5	2.90	-0.00	0.09	0.00	0.00	0.33	-0.25
5	5	6	1.93	-0.00	0.09	0.00	0.00	0.19	-0.12
6	6	7	0.84	0.00	0.03	-0.00	-0.00	0.05	-0.03
7	7	8	0.12	0.00	0.01	-0.00	-0.00	0.01	-0.00
8	9	10	11.29	0.21	0.13	-0.09	-0.09	1.16	-1.05
9	10	11	9.42	0.22	0.14	-0.07	-0.11	1.04	-0.92
10	11	12	7.57	0.21	0.16	-0.07	-0.11	0.89	-0.76
11	12	13	5.71	0.17	0.18	-0.05	-0.09	0.68	-0.53
12	13	14	3.81	0.10	0.18	-0.02	-0.06	0.41	-0.26
13	14	15	1.66	0.02	0.05	-0.00	-0.01	0.11	-0.06
14	15	16	0.24	0.01	0.03	-0.01	-0.00	0.03	-0.00
15	17	18	10.95	0.39	0.09	-0.17	-0.16	1.15	-1.07
16	18	19	9.05	0.42	0.11	-0.14	-0.21	1.09	-1.00
17	19	20	7.18	0.44	0.16	-0.14	-0.23	1.00	-0.86
18	20	21	5.37	0.42	0.20	-0.13	-0.22	0.79	-0.62
19	21	22	3.59	0.30	0.21	-0.09	-0.17	0.47	-0.29
20	22	23	1.58	0.09	0.06	-0.04	-0.04	0.12	-0.07
21	23	24	0.22	0.05	0.03	-0.03	-0.02	0.03	-0.00
22	25	26	10.49	0.51	-0.05	-0.23	-0.20	1.07	-1.11
23	26	27	8.39	0.56	-0.01	-0.19	-0.29	1.14	-1.15
24	27	28	6.40	0.72	0.16	-0.23	-0.37	1.21	-1.07
25	28	29	4.61	0.85	0.46	-0.28	-0.44	1.09	-0.71
26	29	30	3.02	0.82	0.49	-0.27	-0.43	0.68	-0.26

28	31	32	0.19	0.15	0.04	-0.08	-0.05	0.03	0.00
29	33	34	4.91	0.12	-0.17	-0.03	-0.05	0.44	-0.58
30	34	35	3.61	0.19	-0.08	-0.07	-0.09	0.57	-0.64
31	35	36	2.45	0.27	0.41	-0.10	-0.13	0.87	-0.53
32	36	37	1.57	0.35	1.67	-0.14	-0.16	1.29	0.11
33	37	38	1.00	0.37	1.93	-0.15	-0.17	1.15	0.47
34	38	39	0.47	0.25	1.97	-0.12	-0.09	1.02	0.64
35	39	40	0.31	0.13	0.70	-0.07	-0.04	0.42	0.17
36	41	42	6.49	0.05	-0.03	-0.01	-0.03	0.01	-0.04
37	42	43	5.62	0.04	-0.07	0.02	-0.05	-0.00	-0.06
38	43	44	4.03	0.01	0.06	0.04	-0.05	0.04	0.01
39	44	45	3.19	-0.02	0.78	0.04	-0.03	0.34	0.31
40	45	46	2.38	-0.04	0.88	0.03	-0.00	0.38	0.36
41	46	47	1.36	-0.02	0.83	0.00	0.01	0.35	0.34
42	47	48	0.38	-0.00	0.58	-0.00	0.00	0.27	0.22
43	49	50	17.48	-0.03	-0.05	0.19	-0.17	0.02	-0.06
44	50	51	16.52	-0.03	-0.16	0.18	-0.16	-0.04	-0.09
45	51	52	15.93	-0.03	-1.03	0.17	-0.14	-0.26	-0.60
46	52	53	10.90	-0.04	0.19	0.14	-0.10	0.14	0.02
47	53	54	7.47	-0.04	0.04	0.09	-0.06	0.02	0.01
48	54	55	4.10	-0.03	0.06	0.05	-0.02	0.02	0.03
49	55	56	1.04	-0.01	0.08	0.01	-0.00	0.04	0.03
50	1	9	-0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
51	9	17	-0.00	0.00	0.00	-0.00	-0.00	0.00	0.00
52	17	25	-0.00	0.00	0.00	-0.00	-0.00	0.00	0.00
53	25	33	0.00	0.00	0.00	-0.00	-0.00	0.00	0.00
54	33	41	-0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
55	41	49	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
56	2	10	-0.15	0.09	0.01	-0.04	-0.04	-0.00	0.01
57	10	18	-0.14	0.26	0.02	-0.12	-0.12	0.01	0.00
58	18	26	-0.12	0.40	0.03	-0.18	-0.19	0.04	-0.01
59	26	34	-0.06	0.35	0.06	-0.19	-0.12	0.05	0.01
60	34	42	0.15	0.06	-0.01	-0.04	-0.03	-0.01	-0.00
61	42	50	0.11	-0.16	0.00	0.06	0.10	0.00	-0.00
62	3	11	-0.23	0.10	0.01	-0.06	-0.03	-0.03	0.04
63	11	19	-0.24	0.29	0.02	-0.14	-0.13	0.01	0.01
64	19	27	-0.21	0.48	0.08	-0.23	-0.21	0.09	-0.02
65	27	35	-0.06	0.54	0.25	-0.31	-0.19	0.19	0.04
66	35	43	0.74	0.40	-0.03	-0.23	-0.18	-0.02	-0.01
67	43	51	0.87	-0.54	-0.00	0.20	0.36	0.00	-0.00
68	4	12	-0.12	0.08	0.01	-0.06	-0.01	-0.09	0.10
69	12	20	-0.16	0.27	0.02	-0.15	-0.10	-0.05	0.07
70	20	28	-0.18	0.31	0.06	-0.26	-0.21	0.06	0.00
71	28	36	-0.04	0.76	0.36	-0.44	-0.27	0.26	0.09
72	36	44	1.62	0.91	-0.04	-0.60	-0.34	-0.02	-0.02
73	44	52	2.34	0.72	-0.01	-0.01	-0.75	0.00	-0.01
74	5	13	0.23	0.05	0.00	-0.06	0.02	-0.21	0.21
75	13	21	0.15	0.20	0.00	-0.13	-0.05	-0.18	0.18
76	21	29	0.03	0.46	0.01	-0.26	-0.17	-0.11	0.13
77	29	37	-0.00	0.92	0.05	-0.54	-0.32	0.01	0.04
78	37	45	0.31	1.37	-0.02	-0.91	-0.58	-0.00	-0.02
79	45	53	0.41	1.20	-0.00	-0.19	-1.04	0.00	-0.00
80	6	14	0.62	0.02	-0.06	-0.06	0.04	-0.37	0.31
81	14	22	0.74	0.09	-0.19	-0.10	0.02	-0.42	0.25

83	30	38	0.09	0.89	-0.74	-0.53	-0.30	-0.58	-0.11
84	38	46	-0.70	1.48	0.03	-0.99	-0.52	0.04	-0.01
85	46	54	-0.75	1.11	0.01	-0.19	-0.95	0.01	0.00
86	7	15	0.37	0.00	-0.01	-0.01	0.01	-0.01	-0.00
87	15	23	0.37	0.03	-0.04	-0.03	0.00	-0.02	-0.01
88	23	31	0.32	0.11	-0.06	-0.07	-0.04	-0.03	-0.02
89	31	39	0.09	0.37	-0.11	-0.19	-0.16	-0.06	-0.05
90	39	47	-1.39	1.33	0.03	-0.92	-0.45	0.04	-0.01
91	47	55	-1.64	1.00	0.02	-0.17	-0.85	0.01	0.01
92	8	16	0.52	0.00	-0.01	-0.00	0.00	-0.01	-0.00
93	16	24	0.31	0.01	-0.04	-0.01	-0.00	-0.03	-0.01
94	24	32	0.26	0.03	-0.08	-0.02	-0.01	-0.04	-0.03
95	32	40	0.11	0.08	-0.11	-0.04	-0.04	-0.05	-0.05
96	40	48	-0.81	0.28	0.01	-0.16	-0.13	0.02	-0.01
97	48	56	-1.39	0.23	0.01	-0.09	-0.14	0.01	0.01
98	57	58	2.07	-0.00	-1.28	0.00	-0.00	-0.58	-0.50
99	58	59	1.38	-0.00	-1.05	0.00	-0.00	-0.44	-0.45
100	59	60	0.50	-0.00	-0.59	0.00	-0.00	-0.29	-0.21
101	61	62	0.93	-0.00	-0.91	0.00	-0.00	-0.39	-0.38
102	62	63	0.40	-0.00	-0.48	0.00	-0.00	-0.23	-0.18
103	64	65	0.40	-0.00	-0.25	0.00	0.00	-0.13	-0.08
104	53	57	0.26	-0.86	-0.00	1.00	0.28	-0.00	0.00
105	54	58	-0.73	-0.89	-0.00	0.91	0.42	-0.00	0.00
106	58	61	-0.51	-0.64	-0.00	0.52	0.44	-0.00	0.00
107	55	59	-1.62	-0.70	0.00	0.79	0.26	-0.00	0.00
108	59	62	-1.16	-0.64	-0.00	0.48	0.48	-0.00	0.00
109	62	64	-0.73	-0.23	-0.00	0.13	0.21	-0.00	0.00
110	56	60	-1.47	-0.13	0.00	0.12	0.08	0.00	0.00
111	60	63	-0.88	-0.16	0.00	0.13	0.12	0.00	0.00
112	63	65	-0.39	-0.09	0.00	0.06	0.07	-0.00	0.00
113	65	66	-0.14	-0.01	-0.00	0.01	0.01	-0.00	0.00
114	52	57	4.61	-0.92	0.00	1.19	0.39	-0.00	0.00
115	57	61	2.89	0.05	0.00	-0.09	0.01	-0.00	0.00
116	61	64	1.28	0.00	-0.00	-0.06	0.05	-0.00	0.00
117	64	66	0.11	0.08	0.00	-0.13	-0.01	0.00	0.00

Hipotesis (2) : Empuje de tierras + Reacción Fx del tablero

DESPLAZAMIENTOS DE LOS NUDOS

Nudo Nº	Despl.y (mm)	Despl.x (mm)	Despl.z (mm)	Giro y 1000xrad	Giro x 1000xrad	Giro z 1000xrad
1	-0.000	0.000	0.000	0.000	-0.000	0.000
2	-0.000	0.018	0.000	0.038	-0.000	-0.000
3	0.000	0.059	0.001	0.058	-0.000	-0.000
4	0.000	0.112	0.001	0.066	-0.000	-0.000
5	0.000	0.168	0.001	0.068	-0.000	-0.000
6	0.000	0.226	0.001	0.068	-0.000	-0.000
7	0.000	0.284	0.001	0.068	-0.000	-0.000
8	0.000	0.338	0.000	0.061	-0.000	-0.000
9	-0.000	0.000	0.000	0.000	0.000	-0.000
10	-0.000	0.017	0.001	0.038	-0.000	-0.001
11	0.000	0.058	0.001	0.057	-0.001	-0.002
12	0.001	0.110	0.001	0.065	-0.001	-0.003
13	0.002	0.166	0.001	0.067	-0.002	-0.005
14	0.003	0.222	0.001	0.067	-0.002	-0.008
15	0.005	0.279	0.001	0.067	-0.002	-0.008
16	0.007	0.332	0.001	0.058	-0.002	-0.010
17	-0.000	0.000	0.000	0.000	0.000	-0.000
18	-0.000	0.017	0.001	0.036	-0.000	-0.001
19	0.000	0.056	0.002	0.055	-0.001	-0.002
20	0.001	0.106	0.003	0.062	-0.002	-0.006
21	0.003	0.159	0.004	0.063	-0.003	-0.009
22	0.006	0.212	0.004	0.063	-0.004	-0.014
23	0.010	0.265	0.004	0.063	-0.004	-0.015
24	0.014	0.311	0.004	0.049	-0.005	-0.020
25	-0.000	0.000	0.000	0.000	0.000	-0.000
26	-0.000	0.017	0.003	0.035	-0.001	-0.000
27	0.000	0.054	0.005	0.052	-0.002	-0.002
28	0.002	0.101	0.007	0.057	-0.004	-0.006
29	0.005	0.149	0.008	0.057	-0.005	-0.011
30	0.009	0.197	0.009	0.057	-0.007	-0.017
31	0.015	0.245	0.009	0.056	-0.007	-0.020
32	0.021	0.277	0.009	0.036	-0.008	-0.028
33	-0.000	0.000	0.000	0.000	0.000	0.000
34	-0.000	0.017	0.006	0.033	-0.005	0.001
35	0.001	0.054	0.011	0.047	-0.007	0.000
36	0.003	0.097	0.015	0.051	-0.009	-0.003
37	0.006	0.141	0.017	0.051	-0.011	-0.007
38	0.010	0.183	0.019	0.047	-0.013	-0.010
39	0.020	0.220	0.020	0.041	-0.016	0.027
40	0.029	0.254	0.020	0.039	-0.011	0.040
41	0.000	0.000	-0.000	0.000	-0.000	0.000
42	0.010	0.020	-0.005	0.007	-0.020	0.020
43	0.030	0.054	-0.008	0.014	-0.028	0.044

46	0.116	0.180	-0.011	0.026	-0.042	0.132
47	0.153	0.217	-0.011	0.027	-0.045	0.154
48	0.191	0.249	-0.010	0.032	-0.045	0.163
49	0.000	0.000	-0.000	0.000	-0.000	0.000
50	0.019	0.020	-0.012	0.021	-0.040	0.027
51	0.063	0.055	-0.022	0.029	-0.062	0.054
52	0.121	0.097	-0.029	0.038	-0.072	0.083
53	0.184	0.139	-0.034	0.037	-0.078	0.095
54	0.251	0.178	-0.036	0.036	-0.080	0.105
55	0.318	0.215	-0.038	0.035	-0.080	0.112
56	0.385	0.248	-0.038	0.037	-0.080	0.114
57	0.730	0.138	-0.095	0.046	-0.127	0.562
58	0.835	0.177	-0.096	0.044	-0.122	0.570
59	0.936	0.214	-0.096	0.043	-0.118	0.576
60	1.035	0.249	-0.096	0.041	-0.118	0.579
61	1.847	0.176	-0.162	0.044	-0.148	0.741
62	1.970	0.214	-0.162	0.044	-0.145	0.744
63	2.092	0.250	-0.162	0.043	-0.145	0.745
64	3.124	0.214	-0.227	0.044	-0.156	0.783
65	3.256	0.250	-0.227	0.044	-0.156	0.783
66	4.423	0.250	-0.292	0.043	-0.156	0.785

ESFUERZOS EN LAS BARRAS

Barra Nº	i Nº	j Nº	Axil (t.)	Cort.1 (t.)	Cort.2 (t.)	Flec.1i (txm)	Flec.1j (txm)	Flec.2i (txm)	Flec.2j (txm)
1	1	2	0.71	-0.00	-4.29	0.00	0.00	-7.85	4.24
2	2	3	0.41	0.00	-2.90	-0.00	-0.00	-4.33	1.89
3	3	4	0.12	0.00	-1.80	-0.00	-0.00	-2.05	0.54
4	4	5	-0.10	0.00	-0.96	-0.00	-0.00	-0.76	-0.05
5	5	6	-0.18	0.00	-0.39	-0.00	-0.00	-0.22	-0.12
6	6	7	-0.09	-0.00	-0.29	0.00	0.00	-0.17	-0.08
7	7	8	-0.02	-0.00	-0.01	0.00	0.00	0.01	-0.02
8	9	10	2.20	-0.76	-8.44	0.26	0.37	-15.50	8.39
9	10	11	1.57	-0.73	-5.73	0.20	0.42	-8.53	3.70
10	11	12	0.88	-0.69	-3.53	0.18	0.40	-3.99	1.02
11	12	13	0.23	-0.49	-1.85	0.11	0.31	-1.44	-0.12
12	13	14	-0.17	-0.08	-0.75	-0.03	0.10	-0.39	-0.25
13	14	15	-0.14	0.21	-0.57	-0.15	-0.03	-0.31	-0.17
14	15	16	-0.03	0.12	-0.01	-0.07	-0.03	0.03	-0.05
15	17	18	4.61	-1.58	-8.19	0.55	0.78	-15.05	8.15
16	18	19	3.91	-1.61	-5.60	0.45	0.91	-8.15	3.42
17	19	20	2.94	-1.74	-3.31	0.50	0.96	-3.61	0.83
18	20	21	1.71	-1.58	-1.58	0.45	0.88	-1.14	-0.19
19	21	22	0.52	-0.74	-0.66	0.14	0.49	-0.24	-0.31
20	22	23	0.06	0.30	-0.53	-0.25	0.00	-0.22	-0.22
21	23	24	0.01	0.18	0.07	-0.11	-0.04	0.09	-0.03
22	25	26	9.20	-2.77	-9.06	0.94	1.40	-15.07	7.43
23	26	27	8.33	-3.37	-5.77	1.04	1.80	-7.60	2.73
24	27	28	6.63	-4.13	-3.23	1.43	2.05	-3.11	0.39
25	28	29	4.65	-4.32	-1.44	1.49	2.16	-0.72	-0.50
26	29	30	2.55	-3.37	0.00	0.99	1.86	0.29	-0.29

28	31	32	0.23	-0.05	0.61	-0.02	0.06	0.30	0.12
29	33	34	10.78	-1.07	-8.80	0.31	0.59	-9.03	1.61
30	34	35	8.41	-2.11	-6.53	0.81	0.97	-4.87	-0.63
31	35	36	6.05	-2.61	-5.15	1.04	1.15	-2.85	-1.49
32	36	37	4.43	-2.77	-3.78	1.12	1.22	-1.56	-1.63
33	37	38	3.30	-2.61	-3.31	1.04	1.16	-0.79	-2.08
34	38	39	2.13	-1.53	0.14	0.54	0.75	1.49	-1.37
35	39	40	0.19	-1.09	0.24	0.61	0.31	0.45	-0.25
36	41	42	-5.12	2.03	-2.34	-2.77	1.05	-1.04	-0.93
37	42	43	-3.72	0.01	-3.61	-0.79	0.78	-1.58	-1.46
38	43	44	-1.99	-0.96	-3.96	-0.04	0.84	-1.71	-1.63
39	44	45	-1.04	-1.07	-3.48	0.02	0.88	-1.50	-1.43
40	45	46	-0.02	-0.79	-2.85	-0.11	0.78	-1.22	-1.18
41	46	47	0.36	0.00	-2.00	-0.31	0.30	-0.86	-0.83
42	47	48	0.16	0.02	-1.05	-0.02	0.00	-0.49	-0.40
43	49	50	-22.38	13.29	-2.81	-25.85	14.64	-1.48	-0.89
44	50	51	-18.90	10.89	-3.26	-15.76	6.58	-1.50	-1.25
45	51	52	-14.63	8.57	-3.52	-8.46	1.23	-1.60	-1.36
46	52	53	-9.88	6.07	-2.82	-7.78	2.66	-1.17	-1.21
47	53	54	-6.01	3.52	-2.66	-3.04	0.06	-1.11	-1.13
48	54	55	-2.91	1.24	-1.90	-0.56	-0.49	-0.77	-0.83
49	55	56	-0.51	0.01	-0.81	0.04	-0.06	-0.39	-0.29
50	1	9	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
51	9	17	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
52	17	25	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
53	25	33	-0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
54	33	41	-0.00	0.00	0.00	-0.00	-0.00	0.00	0.00
55	41	49	0.00	0.00	0.00	-0.00	-0.00	0.00	-0.00
56	2	10	0.26	-0.30	0.07	0.17	0.10	-0.10	0.17
57	10	18	0.28	-0.92	0.15	0.47	0.39	0.02	0.12
58	18	26	0.24	-1.63	0.11	0.84	0.67	0.22	-0.13
59	26	34	-0.36	-2.51	0.77	1.77	0.55	0.70	0.02
60	34	42	1.72	-4.87	-0.05	3.67	1.33	0.07	-0.13
61	42	50	0.45	-3.48	-0.94	1.18	2.39	-0.44	-0.52
62	3	11	-0.32	-0.29	-0.01	0.25	0.02	-0.43	0.42
63	11	19	-0.28	-0.98	-0.04	0.58	0.33	-0.25	0.21
64	19	27	-0.40	-1.95	0.03	1.08	0.72	0.17	-0.14
65	27	35	-1.16	-3.66	0.34	2.51	0.88	0.70	-0.39
66	35	43	0.61	-6.01	0.42	4.52	1.64	0.46	-0.03
67	43	51	0.26	-4.27	-1.09	1.52	2.85	-0.50	-0.61
68	4	12	-2.08	-0.22	-0.08	0.30	-0.09	-0.91	0.83
69	12	20	-1.86	-0.87	-0.25	0.60	0.20	-0.70	0.47
70	20	28	-1.70	-2.10	-0.36	1.21	0.74	-0.18	-0.15
71	28	36	-1.90	-4.08	-0.41	2.80	0.98	0.55	-0.98
72	36	44	0.04	-5.70	1.05	4.33	1.51	0.96	0.12
73	44	52	0.52	-4.76	-0.87	1.62	3.26	-0.39	-0.51
74	5	13	-4.97	-0.08	-0.15	0.30	-0.23	-1.49	1.35
75	13	21	-4.56	-0.48	-0.49	0.50	-0.06	-1.31	0.86
76	21	29	-3.71	-1.66	-1.01	1.08	0.46	-0.76	-0.18
77	29	37	-2.76	-3.77	-1.01	1.69	0.80	0.60	-1.53
78	37	45	-1.26	-4.90	1.80	3.74	1.28	1.54	0.31
79	45	53	-0.64	-3.87	-0.07	1.37	2.60	-0.08	0.01
80	6	14	-8.98	0.89	-0.42	0.27	-0.35	-2.19	1.80
81	14	22	-8.68	0.13	-1.30	0.30	-0.42	-2.24	1.84

83	30	38	-4.43	-2.37	-5.05	2.08	0.11	-0.61	-4.06
84	38	46	-2.24	-3.53	2.76	2.73	0.89	2.21	0.62
85	46	54	-1.39	-3.16	0.81	1.15	2.09	0.26	0.57
86	7	15	-3.27	0.07	-0.05	0.05	-0.11	-0.05	0.01
87	15	23	-3.36	0.17	-0.14	0.01	-0.17	-0.09	-0.04
88	23	31	-3.48	0.13	-0.20	0.07	-0.18	-0.11	-0.07
89	31	39	-3.38	-0.17	-1.41	0.41	-0.25	-0.48	-0.82
90	39	47	-2.44	-2.11	2.57	1.70	0.47	2.02	0.61
91	47	55	-1.49	-2.31	1.83	0.85	1.52	0.70	1.17
92	8	16	-2.77	0.02	-0.08	0.00	-0.02	-0.07	-0.01
93	16	24	-2.89	0.06	-0.27	-0.01	-0.04	-0.15	-0.09
94	24	32	-3.07	0.04	-0.53	-0.00	-0.04	-0.27	-0.22
95	32	40	-3.02	-0.18	-1.24	0.10	0.07	-0.36	-0.78
96	40	48	-1.57	-0.37	1.82	0.22	0.15	1.28	0.59
97	48	56	-0.53	-0.53	1.62	0.24	0.30	0.69	0.97
98	57	58	-0.29	-0.31	-0.34	1.48	-1.74	-0.11	-0.17
99	58	59	-0.16	-0.42	-0.09	1.14	-0.78	-0.03	-0.05
100	59	60	-0.07	-0.34	0.09	0.34	-0.05	0.05	0.02
101	61	62	0.21	0.18	0.01	0.67	-0.82	0.01	0.00
102	62	63	0.04	-0.16	0.14	0.21	-0.08	0.07	0.05
103	64	65	0.02	0.07	0.04	-0.01	-0.05	0.02	0.01
104	53	57	-0.47	-0.00	1.15	-0.28	0.29	2.64	-0.93
105	54	58	-0.64	-0.06	1.66	-0.19	0.27	3.02	-0.53
106	58	61	-0.39	0.08	0.70	-0.07	-0.04	1.18	-0.13
107	55	59	-0.39	0.08	2.17	-0.31	0.18	3.39	-0.16
108	59	62	-0.21	0.18	1.03	-0.18	-0.09	1.41	0.13
109	62	64	-0.08	0.01	0.32	0.01	-0.02	0.39	0.09
110	56	60	0.28	-0.01	1.37	-0.00	0.03	1.91	0.14
111	60	63	0.19	0.05	0.72	-0.05	-0.03	0.85	0.22
112	63	65	0.05	0.02	0.24	-0.01	-0.01	0.25	0.11
113	65	66	0.02	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
114	52	57	1.06	0.59	0.61	-0.73	-0.28	2.00	-0.96
115	57	61	0.51	-0.07	0.39	0.11	0.01	0.89	-0.21
116	61	64	0.04	-0.01	0.18	0.03	-0.01	0.29	0.02
117	64	66	-0.01	-0.01	0.00	0.01	0.00	0.00	0.00

Hipotesis (3) : Reacción vertical máxima del tablero: Fzmáx

DESPLAZAMIENTOS DE LOS NUDOS

Nudo Nº	Despl.y (mm)	Despl.x (mm)	Despl.z (mm)	Giro y 1000xrad	Giro x 1000xrad	Giro z 1000xrad
1	-0.000	0.000	0.000	0.000	-0.000	0.000
2	-0.000	0.000	0.003	0.000	-0.000	0.000
3	-0.000	0.000	0.006	0.000	-0.000	0.000
4	-0.000	0.000	0.008	-0.001	-0.000	0.000
5	0.000	-0.001	0.009	-0.002	-0.000	0.000
6	0.000	-0.002	0.010	-0.003	-0.000	0.000
7	0.000	-0.005	0.010	-0.003	-0.000	-0.000
8	0.000	-0.007	0.010	-0.002	-0.000	-0.000
9	-0.000	0.000	0.000	0.000	0.000	0.000
10	-0.000	0.000	0.003	0.000	0.000	0.000
11	-0.001	0.001	0.006	0.000	-0.000	0.000
12	-0.001	0.001	0.009	-0.000	-0.001	0.001
13	0.000	-0.000	0.011	-0.002	-0.002	0.001
14	0.002	-0.002	0.012	-0.003	-0.004	0.001
15	0.005	-0.005	0.012	-0.003	-0.004	0.001
16	0.007	-0.007	0.013	-0.001	-0.003	0.001
17	-0.000	0.000	0.000	0.000	0.000	0.000
18	-0.001	0.000	0.004	0.001	0.000	0.000
19	-0.001	0.001	0.008	0.001	-0.000	0.000
20	-0.001	0.002	0.012	0.001	-0.002	0.001
21	-0.000	0.001	0.016	-0.001	-0.004	0.002
22	0.003	-0.001	0.019	-0.004	-0.008	0.002
23	0.009	-0.005	0.020	-0.005	-0.008	0.002
24	0.013	-0.006	0.021	-0.002	-0.005	0.001
25	-0.000	0.000	0.000	0.000	0.000	-0.000
26	-0.001	0.000	0.005	0.001	0.000	-0.000
27	-0.001	0.001	0.010	0.001	-0.000	0.000
28	-0.001	0.003	0.015	0.002	-0.002	0.001
29	0.000	0.004	0.021	0.001	-0.004	0.002
30	0.004	0.002	0.029	-0.006	-0.007	0.005
31	0.009	-0.007	0.038	-0.016	-0.008	0.005
32	0.014	-0.003	0.036	0.009	-0.006	0.008
33	-0.000	-0.000	0.000	0.000	0.000	-0.000
34	-0.001	0.000	0.005	0.001	-0.000	-0.000
35	-0.001	0.001	0.011	0.002	-0.001	-0.000
36	-0.001	0.003	0.017	0.003	-0.002	0.000
37	0.001	0.006	0.025	0.003	-0.004	0.002
38	0.004	0.008	0.033	0.003	-0.003	0.007
39	0.008	0.011	0.039	0.003	-0.003	0.010
40	0.013	0.015	0.039	0.007	-0.005	0.012
41	-0.000	-0.000	0.000	-0.000	0.000	0.000
42	0.000	-0.000	0.004	0.001	-0.000	0.001
43	0.000	0.001	0.008	0.003	-0.001	0.001

46	0.008	0.009	0.020	0.014	-0.004	0.001
47	0.012	0.012	0.022	0.017	-0.004	0.000
48	0.015	0.018	0.023	0.012	-0.005	-0.000
49	0.000	-0.000	0.000	-0.000	-0.000	0.000
50	0.000	-0.000	0.002	0.001	-0.001	0.000
51	0.001	0.001	0.004	0.003	-0.002	0.000
52	0.003	0.002	0.005	0.004	-0.003	0.000
53	0.006	0.005	0.007	0.006	-0.003	0.000
54	0.008	0.008	0.007	0.008	-0.003	-0.000
55	0.011	0.012	0.008	0.009	-0.003	-0.000
56	0.014	0.018	0.008	0.008	-0.003	-0.000
57	0.006	0.005	-0.002	0.005	-0.003	0.000
58	0.009	0.008	-0.002	0.005	-0.003	0.000
59	0.011	0.013	-0.002	0.005	-0.003	0.000
60	0.014	0.018	-0.002	0.006	-0.003	0.000
61	0.009	0.009	-0.009	0.005	-0.003	0.000
62	0.012	0.013	-0.009	0.005	-0.003	0.000
63	0.014	0.018	-0.009	0.005	-0.003	0.000
64	0.012	0.013	-0.017	0.005	-0.003	0.000
65	0.015	0.017	-0.017	0.005	-0.003	0.000
66	0.015	0.017	-0.025	0.005	-0.003	0.000

ESFUERZOS EN LAS BARRAS

Barra Nº	i Nº	j Nº	Axil (t.)	Cort.1 (t.)	Cort.2 (t.)	Flec.1i (txm)	Flec.1j (txm)	Flec.2i (txm)	Flec.2j (txm)
1	1	2	5.45	-0.00	-0.06	0.00	0.00	-0.08	0.03
2	2	3	4.72	-0.00	-0.07	0.00	0.00	-0.01	-0.06
3	3	4	3.69	-0.00	-0.04	0.00	0.00	0.10	-0.14
4	4	5	2.39	0.00	0.03	-0.00	-0.00	0.19	-0.17
5	5	6	1.12	0.00	0.07	-0.00	-0.00	0.18	-0.11
6	6	7	0.35	-0.00	0.02	0.00	0.00	0.04	-0.02
7	7	8	0.08	-0.00	0.01	0.00	0.00	0.00	0.00
8	9	10	11.77	-1.41	-0.15	0.62	0.57	-0.21	0.08
9	10	11	10.61	-1.77	-0.18	0.64	0.86	-0.06	-0.09
10	11	12	8.95	-2.42	-0.16	0.84	1.20	0.16	-0.30
11	12	13	6.68	-3.00	-0.00	0.97	1.57	0.42	-0.42
12	13	14	3.84	-2.72	0.23	0.79	1.50	0.51	-0.31
13	14	15	1.20	-1.02	0.06	0.44	0.42	0.13	-0.08
14	15	16	0.28	-0.57	0.02	0.28	0.20	-0.00	0.02
15	17	18	13.96	-2.26	-0.17	1.01	0.90	-0.28	0.14
16	18	19	13.63	-2.75	-0.19	0.99	1.33	-0.17	0.08
17	19	20	13.31	-3.70	-0.33	1.26	1.86	-0.01	-0.27
18	20	21	12.79	-4.98	-0.44	1.58	2.62	0.37	-0.74
19	21	22	11.21	-6.19	0.31	1.67	3.54	1.05	-0.78
20	22	23	5.15	-4.35	0.23	1.62	2.05	0.62	-0.42
21	23	24	0.54	-1.83	0.02	0.96	0.58	-0.02	0.04
22	25	26	16.08	-2.28	-0.04	1.07	0.85	-0.26	0.23
23	26	27	17.16	-2.44	-0.09	0.84	1.21	-0.26	0.18
24	27	28	18.91	-2.95	-0.29	0.91	1.57	-0.23	-0.02
25	28	29	21.90	-3.41	-0.97	0.92	1.96	-0.05	-0.77
26	29	30	27.53	-3.38	-2.92	0.67	2.15	0.90	-3.36

28	31	32	-1.11	-1.02	-0.45	0.54	0.32	-0.30	-0.08
29	33	34	8.70	-0.45	0.20	0.18	0.20	-0.03	0.19
30	34	35	9.90	-0.57	0.14	0.22	0.27	-0.11	0.23
31	35	36	11.37	-0.59	0.10	0.21	0.29	-0.12	0.21
32	36	37	12.96	-0.40	0.07	0.13	0.21	-0.02	0.08
33	37	38	14.22	0.32	0.43	-0.13	-0.14	0.26	0.10
34	38	39	12.16	0.97	-1.05	-0.40	-0.42	-0.59	-0.30
35	39	40	-0.23	0.40	-0.66	-0.24	-0.10	-0.83	0.27
36	41	42	4.14	-0.14	0.09	0.04	0.08	0.02	0.05
37	42	43	4.32	-0.11	0.18	-0.04	0.13	0.06	0.09
38	43	44	4.55	-0.05	0.33	-0.10	0.14	0.12	0.16
39	44	45	4.63	0.05	0.53	-0.14	0.10	0.20	0.25
40	45	46	4.22	0.18	0.93	-0.13	-0.01	0.36	0.43
41	46	47	2.67	0.17	1.23	-0.08	-0.06	0.49	0.55
42	47	48	0.16	0.07	0.85	-0.06	-0.00	0.40	0.31
43	49	50	3.77	0.04	0.14	-0.45	0.42	0.04	0.07
44	50	51	3.52	0.04	0.22	-0.45	0.42	0.07	0.11
45	51	52	3.10	0.06	0.40	-0.45	0.40	0.14	0.19
46	52	53	2.68	0.08	0.46	-0.40	0.33	0.16	0.23
47	53	54	1.92	0.10	0.70	-0.29	0.21	0.27	0.32
48	54	55	1.04	0.09	0.71	-0.16	0.09	0.28	0.32
49	55	56	0.29	0.04	0.35	-0.04	0.01	0.16	0.14
50	1	9	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
51	9	17	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
52	17	25	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
53	25	33	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
54	33	41	0.00	0.00	0.00	-0.00	-0.00	0.00	0.00
55	41	49	-0.00	0.00	0.00	-0.00	-0.00	0.00	0.00
56	2	10	1.11	-0.72	-0.01	0.32	0.35	0.02	-0.03
57	10	18	0.74	-1.89	-0.03	0.85	0.89	-0.02	-0.01
58	18	26	0.25	-2.21	-0.06	0.99	1.06	-0.07	0.01
59	26	34	0.10	-1.14	-0.11	0.64	0.41	-0.08	-0.03
60	34	42	-0.17	0.07	0.03	-0.07	-0.00	0.02	0.01
61	42	50	-0.08	0.25	-0.00	-0.11	-0.14	-0.00	0.00
62	3	11	2.05	-1.04	0.03	0.54	0.42	0.12	-0.09
63	11	19	1.41	-2.70	0.05	1.27	1.23	0.04	-0.00
64	19	27	0.46	-3.02	-0.09	1.37	1.42	-0.13	0.04
65	27	35	-0.05	-1.27	-0.30	0.70	0.47	-0.21	-0.06
66	35	43	-0.33	0.19	0.08	-0.17	-0.03	0.05	0.03
67	43	51	-0.18	0.42	0.02	-0.18	-0.25	0.00	0.02
68	4	12	2.01	-1.30	0.07	0.78	0.42	0.25	-0.18
69	12	20	1.42	-3.57	0.22	1.75	1.55	0.22	-0.01
70	20	28	0.14	-4.08	0.12	1.89	1.89	-0.05	0.16
71	28	36	-0.32	-1.09	-0.56	0.60	0.41	-0.41	-0.14
72	36	44	-0.59	0.50	0.13	-0.39	-0.12	0.07	0.06
73	44	52	-0.39	0.58	0.03	-0.23	-0.36	0.00	0.02
74	5	13	-0.01	-1.27	0.05	0.98	0.20	0.31	-0.27
75	13	21	0.28	-4.12	0.29	2.16	1.65	0.44	-0.17
76	21	29	-0.93	-5.70	1.04	2.64	2.64	0.53	0.43
77	29	37	-0.86	-0.07	-0.91	-0.01	0.07	-0.62	-0.22
78	37	45	-0.55	1.19	0.14	-0.88	-0.34	0.07	0.07
79	45	53	-0.13	0.78	0.02	-0.27	-0.53	-0.00	0.02
80	6	14	-5.45	-0.77	-0.03	0.99	-0.28	0.20	-0.25
81	14	22	-3.75	-3.41	-0.22	2.23	0.93	0.22	-0.43

83	30	38	-0.63	2.48	1.39	-1.72	-0.58	1.22	0.07
84	38	46	-0.09	2.40	-0.01	-1.71	-0.75	-0.04	0.02
85	46	54	0.21	0.85	-0.01	-0.17	-0.70	-0.01	0.00
86	7	15	-3.30	-0.26	-0.01	0.27	-0.03	-0.00	-0.01
87	15	23	-2.85	-1.18	-0.06	0.73	0.36	-0.02	-0.03
88	23	31	-0.32	-5.79	-0.27	2.65	2.71	-0.11	-0.14
89	31	39	0.72	1.96	0.51	-1.08	-0.73	0.25	0.22
90	39	47	0.90	3.13	-0.15	-2.21	-0.99	-0.13	-0.02
91	47	55	0.51	0.62	-0.04	0.05	-0.68	-0.02	-0.02
92	8	16	-2.90	-0.08	-0.01	0.06	0.02	-0.00	-0.00
93	16	24	-2.33	-0.36	-0.03	0.18	0.16	-0.01	-0.01
94	24	32	-0.51	-0.90	-0.05	0.42	0.41	-0.00	-0.04
95	32	40	0.31	0.20	0.40	-0.10	-0.09	0.20	0.17
96	40	48	1.06	0.43	-0.11	-0.25	-0.19	-0.09	-0.02
97	48	56	0.21	0.27	-0.04	-0.12	-0.16	-0.02	-0.02
98	57	58	-0.10	0.00	0.10	-0.01	0.01	0.04	0.05
99	58	59	-0.08	0.00	0.00	-0.01	0.01	-0.00	0.00
100	59	60	0.01	0.00	-0.07	-0.00	0.00	-0.04	-0.02
101	61	62	-0.06	0.00	-0.00	-0.00	0.00	-0.00	0.00
102	62	63	-0.01	0.00	-0.05	-0.00	0.00	-0.03	-0.02
103	64	65	-0.01	0.00	-0.01	-0.00	0.00	-0.01	-0.00
104	53	57	0.10	0.01	0.00	0.03	-0.05	0.00	-0.00
105	54	58	0.22	-0.03	0.00	0.10	-0.05	0.00	0.00
106	58	61	0.12	-0.01	0.00	0.01	0.01	0.00	-0.00
107	55	59	0.15	-0.13	-0.00	0.20	-0.01	0.00	-0.00
108	59	62	0.08	-0.05	0.00	0.04	0.03	0.00	-0.00
109	62	64	0.03	-0.00	0.00	-0.00	0.01	0.00	-0.00
110	56	60	-0.14	-0.02	-0.00	0.02	0.00	-0.00	-0.00
111	60	63	-0.07	-0.02	-0.00	0.02	0.01	-0.00	-0.00
112	63	65	-0.02	-0.01	-0.00	0.00	0.00	0.00	-0.00
113	65	66	-0.01	-0.00	0.00	0.00	0.00	0.00	0.00
114	52	57	-0.36	-0.02	-0.00	0.00	0.02	0.00	-0.00
115	57	61	-0.15	0.00	-0.00	-0.01	0.00	0.00	-0.00
116	61	64	-0.01	0.00	0.00	-0.01	0.00	0.00	-0.00
117	64	66	0.01	0.00	-0.00	-0.01	-0.00	-0.00	-0.00

Hipotesis (4) : Reaccion vertical minima del tablero: Fzmin

DESPLAZAMIENTOS DE LOS NUDOS

Nudo Nº	Despl.y (mm)	Despl.x (mm)	Despl.z (mm)	Giro y 1000xrad	Giro x 1000xrad	Giro z 1000xrad
1	-0.000	0.000	0.000	0.000	-0.000	0.000
2	-0.000	0.000	0.001	0.000	-0.000	0.000
3	-0.000	0.000	0.003	0.000	-0.000	0.000
4	-0.000	0.000	0.004	-0.000	-0.000	0.000
5	0.000	-0.000	0.004	-0.001	-0.000	0.000
6	0.000	-0.001	0.005	-0.001	-0.000	0.000
7	0.000	-0.002	0.005	-0.001	-0.000	-0.000
8	0.000	-0.003	0.005	-0.001	-0.000	-0.000
9	-0.000	0.000	0.000	0.000	0.000	0.000
10	-0.000	0.000	0.002	0.000	0.000	0.000
11	-0.000	0.000	0.003	0.000	-0.000	0.000
12	-0.000	0.000	0.004	-0.000	-0.000	0.000
13	0.000	-0.000	0.005	-0.001	-0.001	0.000
14	0.001	-0.001	0.005	-0.001	-0.002	0.000
15	0.002	-0.002	0.006	-0.001	-0.002	0.000
16	0.003	-0.003	0.006	-0.001	-0.001	0.000
17	-0.000	0.000	0.000	0.000	0.000	0.000
18	-0.000	0.000	0.002	0.000	0.000	0.000
19	-0.001	0.000	0.004	0.000	-0.000	0.000
20	-0.001	0.001	0.005	0.000	-0.001	0.001
21	-0.000	0.001	0.007	-0.001	-0.002	0.001
22	0.001	-0.000	0.008	-0.002	-0.003	0.001
23	0.004	-0.002	0.009	-0.002	-0.004	0.001
24	0.006	-0.003	0.009	0.001	-0.002	0.001
25	-0.000	0.000	0.000	0.000	0.000	-0.000
26	-0.000	0.000	0.002	0.000	0.000	-0.000
27	-0.001	0.001	0.004	0.001	-0.000	0.000
28	-0.001	0.001	0.007	0.001	-0.001	0.000
29	0.000	0.002	0.010	0.000	-0.002	0.001
30	0.002	0.001	0.013	-0.003	-0.003	0.002
31	0.004	-0.003	0.017	-0.007	-0.003	0.002
32	0.006	-0.002	0.016	0.004	-0.003	0.003
33	-0.000	-0.000	0.000	0.000	0.000	-0.000
34	-0.000	0.000	0.002	0.000	-0.000	-0.000
35	-0.001	0.001	0.005	0.001	-0.000	-0.000
36	-0.001	0.001	0.008	0.001	-0.001	0.000
37	0.000	0.003	0.011	0.001	-0.002	0.001
38	0.002	0.004	0.015	0.001	-0.002	0.003
39	0.004	0.005	0.018	0.001	-0.001	0.005
40	0.006	0.007	0.018	0.003	-0.002	0.006
41	-0.000	-0.000	0.000	-0.000	0.000	0.000
42	0.000	-0.000	0.002	0.001	-0.000	0.000
43	0.000	0.000	0.005	0.002	-0.000	0.001

46	0.004	0.003	0.009	0.006	-0.002	0.000
47	0.005	0.005	0.010	0.008	-0.002	0.000
48	0.007	0.008	0.010	0.005	-0.002	-0.000
49	0.000	-0.000	0.000	-0.000	-0.000	0.000
50	0.000	-0.000	0.001	0.000	-0.000	0.000
51	0.001	0.000	0.002	0.001	-0.001	0.000
52	0.001	0.001	0.002	0.002	-0.001	0.000
53	0.003	0.002	0.003	0.003	-0.001	0.000
54	0.004	0.004	0.003	0.003	-0.001	-0.000
55	0.005	0.006	0.004	0.004	-0.002	-0.000
56	0.006	0.008	0.004	0.004	-0.002	-0.000
57	0.003	0.002	-0.001	0.002	-0.001	0.000
58	0.004	0.004	-0.001	0.002	-0.001	0.000
59	0.005	0.006	-0.001	0.002	-0.001	0.000
60	0.006	0.008	-0.001	0.003	-0.001	0.000
61	0.004	0.004	-0.004	0.002	-0.001	0.000
62	0.005	0.006	-0.004	0.002	-0.001	0.000
63	0.006	0.008	-0.004	0.002	-0.001	0.000
64	0.006	0.006	-0.008	0.002	-0.001	0.000
65	0.007	0.008	-0.008	0.002	-0.001	0.000
66	0.007	0.008	-0.011	0.002	-0.001	0.000

ESFUERZOS EN LAS BARRAS

Barra Nº	i Nº	j Nº	Axil (t.)	Cort.1 (t.)	Cort.2 (t.)	Flec.1i (txm)	Flec.1j (txm)	Flec.2i (txm)	Flec.2j (txm)
1	1	2	2.46	-0.00	-0.03	0.00	0.00	-0.04	0.01
2	2	3	2.14	-0.00	-0.03	0.00	0.00	-0.00	-0.03
3	3	4	1.67	-0.00	-0.02	0.00	0.00	0.05	-0.06
4	4	5	1.08	0.00	0.01	-0.00	-0.00	0.09	-0.08
5	5	6	0.51	0.00	0.03	-0.00	-0.00	0.08	-0.05
6	6	7	0.16	-0.00	0.01	0.00	0.00	0.02	-0.01
7	7	8	0.04	-0.00	0.00	0.00	0.00	0.00	0.00
8	9	10	5.32	-0.64	-0.07	0.28	0.26	-0.09	0.04
9	10	11	4.80	-0.80	-0.08	0.29	0.39	-0.03	-0.04
10	11	12	4.05	-1.09	-0.07	0.38	0.54	0.07	-0.13
11	12	13	3.02	-1.36	-0.00	0.44	0.71	0.19	-0.19
12	13	14	1.73	-1.23	0.11	0.36	0.68	0.23	-0.14
13	14	15	0.54	-0.46	0.03	0.20	0.19	0.06	-0.04
14	15	16	0.13	-0.26	0.01	0.13	0.09	-0.00	0.01
15	17	18	6.31	-1.02	-0.07	0.46	0.41	-0.13	0.06
16	18	19	6.17	-1.25	-0.09	0.45	0.60	-0.08	0.08
17	19	20	6.02	-1.67	-0.15	0.57	0.84	-0.00	-0.12
18	20	21	5.79	-2.25	-0.20	0.71	1.18	0.17	-0.33
19	21	22	5.07	-2.80	0.14	0.76	1.60	0.47	-0.35
20	22	23	2.33	-1.97	0.11	0.73	0.93	0.28	-0.19
21	23	24	0.24	-0.83	0.01	0.44	0.26	-0.01	0.02
22	25	26	7.27	-1.03	-0.02	0.48	0.39	-0.12	0.10
23	26	27	7.76	-1.10	-0.04	0.38	0.55	-0.12	0.08
24	27	28	8.55	-1.34	-0.13	0.41	0.71	-0.10	-0.01
25	28	29	9.90	-1.84	-0.44	0.41	0.89	-0.02	-0.35
26	29	30	12.45	-1.51	-1.32	0.30	0.97	0.41	-1.52

28	31	32	-0.50	-0.46	-0.20	0.24	0.14	-0.13	-0.04
29	33	34	3.93	-0.20	0.09	0.08	0.09	-0.01	0.09
30	34	35	4.48	-0.26	0.06	0.10	0.12	-0.05	0.10
31	35	36	5.14	-0.27	0.04	0.10	0.13	-0.06	0.09
32	36	37	5.86	-0.18	0.03	0.06	0.09	-0.01	0.04
33	37	38	6.43	0.15	0.20	-0.06	-0.06	0.12	0.05
34	38	39	5.50	0.44	-0.47	-0.18	-0.19	-0.27	-0.13
35	39	40	-0.10	0.18	-0.30	-0.11	-0.04	-0.37	0.12
36	41	42	1.87	-0.06	0.04	0.02	0.04	0.01	0.02
37	42	43	1.95	-0.05	0.08	-0.02	0.06	0.03	0.04
38	43	44	2.06	-0.02	0.15	-0.05	0.06	0.05	0.07
39	44	45	2.09	0.02	0.24	-0.06	0.04	0.09	0.11
40	45	46	1.91	0.08	0.42	-0.06	-0.01	0.16	0.19
41	46	47	1.21	0.08	0.56	-0.04	-0.03	0.22	0.25
42	47	48	0.07	0.03	0.38	-0.03	-0.00	0.18	0.14
43	49	50	1.70	0.02	0.06	-0.20	0.19	0.02	0.03
44	50	51	1.59	0.02	0.10	-0.20	0.19	0.03	0.05
45	51	52	1.40	0.03	0.18	-0.20	0.18	0.06	0.09
46	52	53	1.21	0.04	0.21	-0.18	0.15	0.07	0.10
47	53	54	0.87	0.04	0.32	-0.13	0.09	0.12	0.14
48	54	55	0.47	0.04	0.32	-0.07	0.04	0.13	0.14
49	55	56	0.13	0.02	0.16	-0.02	0.00	0.07	0.06
50	1	9	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
51	9	17	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
52	17	25	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
53	25	33	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
54	33	41	0.00	0.00	0.00	-0.00	-0.00	0.00	0.00
55	41	49	-0.00	0.00	0.00	-0.00	-0.00	0.00	0.00
56	2	10	0.50	-0.33	-0.00	0.14	0.16	0.01	-0.02
57	10	18	0.34	-0.85	-0.02	0.38	0.40	-0.01	-0.01
58	18	26	0.11	-1.00	-0.03	0.45	0.48	-0.03	0.00
59	26	34	0.04	-0.51	-0.05	0.29	0.19	-0.03	-0.01
60	34	42	-0.08	0.03	0.01	-0.03	-0.00	0.01	0.00
61	42	50	-0.04	0.11	-0.00	-0.05	-0.06	-0.00	0.00
62	3	11	0.93	-0.47	0.01	0.24	0.19	0.03	-0.04
63	11	19	0.64	-1.22	0.02	0.57	0.55	0.02	-0.00
64	19	27	0.21	-1.37	-0.04	0.62	0.64	-0.06	0.02
65	27	35	-0.02	-0.58	-0.13	0.32	0.21	-0.09	-0.03
66	35	43	-0.15	0.09	0.03	-0.08	-0.01	0.02	0.01
67	43	51	-0.08	0.19	0.01	-0.08	-0.12	0.00	0.01
68	4	12	0.91	-0.59	0.03	0.33	0.19	0.11	-0.08
69	12	20	0.64	-1.61	0.10	0.79	0.70	0.10	-0.01
70	20	28	0.06	-1.85	0.05	0.85	0.85	-0.02	0.07
71	28	36	-0.14	-0.49	-0.26	0.27	0.18	-0.19	-0.08
72	36	44	-0.27	0.23	-0.06	-0.18	-0.06	0.03	0.03
73	44	52	-0.18	0.26	0.01	-0.10	-0.16	0.00	0.01
74	5	13	-0.00	-0.57	0.02	0.44	0.09	0.14	-0.12
75	13	21	0.13	-1.86	0.13	0.97	0.75	0.20	-0.08
76	21	29	-0.42	-2.58	0.47	1.19	1.19	0.24	0.20
77	29	37	-0.39	-0.03	-0.41	-0.00	0.03	-0.28	-0.10
78	37	45	-0.25	0.54	0.06	-0.40	-0.15	0.03	0.03
79	45	53	-0.07	0.35	0.01	-0.12	-0.24	-0.00	0.01
80	6	14	-2.46	-0.35	-0.02	0.45	-0.13	0.09	-0.11
81	14	22	-1.70	-1.54	-0.10	1.01	0.42	0.10	-0.19

83	30	38	-0.29	1.12	0.63	-0.78	-0.26	0.55	0.03
84	38	46	-0.04	1.08	-0.01	-0.77	-0.34	-0.02	0.01
85	46	54	0.10	0.38	-0.01	-0.08	-0.32	-0.01	0.00
86	7	15	-1.49	-0.12	-0.01	0.12	-0.01	-0.00	-0.00
87	15	23	-1.29	-0.53	-0.03	0.33	0.16	-0.01	-0.01
88	23	31	-0.15	-2.62	-0.12	1.20	1.23	-0.05	-0.06
89	31	39	0.32	0.88	0.23	-0.49	-0.33	0.11	0.10
90	39	47	0.41	1.41	-0.07	-1.00	-0.45	-0.06	-0.01
91	47	55	0.23	0.28	-0.02	0.02	-0.31	-0.01	-0.01
92	8	16	-1.31	-0.04	-0.00	0.03	0.01	-0.00	-0.00
93	16	24	-1.05	-0.16	-0.01	0.08	0.07	-0.00	-0.01
94	24	32	-0.23	-0.41	-0.02	0.19	0.19	-0.00	-0.02
95	32	40	0.23	0.09	0.18	-0.04	-0.04	0.09	0.08
96	40	48	0.48	0.20	-0.05	-0.11	-0.09	-0.04	-0.01
97	48	56	0.10	0.12	-0.02	-0.05	-0.07	-0.01	-0.01
98	57	58	-0.05	0.00	0.05	-0.01	0.01	0.02	0.02
99	58	59	-0.04	0.00	0.00	-0.00	0.00	-0.00	0.00
100	59	60	0.00	0.00	-0.03	-0.00	0.00	-0.02	-0.01
101	61	62	-0.03	0.00	-0.00	-0.00	0.00	-0.00	0.00
102	62	63	-0.01	0.00	-0.02	-0.00	0.00	-0.01	-0.01
103	64	65	-0.00	-0.00	-0.01	-0.00	0.00	-0.00	-0.00
104	53	57	0.04	0.01	0.00	0.02	-0.02	0.00	-0.00
105	54	58	0.10	-0.01	0.00	0.05	-0.02	0.00	0.00
106	58	61	0.05	-0.00	0.00	0.00	0.00	0.00	-0.00
107	55	59	0.07	-0.06	-0.00	0.09	-0.00	0.00	-0.00
108	59	62	0.04	-0.02	0.00	0.02	0.01	0.00	-0.00
109	62	64	0.01	-0.00	0.00	-0.00	0.00	0.00	-0.00
110	56	60	-0.06	-0.01	-0.00	0.01	0.00	-0.00	-0.00
111	60	63	-0.03	-0.01	-0.00	0.01	0.01	-0.00	-0.00
112	63	65	-0.01	-0.00	-0.00	0.00	0.00	0.00	-0.00
113	65	66	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.00
114	52	57	-0.16	-0.01	-0.00	0.00	0.01	0.00	-0.00
115	57	61	-0.07	0.00	-0.00	-0.00	0.00	0.00	-0.00
116	61	64	-0.01	0.00	0.00	-0.00	0.00	0.00	-0.00
117	64	66	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00

DIMENSIONAMIENTO DE ARMADURAS

Esfuerzos de cálculo y armadura vertical del muro frontal

Nudo Nº	Canto (m)	Ancho (m)	Recu. (m)	(1)+(2)+(3) Nd (t/m)	(1)+(2)+(3) Md (txm/m)	(1)+(2)+(4) Nd (t/m)	(1)+(2)+(4) Md (txm/m)	Aint. (cm²/m)	Aext. (cm²/m)
8	0.25	1.00	0.05	0.65	-0.03	0.23	-0.08	1.13	1.13
7	0.25	1.00	0.05	0.65	0.08	0.23	0.07	1.13	1.13
6	1.24	1.00	0.05	3.92	-0.00	1.62	-0.44	5.56	5.56
5	1.05	1.00	0.05	10.21	0.86	4.13	-0.21	4.72	4.72
4	1.05	1.00	0.05	18.11	0.29	7.40	-1.84	4.72	4.72
3	1.05	1.00	0.05	26.48	-5.26	10.96	-3.07	4.72	4.72
2	1.05	1.00	0.05	34.29	-13.24	14.25	-7.44	4.72	4.72
1	1.05	1.00	0.05	41.05	-25.45	17.28	-14.23	7.61	4.72
16	0.25	1.00	0.05	0.86	-0.02	0.30	-0.08	1.13	1.13
15	0.25	1.00	0.05	0.86	0.08	0.30	0.09	1.13	1.13
14	1.24	1.00	0.05	4.81	0.12	1.91	-0.37	5.56	5.56
13	1.05	1.00	0.05	13.06	1.21	5.10	-0.05	4.72	4.72
12	1.05	1.00	0.05	21.83	-0.59	8.72	-0.56	4.72	4.72
11	1.05	1.00	0.05	30.09	-5.08	12.16	-2.94	4.72	4.72
10	1.05	1.00	0.05	37.86	-13.05	15.36	-7.31	4.72	4.72
9	1.05	1.00	0.05	43.70	-25.17	18.31	-14.05	7.54	4.72
24	0.25	1.00	0.05	1.34	0.01	0.46	-0.02	1.13	1.13
23	0.25	1.00	0.05	1.34	0.17	0.46	0.11	1.13	1.13
22	1.24	1.00	0.05	11.75	0.90	3.86	0.18	5.56	5.56
21	1.05	1.00	0.05	26.50	2.21	8.93	0.89	4.72	4.72
20	1.05	1.00	0.05	34.38	0.03	12.52	-0.18	4.72	4.72
19	1.05	1.00	0.05	40.53	-4.54	15.70	-2.55	4.72	4.72
18	1.05	1.00	0.05	45.99	-12.49	18.60	-6.94	4.72	4.72
17	1.05	1.00	0.05	51.07	-24.52	21.29	-13.84	7.37	4.72
32	0.25	1.00	0.05	-1.20	0.08	-0.08	0.09	1.13	1.13
31	0.25	1.00	0.05	-1.20	0.06	-0.08	0.19	1.13	1.13
30	1.24	1.00	0.05	60.94	7.32	16.51	1.69	5.56	5.56
29	1.05	1.00	0.05	57.26	3.24	17.54	1.34	4.72	4.72
28	1.05	1.00	0.05	53.91	0.57	18.63	0.34	4.72	4.72
27	1.05	1.00	0.05	55.24	-3.70	21.00	-1.96	4.72	4.72
26	1.05	1.00	0.05	58.59	-11.62	23.81	-6.40	4.72	4.72
25	1.05	1.00	0.05	61.88	-24.66	26.24	-13.73	7.41	4.72
40	1.05	1.00	0.05	0.94	0.65	0.77	0.08	4.72	4.72
39	1.05	1.00	0.05	0.94	0.15	0.77	0.97	4.72	4.72
38	1.24	1.00	0.05	51.08	6.66	15.77	4.37	5.56	5.56

35	1.05	1.00	0.05	68.73	-7.28	26.54	-3.97	4.72	4.72
34	1.05	1.00	0.05	75.83	-15.25	32.10	-8.46	4.83	4.72
33	1.05	1.00	0.05	84.37	-24.80	38.19	-16.73	8.68	4.72

Esfuerzos de cálculo y armadura horizontal del muro frontal

Nudo Nº	Canto (m)	Ancho (m)	Recu. (m)	(2):Emp.tierras+Fx Nd (t/m)	(2):Emp.tierras+Fx Md (txm/m)	Aint. (cm²/m)	Aext. (cm²/m)
1	1.05	1.00	0.05	0.00	-0.00	8.40	8.40
9	1.05	1.00	0.05	0.00	0.00	8.40	8.40
17	1.05	1.00	0.05	0.00	-0.00	8.40	8.40
25	1.05	1.00	0.05	-0.00	0.00	8.40	8.40
33	1.05	1.00	0.05	-0.00	-0.00	8.40	8.40
2	1.05	1.00	0.05	0.31	0.12	8.40	8.40
10	1.05	1.00	0.05	0.33	-0.02	8.40	8.40
18	1.05	1.00	0.05	0.29	-0.27	8.40	8.40
26	1.05	1.00	0.05	-0.42	-0.83	8.40	8.40
34	1.05	1.00	0.05	-0.42	0.02	8.40	8.40
3	1.05	1.00	0.05	-0.38	0.51	8.40	8.40
11	1.05	1.00	0.05	-0.33	0.29	8.40	8.40
19	1.05	1.00	0.05	-0.48	-0.20	8.40	8.40
27	1.05	1.00	0.05	-1.38	-0.83	8.40	8.40
35	1.05	1.00	0.05	-1.38	-0.46	8.40	8.40
4	1.05	1.00	0.05	-2.44	1.07	8.40	8.40
12	1.05	1.00	0.05	-2.21	0.83	8.40	8.40
20	1.05	1.00	0.05	-2.02	0.22	8.40	8.40
28	1.05	1.00	0.05	-2.25	-0.65	8.40	8.40
36	1.05	1.00	0.05	-2.25	-1.10	8.40	8.40
5	1.05	1.00	0.05	-5.90	1.76	8.40	8.40
13	1.05	1.00	0.05	-5.41	1.56	8.40	8.40
21	1.05	1.00	0.05	-4.41	0.90	8.40	8.40
29	1.05	1.00	0.05	-3.28	-0.71	8.40	8.40
37	1.05	1.00	0.05	-3.28	-1.82	8.40	8.40
6	1.05	1.00	0.05	-10.65	2.60	8.40	8.40
14	1.05	1.00	0.05	-10.30	2.65	8.40	8.40
22	1.05	1.00	0.05	-9.07	2.19	8.40	8.40
30	1.05	1.00	0.05	-5.25	0.73	8.40	8.40
38	1.05	1.00	0.05	-5.25	-4.82	8.40	8.40
7	0.25	1.00	0.05	-3.88	0.06	2.00	2.00
15	0.25	1.00	0.05	-3.97	0.11	2.00	2.00
23	0.25	1.00	0.05	-4.13	0.13	2.00	2.00
31	0.25	1.00	0.05	-4.01	0.57	2.00	2.00

8	0.30	1.00	0.05	-6.56	0.17	2.40	2.40
16	0.30	1.00	0.05	-6.86	0.36	2.40	2.40
24	0.30	1.00	0.05	-7.28	0.64	2.40	2.40
32	0.30	1.00	0.05	-7.17	0.86	2.40	2.40
40	0.30	1.00	0.05	-7.17	-1.85	2.40	2.40

Esfuerzos de cálculo y armadura vertical en la aleta

Nudo Nº	Canto (m)	Ancho (m)	Recu. (m)	(1)+(2)+(3) Nd (t/m)	(1)+(2)+(3) Md (txm/m)	(1)+(2)+(4) Nd (t/m)	(1)+(2)+(4) Md (txm/m)	Aint. (cm²/m)	Aext. (cm²/m)
47	0.30	1.00	0.05	1.09	0.29	0.54	-0.03	1.35	1.35
46	0.30	1.00	0.05	6.85	-0.02	2.57	-0.25	1.35	1.35
45	0.30	1.00	0.05	10.28	0.08	3.74	-1.43	1.35	1.35
44	0.30	1.00	0.05	11.29	-0.47	3.01	-1.96	2.32	1.35
43	0.30	1.00	0.05	11.65	-1.25	2.25	-2.58	2.89	1.35
42	0.30	1.00	0.05	12.25	-1.30	0.84	-2.44	2.77	1.35
41	0.30	1.00	0.05	12.10	-0.85	-0.65	-1.60	1.95	1.35
55	0.30	1.00	0.05	0.77	-0.02	0.11	-0.24	1.35	1.35
54	0.30	1.00	0.05	2.60	-0.10	-0.25	-0.51	1.35	1.35
53	0.30	1.00	0.05	4.46	-0.24	-0.98	-0.76	1.35	1.35
52	0.30	1.00	0.05	5.96	-0.26	-2.28	-0.78	1.35	1.35
51	0.30	1.00	0.05	9.70	-0.92	-4.38	-1.54	1.89	1.35
50	0.30	1.00	0.05	8.45	-0.73	-7.83	-1.35	1.68	1.35
49	0.30	1.00	0.05	7.78	-0.69	-10.41	-1.31	1.63	1.35
59	0.30	1.00	0.05	0.50	-0.32	0.23	-0.13	1.35	1.35
58	0.30	1.00	0.05	1.30	-0.49	0.64	-0.29	1.35	1.35
57	0.30	1.00	0.05	1.94	-0.65	0.91	-0.46	1.35	1.35
62	0.30	1.00	0.05	0.45	-0.20	0.26	-0.10	1.35	1.35
61	0.30	1.00	0.05	1.15	-0.42	0.67	-0.23	1.35	1.35
64	0.30	1.00	0.05	0.44	-0.13	0.25	-0.07	1.35	1.35

Esfuerzos de cálculo y armadura horizontal en la aleta

Nudo Nº	Canto (m)	Ancho (m)	Recu. (m)	(2):Emp.tierras+Fx Nd (t/m)	(2):Emp.tierras+Fx Md (txm/m)	Aint. (cm²/m)	Aext. (cm²/m)
33	0.30	1.00	0.05	-0.00	-0.00	2.40	2.40
41	0.30	1.00	0.05	0.00	-0.00	2.40	2.40

34	0.30	1.00	0.05	2.04	-0.09	2.40	2.40
42	0.30	1.00	0.05	0.54	0.52	2.40	2.40
50	0.30	1.00	0.05	0.54	-0.62	2.40	2.40
35	0.30	1.00	0.05	0.72	-0.54	2.40	2.40
43	0.30	1.00	0.05	0.30	0.59	2.40	2.40
51	0.30	1.00	0.05	0.30	-0.73	2.40	2.40
36	0.30	1.00	0.05	0.05	-1.13	2.40	2.40
44	0.30	1.00	0.05	0.62	0.46	2.40	2.40
52	0.30	1.00	0.05	0.62	-0.60	2.40	2.40
37	0.30	1.00	0.05	-1.49	-1.82	2.40	2.40
45	0.30	1.00	0.05	-0.75	0.10	2.40	2.40
53	0.30	1.00	0.05	-0.56	-3.13	3.33	2.40
57	0.30	1.00	0.05	-0.56	-1.10	3.33	2.40
38	0.30	1.00	0.05	-2.66	-2.62	2.93	2.40
46	0.30	1.00	0.05	-1.65	-0.31	2.40	2.40
54	0.30	1.00	0.05	-0.75	-3.58	3.38	2.40
58	0.30	1.00	0.05	-0.46	-1.40	2.40	2.40
61	0.30	1.00	0.05	-0.46	-0.15	2.40	2.40
39	0.30	1.00	0.05	-2.89	-2.40	2.73	2.40
47	0.30	1.00	0.05	-1.76	-0.83	2.40	2.40
55	0.30	1.00	0.05	-0.46	-4.02	3.77	2.40
59	0.30	1.00	0.05	-0.25	-1.67	2.40	2.40
62	0.30	1.00	0.05	-0.10	-0.46	2.40	2.40
64	0.30	1.00	0.05	-0.10	0.11	2.40	2.40
40	0.30	1.00	0.05	-3.73	-3.06	3.26	2.40
48	0.30	1.00	0.05	-1.25	-1.64	2.40	2.40
56	0.30	1.00	0.05	0.67	-4.54	4.27	2.40
60	0.30	1.00	0.05	0.46	-2.03	2.40	2.40
63	0.30	1.00	0.05	0.13	-0.60	2.40	2.40
65	0.30	1.00	0.05	0.04	0.00	2.40	2.40
66	0.30	1.00	0.05	0.04	-0.00	2.40	2.40

Esfuerzos de cálculo y armadura en zapata

Puntera :

Flexion: Md = 9.66 txm/m ; Asup.= 15.00 cm²/m ; Ainf.= 0.00 cm²/m
Comprobación a cortante ...: Vcu= 64.55 t ; Vd = 0.00 t
Vd < Vcu ..... No es necesaria armadura transversal por cortante

Talón :

Borde empotrado en muro frontal ..... : Mxd = 4.05 txm/m
Borde empotrado en aleta ..... : Myd = -0.18 txm/m

Centro del talón ..... ; Mxd = -0.98 txm/m ; Myd = 0.68 txm/m
Armaduras ..... ; Asup.= 7.50 cm²/m ; Ainf.= 7.50 cm²/m

PROGRAMA ESTRIBOS

CALCULO Y ARMADO DE ESTRIBOS DE PUENTE

VERSION Nº 1 FECHA : 12/10/1995

Copyright : J.Diaz del Valle, 1995

E.T.S. de I.C.C. y P. de Santander

DATOS DEL PROYECTO DEL ESTRIBO

PROYECTO : AVE LLEIDA-MARTORELL

REFERENCIA : P.K. 307+860. ESTRIBO 2.

FECHA DEL CALCULO : 20-9-99

DATOS DEL ESTRIBO

ESTRIBO 2.

-Datos geométricos:

H1= 3.15	H2= 0.00	H3= 0.00	H4= 1.00	H5= 0.00	m.
H6= 0.00	H7= 1.00	H8= 0.00	H9= 2.00	H10= 0.00	m.
B1= 1.05	B2= 0.00	B3= 1.20	B4= 0.00	B5= 0.00	m.
B6= 0.50	B7= 0.00	B8= 0.00	B9= 0.00	H9= 0.00	m.
C1= 0.35	C2= 0.45	C3= 0.00	C4= 0.25	C5= 0.25	m.
D1= 0.00	D2= 0.00	D3= 0.95	D4= 0.95	D5= 0.25	m.
D6= 0.25					
A1= 1.00	A2= 0.20	A3= 0.40	A4= 0.60	A5= 0.25	m.
E1= 7.90	E2= 7.70	E3= 0.30	E4= 0.00	E5= 0.30	m.
E6= 0.30	E7= 0.00	E8= 0.00	E9= 0.95	E10= 6.00	m.

-Caracteristicas de los materiales:

Peso especifico del hormigón (t/m3) ..... ϒh = 2.50
Resistencia del hormigón del alzado (Kp/cm²) ..... fck = 250
Resistencia del hormigón de la zapata (Kp/cm²) ..... fck'= 250
Limite elástico del acero (Kp/cm²) ..... fyk = 5100
Recubrimiento de las armaduras (m) ..... c = 0.05
Se incluyen las cuantias geometricas minimas
Coeficiente de minoración resistencia hormigón ..... ϒc = 1.50
Coeficiente de minoración resistencia acero ..... ϒs = 1.15
Coeficiente de mayoracion de las acciones ..... ϒf = 1.60

-Caracteristicas del terreno:

Terreno sobre talón:
Peso especifico de las tierras (t/m3) ..... ϒt = 1.80
Angulo de rozamiento interno de las tierras (°) ..... ϕ = 30.00
Angulo de rozamiento entre las tierras y el muro (°) .... δ = 0.00
Coeficiente de empuje activo calculado segun Coulomb ... Kax = 0.333
Cohesión de las tierras (t/m²) ..... c = 0.00
Terreno sobre puntera :
Peso especifico de las tierras (t/m3) ..... ϒt = 1.80
Angulo de rozamiento interno de las tierras (°) ..... ϕ = 30.00
Angulo de rozamiento entre las tierras y el muro (°) .... δ = 0.00
Coeficiente de empuje pasivo de las tierras ..... Kpx = 3.000

Terreno de cimentación :
Coeficiente de rozamiento entre el cimiento y el suelo .. μ = 0.577
Adherencia entre el cimiento y el suelo (t/m²) ..... a = 0.00

Angulo de la superficie del terreno con la horizontal ... β = 0.00°

-Sobrecargas:

Carga por unidad de longitud de talud (t/m²) ..... q = 1.00
No se considera la acción sísmica .....

-Acciones del tablero sobre el estribo :

Reacciones verticales (t) y excentricidades transversales (m) :

Reacción del peso propio del tablero ... Rpp = 49.00 , Exc.= 0.00
Reacción del peso de la superestructura. Rse = 16.68 , Exc.= 0.00
Reacción hiperestática de pretensado ... Rhp = 0.00 , Exc.= 0.00
Reacción máxima de la sobrecarga ..... Rma = 62.06 , Exc.= 0.00
Reacción mínima de la sobrecarga ..... Rmi = -7.91 , Exc.= 0.00
Reacción debida al gradiente térmico ... Rgt = 0.00 , Exc.= 0.00
Reacción debidas a otras acciones ..... Rot = 0.00 , Exc.= 0.00

Reacciones horizontales longitudinales (t) :

Reacción debida al frenado (+ -) ..... Rfx = 7.55
Reacción debida a las deformaciones impuestas ..... Rdx = 0.00
Reacciones debidas a otras causas (Rozam.,sismo,etc) , Rox = 0.00

Reacciones horizontales transversales (t) :

Reaccion debida al viento ..... Rvy = 13.63
Reacción debida a la fuerza centrifuga ..... Rcy = 0.00
Reacciones debidas a otras causas (Rozam.,sismo,etc) , Roy = 0.00

ACCIONES SOBRE EL ESTRIBO

Las acciones actuantes sobre el estribo tienen el siguiente origen:

a) Peso propio del estribo.
b) Acciones del tablero.
c) Empuje y peso de las tierras.

Estas acciones pueden ser verticales Fz ,horizontales longitudinales Fx ,y horizontales transversales Fy. En las tablas que siguen, se recogen las citadas acciones junto con los momentos Ma ,Mx, y My :

Ma : Momento respecto a la puntera del estribo.Se utiliza para la comprobación de seguridad al vuelco.

Mx, My: Momentos respecto al c.d.g de la zapata. Se utilizan para el calculo de las tensiones sobre el terreno.

a) PESO PROPIO DEL ESTRIBO

Zona	Volumen (m3)	Peso Fz (t)	Ma (txm)	My (txm)
Muro frontal	24.15	60.37	-62.94	20.07
Muro de guarda	1.69	4.22	-6.01	-0.21
Muros en vuelta	5.04	12.61	-19.23	-1.89
Aletas en voladizo	0.17	0.44	-1.19	-0.59
Contrafuertes aleta	0.00	0.00	0.00	0.00
Impostas	0.00	0.00	0.00	0.00
Macizos caquejeado	0.00	0.00	0.00	0.00
Zapata	21.73	54.31	-74.68	0.00
TOTAL	52.78	131.94	-164.04	17.38

b) ACCIONES DEL TABLERO

b1) Reacciones verticales:

Se consideran las reacciones del tablero en los siguientes casos:

-Caso permanente: Incluye las reacciones del peso propio del tablero y de la superestructura, las reacciones hiperestáticas de pretensado y otras acciones permanentes.

-Caso máximo: Incluye la suma de las reacciones de las acciones permanentes y las reacciones máximas de las sobrecargas variables.

-Caso mínimo: Incluye la suma de las reacciones de las acciones permanentes y las reacciones mínimas de las sobrecargas variables.

Reacción	Axil Fz (t)	Ma (txm)	My (txm)
Permanente	65.68	-55.83	34.48
Máxima	127.74	-108.58	67.06
Mínima	57.77	-49.10	30.33

b2) Reacciones horizontales longitudinales:

Las reacciones horizontales que ejerce el tablero provienen de movimientos impuestos, frenado,sismo , rozamiento de apoyos y de otras acciones.

El valor maximo considerado para estas acciones es:

Reaccion Longitudinal	Fx (t)	Ma (txm)	My (txm)
Maxima	7.55	31.33	31.33

b3) Reacciones horizontales transversales:

Estas reacciones provienen de dos tipos de fuerzas:

-Fuerzas transversales:

Son debidas a las acciones de viento y sismo, y a la fuerza centrifuga de los vehiculos que circulan por el tablero :

Fy = 13.63 t. ; Mx = 56.58 txm.

-Fuerzas verticales:

Debido a la excentricidad transversal de las reacciones verticales, se produce un momento transversal Mx :

. Para reaccion vertical permanente .. Mx = 0.00 txm.
. Para reaccion vertical maxima ..... Mx = 0.00 txm.
. Para reaccion vertical minima ..... Mx = 0.00 txm.

c) EMPUJE Y PESO DE TIERRAS

c1) Acciones horizontales:

Acción	Fuerza Fx (t)	Mz (txm)	My (txm)
Empuje de tierras.	44.59	78.77	78.77
Empuje de sobrecarga.	12.83	33.37	33.37
Empuje del agua.	0.00	0.00	0.00
Empuje total sobre trasdós.	57.42	112.14	112.14
Empuje pasivo frente puntera.	83.16	55.44	55.44

c2) Acciones verticales:

Acción	Fuerza Fz (t)	Mz (txm)	My (txm)
Peso tierras sobre talón.	62.08	-135.84	-50.48
Peso tierras sobre puntera.	6.39	-1.60	7.19
Sobrecarga sobre terraplen.	8.52	-18.32	-6.60
Rozamiento vertical tierras.	0.00	0.00	0.00
Resultante total vertical.	76.99	-155.75	-49.89

COMPROBACIÓN DE ESTABILIDAD

Se consideran las siguientes hipótesis para las comprobaciones al vuelco y deslizamiento :

Hipotesis 1 : Construcción. Situación de estribo con relleno antes de construir el tablero.

Hipotesis 2 : Construcción. Situación de tablero construido antes del relleno del estribo.

Hipotesis 3 : Servicio. Se considera la hipótesis más desfavorable que corresponde al mínimo valor de la reacción vertical del tablero.

Hipótesis Nº	Coeficientes de seguridad Vuelco	Deslizamiento
1	5.640	4.684
2	7.017	7.317
3	4.191	6.770

El coeficiente de seguridad al vuelco se obtiene a partir de los momentos Mz respecto de la puntera de la zapata.Se distinguen momentos volcadores y estabilizadores.El coeficiente de seguridad se obtiene como cociente entre estos momentos.

El mínimo coeficiente de seguridad al vuelco es mayor que 2, y por tanto se cumple la seguridad al vuelco.

El coeficiente de seguridad al deslizamiento se obtiene como cociente entre la fuerza estabilizadora y la desestabilizadora. La primera es la fuerza de rozamiento obtenida como producto de las fuerzas verticales por un coeficiente de rozamiento igual a

$$\mu = Tg\ \phi = 0.577$$

en donde ϕ es el ángulo de rozamiento entre la zapata y terreno. Tambien se consideran como fuerzas estabilizadoras,la fuerza de adherencia suelo-zapata, el empuje pasivo frente a puntera, la existencia de tacón y la inclinación de la base de la zapata.

La fuerza desestabilizadora es la resultante de las fuerzas horizontales tanto longitudinales como transversales.

El mínimo coeficiente de seguridad al deslizamiento es mayor que 1.5 ,cumpliéndose por tanto la seguridad al deslizamiento.

ESTADO TENSIONAL EN EL TERRENO

Se consideran las siguientes hipotesis para el cálculo de las tensiones en el terreno :

Hipotesis 1 : Construcción. Se supone que el relleno se ejecuta antes que el tablero.

Hipotesis 2 : Construcción. Se supone que el tablero se ejecuta antes que el relleno.

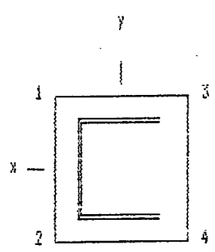
Hipotesis 3 : Servicio, con reacción de tablero minima y acciones horizontales máximas.

Hipotesis 4 : Servicio, con reacción de tablero minima y acciones longitudinales nulas.

Hipotesis 5 : Servicio, con reacción de tablero máxima y acciones longitudinales nulas.

Hipotesis 6 : Servicio, con reacción de tablero máxima y acciones horizontales máximas.

Las tensiones σ1,σ2,σ3,σ4 del terreno en las 4 esquinas de la base de la zapata (figura 1),



(fig.1)

se obtienen a partir de la formula de flexocompresión:

$$\sigma = \frac{N}{A} + \frac{Mx}{-Wx} + \frac{My}{-Wy}$$

donde N , Mx , My , son los esfuerzos en la base de la zapata , y

A = 21.73 m2 , Wx= 28.80 m3 , Wy = 9.96 m3

son las caracteristicas mecánicas de la base de la zapata.

La expresión anterior solamente es valida en el caso de que toda la planta resulte comprimida, en otro caso, y dado que el terreno no puede soportar traccion alguna, el programa calcula las tensiones del terreno de manera iterativa.

El proceso iterativo anterior, se detiene cuando la resultante de las tensiones obtenidas, sea sensiblemente igual a los esfuerzos que solicitan a la base de la zapata.

La tension media, se obtiene según la expresión : $\sigma med = \frac{N}{A}$

Siguiendo esta formulación,resulta la siguiente tabla que resume el estado tensional correspondiente a las 6 hipotesis anteriores :

ESFUERZOS DE ZAPATA Y TENSIONES DEL TERRENO

Hip	N (t)	Mx (txm)	My (txm)	σ1 (t/m²)	σ2 (t/m²)	σ3 (t/m²)	σ4 (t/m²)	σmed (t/m²)
1	250.93	0.00	135.06	25.31	25.31	0.00	0.00	11.55
2	239.62	56.58	83.19	21.36	17.41	4.65	0.70	11.03
3	308.70	56.58	196.72	37.93	32.90	0.00	0.00	14.21
4	308.70	56.58	2.19	18.97	12.01	16.41	12.45	14.21
5	378.67	56.58	34.55	22.88	18.92	15.94	11.98	17.43
6	378.67	56.58	233.46	42.85	38.90	0.00	0.00	17.43

ANALISIS ESTRUCTURAL DEL ESTRIBO COMO EMPARRILLADO ESPACIAL

DIMENSIONES Y CARACTERISTICAS MECANICAS DE LAS BARRAS

Barra Nº	i Nº	j Nº	Long. (m.)	Canto (m.)	Ancho (m.)	Area (m²)	Iner.1 (m4)	Iner.2 (m4)
1	1	2	0.59	1.05	0.31	0.324	0.003	0.030
2	2	3	0.59	1.05	0.31	0.324	0.003	0.030
3	3	4	0.59	1.05	0.31	0.324	0.003	0.030
4	4	5	0.59	1.05	0.31	0.324	0.003	0.030
5	5	6	0.59	1.05	0.31	0.324	0.003	0.030
6	6	7	0.59	0.25	0.31	0.077	0.001	0.000
7	7	8	0.59	0.25	0.31	0.077	0.001	0.000
8	9	10	0.59	1.05	0.62	0.647	0.021	0.059
9	10	11	0.59	1.05	0.62	0.647	0.021	0.059
10	11	12	0.59	1.05	0.62	0.647	0.021	0.059
11	12	13	0.59	1.05	0.62	0.647	0.021	0.059
12	13	14	0.59	1.05	0.62	0.647	0.021	0.059
13	14	15	0.59	0.25	0.62	0.154	0.005	0.001
14	15	16	0.59	0.25	0.62	0.154	0.005	0.001
15	17	18	0.59	1.05	0.62	0.647	0.021	0.059
16	18	19	0.59	1.05	0.62	0.647	0.021	0.059
17	19	20	0.59	1.05	0.62	0.647	0.021	0.059
18	20	21	0.59	1.05	0.62	0.647	0.021	0.059
19	21	22	0.59	1.05	0.62	0.647	0.021	0.059
20	22	23	0.59	0.25	0.62	0.154	0.005	0.001
21	23	24	0.59	0.25	0.62	0.154	0.005	0.001
22	25	26	0.59	1.05	0.62	0.647	0.021	0.059
23	26	27	0.59	1.05	0.62	0.647	0.021	0.059
24	27	28	0.59	1.05	0.62	0.647	0.021	0.059
25	28	29	0.59	1.05	0.62	0.647	0.021	0.059
26	29	30	0.59	1.05	0.62	0.647	0.021	0.059
27	30	31	0.59	0.25	0.62	0.154	0.005	0.001
28	31	32	0.59	0.25	0.62	0.154	0.005	0.001
29	33	34	0.59	1.05	0.62	0.647	0.021	0.059
30	34	35	0.59	1.05	0.62	0.647	0.021	0.059
31	35	36	0.59	1.05	0.62	0.647	0.021	0.059
32	36	37	0.59	1.05	0.62	0.647	0.021	0.059
33	37	38	0.59	1.05	0.62	0.647	0.021	0.059
34	38	39	0.59	0.25	0.62	0.154	0.005	0.001
35	39	40	0.59	0.25	0.62	0.154	0.005	0.001
36	41	42	0.59	1.05	0.62	0.647	0.021	0.059
37	42	43	0.59	1.05	0.62	0.647	0.021	0.059
38	43	44	0.59	1.05	0.62	0.647	0.021	0.059
39	44	45	0.59	1.05	0.62	0.647	0.021	0.059
40	45	46	0.59	1.05	0.62	0.647	0.021	0.059
41	46	47	0.59	0.25	0.62	0.154	0.005	0.001
42	47	48	0.59	0.25	0.62	0.154	0.005	0.001
43	49	50	0.59	1.05	0.31	0.324	0.003	0.030
44	50	51	0.59	1.05	0.31	0.324	0.003	0.030

45	51	52	0.59	1.05	0.31	0.324	0.003	0.030
46	52	53	0.59	1.05	0.31	0.324	0.003	0.030
47	53	54	0.59	1.05	0.31	0.324	0.003	0.030
48	54	55	0.59	1.05	0.31	0.324	0.003	0.030
49	55	56	0.59	1.05	0.31	0.324	0.003	0.030
50	1	9	0.62	1.05	0.29	0.307	0.002	0.028
51	9	17	0.62	1.05	0.29	0.307	0.002	0.028
52	17	25	0.62	1.05	0.29	0.307	0.002	0.028
53	25	33	0.62	1.05	0.29	0.307	0.002	0.028
54	33	41	0.62	1.05	0.29	0.307	0.002	0.028
55	41	49	0.62	1.05	0.29	0.307	0.002	0.028
56	2	10	0.62	1.05	0.59	0.615	0.018	0.057
57	10	18	0.62	1.05	0.59	0.615	0.018	0.057
58	18	26	0.62	1.05	0.59	0.615	0.018	0.057
59	26	34	0.62	1.05	0.59	0.615	0.018	0.057
60	34	42	0.62	1.05	0.59	0.615	0.018	0.057
61	42	50	0.62	1.05	0.59	0.615	0.018	0.057
62	3	11	0.62	1.05	0.59	0.615	0.018	0.057
63	11	19	0.62	1.05	0.59	0.615	0.018	0.057
64	19	27	0.62	1.05	0.59	0.615	0.018	0.057
65	27	35	0.62	1.05	0.59	0.615	0.018	0.057
66	35	43	0.62	1.05	0.59	0.615	0.018	0.057
67	43	51	0.62	1.05	0.59	0.615	0.018	0.057
68	4	12	0.62	1.05	0.59	0.615	0.018	0.057
69	12	20	0.62	1.05	0.59	0.615	0.018	0.057
70	20	28	0.62	1.05	0.59	0.615	0.018	0.057
71	28	36	0.62	1.05	0.59	0.615	0.018	0.057
72	36	44	0.62	1.05	0.59	0.615	0.018	0.057
73	44	52	0.62	1.05	0.59	0.615	0.018	0.057
74	5	13	0.62	1.05	0.59	0.615	0.018	0.057
75	13	21	0.62	1.05	0.59	0.615	0.018	0.057
76	21	29	0.62	1.05	0.59	0.615	0.018	0.057
77	29	37	0.62	1.05	0.59	0.615	0.018	0.057
78	37	45	0.62	1.05	0.59	0.615	0.018	0.057
79	45	53	0.62	1.05	0.59	0.615	0.018	0.057
80	6	14	0.62	1.21	0.59	0.708	0.020	0.086
81	14	22	0.62	1.21	0.59	0.708	0.020	0.086
82	22	30	0.62	1.21	0.59	0.708	0.020	0.086
83	30	38	0.62	1.21	0.59	0.708	0.020	0.086
84	38	46	0.62	1.21	0.59	0.708	0.020	0.086
85	46	54	0.62	1.21	0.59	0.708	0.020	0.086
86	7	15	0.62	0.25	0.59	0.146	0.004	0.001
87	15	23	0.62	0.25	0.59	0.146	0.004	0.001
88	23	31	0.62	0.25	0.59	0.146	0.004	0.001
89	31	39	0.62	0.25	0.59	0.146	0.004	0.001
90	39	47	0.62	0.25	0.59	0.146	0.004	0.001
91	47	55	0.62	0.25	0.59	0.146	0.004	0.001
92	8	16	0.62	0.25	0.29	0.073	0.001	0.000
93	16	24	0.62	0.25	0.29	0.073	0.001	0.000
94	24	32	0.62	0.25	0.29	0.073	0.001	0.000
95	32	40	0.62	0.25	0.29	0.073	0.001	0.000
96	40	48	0.62	0.25	0.29	0.073	0.001	0.000
97	48	56	0.62	0.25	0.29	0.073	0.001	0.000
98	57	58	0.59	0.30	0.90	0.270	0.018	0.002
99	58	57	0.90	0.30	0.59	0.176	0.005	0.001

100	56	58	0.90	0.30	0.29	0.088	0.001	0.001
101	58	59	0.90	0.30	0.29	0.088	0.001	0.001
102	54	57	1.07	0.30	0.59	0.176	0.005	0.001
103	57	59	1.07	0.30	0.59	0.176	0.005	0.001

Hipotesis (1) : Peso propio del muro y aletas del estribo

DESPLAZAMIENTOS DE LOS NUDOS

Nudo Nº	Despl.y (mm)	Despl.x (mm)	Despl.z (mm)	Giro y 1000xrad	Giro x 1000xrad	Giro z 1000xrad
1	-0.000	-0.000	0.000	-0.000	-0.000	-0.000
2	-0.000	-0.000	0.001	-0.000	-0.000	-0.000
3	-0.000	-0.000	0.003	-0.000	-0.000	-0.000
4	0.000	-0.000	0.003	-0.000	-0.000	-0.000
5	0.000	-0.001	0.004	-0.001	-0.000	-0.000
6	0.000	-0.001	0.004	-0.001	-0.000	-0.000
7	0.000	-0.002	0.005	-0.002	-0.000	-0.000
8	0.000	-0.003	0.005	-0.002	0.000	-0.000
9	-0.000	-0.000	0.000	-0.000	0.000	-0.000
10	-0.000	-0.000	0.001	-0.000	-0.000	-0.000
11	-0.000	-0.000	0.003	-0.000	-0.000	-0.000
12	0.000	-0.000	0.003	-0.000	-0.000	-0.000
13	0.000	-0.001	0.004	-0.001	-0.000	-0.000
14	0.000	-0.001	0.004	-0.001	-0.000	-0.000
15	0.000	-0.002	0.005	-0.002	-0.000	-0.000
16	0.000	-0.003	0.005	-0.002	-0.000	-0.000
17	-0.000	-0.000	0.000	-0.000	0.000	-0.000
18	-0.000	-0.000	0.001	-0.000	-0.000	-0.000
19	-0.000	-0.000	0.003	-0.000	-0.000	-0.000
20	0.000	-0.000	0.003	-0.000	-0.000	-0.000
21	0.000	-0.001	0.004	-0.001	-0.000	-0.000
22	0.000	-0.001	0.004	-0.001	-0.000	-0.000
23	0.000	-0.002	0.005	-0.002	-0.000	-0.000
24	0.000	-0.003	0.005	-0.002	-0.000	-0.000
25	-0.000	-0.000	0.000	-0.000	0.000	-0.000
26	-0.000	-0.000	0.001	-0.000	-0.000	-0.000
27	-0.000	-0.000	0.003	-0.000	-0.000	-0.000
28	-0.000	-0.001	0.004	-0.001	-0.000	-0.000
29	0.000	-0.001	0.004	-0.001	-0.000	-0.000
30	0.000	-0.001	0.004	-0.001	-0.000	-0.000
31	0.000	-0.002	0.005	-0.002	-0.000	-0.001
32	0.000	-0.004	0.005	-0.002	-0.000	-0.001
33	-0.000	0.000	0.000	-0.000	0.000	0.000
34	-0.000	-0.000	0.001	-0.000	0.000	0.000
35	-0.000	-0.000	0.003	-0.000	-0.000	-0.000
36	-0.000	-0.001	0.004	-0.001	-0.000	-0.000
37	0.000	-0.001	0.004	-0.001	-0.000	-0.000
38	0.000	-0.002	0.005	-0.001	-0.000	-0.000
39	0.000	-0.003	0.005	-0.002	-0.000	-0.001
40	0.001	-0.004	0.005	-0.003	-0.000	-0.001
41	-0.000	0.000	0.000	-0.000	0.000	0.000
42	-0.000	-0.000	0.002	-0.000	0.000	0.000
43	-0.000	-0.000	0.003	-0.000	-0.000	0.000
44	-0.000	-0.001	0.004	-0.001	-0.000	-0.000
45	0.000	-0.001	0.004	-0.001	-0.000	-0.000

46	0.000	-0.002	0.005	-0.001	-0.001	-0.001
47	0.001	-0.003	0.005	-0.003	-0.001	-0.001
48	0.001	-0.005	0.006	-0.003	-0.000	-0.001
49	-0.000	0.000	0.000	-0.000	0.000	0.000
50	-0.000	-0.000	0.002	-0.000	-0.000	0.000
51	-0.000	-0.000	0.003	-0.000	-0.000	0.000
52	-0.000	-0.001	0.004	-0.001	-0.000	-0.000
53	0.000	-0.001	0.005	-0.001	-0.001	-0.000
54	0.000	-0.002	0.005	-0.002	-0.001	-0.001
55	0.001	-0.004	0.006	-0.003	-0.001	-0.001
56	0.001	-0.006	0.006	-0.004	-0.001	-0.001
57	-0.000	-0.004	0.010	-0.005	-0.001	-0.001
58	0.000	-0.006	0.010	-0.004	-0.001	-0.001
59	-0.001	-0.007	0.013	-0.004	-0.001	-0.001

ESFUERZOS EN LAS BARRAS

Barra Nº	i Nº	j Nº	Axil (t.)	Cort.1 (t.)	Cort.2 (t.)	Flec.1i (txm)	Flec.1j (txm)	Flec.2i (txm)	Flec.2j (txm)
1	1	2	2.37	-0.00	0.01	0.00	0.00	0.03	-0.02
2	2	3	1.88	-0.00	0.01	0.00	0.00	0.02	-0.02
3	3	4	1.40	0.00	0.01	-0.00	-0.00	0.02	-0.01
4	4	5	0.92	0.00	0.01	-0.00	-0.00	0.01	-0.01
5	5	6	0.45	0.00	0.00	-0.00	-0.00	0.01	-0.01
6	6	7	0.17	-0.00	0.00	0.00	0.00	0.00	-0.00
7	7	8	0.06	-0.00	0.00	0.00	0.00	0.00	-0.00
8	9	10	4.75	-0.03	0.01	0.01	0.01	0.06	-0.05
9	10	11	3.78	-0.02	0.01	0.00	0.01	0.05	-0.04
10	11	12	2.81	-0.01	0.01	0.00	0.01	0.04	-0.03
11	12	13	1.86	-0.00	0.01	-0.00	0.00	0.03	-0.02
12	13	14	0.91	0.01	0.01	-0.00	-0.00	0.02	-0.01
13	14	15	0.33	0.01	0.00	-0.00	-0.00	0.01	-0.00
14	15	16	0.11	0.00	0.00	-0.00	-0.00	0.00	-0.00
15	17	18	4.80	-0.05	0.01	0.01	0.02	0.06	-0.05
16	18	19	3.82	-0.05	0.01	0.01	0.02	0.05	-0.05
17	19	20	2.84	-0.04	0.01	0.01	0.01	0.04	-0.04
18	20	21	1.87	-0.01	0.01	0.00	0.01	0.03	-0.03
19	21	22	0.92	0.01	0.01	-0.01	-0.00	0.02	-0.01
20	22	23	0.34	0.01	0.00	-0.00	-0.00	0.01	-0.00
21	23	24	0.11	0.01	0.00	-0.00	-0.00	0.00	-0.00
22	25	26	4.87	-0.08	0.01	0.02	0.02	0.06	-0.06
23	26	27	3.90	-0.08	0.01	0.02	0.03	0.06	-0.06
24	27	28	2.91	-0.07	0.01	0.02	0.03	0.06	-0.05
25	28	29	1.92	-0.04	0.02	0.01	0.02	0.05	-0.03
26	29	30	0.94	0.00	0.01	-0.00	0.00	0.03	-0.02
27	30	31	0.35	0.01	0.00	-0.00	-0.00	0.01	-0.00
28	31	32	0.11	0.01	0.00	-0.00	-0.00	0.00	-0.00
29	33	34	4.98	-0.10	-0.01	0.03	0.03	0.06	-0.06
30	34	35	4.02	-0.11	-0.01	0.03	0.04	0.07	-0.07
31	35	36	3.04	-0.12	0.00	0.03	0.04	0.07	-0.07
32	36	37	2.04	-0.11	0.02	0.02	0.04	0.07	-0.06
33	37	38	1.00	-0.04	0.05	0.00	0.02	0.05	-0.03
34	38	39	0.38	-0.01	0.01	0.00	0.00	0.01	-0.00

35	39	40	0.12	-0.01	0.00	0.00	0.00	0.00	-0.00
36	41	42	5.08	-0.11	-0.02	0.03	0.03	0.06	-0.07
37	42	43	4.17	-0.11	-0.02	0.03	0.04	0.07	-0.08
38	43	44	3.26	-0.14	-0.03	0.03	0.05	0.08	-0.10
39	44	45	2.32	-0.19	-0.02	0.04	0.07	0.10	-0.11
40	45	46	1.30	-0.22	0.07	0.03	0.10	0.12	-0.07
41	46	47	0.41	-0.07	0.01	0.02	0.02	0.01	-0.00
42	47	48	0.12	-0.03	0.00	0.01	0.01	0.00	0.00
43	49	50	2.58	-0.02	-0.02	0.01	0.01	0.03	-0.03
44	50	51	2.17	-0.03	-0.02	0.01	0.01	0.03	-0.04
45	51	52	1.78	-0.04	-0.02	0.01	0.01	0.04	-0.06
46	52	53	1.43	-0.06	-0.05	0.02	0.02	0.06	-0.10
47	53	54	1.14	-0.09	-0.14	0.02	0.03	0.12	-0.20
48	54	55	0.70	-0.07	0.19	0.02	0.02	0.21	-0.10
49	55	56	0.24	-0.02	0.09	0.01	0.01	0.06	-0.01
50	1	9	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
51	9	17	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
52	17	25	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
53	25	33	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
54	33	41	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
55	41	49	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
56	2	10	0.02	-0.01	0.00	0.00	0.00	-0.00	0.00
57	10	18	0.02	-0.03	0.00	0.01	0.01	-0.00	0.00
58	18	26	0.02	-0.06	0.00	0.02	0.02	0.00	-0.00
59	26	34	0.02	-0.09	0.00	0.03	0.03	0.00	-0.00
60	34	42	0.02	-0.10	0.00	0.03	0.03	0.00	0.00
61	42	50	0.01	-0.06	0.00	0.02	0.01	0.00	0.00
62	3	11	0.02	-0.01	-0.00	0.00	0.00	-0.01	0.00
63	11	19	0.03	-0.03	-0.00	0.01	0.01	-0.00	0.00
64	19	27	0.04	-0.05	-0.00	0.02	0.02	0.00	-0.00
65	27	35	0.05	-0.09	0.01	0.03	0.03	0.01	-0.00
66	35	43	0.04	-0.12	0.01	0.04	0.04	0.01	0.00
67	43	51	0.01	-0.08	0.01	0.03	0.02	0.00	0.00
68	4	12	-0.02	-0.00	-0.00	0.00	-0.00	-0.01	0.01
69	12	20	-0.00	-0.01	-0.00	0.01	0.00	-0.01	0.01
70	20	28	0.02	-0.03	-0.01	0.01	0.01	-0.01	0.00
71	28	36	0.05	-0.08	-0.00	0.03	0.02	0.00	-0.01
72	36	44	0.07	-0.13	0.02	0.04	0.04	0.02	-0.00
73	44	52	0.02	-0.12	0.03	0.05	0.03	0.02	0.00
74	5	13	-0.08	0.00	-0.00	0.00	-0.00	-0.02	0.02
75	13	21	-0.07	0.00	-0.00	0.00	-0.01	-0.02	0.02
76	21	29	-0.05	-0.00	-0.01	0.01	-0.00	-0.02	0.01
77	29	37	-0.00	-0.03	-0.01	0.02	0.00	-0.01	0.00
78	37	45	0.06	-0.12	-0.01	0.04	0.03	0.01	-0.01
79	45	53	0.03	-0.19	0.09	0.07	0.04	0.05	0.01
80	6	14	-0.20	0.01	-0.00	0.00	-0.01	-0.05	0.05
81	14	22	-0.20	0.01	-0.01	0.00	-0.01	-0.05	0.05
82	22	30	-0.20	0.02	-0.02	0.00	-0.01	-0.05	0.04
83	30	38	-0.20	0.01	-0.03	0.01	-0.02	-0.06	0.04
84	38	46	-0.15	-0.03	-0.05	0.04	-0.02	-0.06	0.03
85	46	54	-0.02	-0.33	-0.11	0.14	0.07	-0.07	0.00
86	7	15	-0.07	0.00	-0.00	0.00	-0.00	-0.00	0.00
87	15	23	-0.08	0.01	-0.00	-0.00	-0.00	-0.00	0.00
88	23	31	-0.08	0.01	-0.00	-0.00	-0.01	-0.00	0.00
89	31	39	-0.07	0.01	-0.00	0.00	-0.00	-0.00	-0.00

90	39	47	-0.09	-0.03	-0.01	0.01	0.00	-0.00	-0.00
91	47	55	-0.05	-0.09	-0.02	0.03	0.03	-0.00	-0.00
92	8	16	-0.05	0.00	-0.00	-0.00	-0.00	-0.00	0.00
93	16	24	-0.06	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
94	24	32	-0.06	0.00	-0.01	-0.00	-0.00	-0.00	-0.00
95	32	40	-0.07	0.00	-0.01	0.00	-0.00	-0.00	-0.00
96	40	48	-0.06	-0.01	-0.01	0.00	0.00	-0.00	-0.00
97	48	56	-0.03	-0.02	-0.02	0.01	0.00	-0.00	-0.00
98	57	58	0.18	-0.00	-0.07	0.00	-0.00	-0.03	-0.01
99	55	57	-0.12	-0.07	0.00	0.05	0.01	0.00	0.00
100	56	58	-0.10	-0.02	0.00	0.01	0.01	0.00	0.00
101	58	59	-0.03	-0.01	-0.00	0.00	0.00	-0.00	0.00
102	54	57	0.36	-0.13	-0.01	0.10	0.04	-0.01	-0.00
103	57	59	0.03	0.02	0.00	-0.02	-0.00	0.00	0.00

Hipotesis (2) : Empuje de tierras + Reacción Fx del tablero

DESPLAZAMIENTOS DE LOS NUDOS

Nudo Nº	Despl.y (mm)	Despl.x (mm)	Despl.z (mm)	Giro y 1000xrad	Giro x 1000xrad	Giro z 1000xrad
1	0.000	0.000	-0.000	0.000	-0.000	0.000
2	0.000	0.006	-0.000	0.021	0.000	0.000
3	0.000	0.023	-0.000	0.034	0.000	0.000
4	0.000	0.046	-0.000	0.043	0.000	0.000
5	0.000	0.072	-0.000	0.048	0.000	0.000
6	0.000	0.101	-0.000	0.050	-0.000	0.000
7	0.000	0.143	-0.000	0.083	0.000	0.000
8	0.000	0.194	-0.000	0.088	0.000	0.000
9	0.000	0.000	-0.000	0.000	-0.000	0.000
10	0.000	0.006	-0.000	0.021	-0.000	0.000
11	0.000	0.023	-0.000	0.035	-0.000	0.001
12	0.000	0.046	-0.000	0.044	-0.000	0.001
13	0.000	0.073	-0.000	0.048	-0.000	0.002
14	0.000	0.102	-0.000	0.050	-0.000	0.003
15	0.000	0.144	-0.000	0.083	-0.000	0.003
16	0.000	0.194	-0.000	0.088	-0.000	0.003
17	0.000	0.000	-0.000	0.000	-0.000	0.000
18	0.000	0.007	-0.000	0.021	-0.000	0.000
19	0.000	0.023	-0.000	0.036	-0.000	0.001
20	0.000	0.047	-0.000	0.045	-0.000	0.002
21	0.000	0.075	-0.000	0.050	-0.000	0.004
22	0.000	0.105	-0.000	0.052	-0.000	0.005
23	0.000	0.147	-0.000	0.083	-0.000	0.006
24	0.000	0.197	-0.000	0.087	-0.000	0.006
25	0.000	0.000	-0.000	0.000	-0.000	0.000
26	0.000	0.007	-0.000	0.022	-0.000	0.000
27	0.000	0.024	-0.000	0.037	-0.000	0.002
28	0.000	0.049	-0.000	0.046	-0.000	0.003
29	0.000	0.078	-0.000	0.052	-0.000	0.005
30	0.000	0.109	-0.000	0.054	-0.000	0.008
31	0.000	0.151	-0.000	0.082	-0.000	0.009
32	0.000	0.201	-0.000	0.085	-0.000	0.008
33	0.000	0.000	0.000	0.000	-0.000	0.000
34	0.000	0.007	0.000	0.023	-0.000	0.001
35	0.000	0.025	0.000	0.038	-0.000	0.002
36	0.000	0.051	0.000	0.049	-0.000	0.004
37	0.000	0.081	0.000	0.054	-0.000	0.006
38	0.000	0.114	0.000	0.057	-0.000	0.009
39	0.001	0.158	-0.000	0.081	-0.000	0.010
40	0.001	0.205	-0.000	0.080	-0.000	0.008
41	0.000	0.000	0.000	0.000	-0.000	0.000
42	0.000	0.007	0.000	0.024	-0.000	0.001
43	0.000	0.026	0.000	0.040	-0.000	0.002
44	0.000	0.053	0.000	0.051	-0.000	0.004
45	0.000	0.085	0.000	0.057	-0.000	0.006

46	0.000	0.120	0.000	0.080	-0.000	0.009
47	0.001	0.164	0.000	0.076	-0.000	0.005
48	0.001	0.207	0.000	0.071	-0.001	0.002
49	0.000	0.000	0.000	0.000	-0.000	0.000
50	0.000	0.008	0.000	0.025	-0.000	0.001
51	0.000	0.028	0.000	0.042	-0.000	0.002
52	0.000	0.056	0.000	0.053	-0.000	0.004
53	0.000	0.089	0.000	0.060	-0.000	0.006
54	0.001	0.125	0.000	0.064	-0.000	0.009
55	0.001	0.164	0.000	0.068	-0.001	0.008
56	0.001	0.204	0.000	0.068	-0.001	0.005
57	0.013	0.164	-0.060	0.067	-0.002	0.017
58	0.015	0.204	-0.060	0.067	-0.002	0.017
59	0.030	0.204	-0.121	0.068	-0.002	0.017

ESFUERZOS EN LAS BARRAS

Barra Nº	i Nº	j Nº	Axil (t.)	Cort.1 (t.)	Cort.2 (t.)	Flec.1i (txm)	Flec.1j (txm)	Flec.2i (txm)	Flec.2j (txm)
1	1	2	-0.05	0.00	-1.90	-0.00	-0.00	-3.69	2.57
2	2	3	-0.04	0.00	-1.48	-0.00	-0.00	-2.55	1.69
3	3	4	-0.03	0.00	-1.11	-0.00	-0.00	-1.66	1.01
4	4	5	-0.02	0.00	-0.78	-0.00	-0.00	-0.97	0.51
5	5	6	-0.01	0.00	-0.50	-0.00	-0.00	-0.46	0.17
6	6	7	-0.00	-0.00	-0.17	0.00	0.00	-0.12	0.02
7	7	8	-0.00	-0.00	-0.04	0.00	0.00	-0.02	-0.00
8	9	10	-0.10	0.03	-3.83	-0.01	-0.01	-7.43	5.19
9	10	11	-0.08	0.02	-2.99	-0.01	-0.01	-5.16	3.41
10	11	12	-0.05	0.02	-2.25	-0.01	-0.01	-3.35	2.03
11	12	13	-0.04	0.02	-1.59	-0.01	-0.01	-1.95	1.02
12	13	14	-0.02	0.02	-1.01	-0.00	-0.00	-0.93	0.34
13	14	15	-0.01	0.01	-0.54	-0.00	-0.00	-0.25	0.04
14	15	16	-0.00	0.00	-0.08	-0.00	-0.00	-0.04	-0.00
15	17	18	-0.08	0.06	-3.89	-0.02	-0.01	-7.59	5.31
16	18	19	-0.06	0.05	-3.05	-0.02	-0.01	-5.29	3.50
17	19	20	-0.04	0.04	-2.32	-0.01	-0.01	-3.45	2.09
18	20	21	-0.03	0.03	-1.67	-0.01	-0.01	-2.03	1.05
19	21	22	-0.02	0.03	-1.08	-0.01	-0.01	-0.96	0.33
20	22	23	-0.01	0.02	-0.54	-0.01	-0.01	-0.23	0.03
21	23	24	-0.00	0.01	-0.07	-0.00	-0.00	-0.04	-0.00
22	25	26	-0.05	0.09	-3.97	-0.03	-0.02	-7.83	5.51
23	26	27	-0.02	0.07	-3.13	-0.02	-0.02	-5.49	3.65
24	27	28	-0.02	0.04	-2.42	-0.01	-0.01	-3.62	2.20
25	28	29	-0.02	0.03	-1.80	-0.01	-0.01	-2.16	1.10
26	29	30	-0.03	0.03	-1.22	-0.01	-0.01	-1.04	0.32
27	30	31	-0.02	0.03	-0.39	-0.01	-0.01	-0.23	0.00
28	31	32	-0.00	0.02	-0.07	-0.01	-0.00	-0.03	-0.01
29	33	34	0.01	0.14	-4.11	-0.05	-0.03	-8.15	5.74
30	34	35	0.03	0.08	-3.24	-0.03	-0.02	-5.73	3.83
31	35	36	0.03	0.03	-2.49	-0.01	-0.01	-3.82	2.36
32	36	37	0.00	0.01	-1.93	-0.00	-0.00	-2.35	1.21
33	37	38	-0.02	0.02	-1.50	-0.01	-0.01	-1.19	0.31
34	38	39	-0.02	0.05	-0.56	-0.02	-0.01	-0.26	-0.07

35	39	40	-0.00	0.03	-0.03	-0.01	-0.01	-0.00	-0.01
36	41	42	0.12	0.22	-4.39	-0.08	-0.05	-8.55	5.98
37	42	43	0.10	0.08	-3.39	-0.02	-0.02	-5.97	3.99
38	43	44	0.07	0.01	-2.55	-0.00	-0.00	-4.00	2.51
39	44	45	0.05	-0.02	-1.94	0.00	0.01	-2.53	1.39
40	45	46	0.03	-0.01	-1.85	-0.00	0.01	-1.44	0.36
41	46	47	-0.01	0.07	-0.71	-0.03	-0.02	-0.27	-0.14
42	47	48	0.00	0.03	0.12	-0.01	-0.01	0.05	0.02
43	49	50	0.15	0.07	-2.51	-0.02	-0.02	-4.53	3.06
44	50	51	0.07	0.01	-2.02	-0.00	-0.00	-3.17	1.99
45	51	52	0.05	-0.00	-1.64	0.00	0.00	-2.16	1.21
46	52	53	0.06	-0.01	-1.29	0.00	0.00	-1.42	0.67
47	53	54	0.08	-0.01	-0.84	0.00	0.00	-0.93	0.44
48	54	55	0.24	0.05	-0.88	-0.02	-0.01	-0.81	0.29
49	55	56	0.03	-0.01	-0.27	0.00	0.00	-0.15	-0.00
50	1	9	-0.00	0.00	0.00	-0.00	-0.00	0.00	0.00
51	9	17	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00
52	17	25	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00
53	25	33	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00
54	33	41	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00
55	41	49	-0.00	0.00	-0.00	-0.00	0.00	-0.00	-0.00
56	2	10	-0.04	0.01	-0.02	-0.00	-0.00	0.04	-0.05
57	10	18	-0.04	0.03	-0.07	-0.01	-0.01	0.02	-0.06
58	18	26	-0.05	0.06	-0.11	-0.02	-0.02	-0.00	-0.07
59	26	34	-0.07	0.08	-0.15	-0.02	-0.03	-0.02	-0.07
60	34	42	-0.12	0.11	-0.17	-0.03	-0.04	-0.03	-0.08
61	42	50	-0.26	0.08	-0.05	-0.03	-0.02	-0.02	-0.01
62	3	11	-0.09	0.01	-0.00	-0.00	-0.01	0.16	-0.17
63	11	19	-0.10	0.03	-0.02	-0.01	-0.01	0.14	-0.15
64	19	27	-0.11	0.05	-0.04	-0.01	-0.02	0.10	-0.12
65	27	35	-0.13	0.06	-0.08	-0.01	-0.02	0.05	-0.10
66	35	43	-0.19	0.05	-0.09	-0.01	-0.02	0.02	-0.07
67	43	51	-0.26	0.02	-0.00	-0.01	-0.00	0.01	-0.01
68	4	12	-0.15	0.01	0.02	-0.00	-0.01	0.35	-0.34
69	12	20	-0.16	0.03	0.05	-0.01	-0.01	0.32	-0.29
70	20	28	-0.16	0.04	0.07	-0.01	-0.01	0.25	-0.21
71	28	36	-0.18	0.03	0.06	-0.01	-0.01	0.15	-0.12
72	36	44	-0.20	0.01	-0.01	-0.00	-0.00	0.04	-0.05
73	44	52	-0.22	-0.01	-0.03	0.00	0.00	-0.01	-0.01
74	5	13	-0.21	0.01	0.03	-0.00	-0.00	0.56	-0.54
75	13	21	-0.21	0.02	0.11	-0.00	-0.01	0.54	-0.47
76	21	29	-0.22	0.03	0.20	-0.01	-0.01	0.46	-0.34
77	29	37	-0.21	0.03	0.28	-0.01	-0.01	0.31	-0.14
78	37	45	-0.20	0.00	0.21	0.00	-0.00	0.09	-0.04
79	45	53	-0.19	-0.02	-0.20	0.01	0.00	-0.11	-0.01
80	6	14	-0.31	0.01	0.14	0.00	-0.00	1.22	-1.18
81	14	22	-0.31	0.02	-0.44	-0.00	-0.01	1.24	-0.96
82	22	30	-0.32	0.05	0.80	-0.01	-0.01	1.16	-0.67
83	30	38	-0.32	0.04	1.28	-0.01	-0.02	0.94	-0.17
84	38	46	-0.29	0.04	1.50	-0.00	-0.02	0.51	0.42
85	46	54	-0.21	0.00	0.23	0.00	-0.00	0.10	0.04
86	7	15	-0.08	0.00	0.01	-0.00	-0.00	0.01	-0.01
87	15	23	-0.09	0.01	0.02	-0.00	-0.00	0.02	-0.00
88	23	31	-0.10	0.02	0.05	-0.01	-0.01	0.02	0.00
89	31	39	-0.11	0.03	0.12	-0.01	-0.01	0.04	0.03

90	39	47	-0.13	0.05	0.22	-0.01	-0.02	0.05	0.09
91	47	55	-0.17	0.07	-0.43	-0.01	-0.03	-0.13	-0.14
92	8	16	-0.05	0.00	-0.00	-0.00	-0.00	0.00	-0.01
93	16	24	-0.05	0.00	-0.01	-0.00	-0.00	0.00	-0.01
94	24	32	-0.07	0.00	-0.02	-0.00	-0.00	-0.00	-0.01
95	32	40	-0.08	0.01	-0.03	-0.00	-0.00	-0.01	-0.01
96	40	48	-0.11	0.01	-0.09	-0.00	-0.00	-0.04	-0.01
97	48	56	-0.15	0.01	-0.29	-0.00	-0.00	-0.08	-0.09
98	57	58	-0.02	0.01	-0.04	-0.00	-0.00	-0.01	-0.01
99	55	57	0.05	-0.14	0.14	0.07	0.06	0.11	0.02
100	56	58	-0.06	-0.03	0.11	0.01	0.01	0.03	0.02
101	58	59	-0.01	-0.00	-0.00	0.00	0.00	-0.00	-0.00
102	54	57	-0.09	0.14	0.02	-0.12	-0.03	0.04	-0.02
103	57	59	0.01	0.01	0.00	-0.01	-0.00	0.00	0.00

Hipotesis (3) : Reacción vertical máxima del tablero: Rzmax

DESPLAZAMIENTOS DE LOS NUDOS

Nudo Nº	Despl.y (mm)	Despl.x (mm)	Despl.z (mm)	Giro y 1000xrad	Giro x 1000xrad	Giro z 1000xrad
1	-0.000	-0.000	0.000	-0.000	-0.000	-0.000
2	-0.000	-0.002	0.001	-0.006	-0.000	-0.000
3	-0.000	-0.007	0.002	-0.011	-0.000	-0.000
4	-0.000	-0.014	0.003	-0.015	-0.000	-0.000
5	0.000	-0.024	0.003	-0.017	-0.000	-0.000
6	0.000	-0.034	0.003	-0.019	-0.000	-0.000
7	0.000	-0.062	0.003	-0.071	-0.000	-0.000
8	0.000	-0.107	0.003	-0.080	-0.000	-0.000
9	-0.000	-0.000	0.000	-0.000	0.000	-0.000
10	-0.000	-0.002	0.001	-0.006	-0.000	-0.000
11	-0.000	-0.007	0.003	-0.011	-0.001	-0.000
12	-0.000	-0.014	0.003	-0.015	-0.001	-0.001
13	0.001	-0.024	0.004	-0.018	-0.002	-0.002
14	0.002	-0.035	0.004	-0.020	-0.003	-0.003
15	0.004	-0.064	0.004	-0.073	-0.003	-0.006
16	0.006	-0.110	0.004	-0.082	-0.004	-0.007
17	-0.000	-0.000	0.000	-0.000	0.000	-0.000
18	-0.001	-0.002	0.002	-0.006	-0.000	-0.000
19	-0.001	-0.007	0.004	-0.011	-0.001	-0.000
20	-0.000	-0.015	0.005	-0.016	-0.003	-0.001
21	0.001	-0.026	0.006	-0.020	-0.005	-0.003
22	0.004	-0.038	0.007	-0.022	-0.006	-0.006
23	0.007	-0.069	0.008	-0.080	-0.008	-0.011
24	0.011	-0.119	0.008	-0.086	-0.007	-0.014
25	-0.000	-0.000	0.000	-0.000	0.000	-0.000
26	-0.001	-0.002	0.003	-0.006	-0.000	-0.000
27	-0.001	-0.007	0.006	-0.012	-0.002	-0.000
28	-0.000	-0.016	0.009	-0.018	-0.004	-0.001
29	0.002	-0.028	0.011	-0.023	-0.007	-0.004
30	0.006	-0.043	0.013	-0.026	-0.010	-0.009
31	0.010	-0.079	0.015	-0.093	-0.013	-0.016
32	0.016	-0.133	0.016	-0.091	-0.011	-0.020
33	-0.000	0.000	0.000	-0.000	0.000	-0.000
34	-0.001	-0.002	0.004	-0.006	-0.000	-0.000
35	-0.001	-0.007	0.008	-0.013	-0.002	-0.000
36	-0.000	-0.017	0.013	-0.020	-0.004	-0.001
37	0.002	-0.031	0.017	-0.027	-0.008	-0.004
38	0.007	-0.049	0.022	-0.034	-0.015	-0.010
39	0.012	-0.090	0.029	-0.114	-0.018	-0.016
40	0.018	-0.149	0.029	-0.089	-0.010	-0.017
41	-0.000	0.000	0.000	-0.000	0.000	-0.000
42	-0.001	-0.002	0.005	-0.006	0.000	-0.000
43	-0.001	-0.008	0.011	-0.013	-0.002	-0.001
44	-0.000	-0.018	0.017	-0.022	-0.004	-0.002
45	0.003	-0.033	0.024	-0.031	-0.007	-0.005

46	0.007	-0.055	0.032	-0.045	-0.010	-0.011
47	0.012	-0.099	0.044	-0.136	-0.006	-0.003
48	0.015	-0.154	0.043	-0.075	-0.006	0.004
49	-0.000	0.000	0.000	-0.000	0.000	-0.000
50	-0.001	-0.002	0.006	-0.007	-0.001	-0.000
51	-0.001	-0.008	0.012	-0.014	-0.003	-0.001
52	0.000	-0.019	0.020	-0.024	-0.005	-0.002
53	0.003	-0.036	0.027	-0.036	-0.006	-0.005
54	0.008	-0.062	0.034	-0.051	-0.001	-0.010
55	0.010	-0.096	0.037	-0.065	0.006	0.001
56	0.012	-0.135	0.037	-0.066	-0.003	0.010
57	0.008	-0.097	0.090	-0.062	-0.002	-0.003
58	0.010	-0.134	0.090	-0.062	-0.003	-0.003
59	0.007	-0.134	0.146	-0.063	-0.002	-0.003

ESFUERZOS EN LAS BARRAS

Barra Nº	i Nº	j Nº	Axil (t.)	Cort.1 (t.)	Cort.2 (t.)	Flec.1i (txm)	Flec.1j (txm)	Flec.2i (txm)	Flec.2j (txm)
1	1	2	2.03	-0.00	0.22	0.00	0.00	0.96	-0.83
2	2	3	1.52	-0.00	0.23	0.00	0.00	0.82	-0.68
3	3	4	0.96	0.00	0.23	-0.00	-0.00	0.66	-0.53
4	4	5	0.46	0.00	0.20	-0.00	-0.00	0.49	-0.37
5	5	6	0.13	0.00	0.16	-0.00	-0.00	0.31	-0.21
6	6	7	0.02	-0.00	0.06	0.00	0.00	0.12	-0.09
7	7	8	0.00	-0.00	0.04	0.00	0.00	0.03	-0.01
8	9	10	4.77	-1.12	0.40	0.32	0.34	1.91	-1.68
9	10	11	3.77	-1.19	0.43	0.28	0.42	1.67	-1.42
10	11	12	2.61	-1.22	0.46	0.28	0.44	1.39	-1.12
11	12	13	1.46	-1.02	0.43	0.22	0.38	1.04	-0.79
12	13	14	0.59	-0.55	0.36	0.10	0.22	0.66	-0.45
13	14	15	0.17	-0.14	0.13	0.03	0.06	0.26	-0.18
14	15	16	0.03	-0.04	0.09	0.01	0.01	0.06	-0.01
15	17	18	6.84	-2.12	0.25	0.60	0.63	1.90	-1.76
16	18	19	5.98	-2.32	0.29	0.55	0.81	1.76	-1.59
17	19	20	4.85	-2.54	0.41	0.58	0.90	1.58	-1.34
18	20	21	3.41	-2.42	0.54	0.53	0.89	1.28	-0.96
19	21	22	1.86	-1.63	0.49	0.32	0.64	0.82	-0.53
20	22	23	0.73	-0.62	0.16	0.15	0.22	0.28	-0.19
21	23	24	0.15	-0.27	0.08	0.09	0.07	0.05	-0.00
22	25	26	10.03	-2.82	0.02	0.81	0.84	1.86	-1.85
23	26	27	9.56	-3.15	0.04	0.75	1.10	1.85	-1.83
24	27	28	8.88	-3.67	0.15	0.85	1.30	1.83	-1.74
25	28	29	7.72	-4.12	0.55	0.90	1.51	1.73	-1.44
26	29	30	5.55	-3.85	0.99	0.74	1.51	1.30	-0.72
27	30	31	2.24	-1.97	0.15	0.51	0.65	0.32	-0.23
28	31	32	0.38	-1.01	0.04	0.36	0.23	0.00	0.02
29	33	34	13.76	-3.02	-0.22	0.87	0.89	1.82	-1.94
30	34	35	13.97	-3.29	-0.23	0.77	1.15	1.94	-2.07
31	35	36	14.44	-3.78	-0.30	0.85	1.36	2.06	-2.23
32	36	37	15.14	-4.65	-0.22	0.99	1.73	2.23	-2.36
33	37	38	15.43	-6.08	1.16	1.07	2.49	2.37	-1.69
34	38	39	5.78	-5.77	-0.23	1.81	1.20	0.26	-0.40

35	39	40	0.11	-1.97	-0.21	0.78	0.37	-0.16	0.04
36	41	42	16.87	-2.66	-0.41	0.80	0.76	1.81	-2.05
37	42	43	18.23	-2.55	-0.46	0.58	0.94	2.04	-2.31
38	43	44	20.13	-2.51	-0.63	0.47	1.00	2.30	-2.67
39	44	45	23.13	-2.08	-1.23	0.30	0.92	2.63	-3.35
40	45	46	29.05	-1.03	-3.34	0.04	0.56	3.31	-5.27
41	46	47	9.58	-0.37	-1.46	0.20	0.01	-0.06	-0.80
42	47	48	-1.35	-0.01	-0.91	0.00	0.00	-0.51	-0.02
43	49	50	9.57	-0.49	-0.27	0.13	0.16	0.92	-1.07
44	50	51	10.84	-0.56	-0.29	0.14	0.18	1.10	-1.26
45	51	52	12.01	-0.43	-0.32	0.10	0.15	1.35	-1.54
46	52	53	12.55	0.01	-0.27	-0.02	0.01	1.77	-1.93
47	53	54	11.26	1.17	0.17	-0.28	-0.40	2.41	-2.31
48	54	55	4.60	1.91	1.34	-0.46	-0.66	2.46	-1.68
49	55	56	0.54	1.08	0.62	-0.43	-0.20	0.33	0.04
50	1	9	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
51	9	17	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
52	17	25	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
53	25	33	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
54	33	41	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00
55	41	49	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
56	2	10	0.84	-0.51	0.01	0.16	0.15	-0.01	0.01
57	10	18	0.76	-1.50	0.04	0.47	0.46	0.01	0.01
58	18	26	0.56	-2.35	0.07	0.73	0.72	0.03	0.02
59	26	34	0.23	-2.83	0.09	0.87	0.88	0.02	0.03
60	34	42	-0.04	-2.62	0.08	0.79	0.83	0.01	0.04
61	42	50	0.07	-1.26	0.02	0.48	0.50	0.01	0.01
62	3	11	1.09	-0.56	-0.01	0.24	0.11	-0.07	0.07
63	11	19	1.06	-1.72	0.02	0.59	0.48	-0.02	0.04
64	19	27	0.84	-2.86	0.14	0.92	0.84	0.05	0.04
65	27	35	0.32	-3.54	0.26	1.10	1.08	0.07	0.09
66	35	43	-0.17	-3.07	0.20	0.92	0.97	0.01	0.11
67	43	51	-0.12	-1.17	0.03	0.44	0.28	0.00	0.02
68	4	12	0.13	-0.50	-0.03	0.28	0.03	-0.23	0.22
69	12	20	0.34	-1.65	-0.06	0.63	0.39	-0.16	0.13
70	20	28	0.46	-3.09	0.08	1.04	0.86	-0.01	0.05
71	28	36	0.00	-4.24	0.48	1.34	1.28	0.14	0.15
72	36	44	-0.86	-3.54	0.56	1.08	1.10	0.06	0.28
73	44	52	-0.44	-0.54	-0.05	0.20	0.14	-0.06	0.03
74	5	13	-2.30	-0.32	-0.04	0.29	-0.04	-0.50	0.48
75	13	21	-1.84	-1.19	-0.11	0.57	0.16	-0.44	0.38
76	21	29	-1.05	-2.75	-0.16	1.04	0.65	-0.28	0.18
77	29	37	-0.78	-4.92	0.29	1.60	1.43	0.06	0.12
78	37	45	-2.22	-4.63	1.66	1.37	1.49	0.34	0.68
79	45	53	-1.16	1.29	-0.44	-0.52	-0.27	-0.30	0.03
80	6	14	-7.24	-0.12	-0.10	0.31	-0.24	-1.30	1.24
81	14	22	-6.83	-0.54	-0.32	0.49	-0.16	-1.32	1.12
82	22	30	-5.82	-1.66	-0.66	0.94	0.08	-1.31	0.90
83	30	38	-3.94	-4.97	-1.50	1.94	1.13	-1.26	0.33
84	38	46	-1.62	-9.26	-2.89	2.37	3.34	-0.99	-0.79
85	46	54	-0.96	5.63	-1.01	-2.58	-0.90	-0.21	-0.62
86	7	15	-2.69	-0.01	-0.02	0.07	-0.07	-0.03	0.02
87	15	23	-2.58	-0.15	-0.06	0.13	-0.04	-0.04	0.00
88	23	31	-2.22	-0.73	-0.13	0.34	0.11	-0.06	-0.02
89	31	39	-1.26	-2.59	-0.25	0.90	0.70	-0.08	-0.08

90	39	47	0.53	-4.99	-0.23	1.29	1.79	-0.02	-0.11
91	47	55	0.89	4.95	0.32	-1.78	-1.28	0.12	0.08
92	8	16	-2.05	-0.00	-0.04	0.01	-0.01	-0.03	-0.00
93	16	24	-2.02	-0.04	-0.13	0.02	0.00	-0.05	-0.03
94	24	32	-1.75	-0.19	-0.21	0.07	0.05	-0.08	-0.05
95	32	40	-0.74	-0.57	-0.26	0.17	0.18	-0.07	-0.08
96	40	48	1.23	-0.68	-0.04	0.20	0.22	0.03	-0.05
97	48	56	1.24	0.68	0.86	-0.22	-0.20	0.28	0.25
98	57	58	0.13	0.15	0.19	-0.09	-0.00	0.06	0.05
99	55	57	-0.39	0.90	-0.07	-0.45	-0.36	-0.05	-0.01
100	56	58	0.24	0.14	-0.15	-0.07	-0.05	-0.10	-0.04
101	58	59	0.05	0.00	-0.00	0.00	-0.00	0.00	-0.00
102	54	57	0.69	-0.78	0.22	0.57	0.27	0.14	0.09
103	57	59	-0.04	-0.03	0.00	0.03	0.00	0.00	0.00

Hipotesis (4) : Reacción vertical mínima del tablero: Rzmin

DESPLAZAMIENTOS DE LOS NUDOS

Nudo Nº	Despl.y (mm)	Despl.x (mm)	Despl.z (mm)	Giro y 1000xrad	Giro x 1000xrad	Giro z 1000xrad
1	-0.000	-0.000	0.000	-0.000	-0.000	-0.000
2	-0.000	-0.001	0.001	-0.003	-0.000	-0.000
3	-0.000	-0.003	0.001	-0.005	-0.000	-0.000
4	-0.000	-0.006	0.001	-0.007	-0.000	-0.000
5	0.000	-0.011	0.001	-0.008	-0.000	-0.000
6	0.000	-0.016	0.001	-0.009	-0.000	-0.000
7	0.000	-0.023	0.001	-0.032	-0.000	-0.000
8	0.000	-0.048	0.001	-0.036	-0.000	-0.000
9	-0.000	-0.000	0.000	-0.000	0.000	-0.000
10	-0.000	-0.001	0.001	-0.003	-0.000	-0.000
11	-0.000	-0.003	0.001	-0.005	-0.000	-0.000
12	-0.000	-0.007	0.002	-0.007	-0.001	-0.000
13	0.000	-0.011	0.002	-0.008	-0.001	-0.001
14	0.001	-0.016	0.002	-0.009	-0.001	-0.001
15	0.002	-0.029	0.002	-0.033	-0.002	-0.003
16	0.003	-0.050	0.002	-0.037	-0.002	-0.003
17	-0.000	-0.000	0.000	-0.000	0.000	-0.000
18	-0.000	-0.001	0.001	-0.003	-0.000	-0.000
19	-0.000	-0.003	0.002	-0.005	-0.001	-0.000
20	-0.000	-0.007	0.002	-0.007	-0.001	-0.001
21	0.001	-0.012	0.003	-0.009	-0.002	-0.001
22	0.002	-0.017	0.003	-0.010	-0.003	-0.003
23	0.003	-0.031	0.004	-0.036	-0.003	-0.005
24	0.005	-0.054	0.004	-0.039	-0.003	-0.007
25	-0.000	-0.000	0.000	-0.000	0.000	-0.000
26	-0.000	-0.001	0.001	-0.003	-0.000	-0.000
27	-0.000	-0.003	0.003	-0.005	-0.001	-0.000
28	-0.000	-0.007	0.004	-0.008	-0.002	-0.001
29	0.001	-0.013	0.005	-0.010	-0.003	-0.002
30	0.003	-0.019	0.006	-0.012	-0.005	-0.004
31	0.005	-0.036	0.007	-0.042	-0.006	-0.007
32	0.007	-0.060	0.007	-0.041	-0.005	-0.009
33	-0.000	0.000	0.000	-0.000	0.000	-0.000
34	-0.000	-0.001	0.002	-0.003	-0.000	-0.000
35	-0.001	-0.003	0.004	-0.006	-0.001	-0.000
36	-0.000	-0.008	0.006	-0.009	-0.002	-0.001
37	0.001	-0.014	0.008	-0.012	-0.004	-0.002
38	0.003	-0.022	0.010	-0.015	-0.007	-0.005
39	0.006	-0.041	0.013	-0.052	-0.008	-0.007
40	0.008	-0.067	0.013	-0.040	-0.005	-0.008
41	-0.000	0.000	0.000	-0.000	0.000	-0.000
42	-0.000	-0.001	0.002	-0.003	0.000	-0.000
43	-0.000	-0.003	0.005	-0.006	-0.001	-0.000
44	-0.000	-0.008	0.008	-0.010	-0.002	-0.001
45	0.001	-0.015	0.011	-0.014	-0.003	-0.002

46	0.003	-0.025	0.015	-0.021	-0.004	-0.005
47	0.005	-0.044	0.029	-0.041	-0.003	-0.002
48	0.007	-0.069	0.019	-0.034	-0.003	0.002
49	-0.000	0.000	0.000	-0.000	0.000	-0.000
50	-0.000	-0.001	0.003	-0.003	-0.000	-0.000
51	-0.000	-0.004	0.006	-0.006	-0.001	-0.000
52	0.000	-0.009	0.009	-0.011	-0.002	-0.001
53	0.001	-0.016	0.012	-0.016	-0.003	-0.002
54	0.003	-0.028	0.015	-0.023	-0.001	-0.005
55	0.005	-0.044	0.017	-0.029	0.003	0.000
56	0.005	-0.061	0.017	-0.030	-0.001	0.005
57	0.004	-0.044	0.041	-0.028	-0.001	-0.001
58	0.004	-0.061	0.041	-0.028	-0.001	-0.002
59	0.003	-0.060	0.066	-0.028	-0.001	-0.001

ESFUERZOS EN LAS BARRAS

Barra Nº	i Nº	j Nº	Axil (t.)	Cort.1 (t.)	Cort.2 (t.)	Flec.1i (txm)	Flec.1j (txm)	Flec.2i (txm)	Flec.2j (txm)
1	1	2	0.92	-0.00	0.10	0.00	0.00	0.43	-0.37
2	2	3	0.69	-0.00	0.11	0.00	0.00	0.37	-0.31
3	3	4	0.43	0.00	0.10	-0.00	-0.00	0.30	-0.24
4	4	5	0.21	0.00	0.09	-0.00	-0.00	0.22	-0.17
5	5	6	0.06	0.00	0.07	-0.00	-0.00	0.14	-0.10
6	6	7	0.01	-0.00	0.03	0.00	0.00	0.06	-0.04
7	7	8	0.00	-0.00	0.02	0.00	0.00	0.01	-0.00
8	9	10	2.16	-0.51	0.18	0.14	0.15	0.87	-0.76
9	10	11	1.71	-0.54	0.19	0.13	0.19	0.76	-0.64
10	11	12	1.18	-0.55	0.21	0.13	0.20	0.63	-0.51
11	12	13	0.66	-0.46	0.19	0.10	0.17	0.47	-0.36
12	13	14	0.27	-0.25	0.16	0.05	0.10	0.30	-0.20
13	14	15	0.08	-0.07	0.06	0.01	0.03	0.12	-0.08
14	15	16	0.02	-0.02	0.04	0.00	0.01	0.03	-0.00
15	17	18	3.09	-0.96	0.11	0.27	0.29	0.86	-0.79
16	18	19	2.71	-1.05	0.13	0.25	0.37	0.80	-0.72
17	19	20	2.19	-1.15	0.18	0.26	0.41	0.71	-0.61
18	20	21	1.54	-1.09	0.24	0.24	0.40	0.58	-0.44
19	21	22	0.84	-0.74	0.22	0.14	0.29	0.37	-0.24
20	22	23	0.33	-0.28	0.07	0.07	0.10	0.13	-0.09
21	23	24	0.07	-0.12	0.04	0.04	0.03	0.02	-0.00
22	25	26	4.84	-1.27	0.01	0.37	0.38	0.84	-0.84
23	26	27	4.32	-1.42	0.02	0.34	0.50	0.84	-0.83
24	27	28	4.02	-1.66	0.07	0.38	0.59	0.83	-0.79
25	28	29	3.49	-1.87	0.25	0.41	0.68	0.78	-0.69
26	29	30	2.51	-1.74	0.45	0.34	0.68	0.59	-0.33
27	30	31	1.01	-0.89	0.07	0.23	0.29	0.14	-0.10
28	31	32	0.17	-0.46	0.02	0.16	0.10	0.00	0.01
29	33	34	6.22	-1.36	-0.10	0.40	0.40	0.82	-0.88
30	34	35	6.52	-1.49	-0.10	0.35	0.52	0.88	-0.94
31	35	36	6.53	-1.71	-0.13	0.39	0.62	0.95	-1.01
32	36	37	6.85	-2.10	-0.10	0.45	0.78	1.01	-1.07
33	37	38	6.98	-2.75	0.52	0.49	1.15	1.07	-0.76
34	38	39	7.61	-1.70	-0.10	0.46	0.34	0.12	-0.18

35	39	40	0.05	-0.89	-0.10	0.35	0.17	-0.07	0.02
36	41	42	7.63	-1.21	-0.18	0.36	0.34	0.82	-0.93
37	42	43	8.25	-1.15	-0.21	0.25	0.43	0.92	-1.05
38	43	44	9.10	-1.13	-0.28	0.21	0.45	1.04	-1.21
39	44	45	10.46	-0.94	-0.56	0.13	0.42	1.19	-1.52
40	45	46	13.14	-0.47	-1.51	0.02	0.25	1.50	-2.38
41	46	47	4.33	-0.17	-0.66	0.09	0.01	-0.03	-0.36
42	47	48	-0.61	-0.00	-0.41	0.00	0.00	-0.23	-0.01
43	49	50	4.33	-0.22	-0.12	0.06	0.07	0.41	-0.49
44	50	51	4.90	-0.25	-0.13	0.06	0.08	0.50	-0.57
45	51	52	5.43	-0.20	-0.15	0.05	0.07	0.61	-0.70
46	52	53	5.67	0.00	-0.12	-0.01	0.01	0.80	-0.87
47	53	54	5.09	0.53	0.08	-0.13	-0.18	1.09	-1.04
48	54	55	2.08	0.86	0.60	-0.21	-0.30	1.11	-0.76
49	55	56	0.24	0.49	0.28	-0.20	-0.09	0.15	0.02
50	1	9	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
51	9	17	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
52	17	25	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
53	25	33	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
54	33	41	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00
55	41	49	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
56	2	10	0.38	-0.23	0.00	0.07	0.07	-0.00	0.01
57	10	18	0.34	-0.68	0.02	0.21	0.21	0.01	0.00
58	18	26	0.25	-1.06	0.03	0.33	0.33	0.01	0.01
59	26	34	0.10	-1.28	0.04	0.39	0.40	0.01	0.01
60	34	42	-0.02	-1.19	0.04	0.36	0.38	0.00	0.02
61	42	50	0.03	-0.57	0.01	0.22	0.13	0.00	0.00
62	3	11	0.49	-0.25	-0.00	0.11	0.05	-0.03	0.03
63	11	19	0.48	-0.78	0.01	0.27	0.22	-0.01	0.02
64	19	27	0.38	-1.29	0.07	0.42	0.38	0.02	0.02
65	27	35	0.15	-1.60	0.12	0.50	0.49	0.03	0.04
66	35	43	-0.08	-1.39	0.09	0.42	0.44	0.00	0.05
67	43	51	-0.06	-0.53	0.01	0.20	0.13	0.00	0.01
68	4	12	0.06	-0.23	-0.01	0.13	0.01	-0.11	0.10
69	12	20	0.15	-0.75	-0.03	0.28	0.18	-0.07	0.06
70	20	28	0.21	-1.40	0.04	0.47	0.39	-0.00	0.02
71	28	36	0.00	-1.92	0.22	0.61	0.58	0.06	0.07
72	36	44	-0.39	-1.80	0.25	0.49	0.50	0.03	0.13
73	44	52	-0.20	-0.24	-0.02	0.09	0.06	-0.03	0.01
74	5	13	-1.04	-0.15	-0.02	0.13	-0.04	-0.23	0.22
75	13	21	-0.83	-0.34	-0.05	0.26	0.07	-0.20	0.17
76	21	29	-0.48	-1.24	-0.07	0.47	0.30	-0.13	0.08
77	29	37	-0.35	-2.23	0.13	0.73	0.65	0.03	0.05
78	37	45	-1.00	-2.10	0.75	0.62	0.67	0.15	0.31
79	45	53	-0.53	0.58	-0.20	-0.24	-0.12	-0.14	0.01
80	6	14	-3.27	-0.05	-0.05	0.14	-0.11	-0.59	0.56
81	14	22	-3.09	-0.24	-0.15	0.22	-0.07	-0.60	0.51
82	22	30	-2.63	-0.75	-0.30	0.43	0.04	-0.59	0.41
83	30	38	-1.78	-2.25	-0.68	0.88	0.51	-0.57	0.15
84	38	46	-0.73	-4.19	-1.31	1.07	1.51	-0.45	-0.36
85	46	54	-0.43	2.55	-0.46	-1.16	-0.41	-0.09	-0.19
86	7	15	-1.21	-0.01	-0.01	0.03	-0.03	-0.01	0.01
87	15	23	-1.17	-0.07	-0.03	0.06	-0.02	-0.02	0.00
88	23	31	-1.01	-0.33	-0.06	0.15	0.05	-0.03	-0.01
89	31	39	-0.57	-1.17	-0.11	0.41	0.31	-0.03	-0.03

90	39	47	0.24	-2.26	-0.10	0.58	0.81	-0.01	-0.05
91	47	55	0.40	2.24	0.15	-0.80	-0.58	0.05	0.04
92	8	16	-0.93	-0.00	-0.02	0.00	-0.00	-0.01	-0.00
93	16	24	-0.91	-0.02	-0.06	0.01	0.00	-0.02	-0.01
94	24	32	-0.79	-0.09	-0.10	0.03	0.02	-0.03	-0.03
95	32	40	-0.34	-0.26	-0.12	0.08	0.08	-0.03	-0.04
96	40	48	0.55	-0.31	-0.02	0.09	0.10	0.01	-0.02
97	48	56	0.56	0.31	0.39	-0.10	-0.09	0.13	0.11
98	57	58	0.06	0.07	0.09	-0.04	-0.00	0.03	0.02
99	55	57	-0.18	0.41	-0.03	-0.20	-0.16	-0.02	-0.01
100	56	58	0.11	0.06	-0.07	-0.03	-0.02	-0.05	-0.02
101	58	59	0.02	0.00	-0.00	0.00	-0.00	0.00	-0.00
102	54	57	0.31	-0.35	0.10	0.26	0.12	0.06	0.04
103	57	59	-0.02	-0.01	0.00	0.01	0.00	0.00	0.00

DIMENSIONAMIENTO DE ARMADURAS

Esfuerzos de cálculo y armadura vertical del muro frontal

Nudo Nº	Canto (m)	Ancho (m)	Recu. (m)	(1)+(2)+(3) Nd (t/m)	(1)+(2)+(3) Nd (tnm/m)	(1)+(2)+(4) Nd (t/m)	(1)+(2)+(4) Nd (tnm/m)	Aint. (cm²/m)	Aext. (cm²/m)
8	0.25	1.00	0.05	0.30	-0.03	0.16	-0.01	1.13	1.13
7	0.25	1.00	0.05	0.30	0.10	0.16	-0.07	1.13	1.13
6	0.25	1.00	0.05	0.94	0.32	0.48	-0.44	1.13	1.13
5	1.05	1.00	0.05	3.02	0.28	1.44	-1.97	4.72	4.72
4	1.05	1.00	0.05	7.12	-0.22	3.20	-4.33	4.72	4.72
3	1.05	1.00	0.05	12.16	-1.30	5.20	-7.66	4.72	4.72
2	1.05	1.00	0.05	17.54	-3.08	7.30	-12.11	4.72	4.72
1	1.05	1.00	0.05	22.66	-5.65	9.32	-17.78	5.56	4.72
16	0.25	1.00	0.05	0.38	-0.03	0.18	-0.01	1.13	1.13
15	0.25	1.00	0.05	0.38	0.10	0.18	-0.07	1.13	1.13
14	0.25	1.00	0.05	1.30	0.34	0.57	-0.43	1.13	1.13
13	1.05	1.00	0.05	3.87	0.39	1.66	-1.97	4.72	4.72
12	1.05	1.00	0.05	8.55	-0.07	3.58	-4.34	4.72	4.72
11	1.05	1.00	0.05	14.00	-1.17	5.89	-7.71	4.72	4.72
10	1.05	1.00	0.05	19.49	-3.05	7.81	-12.20	4.72	4.72
9	1.05	1.00	0.05	24.54	-5.72	9.82	-17.93	5.60	4.72
24	0.25	1.00	0.05	0.69	-0.01	0.26	-0.01	1.13	1.13
23	0.25	1.00	0.05	0.69	0.07	0.26	-0.06	1.13	1.13
22	0.25	1.00	0.05	2.74	0.42	0.94	-0.40	1.13	1.13
21	1.05	1.00	0.05	7.17	0.78	2.50	-1.93	4.72	4.72
20	1.05	1.00	0.05	13.67	0.45	4.91	-4.36	4.72	4.72
19	1.05	1.00	0.05	19.90	-0.83	7.24	-7.85	4.72	4.72
18	1.05	1.00	0.05	25.35	-3.01	9.37	-12.48	4.72	4.72
17	1.05	1.00	0.05	30.06	-5.98	11.30	-18.35	5.72	4.72
32	0.25	1.00	0.05	1.27	0.04	0.41	-0.01	1.13	1.13
31	0.25	1.00	0.05	1.27	-0.03	0.41	-0.07	1.13	1.13
30	0.25	1.00	0.05	6.69	0.51	1.94	-0.38	1.13	1.13
29	1.05	1.00	0.05	16.79	1.93	4.97	-1.79	4.72	4.72
28	1.05	1.00	0.05	24.99	1.46	7.85	-4.39	4.72	4.72
27	1.05	1.00	0.05	30.57	-0.38	10.07	-8.10	4.72	4.72
26	1.05	1.00	0.05	34.88	-3.05	11.94	-12.92	4.72	4.72
25	1.05	1.00	0.05	38.61	-6.44	13.61	-19.00	5.90	4.72
40	0.25	1.00	0.05	0.59	0.09	0.24	-0.00	1.13	1.13
39	0.25	1.00	0.05	0.59	-0.43	0.24	-0.12	1.13	1.13
38	0.25	1.00	0.05	15.93	0.32	4.31	-0.49	1.13	1.13
37	1.05	1.00	0.05	42.60	4.54	11.59	-1.46	4.72	4.72
36	1.05	1.00	0.05	44.57	-0.11	12.97	-1.85	4.72	4.72

35	1.05	1.00	0.05	45.42	-4.37	14.01	-4.10	4.72	4.72
34	1.05	1.00	0.05	46.75	-9.66	15.13	-6.98	4.72	4.72
33	1.05	1.00	0.05	48.63	-16.26	16.36	-10.80	5.12	4.72
48	0.25	1.00	0.05	-3.19	0.00	-0.71	0.01	1.13	1.13
47	0.25	1.00	0.05	-3.19	-1.19	-0.71	-0.26	1.79	1.13
46	0.25	1.00	0.05	25.91	-0.52	6.89	-0.73	1.16	1.13
45	1.05	1.00	0.05	78.82	5.16	21.11	0.26	4.72	4.72
44	1.05	1.00	0.05	66.15	0.53	18.72	-1.80	4.72	4.72
43	1.05	1.00	0.05	60.84	-4.19	18.13	-4.20	4.72	4.72
42	1.05	1.00	0.05	58.38	-10.03	18.26	-7.27	4.72	4.72
41	1.05	1.00	0.05	57.27	-17.34	18.73	-11.20	5.43	4.72
36	1.05	1.00	0.05	4.23	0.15	1.51	0.02	4.72	4.72
55	1.05	1.00	0.05	4.23	1.20	1.51	0.15	4.72	4.72
54	1.05	1.00	0.05	28.71	9.68	8.80	1.51	4.72	4.72
53	1.05	1.00	0.05	64.76	8.29	18.43	0.81	4.72	4.72
52	1.05	1.00	0.05	72.83	2.13	20.91	-1.84	4.72	4.72
51	1.05	1.00	0.05	71.80	-5.99	21.19	-4.40	4.72	4.72
50	1.05	1.00	0.05	67.84	-10.59	20.83	-7.71	4.72	4.72
49	1.05	1.00	0.05	63.86	-18.60	20.62	-11.93	5.79	4.72

Esfuerzos de calculo y armadura horizontal del muro frontal

(Z):tmp.tierras4*x

Nudo Nº	Canto (m)	Ancho (m)	Recu. (m)	Nd (t/m)	Md (txm/m)	Ainf. (cm²/m)	Asup. (cm²/m)
1	1.05	1.00	0.05	-0.00	-0.00	8.40	8.40
9	1.05	1.00	0.05	-0.00	-0.00	8.40	8.40
17	1.05	1.00	0.05	-0.00	-0.00	8.40	8.40
25	1.05	1.00	0.05	-0.00	-0.00	8.40	8.40
33	1.05	1.00	0.05	-0.00	-0.00	8.40	8.40
41	1.05	1.00	0.05	-0.00	0.00	8.40	8.40
49	1.05	1.00	0.05	-0.00	-0.00	8.40	8.40
2	1.05	1.00	0.05	-0.06	-0.07	8.40	8.40
10	1.05	1.00	0.05	-0.07	-0.03	8.40	8.40
18	1.05	1.00	0.05	-0.08	0.01	8.40	8.40
26	1.05	1.00	0.05	-0.12	0.04	8.40	8.40
34	1.05	1.00	0.05	-0.21	0.05	8.40	8.40
42	1.05	1.00	0.05	-0.45	0.03	8.40	8.40
50	1.05	1.00	0.05	-0.45	-0.02	8.40	8.40
3	1.05	1.00	0.05	-0.16	-0.28	8.40	8.40
11	1.05	1.00	0.05	-0.17	-0.24	8.40	8.40
19	1.05	1.00	0.05	-0.18	-0.17	8.40	8.40
27	1.05	1.00	0.05	-0.23	-0.08	8.40	8.40
35	1.05	1.00	0.05	-0.32	-0.03	8.40	8.40
43	1.05	1.00	0.05	-0.44	-0.01	8.40	8.40
51	1.05	1.00	0.05	-0.44	-0.01	8.40	8.40

4	1.05	1.00	0.05	-0.26	-0.59	8.40	8.40
12	1.05	1.00	0.05	-0.27	-0.54	8.40	8.40
20	1.05	1.00	0.05	-0.28	-0.43	8.40	8.40
28	1.05	1.00	0.05	-0.30	-0.26	8.40	8.40
36	1.05	1.00	0.05	-0.33	-0.08	8.40	8.40
44	1.05	1.00	0.05	-0.38	0.02	8.40	8.40
52	1.05	1.00	0.05	-0.38	-0.01	8.40	8.40
5	1.05	1.00	0.05	-0.36	-0.96	8.40	8.40
13	1.05	1.00	0.05	-0.36	-0.92	8.40	8.40
21	1.05	1.00	0.05	-0.37	-0.78	8.40	8.40
29	1.05	1.00	0.05	-0.36	-0.53	8.40	8.40
37	1.05	1.00	0.05	-0.34	-0.15	8.40	8.40
45	1.05	1.00	0.05	-0.32	0.19	8.40	8.40
53	1.05	1.00	0.05	-0.32	-0.03	8.40	8.40
6	1.21	1.00	0.05	-0.52	-2.08	9.67	9.67
14	1.21	1.00	0.05	-0.53	-2.11	9.67	9.67
22	1.21	1.00	0.05	-0.53	-1.98	9.67	9.67
30	1.21	1.00	0.05	-0.55	-1.61	9.67	9.67
38	1.21	1.00	0.05	-0.50	-0.87	9.67	9.67
46	1.21	1.00	0.05	-0.36	-0.17	9.67	9.67
54	1.21	1.00	0.05	-0.36	0.07	9.67	9.67
7	0.25	1.00	0.05	-0.14	-0.02	2.00	2.00
15	0.25	1.00	0.05	-0.15	-0.03	2.00	2.00
23	0.25	1.00	0.05	-0.16	-0.04	2.00	2.00
31	0.25	1.00	0.05	-0.19	-0.07	2.00	2.00
39	0.25	1.00	0.05	-0.23	-0.08	2.00	2.00
47	0.25	1.00	0.05	-0.30	0.22	2.00	2.00
55	0.25	1.00	0.05	-0.30	-0.24	2.00	2.00
8	0.25	1.00	0.05	-0.17	-0.02	2.00	2.00
16	0.25	1.00	0.05	-0.19	-0.01	2.00	2.00
24	0.25	1.00	0.05	-0.22	0.00	2.00	2.00
32	0.25	1.00	0.05	-0.29	0.03	2.00	2.00
40	0.25	1.00	0.05	-0.39	0.13	2.00	2.00
48	0.25	1.00	0.05	-0.50	0.28	2.00	2.00
56	0.25	1.00	0.05	-0.50	-0.32	2.00	2.00

Esfuerzos de calculo y armadura en zapata

Puntera :

Flexion: Md = 12.15 txm/m ; Asup.= 15.00 cm²/m ; Ainf.= 0.00 cm²/m
Comprobacion a cortante ...: Vcu= 64.55 t ; Vd = 0.00 t
Vd < Vcu ..... No es necesaria armadura transversal por cortante

Talon :

Flexion: Md = -0.42 txm/m ; Ainf.= 15.00 cm²/m ; Asup.= 0.00 cm²/m

Comprobacion a cortante ...: Vcu= 64.55 t ; Vd = -0.05 t
Vd < Vcu ..... No es necesaria armadura transversal por cortante

SALIDA RESULTADOS SAP 90

STRUCTURAL ANALYSIS PROGRAMS

VERSION 5.40

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REPOSICION 307+860. 3 VANOS 13+17+13 FILE=307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
1								
	MAX & MIN							
	1	.000			.050			10.266
		.000	6.059	-3.666		2.163	-1.680	
		1.075	3.292	1.361		1.455	.263	
		2.150	.525	3.413		.742	1.443	
		2.150			.050			10.266
	MAX							
	2	.000			1.955			17.854
		.000	19.153	-2.722		1.768	-1.322	
		1.075	10.859	1.708		1.341	.049	
		2.150	2.555	5.082		.915	1.211	
		2.150			1.955			17.854
	MIN							
	2	.000			1.311			6.663
		.000	5.162	-4.849		1.372	-1.644	
		1.075	-2.698	1.315		.945	-.009	
		2.150	-10.588	2.422		.519	.899	
		2.150			1.311			6.663
	MAX							
	3	.000			2.998			18.106
		.000	19.215	-2.790		1.898	-1.555	
		1.075	10.921	1.706		1.471	-.044	
		2.150	2.618	5.148		1.045	1.258	
		2.150			2.998			18.106
	MIN							
	3	.000			2.354			6.915
		.000	5.225	-4.917		1.502	-1.877	
		1.075	-2.636	1.313		1.075	-.102	
		2.150	-10.526	2.488		.649	.945	
		2.150			2.354			6.915
	MAX							
	4	.000			2.174			23.507
		.000	28.030	-2.253		1.881	-1.224	
		1.075	16.051	1.936		1.455	.069	
		2.150	4.056	6.351		1.029	1.320	
		2.150			2.174			23.507
	MIN							
	4	.000			1.101			4.856
		.000	4.712	-5.798		1.221	-1.760	
		1.075	-6.544	1.281		.795	-.027	
		2.150	-17.850	1.918		.369	.799	
		2.150			1.101			4.856
	MAX & MIN							
	5	.000			.027			9.499
		.000	5.718	-3.418		.006	-.009	
		1.075	2.951	1.242		.006	-.003	
		2.150	.184	2.927		.006	.003	
		2.150			.027			9.499
	MAX & MIN							
	6	.000			-.002			10.593

REPOSICION 307+860. 3 VANOS 13+17+13 FILE=307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	6.140	-3.754		-.001	.001	
		1.075	3.373	1.359		-.001	.000	
		2.150	.606	3.499		-.001	-.000	
		2.150			-.002			10.593
	MAX							
	ALL	.000			2.998			23.507
		.000	28.030	-2.253		2.163	.001	
		1.075	16.051	1.936		1.471	.263	
		2.150	4.056	6.351		1.045	1.443	
		2.150			2.998			23.507
	MIN							
	ALL	.000			-.002			4.856
		.000	4.712	-5.798		-.001	-1.877	
		1.075	-6.544	1.242		-.001	-.102	
		2.150	-17.850	1.918		-.001	-.000	
		2.150			-.002			4.856
2								
	MAX & MIN							
	1	.000			-2.578			5.932
		.000	3.708	.068		1.757	-1.112	
		1.075	.941	2.567		1.047	.395	
		2.150	-1.826	2.091		.336	1.139	
		2.150			-2.578			5.932
	MAX							
	2	.000			-.316			11.931
		.000	15.738	1.078		1.360	-.785	
		1.075	7.515	3.446		.933	.226	
		2.150	-.534	3.291		.507	.979	
		2.150			-.316			11.931
	MIN							
	2	.000			-1.080			1.765
		.000	2.430	-.243		1.045	-.998	
		1.075	-5.379	2.396		.619	.183	
		2.150	-13.362	1.322		.192	.694	
		2.150			-1.080			1.765
	MAX							
	3	.000			.346			12.174
		.000	15.780	1.034		1.418	-.880	
		1.075	7.558	3.446		.991	.194	
		2.150	-.491	3.337		.565	1.009	
		2.150			.346			12.174
	MIN							
	3	.000			-.419			2.007
		.000	2.473	-.288		1.103	-1.094	
		1.075	-5.337	2.397		.677	.151	
		2.150	-13.320	1.368		.250	.723	
		2.150			-.419			2.007
	MAX							
	4	.000			-.046			16.499
		.000	23.858	1.649		1.450	-.718	
		1.075	11.998	4.036		1.023	.243	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE=307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150	.427	4.201		.597	1.079	
		2.150			-.046			16.499
	MIN							
	4	.000			-1.320			-.444
		.000	1.678	-.554		.925	-1.074	
		1.075	-9.494	2.286		.499	.171	
		2.150	-20.953	.920		.073	.603	
		2.150			-1.320			-.444
	MAX & MIN							
	5	.000			.008			5.653
		.000	3.565	-.154		.004	-.005	
		1.075	.798	2.191		.004	-.000	
		2.150	-1.969	1.562		.004	.005	
		2.150			.008			5.653
	MAX & MIN							
	6	.000			-.001			6.243
		.000	3.763	.011		-.000	.000	
		1.075	.996	2.569		-.000	.000	
		2.150	-1.771	2.152		-.000	-.000	
		2.150			-.001			6.243
	MAX							
	ALL	.000			.346			16.499
		.000	23.858	1.649		1.757	.000	
		1.075	11.998	4.036		1.047	.395	
		2.150	.427	4.201		.597	1.139	
		2.150			.346			16.499
	MIN							
	ALL	.000			-2.578			-.444
		.000	1.678	-.554		-.000	-1.112	
		1.075	-9.494	2.191		-.000	-.000	
		2.150	-20.953	.920		-.000	-.000	
		2.150			-2.578			-.444
3								
	MAX & MIN							
	1	.000			-4.747			3.225
		.000	2.935	.968		1.634	-.854	
		1.075	.168	2.636		.923	.521	
		2.150	-2.599	1.329		.213	1.131	
		2.150			-4.747			3.225
	MAX							
	2	.000			-1.668			8.064
		.000	14.753	2.227		1.222	-.540	
		1.075	6.533	3.670		.796	.351	
		2.150	-1.461	2.369		.369	.959	
		2.150			-1.668			8.064
	MIN							
	2	.000			-3.022			-1.240
		.000	1.559	.742		.908	-.718	
		1.075	-6.249	2.384		.482	.281	
		2.150	-14.280	.495		.055	.644	
		2.150			-3.022			-1.240

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
	3	.000			-1.164			8.296
		.000	14.796	2.180		1.238	-.573	
		1.075	6.576	3.669		.812	.336	
		2.150	-1.418	2.413		.385	.961	
		2.150			-1.164			8.296
	MIN							
	3	.000			-2.518			-1.008
		.000	1.601	.695		.924	-.750	
		1.075	-6.206	2.382		.498	.266	
		2.150	-14.237	.540		.071	.646	
		2.150			-2.518			-1.008
	MAX							
	4	.000			-1.152			11.834
		.000	22.733	2.960		1.312	-.483	
		1.075	10.878	4.361		.885	.376	
		2.150	-.601	3.172		.459	1.068	
		2.150			-1.152			11.834
	MIN							
	4	.000			-3.409			-3.672
		.000	.742	.485		.789	-.779	
		1.075	-10.426	2.217		.362	.259	
		2.150	-21.966	.050		-.064	.543	
		2.150			-3.409			-3.672
	MAX & MIN							
	5	.000			-.010			3.340
		.000	2.837	.466		.006	-.005	
		1.075	.070	2.028		.006	.001	
		2.150	-2.697	.616		.006	.007	
		2.150			-.010			3.340
	MAX & MIN							
	6	.000			.001			3.515
		.000	2.990	.909		-.001	.000	
		1.075	.223	2.636		-.001	-.000	
		2.150	-2.544	1.388		-.001	-.001	
		2.150			.001			3.515
	MAX							
	ALL	.000			.001			11.834
		.000	22.733	2.960		1.634	.000	
		1.075	10.878	4.361		.923	.521	
		2.150	-.601	3.172		.459	1.131	
		2.150			.001			11.834
	MIN							
	ALL	.000			-4.747			-3.672
		.000	.742	.466		-.001	-.854	
		1.075	-10.426	2.028		-.001	-.000	
		2.150	-21.966	.050		-.064	-.001	
		2.150			-4.747			-3.672
4	----------							
	MAX & MIN							
	1	.000			-6.608			2.190

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	2.322	.851		1.501	-.580	
		1.075	-.446	1.859		.790	.651	
		2.150	-3.213	-.107		.080	1.119	
		2.150			-6.608			2.190
	MAX							
	2	.000			-2.656			6.450
		.000	13.963	2.008		1.117	-.346	
		1.075	5.747	2.750		.690	.467	
		2.150	-2.191	.614		.264	.962	
		2.150			-2.656			6.450
	MIN							
	2	.000			-4.685			-2.205
		.000	.874	.649		.802	-.488	
		1.075	-6.928	1.508		.376	.361	
		2.150	-15.005	-1.018		-.051	.610	
		2.150			-4.685			-2.205
	MAX							
	3	.000			-2.203			6.681
		.000	14.006	1.960		1.115	-.356	
		1.075	5.790	2.748		.689	.456	
		2.150	-2.148	.659		.263	.949	
		2.150			-2.203			6.681
	MIN							
	3	.000			-4.233			-2.054
		.000	.917	.601		.801	-.498	
		1.075	-6.886	1.506		.374	.350	
		2.150	-14.962	-.974		-.052	.597	
		2.150			-4.233			-2.054
	MAX							
	4	.000			-1.882			9.833
		.000	21.824	2.672		1.207	-.300	
		1.075	9.977	3.346		.780	.504	
		2.150	-1.410	1.206		.354	1.084	
		2.150			-1.882			9.833
	MIN							
	4	.000			-5.265			-4.726
		.000	.010	.409		.682	-.537	
		1.075	-11.150	1.275		.256	.327	
		2.150	-22.766	-1.515		-.171	.497	
		2.150			-5.265			-4.726
	MAX & MIN							
	5	.000			-.037			2.619
		.000	2.262	.066		.010	-.008	
		1.075	-.505	1.011		.010	.003	
		2.150	-3.272	-1.020		.010	.014	
		2.150			-.037			2.619
	MAX & MIN							
	6	.000			.003			2.463
		.000	2.376	.792		-.001	.001	
		1.075	-.392	1.859		-.001	-.000	
		2.150	-3.159	-.049		-.001	-.001	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150			.003			2.463
	MAX							
	ALL	.000			.003			9.833
		.000	21.824	2.672		1.501	.001	
		1.075	9.977	3.346		.790	.651	
		2.150	-1.410	1.206		.354	1.119	
		2.150			.003			9.833
	MIN							
	ALL	.000			-6.608			-4.726
		.000	.010	.066		-.001	-.580	
		1.075	-11.150	1.011		-.001	-.000	
		2.150	-22.766	-1.515		-.171	-.001	
		2.150			-6.608			-4.726
5	----------							
	MAX & MIN							
	1	.000			-8.173			2.148
		.000	1.862	-.375		1.366	-.325	
		1.075	-.905	.139		.655	.761	
		2.150	-3.672	-2.322		-.056	1.083	
		2.150			-8.173			2.148
	MAX							
	2	.000			-3.393			6.138
		.000	13.365	.469		1.028	-.186	
		1.075	5.154	.636		.601	.570	
		2.150	-2.735	-2.089		.175	.971	
		2.150			-3.393			6.138
	MIN							
	2	.000			-6.105			-2.221
		.000	.374	-.691		.708	-.291	
		1.075	-7.424	-.314		.282	.422	
		2.150	-15.540	-3.309		-.144	.571	
		2.150			-6.105			-2.221
	MAX							
	3	.000			-2.946			6.372
		.000	13.408	.420		1.019	-.188	
		1.075	5.197	.633		.593	.559	
		2.150	-2.692	-2.045		.167	.951	
		2.150			-2.946			6.372
	MIN							
	3	.000			-5.659			-1.988
		.000	.417	-.740		.700	-.293	
		1.075	-7.381	-.316		.274	.410	
		2.150	-15.497	-3.266		-.153	.551	
		2.150			-5.659			-1.988
	MAX							
	4	.000			-2.359			9.357
		.000	21.135	.924		1.119	-.153	
		1.075	9.295	.968		.693	.622	
		2.150	-2.009	-1.824		.266	1.111	
		2.150			-2.359			9.357

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MIN							
	4	.000			-6.879			-4.576
		.000	-.516	-1.010		.587	-.328	
		1.075	-11.668	-.614		.161	.375	
		2.150	-23.351	-3.057		-.266	.444	
		2.150			-6.879			-4.576
	MAX & MIN							
	5	.000			-.087			2.906
		.000	1.846	-1.457		.020	-.015	
		1.075	-.921	-.960		.020	.007	
		2.150	-3.688	-3.437		.020	.028	
		2.150			-.087			2.906
	MAX & MIN							
	6	.000			.008			2.389
		.000	1.914	-.431		-.002	.001	
		1.075	-.853	.140		-.002	-.001	
		2.150	-3.620	-2.264		-.002	-.003	
		2.150			.008			2.389
	MAX							
	ALL	.000			.008			9.357
		.000	21.135	.924		1.366	.001	
		1.075	9.295	.968		.693	.761	
		2.150	-2.009	-1.824		.266	1.111	
		2.150			.008			9.357
	MIN							
	ALL	.000			-8.173			-4.576
		.000	-.516	-1.457		-.002	-.328	
		1.075	-11.668	-.960		-.002	-.001	
		2.150	-23.351	-3.857		-.266	-.003	
		2.150			-8.173			-4.576
6	----------							
	MAX & MIN							
	1	.000			-9.449			1.897
		.000	1.940	-2.943		1.232	-.103	
		1.075	-.827	-2.345		.522	.840	
		2.150	-3.594	-4.722		-.189	1.019	
		2.150			-9.449			1.897
	MAX							
	2	.000			-3.942			5.706
		.000	13.387	-2.597		.937	-.061	
		1.075	5.183	-2.243		.510	.676	
		2.150	-2.679	-4.729		.084	.982	
		2.150			-3.942			5.706
	MIN							
	2	.000			-7.316			-2.445
		.000	.492	-3.393		.630	-.098	
		1.075	-7.299	-2.907		.204	.457	
		2.150	-15.438	-5.771		-.222	.519	
		2.150			-7.316			-2.445
	MAX							
	3	.000			-3.485			5.942

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			.000	13.436	-2.652		.927	-.064	
			1.075	5.232	-2.246		.501	.662	
			2.150	-2.631	-4.679		.074	.957	
			2.150			-3.485			5.942
		MIN							
	3		.000			-6.860			-2.209
			.000	.541	-3.448		.621	-.102	
			1.075	-7.250	-2.909		.194	.443	
			2.150	-15.389	-5.721		-.232	.495	
			2.150			-6.860			-2.209
		MAX							
	4		.000			-2.656			8.833
			.000	21.133	-2.491		1.024	-.050	
			1.075	9.305	-2.177		.598	.753	
			2.150	-1.955	-4.612		.172	1.144	
			2.150			-2.656			8.833
		MIN							
	4		.000			-8.280			-4.753
			.000	-.358	-3.818		.514	-.113	
			1.075	-11.498	-3.283		.088	.389	
			2.150	-23.220	-6.348		-.339	.374	
			2.150			-8.280			-4.753
		MAX & MIN							
	5		.000			-.166			2.935
			.000	2.041	-4.429		.033	-.025	
			1.075	-.726	-3.722		.033	.010	
			2.150	-3.493	-5.990		.033	.046	
			2.150			-.166			2.935
		MAX & MIN							
	6		.000			.015			2.075
			.000	1.987	-2.986		-.003	.002	
			1.075	-.780	-2.337		-.003	-.001	
			2.150	-3.547	-4.663		-.003	-.004	
			2.150			.015			2.075
		MAX							
	ALL		.000			.015			8.833
			.000	21.133	-2.491		1.232	.002	
			1.075	9.305	-2.177		.598	.840	
			2.150	-1.955	-4.612		.172	1.144	
			2.150			.015			8.833
		MIN							
	ALL		.000			-9.449			-4.753
			.000	-.358	-4.429		-.003	-.113	
			1.075	-11.498	-3.722		-.003	-.001	
			2.150	-23.220	-6.348		-.339	-.004	
			2.150			-9.449			-4.753
7	----------								
	MAX & MIN								
	1		.000			-10.500			-1.491
			.000	3.652	-4.838		1.167	.043	
			1.075	.885	-2.399		.457	.917	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			2.150	-1.882	-2.934		-.254	1.026	
			2.150			-10.500			-1.491
		MAX							
	2		.000			-4.491			1.782
			.000	15.392	-4.416		.746	.232	
			1.075	7.195	-2.292		.320	.736	
			2.150	-.726	-2.864		-.107	.005	
			2.150			-4.491			1.782
		MIN							
	2		.000			-8.179			-6.137
			.000	2.438	-5.418		.674	-.030	
			1.075	-5.347	-2.870		.248	.503	
			2.150	-13.420	-3.769		-.179	.577	
			2.150			-8.179			-6.137
		MAX							
	3		.000			-4.042			1.984
			.000	15.437	-4.459		.753	.212	
			1.075	7.239	-2.287		.326	.723	
			2.150	-.681	-2.812		-.100	.799	
			2.150			-4.042			1.984
		MIN							
	3		.000			-7.730			-5.935
			.000	2.482	-5.461		.681	-.050	
			1.075	-5.302	-2.866		.254	.490	
			2.150	-13.375	-3.716		-.172	.572	
			2.150			-7.730			-5.935
		MAX							
	4		.000			-3.086			4.477
			.000	23.333	-4.257		.768	.335	
			1.075	11.516	-2.221		.342	.818	
			2.150	.159	-2.695		-.084	.880	
			2.150			-3.086			4.477
		MIN							
	4		.000			-9.232			-8.721
			.000	1.742	-5.928		.648	-.102	
			1.075	-9.387	-3.185		.222	.429	
			2.150	-20.997	-4.203		-.204	.501	
			2.150			-9.232			-8.721
		MAX & MIN							
	5		.000			-.239			-1.427
			.000	4.898	-6.831		.033	-.046	
			1.075	1.485	-3.400		.033	-.010	
			2.150	-1.927	-3.637		.033	.025	
			2.150			-.239			-1.427
		MAX & MIN							
	6		.000			.022			-1.379
			.000	3.660	-4.838		-.003	.004	
			1.075	.893	-2.391		-.003	.001	
			2.150	-1.874	-2.918		-.003	-.002	
			2.150			.022			-1.379

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		MAX							
	ALL		.000			.022			4.477
			.000	23.333	-4.257		1.167	.335	
			1.075	11.516	-2.221		.457	.917	
			2.150	.159	-2.695		.033	1.026	
			2.150			.022			4.477
		MIN							
	ALL		.000			-10.500			-8.721
			.000	1.742	-6.831		-.003	-.102	
			1.075	-9.387	-3.400		-.003	-.010	
			2.150	-20.997	-4.203		-.254	-.002	
			2.150			-10.500			-8.721
8	----------								
	MAX & MIN								
	1		.000			-11.349			-1.547
			.000	3.798	-2.392		1.041	.253	
			1.075	1.031	.204		.330	.990	
			2.150	-1.736	-.175		-.380	.963	
			2.150			-11.349			-1.547
		MAX							
	2		.000			-5.081			1.679
			.000	15.552	-1.982		.679	.325	
			1.075	7.352	.639		.253	.751	
			2.150	-.542	.435		-.174	.763	
			2.150			-5.081			1.679
		MIN							
	2		.000			-8.731			-5.951
			.000	2.667	-2.843		.605	.092	
			1.075	-5.119	-.154		.179	.558	
			2.150	-13.213	-.592		-.247	.565	
			2.150			-8.731			-5.951
		MAX							
	3		.000			-4.669			1.838
			.000	15.583	-2.009		.694	.301	
			1.075	7.384	.646		.267	.743	
			2.150	-.510	.476		-.159	.770	
			2.150			-4.669			1.838
		MIN							
	3		.000			-8.318			-5.792
			.000	2.699	-2.871		.620	.067	
			1.075	-5.087	-.147		.194	.549	
			2.150	-13.181	-.551		-.233	.572	
			2.150			-8.318			-5.792
		MAX							
	4		.000			-3.691			4.238
			.000	23.473	-1.793		.702	.415	
			1.075	11.652	.937		.275	.816	
			2.150	.339	.942		-.151	.832	
			2.150			-3.691			4.238
		MIN							
	4		.000			-9.774			-8.479

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			.000	1.999	-3.228		.579	.026	
			1.075	-9.133	-.385		.153	.493	
			2.150	-20.778	-.770		-.274	.502	
			2.150			-9.774			-8.479
		MAX & MIN							
	5		.000			-.315			-1.927
			.000	5.146	-3.114		.020	-.028	
			1.075	1.734	.584		.020	-.007	
			2.150	-1.678	.614		.020	.014	
			2.150			-.315			-1.927
		MAX & MIN							
	6		.000			.029			-1.498
			.000	3.801	-2.394		-.002	.003	
			1.075	1.034	.204		-.002	.001	
			2.150	-1.733	-.172		-.002	-.001	
			2.150			.029			-1.498
		MAX							
	ALL		.000			.029			4.238
			.000	23.473	-1.793		1.041	.415	
			1.075	11.652	.937		.330	.990	
			2.150	.339	.942		.020	.963	
			2.150			.029			4.238
		MIN							
	ALL		.000			-11.349			-8.479
			.000	1.999	-3.228		-.002	-.028	
			1.075	-9.133	-.385		-.002	-.007	
			2.150	-20.778	-.770		-.380	-.001	
			2.150			-11.349			-8.479
9	----------								
	MAX & MIN								
	1		.000			-11.923			-.840
			.000	3.423	-.110		.909	.438	
			1.075	.656	2.083		.198	1.033	
			2.150	-2.111	1.301		-.512	.864	
			2.150			-11.923			-.840
		MAX							
	2		.000			-5.566			2.388
			.000	15.108	.671		.620	.405	
			1.075	6.906	2.917		.194	.774	
			2.150	-.949	2.275		-.232	.737	
			2.150			-5.566			2.388
		MIN							
	2		.000			-9.154			-4.773
			.000	2.313	-.534		.553	.189	
			1.075	-5.476	1.801		.127	.592	
			2.150	-13.613	.958		-.300	.537	
			2.150			-9.154			-4.773
		MAX							
	3		.000			-5.224			2.488
			.000	15.127	.657		.649	.371	
			1.075	6.925	2.923		.223	.771	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150	-.930	2.302		-.203	.765	
		2.150			-5.224			2.480
	MIN							
	3	.000			-8.812			-4.673
		.000	2.332	-.549		.582	.154	
		1.075	-5.457	1.807		.156	.589	
		2.150	-13.594	.984		-.271	.565	
		2.150			-8.812			-4.673
	MAX							
	4	.000			-4.202			4.799
		.000	22.950	1.146		.642	.487	
		1.075	11.125	3.483		.216	.833	
		2.150	-.122	2.991		-.211	.808	
		2.150			-4.202			4.799
	MIN							
	4	.000			-10.182			-7.136
		.000	1.625	-.864		.530	.126	
		1.075	-9.512	1.623		.103	.530	
		2.150	-21.228	.796		-.323	.476	
		2.150			-10.182			-7.136
	MAX & MIN							
	5	.000			-.361			-1.235
		.000	4.655	.609		.009	-.013	
		1.075	1.243	3.779		.009	-.004	
		2.150	-2.169	3.281		.009	.006	
		2.150			-.361			-1.235
	MAX & MIN							
	6	.000			.033			-.821
		.000	3.424	-.111		-.001	.001	
		1.075	.657	2.083		-.001	.000	
		2.150	-2.110	1.302		-.001	-.001	
		2.150			.033			-.821
	MAX							
	ALL	.000			.033			4.799
		.000	22.950	1.146		.909	.487	
		1.075	11.125	3.779		.223	1.033	
		2.150	-.122	3.281		.009	.864	
		2.150			.033			4.799
	MIN							
	ALL	.000			-11.923			-7.136
		.000	1.625	-.864		-.001	-.013	
		1.075	-9.512	1.623		-.001	-.004	
		2.150	-21.228	.796		-.512	-.001	
		2.150			-11.923			-7.136
10	----------							
	MAX & MIN							
	1	.000			-12.211			-.255
		.000	2.991	1.279		.777	.601	
		1.075	.224	3.007		.066	1.054	
		2.150	-2.543	1.760		-.645	.743	
		2.150			-12.211			-.255

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
	2	.000			-5.940			2.951
		.000	14.588	2.314		.569	.474	
		1.075	6.385	4.061		.143	.787	
		2.150	-1.428	2.878		-.284	.706	
		2.150			-5.940			2.951
	MIN							
	2	.000			-9.482			-3.697
		.000	1.893	.880		.504	.265	
		1.075	-5.897	2.799		.077	.613	
		2.150	-14.079	1.391		-.349	.502	
		2.150			-9.482			-3.697
	MAX							
	3	.000			-5.709			2.985
		.000	14.594	2.313		.616	.425	
		1.075	6.391	4.066		.190	.791	
		2.150	-1.422	2.890		-.236	.759	
		2.150			-5.709			2.985
	MIN							
	3	.000			-9.251			-3.663
		.000	1.899	.878		.551	.216	
		1.075	-5.891	2.804		.124	.615	
		2.150	-14.073	1.402		-.302	.555	
		2.150			-9.251			-3.663
	MAX							
	4	.000			-4.600			5.177
		.000	22.338	2.996		.591	.551	
		1.075	10.511	4.776		.164	.845	
		2.150	-.666	3.655		-.262	.780	
		2.150			-4.600			5.177
	MIN							
	4	.000			-10.502			-5.903
		.000	1.179	.606		.481	.203	
		1.075	-9.960	2.672		.055	.551	
		2.150	-21.751	1.176		-.371	.441	
		2.150			-10.502			-5.903
	MAX & MIN							
	5	.000			-.380			-.392
		.000	3.841	3.212		.003	-.005	
		1.075	.429	5.507		.003	-.002	
		2.150	-2.983	4.134		.003	.000	
		2.150			-.380			-.392
	MAX & MIN							
	6	.000			.035			-.250
		.000	2.991	1.279		-.000	.000	
		1.075	.224	3.007		-.000	.000	
		2.150	-2.543	1.760		-.000	.000	
		2.150			.035			-.250
	MAX							
	ALL	.000			.035			5.177
		.000	22.338	3.212		.777	.601	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.075	10.511	5.507		.190	1.054	
		2.150	-.666	4.134		.003	.780	
		2.150			.035			5.177
	MIN							
	ALL	.000			-12.211			-5.903
		.000	1.179	.606		-.000	-.005	
		1.075	-9.960	2.672		-.000	-.002	
		2.150	-21.751	1.176		-.645	.000	
		2.150			-12.211			-5.903
21	----------							
	MAX & MIN							
	1	.000			-.326			17.835
		.000	19.264	.248		3.144	-3.157	
		1.075	16.187	19.303		3.144	.222	
		2.150	13.111	35.051		3.144	3.602	
		2.150			-.326			17.835
	MAX							
	2	.000			.529			31.330
		.000	28.086	3.181		2.706	-2.253	
		1.075	24.622	26.978		2.706	.015	
		2.150	21.159	50.176		2.706	2.849	
		2.150			.529			31.330
	MIN							
	2	.000			.262			8.977
		.000	16.222	-.683		1.874	-2.895	
		1.075	13.145	17.783		1.874	-.062	
		2.150	10.069	30.276		1.874	2.172	
		2.150			.262			8.977
	MAX							
	3	.000			.946			31.918
		.000	28.259	3.029		2.868	-2.541	
		1.075	24.795	27.011		2.868	-.099	
		2.150	21.332	50.395		2.868	2.909	
		2.150			.946			31.918
	MIN							
	3	.000			.678			9.566
		.000	16.395	-.835		2.037	-3.184	
		1.075	13.319	17.816		2.037	-.176	
		2.150	10.242	30.495		2.037	2.232	
		2.150			.678			9.566
	MAX							
	4	.000			.609			41.710
		.000	34.388	4.781		2.944	-2.053	
		1.075	30.666	32.191		2.944	.044	
		2.150	26.944	60.807		2.944	3.083	
		2.150			.609			41.710
	MIN							
	4	.000			.164			4.456
		.000	14.614	-1.659		1.558	-3.123	
		1.075	11.538	16.866		1.558	-.085	
		2.150	8.461	27.641		1.558	1.955	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150			.164			4.456
	MAX & MIN							
	5	.000			.012			16.282
		.000	16.938	.148		.008	-.012	
		1.075	13.861	16.702		.008	-.003	
		2.150	10.785	29.950		.008	.005	
		2.150			.012			16.282
	MAX & MIN							
	6	.000			-.001			18.600
		.000	19.494	.051		-.001	.001	
		1.075	16.418	19.354		-.001	.000	
		2.150	13.341	35.349		-.001	-.001	
		2.150			-.001			18.600
	MAX							
	ALL	.000			.946			41.710
		.000	34.388	4.781		3.144	.001	
		1.075	30.666	32.191		3.144	.222	
		2.150	26.944	60.807		3.144	3.602	
		2.150			.946			41.710
	MIN							
	ALL	.000			-.326			4.456
		.000	14.614	-1.659		-.001	-3.184	
		1.075	11.538	16.702		-.001	-.176	
		2.150	8.461	27.641		-.001	-.001	
		2.150			-.326			4.456
22	----------							
	MAX & MIN							
	1	.000			-3.279			7.783
		.000	9.418	33.678		2.854	-2.561	
		1.075	6.341	42.148		2.854	.507	
		2.150	3.265	47.311		2.854	3.574	
		2.150			-3.279			7.783
	MAX							
	2	.000			-.623			18.483
		.000	15.794	49.547		2.400	-1.640	
		1.075	12.330	60.278		2.400	.310	
		2.150	8.866	69.285		2.400	2.838	
		2.150			-.623			18.483
	MIN							
	2	.000			-1.596			-1.656
		.000	5.120	31.931		1.554	-2.231	
		1.075	2.044	38.850		1.554	.231	
		2.150	-1.033	40.751		1.554	2.102	
		2.150			-1.596			-1.656
	MAX							
	3	.000			.074			19.084
		.000	15.976	49.342		2.468	-1.755	
		1.075	12.512	60.269		2.468	.267	
		2.150	9.048	69.472		2.468	2.868	
		2.150			.074			19.084

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MIN							
	3	.000			-.900			-1.055
		.000	5.303	31.726		1.622	-2.347	
		1.075	2.226	38.841		1.622	.188	
		2.150	-.851	40.939		1.622	2.131	
		2.150			-.900			-1.055
	MAX							
	4	.000			-.266			27.018
		.000	20.484	59.688		2.642	-1.450	
		1.075	16.763	72.400		2.642	.339	
		2.150	13.041	84.443		2.642	3.093	
		2.150			-.266			27.018
	MIN							
	4	.000			-1.889			-6.546
		.000	2.696	30.328		1.232	-2.436	
		1.075	-.381	36.687		1.232	.207	
		2.150	-3.457	36.887		1.232	1.865	
		2.150			-1.889			-6.546
	MAX & MIN							
	5	.000			.018			7.631
		.000	7.231	28.282		.007	-.008	
		1.075	4.155	34.402		.007	.000	
		2.150	1.078	37.215		.007	.008	
		2.150			.018			7.631
	MAX & MIN							
	6	.000			-.002			8.561
		.000	9.660	33.427		-.001	.001	
		1.075	6.583	42.158		-.001	.000	
		2.150	3.507	47.581		-.001	-.001	
		2.150			-.002			8.561
	MAX							
	ALL	.000			.074			27.018
		.000	20.484	59.688		2.854	.001	
		1.075	16.763	72.400		2.854	.507	
		2.150	13.041	84.443		2.854	3.574	
		2.150			.074			27.018
	MIN							
	ALL	.000			-3.279			-6.546
		.000	2.696	28.282		-.001	-2.561	
		1.075	-.381	34.402		-.001	.000	
		2.150	-3.457	36.887		-.001	-.001	
		2.150			-3.279			-6.546
23	----------							
	MAX & MIN							
	1	.000			-6.082			3.481
		.000	.129	47.028		2.494	-1.853	
		1.075	-2.948	45.513		2.494	.828	
		2.150	-6.024	40.690		2.494	3.509	
		2.150			-6.082			3.481
	MAX							
	2	.000			-1.854			12.281

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	4.883	69.548		2.092	-1.099	
		1.075	1.419	67.536		2.092	.592	
		2.150	-1.965	63.110		2.092	2.793	
		2.150			-1.854			12.281
	MIN							
	2	.000			-3.663			-6.126
		.000	-5.473	43.181		1.249	-1.611	
		1.075	-8.549	40.183		1.249	.443	
		2.150	-11.705	32.023		1.249	1.985	
		2.150			-3.663			-6.126
	MAX							
	3	.000			-1.036			12.876
		.000	5.073	69.315		2.099	-1.131	
		1.075	1.610	67.508		2.099	.568	
		2.150	-1.775	63.287		2.099	2.776	
		2.150			-1.036			12.876
	MIN							
	3	.000			-2.845			-5.530
		.000	-5.282	42.948		1.257	-1.643	
		1.075	-8.359	40.155		1.257	.417	
		2.150	-11.514	32.199		1.257	1.968	
		2.150			-2.845			-5.530
	MAX							
	4	.000			-1.165			19.532
		.000	8.511	84.095		2.333	-.933	
		1.075	4.790	82.246		2.333	.645	
		2.150	1.199	78.577		2.333	3.071	
		2.150			-1.165			19.532
	MIN							
	4	.000			-4.180			-11.146
		.000	-8.748	40.150		.928	-1.787	
		1.075	-11.825	36.658		.928	.396	
		2.150	-15.033	26.766		.928	1.724	
		2.150			-4.180			-11.146
	MAX & MIN							
	5	.000			.019			4.034
		.000	-2.009	36.457		.010	-.008	
		1.075	-5.086	32.644		.010	.002	
		2.150	-8.162	25.523		.010	.013	
		2.150			.019			4.034
	MAX & MIN							
	6	.000			-.002			4.251
		.000	.382	46.753		-.001	.001	
		1.075	-2.694	45.510		-.001	-.000	
		2.150	-5.771	40.960		-.001	-.001	
		2.150			-.002			4.251
	MAX							
	ALL	.000			.019			19.532
		.000	8.511	84.095		2.494	.001	
		1.075	4.790	82.246		2.494	.828	
		2.150	1.199	78.577		2.494	3.509	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150			.019			19.532
	MIN							
	ALL	.000			-6.082			-11.146
		.000	-8.748	36.457		-.001	-1.853	
		1.075	-11.825	32.644		-.001	-.000	
		2.150	-15.033	25.523		-.001	-.001	
		2.150			-6.082			-11.146
24	----------							
	MAX & MIN							
	1	.000			-8.534			2.671
		.000	-8.992	40.754		2.135	-1.186	
		1.075	-12.069	29.434		2.135	1.109	
		2.150	-15.146	14.806		2.135	3.405	
		2.150			-8.534			2.671
	MAX							
	2	.000			-2.953			10.536
		.000	-5.686	63.913		1.837	-.660	
		1.075	-9.149	48.542		1.837	.893	
		2.150	-12.231	31.305		1.837	2.760	
		2.150			-2.953			10.536
	MIN							
	2	.000			-5.634			-6.513
		.000	-15.932	34.769		.995	-1.096	
		1.075	-19.009	21.968		.995	.607	
		2.150	-22.467	4.002		.995	1.875	
		2.150			-5.634			-6.513
	MAX							
	3	.000			-2.065			11.133
		.000	-5.494	63.668		1.818	-.661	
		1.075	-8.958	48.503		1.818	.812	
		2.150	-12.040	31.472		1.818	2.719	
		2.150			-2.065			11.133
	MIN							
	3	.000			-4.746			-5.916
		.000	-15.741	34.524		.976	-1.097	
		1.075	-18.817	21.929		.976	.586	
		2.150	-22.276	4.168		.976	1.834	
		2.150			-4.746			-5.916
	MAX							
	4	.000			-1.930			17.165
		.000	-3.021	78.897		2.078	-.519	
		1.075	-6.743	61.321		2.078	.912	
		2.150	-9.828	42.839		2.078	3.065	
		2.150			-1.930			17.165
	MIN							
	4	.000			-6.398			-11.250
		.000	-20.098	30.324		.674	-1.245	
		1.075	-23.175	17.031		.674	.536	
		2.150	-26.888	-2.667		.674	1.590	
		2.150			-6.398			-11.250

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX & MIN							
	5	.000			.010			3.753
		.000	-11.101	25.011		.020	-.015	
		1.075	-14.177	11.424		.020	.006	
		2.150	-17.254	-5.470		.020	.027	
		2.150			.010			3.753
	MAX & MIN							
	6	.000			-.001			3.439
		.000	-8.733	40.469		-.002	.001	
		1.075	-11.810	27.428		-.002	-.001	
		2.150	-14.886	15.079		-.002	-.002	
		2.150			-.001			3.439
	MAX							
	ALL	.000			.010			17.165
		.000	-3.021	78.897		2.135	.001	
		1.075	-6.743	61.321		2.135	1.109	
		2.150	-9.828	42.839		2.135	3.405	
		2.150			.010			17.165
	MIN							
	ALL	.000			-8.534			-11.250
		.000	-20.098	25.011		-.002	-1.245	
		1.075	-23.175	11.424		-.002	-.001	
		2.150	-26.888	-5.470		-.002	-.002	
		2.150			-8.534			-11.250
25	----------							
	MAX & MIN							
	1	.000			-10.618			5.153
		.000	-18.153	14.519		1.774	-.562	
		1.075	-21.230	-6.650		1.774	1.345	
		2.150	-24.306	-31.126		1.774	3.252	
		2.150			-10.618			5.153
	MAX							
	2	.000			-3.866			12.799
		.000	-16.162	31.694		1.605	-.280	
		1.075	-19.310	4.133		1.605	1.047	
		2.150	-22.387	-24.577		1.605	2.728	
		2.150			-3.866			12.799
	MIN							
	2	.000			-7.395			-3.285
		.000	-26.802	6.372		.760	-.635	
		1.075	-30.194	-16.267		.760	.036	
		2.150	-33.658	-43.997		.760	1.752	
		2.150			-7.395			-3.285
	MAX							
	3	.000			-2.926			13.408
		.000	-15.974	31.438		1.576	-.271	
		1.075	-19.122	4.079		1.576	1.024	
		2.150	-22.199	-24.428		1.576	2.673	
		2.150			-2.926			13.408
	MIN							
	3	.000			-6.455			-2.676

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END!	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	-26.615	6.117		.731	-.626	
		1.075	-30.006	-16.321		.731	.713	
		2.150	-33.470	-43.849		.731	1.697	
		2.150			-6.455			-2.676
	MAX							
	4	.000			-2.519			19.314
		.000	-14.391	42.709		1.847	-.166	
		1.075	-17.588	11.362		1.847	1.156	
		2.150	-20.664	-19.693		1.847	3.067	
		2.150			-2.519			19.314
	MIN							
	4	.000			-8.400			-7.492
		.000	-32.126	.506		.439	-.757	
		1.075	-35.727	-22.637		.439	.437	
		2.150	-39.449	-52.060		.439	1.440	
		2.150			-8.400			-7.492
	MAX & MIN							
	5	.000			-.032			7.153
		.000	-20.274	-6.444		.044	-.032	
		1.075	-23.351	-29.892		.044	.015	
		2.150	-26.427	-56.648		.044	.062	
		2.150			-.032			7.153
	MAX & MIN							
	6	.000			.003			5.891
		.000	-17.871	14.217		-.004	.003	
		1.075	-20.947	-6.648		-.004	-.001	
		2.150	-24.024	-30.820		-.004	-.006	
		2.150			.003			5.891
	MAX							
	ALL	.000			.003			19.314
		.000	-14.391	42.709		1.847	.003	
		1.075	-17.588	11.362		1.847	1.345	
		2.150	-20.664	-19.693		1.847	3.252	
		2.150			.003			19.314
	MIN							
	ALL	.000			-10.618			-7.492
		.000	-32.126	-6.444		-.004	-.757	
		1.075	-35.727	-29.892		-.004	-.001	
		2.150	-39.449	-56.648		-.004	-.006	
		2.150			-10.618			-7.492
26	----------							
	MAX & MIN							
	1	.000			-12.328			10.397
		.000	-21.698	-35.799		1.411	-.001	
		1.075	-24.774	-60.778		1.411	1.516	
		2.150	-27.851	-89.063		1.411	3.033	
		2.150			-12.328			10.397
	MAX							
	2	.000			-4.590			18.577
		.000	-20.064	-29.320		1.374	.032	
		1.075	-23.141	-58.693		1.374	1.274	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END!	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150	-26.218	-87.213		1.374	2.715	
		2.150			-4.590			18.577
	MIN							
	2	.000			-8.886			2.627
		.000	-30.867	-46.423		.541	-.179	
		1.075	-34.331	-72.733		.541	.809	
		2.150	-37.794	-103.475		.541	1.587	
		2.150			-8.886			2.627
	MAX							
	3	.000			-3.605			19.210
		.000	-19.856	-29.604		1.342	.036	
		1.075	-22.933	-58.753		1.342	1.244	
		2.150	-26.009	-87.049		1.342	2.650	
		2.150			-3.605			19.210
	MIN							
	3	.000			-7.901			3.260
		.000	-30.659	-46.706		.509	-.175	
		1.075	-34.122	-72.793		.509	.779	
		2.150	-37.586	-103.311		.509	1.522	
		2.150			-7.901			3.260
	MAX							
	4	.000			-2.951			25.591
		.000	-18.567	-25.457		1.613	.097	
		1.075	-21.644	-57.320		1.613	1.439	
		2.150	-24.721	-85.558		1.613	3.113	
		2.150			-2.951			25.591
	MIN							
	4	.000			-10.111			-.992
		.000	-36.572	-53.961		.225	-.256	
		1.075	-40.293	-80.721		.225	.664	
		2.150	-44.015	-112.661		.225	1.232	
		2.150			-10.111			-.992
	MAX & MIN							
	5	.000			-.205			14.526
		.000	-23.550	-62.813		.093	-.065	
		1.075	-26.627	-89.783		.093	.036	
		2.150	-29.703	-120.060		.093	.136	
		2.150			-.205			14.526
	MAX & MIN							
	6	.000			.019			10.950
		.000	-21.326	-36.076		-.009	.006	
		1.075	-24.402	-60.655		-.009	-.003	
		2.150	-27.479	-88.541		-.009	-.013	
		2.150			.019			10.950
	MAX							
	ALL	.000			.019			25.591
		.000	-18.567	-25.457		1.613	.097	
		1.075	-21.644	-57.320		1.613	1.516	
		2.150	-24.721	-85.558		1.613	3.113	
		2.150			.019			25.591

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END!	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MIN							
	ALL	.000			-12.328			-.992
		.000	-36.572	-62.813		-.009	-.256	
		1.075	-40.293	-89.783		-.009	-.003	
		2.150	-44.015	-120.060		-.009	-.013	
		2.150			-12.328			-.992
27	----------							
	MAX & MIN							
	1	.000			-13.645			-10.248
		.000	28.414	-91.019		1.240	.343	
		1.075	25.337	-62.128		1.240	1.676	
		2.150	22.260	-36.544		1.240	3.010	
		2.150			-13.645			-10.248
	MAX							
	2	.000			-5.183			-5.133
		.000	37.506	-86.513		.854	.680	
		1.075	34.043	-59.823		.854	1.403	
		2.150	30.579	-32.006		.854	2.215	
		2.150			-5.183			-5.133
	MIN							
	2	.000			-9.938			-21.238
		.000	25.723	-106.101		.655	.094	
		1.075	22.647	-72.410		.655	.906	
		2.150	19.570	-45.828		.655	1.719	
		2.150			-9.938			-21.238
	MAX							
	3	.000			-4.162			-4.548
		.000	37.772	-86.714		.865	.639	
		1.075	34.308	-59.738		.865	1.324	
		2.150	30.845	-31.635		.865	2.199	
		2.150			-4.162			-4.548
	MIN							
	3	.000			-8.918			-20.653
		.000	25.989	-106.302		.667	.053	
		1.075	22.913	-72.325		.667	.878	
		2.150	19.836	-45.458		.667	1.703	
		2.150			-8.918			-20.653
	MAX							
	4	.000			-3.382			-.205
		.000	44.276	-84.318		.914	.918	
		1.075	40.554	-58.335		.914	1.575	
		2.150	36.833	-28.266		.914	2.383	
		2.150			-3.382			-.205
	MIN							
	4	.000			-11.308			-27.048
		.000	24.638	-116.965		.584	-.059	
		1.075	21.561	-79.312		.584	.748	
		2.150	18.485	-51.304		.584	1.556	
		2.150			-11.308			-27.048
	MAX & MIN							
	5	.000			-.871			-12.148

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END!	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	41.643	-129.509		.093	-.136	
		1.075	37.922	-86.742		.093	-.036	
		2.150	34.200	-47.977		.093	.065	
		2.150			-.871			-12.148
	MAX & MIN							
	6	.000			.080			-10.032
		.000	28.297	-90.769		-.009	.013	
		1.075	25.220	-62.004		-.009	.003	
		2.150	22.143	-36.546		-.009	-.006	
		2.150			.080			-10.032
	MAX							
	ALL	.000			.080			-.205
		.000	44.276	-84.318		1.240	.918	
		1.075	40.554	-58.335		1.240	1.676	
		2.150	36.833	-28.266		1.240	3.010	
		2.150			.080			-.205
	MIN							
	ALL	.000			-13.645			-27.048
		.000	24.638	-129.509		-.009	-.136	
		1.075	21.561	-86.742		-.009	-.036	
		2.150	18.485	-51.304		-.009	-.006	
		2.150			-13.645			-27.048
28	----------							
	MAX & MIN							
	1	.000			-14.746			-5.185
		.000	25.741	-31.125		.893	.875	
		1.075	22.665	-5.106		.893	1.835	
		2.150	19.588	17.605		.893	2.796	
		2.150			-14.746			-5.185
	MAX							
	2	.000			-5.849			.522
		.000	34.698	-24.649		.664	.906	
		1.075	31.234	4.469		.664	1.431	
		2.150	27.770	32.646		.664	2.087	
		2.150			-5.849			.522
	MIN							
	2	.000			-10.671			-14.702
		.000	23.017	-39.665		.480	.404	
		1.075	19.941	-12.625		.480	1.023	
		2.150	16.864	10.432		.480	1.642	
		2.150			-10.671			-14.702
	MAX							
	3	.000			-4.834			.988
		.000	34.850	-24.697		.692	.857	
		1.075	31.387	4.585		.692	1.412	
		2.150	27.923	32.926		.692	2.098	
		2.150			-4.834			.988
	MIN							
	3	.000			-9.655			-14.237
		.000	23.170	-39.713		.508	.355	
		1.075	20.093	-12.509		.508	1.004	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE+307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150	17.016	10.712		.508	1.653	
		2.150			-9.655			-14.237
	MAX							
	4	.000			-4.034			5.547
		.000	41.119	-20.718		.723	1.106	
		1.075	37.398	10.951		.723	1.568	
		2.150	33.676	43.257		.723	2.248	
		2.150			-4.034			5.547
	MIN							
	4	.000			-12.070			-19.827
		.000	21.652	-45.745		.416	.268	
		1.075	18.575	-17.539		.416	.887	
		2.150	15.499	6.234		.416	1.507	
		2.150			-12.070			-19.827
	MAX & MIN							
	5	.000			-1.042			-6.961
		.000	40.216	-40.502		.043	-.062	
		1.075	36.494	.730		.043	-.015	
		2.150	32.773	37.961		.043	.031	
		2.150			-1.042			-6.961
	MAX & MIN							
	6	.000			.096			-5.154
		.000	25.714	-31.093		-.004	.006	
		1.075	22.637	-5.104		-.004	.001	
		2.150	19.561	17.577		-.004	-.003	
		2.150			.096			-5.154
	MAX							
	ALL	.000			.096			5.547
		.000	41.119	-20.718		.893	1.106	
		1.075	37.398	10.951		.893	1.835	
		2.150	33.676	43.257		.893	2.796	
		2.150			.096			5.547
	MIN							
	ALL	.000			-14.746			-19.827
		.000	21.652	-45.745		-.004	-.062	
		1.075	18.575	-17.539		-.004	-.015	
		2.150	15.499	6.234		-.004	-.003	
		2.150			-14.746			-19.827
29	----------							
	MAX & MIN							
	1	.000			-15.495			-1.750
		.000	16.631	18.361		.537	1.349	
		1.075	13.555	34.586		.537	1.926	
		2.150	10.478	47.504		.537	2.504	
		2.150			-15.495			-1.750
	MAX							
	2	.000			-6.417			4.164
		.000	23.538	34.234		.504	1.130	
		1.075	20.074	52.622		.504	1.486	
		2.150	16.610	69.560		.504	1.992	
		2.150			-6.417			4.164

REPOSICION 307+860. 3 VANOS 13+17+13 FILE+307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MIN							
	2	.000			-11.223			-9.591
		.000	13.508	11.164		.325	.651	
		1.075	10.431	28.669		.325	1.098	
		2.150	7.354	42.109		.325	1.546	
		2.150			-11.223			-9.591
	MAX							
	3	.000			-5.460			4.448
		.000	23.621	34.238		.567	1.056	
		1.075	20.157	52.716		.567	1.480	
		2.150	16.693	69.744		.567	2.054	
		2.150			-5.460			4.448
	MIN							
	3	.000			-10.266			-9.306
		.000	13.591	11.169		.389	.577	
		1.075	10.514	28.763		.389	1.092	
		2.150	7.437	42.293		.389	1.608	
		2.150			-10.266			-9.306
	MAX							
	4	.000			-4.617			8.859
		.000	28.403	44.663		.563	1.316	
		1.075	24.681	64.774		.563	1.612	
		2.150	20.959	84.673		.563	2.157	
		2.150			-4.617			8.859
	MIN							
	4	.000			-12.626			-14.065
		.000	11.686	6.214		.265	.518	
		1.075	8.610	24.853		.265	.986	
		2.150	5.533	38.922		.265	1.413	
		2.150			-12.626			-14.065
	MAX & MIN							
	5	.000			-1.085			-3.011
		.000	28.969	39.309		.018	-.026	
		1.075	25.248	68.450		.018	-.007	
		2.150	21.526	93.591		.018	.012	
		2.150			-1.085			-3.011
	MAX & MIN							
	6	.000			.100			-1.750
		.000	16.627	18.360		-.002	.002	
		1.075	13.550	34.581		-.002	.001	
		2.150	10.474	47.494		-.002	-.001	
		2.150			.100			-1.750
	MAX							
	ALL	.000			.100			8.859
		.000	28.969	44.663		.567	1.349	
		1.075	25.248	68.450		.567	1.926	
		2.150	21.526	93.591		.567	2.504	
		2.150			.100			8.859
	MIN							
	ALL	.000			-15.495			-14.065
		.000	11.686	6.214		-.002	-.026	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE+307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		8.610	24.853		-.002	-.007		
		2.150	5.533	38.922		-.002	-.001	
		2.150			-15.495			-14.065
30	----------							
	MAX & MIN							
	1	.000			-15.873			-.428
		.000	7.591	47.691		.179	1.778	
		1.075	4.514	54.198		.179	1.971	
		2.150	1.438	57.397		.179	2.163	
		2.150			-15.873			-.428
	MAX							
	2	.000			-7.054			5.439
		.000	12.661	70.118		.397	1.303	
		1.075	9.197	76.928		.397	1.548	
		2.150	5.969	82.033		.397	1.957	
		2.150			-7.054			5.439
	MIN							
	2	.000			-11.820			-6.894
		.000	3.988	41.889		.221	.837	
		1.075	.912	49.856		.221	1.170	
		2.150	-2.400	52.989		.221	1.503	
		2.150			-11.820			-6.894
	MAX							
	3	.000			-6.344			5.535
		.000	12.681	70.166		.532	1.182	
		1.075	9.218	76.999		.532	1.572	
		2.150	5.989	82.125		.532	2.127	
		2.150			-6.344			5.535
	MIN							
	3	.000			-11.109			-6.799
		.000	4.009	41.937		.356	.716	
		1.075	.932	49.927		.356	1.194	
		2.150	-2.379	53.082		.356	1.672	
		2.150			-11.109			-6.799
	MAX							
	4	.000			-5.280			9.603
		.000	16.134	85.116		.456	1.481	
		1.075	12.412	92.229		.456	1.668	
		2.150	9.082	98.704		.456	2.128	
		2.150			-5.280			9.603
	MIN							
	4	.000			-13.222			-10.953
		.000	1.680	38.067		.163	.705	
		1.075	-1.397	47.109		.163	1.038	
		2.150	-4.865	50.298		.163	1.370	
		2.150			-13.222			-10.953
	MAX & MIN							
	5	.000			-1.094			-.775
		.000	12.212	94.109		.005	-.009	
		1.075	8.491	105.237		.005	-.004	
		2.150	4.769	112.364		.005	.001	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE+307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150			-1.094			-.775
	MAX & MIN							
	6	.000			.101			-.429
		.000	7.590	47.689		-.000	.001	
		1.075	4.513	54.195		-.000	.000	
		2.150	1.437	57.393		-.000	-.000	
		2.150			.101			-.429
	MAX							
	ALL	.000			.101			9.603
		.000	16.134	94.109		.532	1.778	
		1.075	12.412	105.237		.532	1.971	
		2.150	9.082	112.364		.532	2.163	
		2.150			.101			9.603
	MIN							
	ALL	.000			-15.873			-10.953
		.000	1.680	38.067		-.000	-.009	
		1.075	-1.397	47.109		-.000	-.004	
		2.150	-4.865	50.298		-.000	-.000	
		2.150			-15.873			-10.953
41	----------							
	MAX & MIN							
	1	.000			.013			-.769
		.000	14.477	7.407		3.476	-3.419	
		1.075	11.115	21.163		3.476	.317	
		2.150	7.752	31.304		3.476	4.054	
		2.150			.013			-.769
	MAX							
	2	.000			.123			8.293
		.000	30.885	11.048		2.648	-1.907	
		1.075	21.250	33.817		2.648	.230	
		2.150	13.942	46.664		2.648	3.027	
		2.150			.123			8.293
	MIN							
	2	.000			.085			-12.635
		.000	12.030	7.047		1.741	-2.567	
		1.075	4.974	19.934		1.741	.180	
		2.150	-6.123	28.207		1.741	2.267	
		2.150			.085			-12.635
	MAX							
	3	.000			.188			8.890
		.000	30.880	11.046		2.605	-1.864	
		1.075	21.246	33.810		2.605	.227	
		2.150	13.938	46.653		2.605	2.976	
		2.150			.188			8.890
	MIN							
	3	.000			.150			-12.039
		.000	12.026	7.045		1.697	-2.523	
		1.075	4.970	19.926		1.697	.177	
		2.150	-6.127	28.196		1.697	2.217	
		2.150			.150			-12.039

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
	4	.000			.135			15.720
		.000	41.827	13.477		2.907	-1.695	
		1.075	28.012	42.259		2.907	.247	
		2.150	18.073	56.915		2.907	3.289	
		2.150			.135			15.720
	MIN							
	4	.000			.071			-19.161
		.000	10.403	6.809		1.395	-2.794	
		1.075	.885	19.122		1.395	.164	
		2.150	-15.369	26.154		1.395	2.023	
		2.150			.071			-19.161
	MAX & MIN							
	5	.000			.005			.000
		.000	12.526	6.539		.000	.000	
		1.075	9.163	18.197		.000	.000	
		2.150	5.800	26.240		.000	.000	
		2.150			.005			.000
	MAX & MIN							
	6	.000			-.001			.000
		.000	14.477	7.407		.000	.000	
		1.075	11.115	21.163		.000	.000	
		2.150	7.752	31.304		.000	.000	
		2.150			-.001			.000
	MAX							
	ALL	.000			.188			15.720
		.000	41.827	13.477		3.476	.000	
		1.075	28.012	42.259		3.476	.317	
		2.150	18.073	56.915		3.476	4.054	
		2.150			.188			15.720
	MIN							
	ALL	.000			-.001			-19.161
		.000	10.403	6.539		.000	-3.419	
		1.075	.885	18.197		.000	.000	
		2.150	-15.369	26.154		.000	.000	
		2.150			-.001			-19.161
42	----------							
	MAX & MIN							
	1	.000			.012			-.899
		.000	8.802	42.123		3.480	-3.173	
		1.075	5.439	49.777		3.480	.568	
		2.150	2.076	53.817		3.480	4.309	
		2.150			.012			-.899
	MAX							
	2	.000			.750			8.408
		.000	26.235	61.078		2.724	-1.747	
		1.075	16.299	75.100		2.724	.410	
		2.150	8.298	79.656		2.724	3.280	
		2.150			.750			8.408
	MIN							
	2	.000			.504			-13.662

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	6.066	39.472		1.699	-2.458	
		1.075	-2.169	45.947		1.699	.322	
		2.150	-12.178	48.806		1.699	2.392	
		2.150			.504			-13.662
	MAX							
	3	.000			1.169			9.103
		.000	26.229	61.064		2.674	-1.700	
		1.075	16.293	75.080		2.674	.405	
		2.150	8.293	79.630		2.674	3.221	
		2.150			1.169			9.103
	MIN							
	3	.000			.923			-12.967
		.000	6.060	39.459		1.650	-2.411	
		1.075	-2.175	45.927		1.650	.317	
		2.150	-12.184	48.780		1.650	2.333	
		2.150			.923			-12.967
	MAX							
	4	.000			.826			16.226
		.000	37.863	73.728		3.016	-1.516	
		1.075	23.545	92.002		3.016	.441	
		2.150	12.452	96.909		3.016	3.586	
		2.150			.826			16.226
	MIN							
	4	.000			.416			-20.557
		.000	4.248	37.719		1.309	-2.701	
		1.075	-7.235	43.413		1.309	.295	
		2.150	-21.676	45.491		1.309	2.106	
		2.150			.416			-20.557
	MAX & MIN							
	5	.000			.030			.000
		.000	6.145	35.736		.000	.000	
		1.075	2.782	40.534		.000	.000	
		2.150	-.580	41.717		.000	.000	
		2.150			.030			.000
	MAX & MIN							
	6	.000			-.003			.000
		.000	8.802	42.123		.000	.000	
		1.075	5.439	49.777		.000	.000	
		2.150	2.076	53.817		.000	.000	
		2.150			-.003			.000
	MAX							
	ALL	.000			1.169			16.226
		.000	37.863	73.728		3.480	.000	
		1.075	23.545	92.002		3.480	.568	
		2.150	12.452	96.909		3.480	4.309	
		2.150			1.169			16.226
	MIN							
	ALL	.000			-.003			-20.557
		.000	4.248	35.736		.000	-3.173	
		1.075	-7.235	40.534		.000	.000	
		2.150	-21.676	41.717		.000	.000	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150			-.003			-20.557
43	----------							
	MAX & MIN							
	1	.000			.003			-.920
		.000	-1.198	57.960		3.039	-2.294	
		1.075	-4.560	54.865		3.039	.973	
		2.150	-7.923	48.156		3.039	4.240	
		2.150			.003			-.920
	MAX							
	2	.000			1.135			7.694
		.000	14.243	85.042		2.459	-1.239	
		1.075	4.352	85.357		2.459	.724	
		2.150	-3.574	75.511		2.459	3.308	
		2.150			1.135			7.694
	MIN							
	2	.000			.751			-12.685
		.000	-6.042	52.757		1.435	-1.860	
		1.075	-14.189	48.415		1.435	.546	
		2.150	-24.186	40.453		1.435	2.331	
		2.150			.751			-12.685
	MAX							
	3	.000			1.776			8.398
		.000	14.237	85.015		2.409	-1.198	
		1.075	4.346	85.323		2.409	.712	
		2.150	-3.580	75.471		2.409	3.243	
		2.150			1.776			8.398
	MIN							
	3	.000			1.393			-11.981
		.000	-6.048	52.730		1.386	-1.818	
		1.075	-14.195	48.381		1.386	.534	
		2.150	-24.192	40.413		1.386	2.266	
		2.150			1.393			-11.981
	MAX							
	4	.000			1.251			15.069
		.000	24.543	103.124		2.751	-1.037	
		1.075	10.299	105.718		2.751	.786	
		2.150	-.669	93.787		2.751	3.645	
		2.150			1.251			15.069
	MIN							
	4	.000			.612			-18.896
		.000	-9.265	49.316		1.044	-2.071	
		1.075	-20.603	44.147		1.044	.489	
		2.150	-35.022	35.358		1.044	2.016	
		2.150			.612			-18.896
	MAX & MIN							
	5	.000			.064			.000
		.000	-4.018	45.425		.000	.000	
		1.075	-7.380	39.298		.000	.000	
		2.150	-10.743	29.557		.000	.000	
		2.150			.064			.000

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX & MIN							
	6	.000			-.006			.000
		.000	-1.198	57.960		.000	.000	
		1.075	-4.560	54.865		.000	.000	
		2.150	-7.923	48.156		.000	.000	
		2.150			-.006			.000
	MAX							
	ALL	.000			1.776			15.069
		.000	24.543	103.124		3.039	.000	
		1.075	10.299	105.718		3.039	.973	
		2.150	-.669	93.787		3.039	4.240	
		2.150			1.776			15.069
	MIN							
	ALL	.000			-.006			-18.896
		.000	-9.265	45.425		.000	-2.294	
		1.075	-20.603	39.298		.000	.000	
		2.150	-35.022	29.557		.000	.000	
		2.150			-.006			-18.896
44	----------							
	MAX & MIN							
	1	.000			-.008			-.947
		.000	-11.838	50.328		2.603	-1.489	
		1.075	-15.201	35.795		2.603	1.310	
		2.150	-18.563	17.647		2.603	4.108	
		2.150			-.008			-.947
	MAX							
	2	.000			1.323			6.868
		.000	1.517	78.088		2.196	-.776	
		1.075	-8.232	62.883		2.196	.996	
		2.150	-15.989	38.102		2.196	3.298	
		2.150			1.323			6.868
	MIN							
	2	.000			.847			-11.528
		.000	-19.019	42.581		1.174	-1.305	
		1.075	-27.102	26.753		1.174	.228	
		2.150	-37.006	7.300		1.174	2.232	
		2.150			.847			-11.528
	MAX							
	3	.000			2.078			7.573
		.000	1.511	78.048		2.147	-.741	
		1.075	-8.238	62.836		2.147	.978	
		2.150	-15.995	38.049		2.147	3.227	
		2.150			2.078			7.573
	MIN							
	3	.000			1.603			-10.823
		.000	-19.025	42.541		1.125	-1.269	
		1.075	-27.108	26.706		1.125	.710	
		2.150	-37.012	7.247		1.125	2.161	
		2.150			1.603			-10.823
	MAX							
	4	.000			1.455			13.704

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			.000	10.426	96.635		2.487	-.603	
			1.075	-3.580	80.988		2.487	1.089	
			2.150	-14.266	51.793		2.487	3.665	
			2.150			1.455			13.704
	MIN								
	4		.000			.663			-16.955
			.000	-23.800	37.457		.784	-1.485	
			1.075	-35.031	20.772		.784	.643	
			2.150	-49.295	.456		.784	1.889	
			2.150			.663			-16.955
	MAX & MIN								
	5		.000			.137			.000
			.000	-14.705	31.679		.000	.000	
			1.075	-18.148	13.978		.000	.000	
			2.150	-21.510	-7.338		.000	.000	
			2.150			.137			.000
	MAX & MIN								
	6		.000			-.013			.000
			.000	-11.838	50.328		.000	.000	
			1.075	-15.201	35.795		.000	.000	
			2.150	-18.563	17.647		.000	.000	
			2.150			-.013			.000
	MAX								
	ALL		.000			2.078			13.704
			.000	10.426	96.635		2.603	.000	
			1.075	-3.580	80.988		2.603	1.310	
			2.150	-14.266	51.793		2.603	4.108	
			2.150			2.078			13.704
	MIN								
	ALL		.000			-.013			-16.955
			.000	-23.800	31.679		.000	-1.489	
			1.075	-35.031	13.978		.000	.000	
			2.150	-49.295	-7.338		.000	.000	
			2.150			-.013			-16.955
45	----------								
	MAX & MIN								
	1		.000			-.027			-1.012
			.000	-22.740	20.133		2.169	-.738	
			1.075	-26.103	-6.119		2.169	1.593	
			2.150	-29.465	-35.987		2.169	3.925	
			2.150			-.027			-1.012
	MAX								
	2		.000			1.408			5.966
			.000	-11.254	40.960		1.931	-.348	
			1.075	-20.783	11.170		1.931	1.240	
			2.150	-28.29[illegible]	-27.292		1.931	3.256	
			2.150			1.408			5.966
	MIN								
	2		.000			.812			-10.635
			.000	-32.246	9.880		.918	-.776	
			1.075	-40.192	-17.660		.918	.878	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			2.150	-49.928	-48.837		.918	2.104	
			2.150			.812			-10.635
	MAX								
	3		.000			2.221			6.657
			.000	-11.261	40.909		1.882	-.319	
			1.075	-20.790	11.111		1.882	1.216	
			2.150	-28.301	-27.359		1.882	3.180	
			2.150			2.221			6.657
	MIN								
	3		.000			1.625			-9.944
			.000	-32.254	9.829		.869	-.747	
			1.075	-40.199	-17.719		.869	.854	
			2.150	-49.935	-48.904		.869	2.027	
			2.150			1.625			-9.944
	MAX								
	4		.000			1.553			12.190
			.000	-3.589	54.896		2.219	-.207	
			1.075	-17.229	22.755		2.219	1.366	
			2.150	-27.505	-21.429		2.219	3.653	
			2.150			1.553			12.190
	MIN								
	4		.000			.560			-15.477
			.000	-38.577	3.095		.531	-.920	
			1.075	-49.577	-25.295		.531	.762	
			2.150	-63.563	-57.338		.531	1.732	
			2.150			.560			-15.477
	MAX & MIN								
	5		.000			.320			.000
			.000	-25.707	-4.515		.000	.000	
			1.075	-29.070	-33.958		.000	.000	
			2.150	-32.433	-67.016		.000	.000	
			2.150			.320			.000
	MAX & MIN								
	6		.000			-.030			.000
			.000	-22.740	20.133		.000	.000	
			1.075	-26.103	-6.119		.000	.000	
			2.150	-29.465	-35.987		.000	.000	
			2.150			-.030			.000
	MAX								
	ALL		.000			2.221			12.190
			.000	-3.589	54.896		2.219	.000	
			1.075	-17.229	22.755		2.219	1.593	
			2.150	-27.505	-21.429		2.219	3.925	
			2.150			2.221			12.190
	MIN								
	ALL		.000			-.030			-15.477
			.000	-38.577	-4.515		.000	-.920	
			1.075	-49.577	-33.958		.000	.000	
			2.150	-63.563	-67.016		.000	.000	
			2.150			-.030			-15.477

PROGRAMA:SAP90/FILE:307860.F90

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			.000	-46.076	-24.032		.000	.000	
			1.075	-49.438	-75.371		.000	.000	
			2.150	-52.801	-130.324		.000	.000	
			2.150			-.076			.000
	MAX								
	ALL		.000			2.471			10.294
			.000	-32.939	-6.180		2.014	.142	
			1.075	-45.559	-69.538		2.014	1.016	
			2.150	-52.631	-126.650		2.014	3.769	
			2.150			2.471			10.294
	MIN								
	ALL		.000			-.076			-13.565
			.000	-70.460	-52.701		.000	-.359	
			1.075	-80.417	-107.876		.000	.000	
			2.150	-93.651	-166.665		.000	.000	
			2.150			-.076			-13.565
47	----------								
	MAX & MIN								
	1		.000			.186			.348
			.000	56.487	-138.085		1.557	.291	
			1.075	53.124	-79.169		1.557	1.965	
			2.150	49.762	-23.867		1.557	3.639	
			2.150			.186			.348
	MAX								
	2		.000			2.341			7.720
			.000	81.015	-133.563		1.058	.792	
			1.075	71.847	-76.061		1.058	1.647	
			2.150	64.953	-14.138		1.058	2.611	
			2.150			2.341			7.720
	MIN								
	2		.000			.763			-13.000
			.000	55.104	-163.843		.791	.037	
			1.075	50.664	-93.351		.791	1.051	
			2.150	41.827	-32.727		.791	2.065	
			2.150			.763			-13.000
	MAX								
	3		.000			3.297			8.629
			.000	80.962	-133.381		1.061	.750	
			1.075	71.793	-75.937		1.061	1.608	
			2.150	64.900	-14.072		1.061	2.575	
			2.150			3.297			8.629
	MIN								
	3		.000			1.718			-12.092
			.000	55.050	-163.662		.794	-.004	
			1.075	50.611	-93.227		.794	1.012	
			2.150	41.773	-32.661		.794	2.029	
			2.150			1.718			-12.092
	MAX								
	4		.000			2.822			15.151
			.000	97.420	-130.729		1.148	1.092	
			1.075	84.381	-74.114		1.148	1.856	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150	75.134	-7.719		1.148	2.799	
		2.150			2.822			15.151
	MIN							
	4	.000			.191			-19.384
		.000	54.235	-181.197		.702	-.165	
		1.075	49.078	-102.930		.702	.862	
		2.150	36.590	-38.701		.702	1.890	
		2.150			.191			-19.384
	MAX & MIN							
	5	.000			-2.002			.000
		.000	83.118	-200.806		.000	.000	
		1.075	79.111	-113.609		.000	.000	
		2.150	75.103	-30.719		.000	.000	
		2.150			-2.002			.000
	MAX & MIN							
	6	.000			.185			.000
		.000	56.487	-138.085		.000	.000	
		1.075	53.124	-79.169		.000	.000	
		2.150	49.762	-23.867		.000	.000	
		2.150			.185			.000
	MAX							
	ALL	.000			3.297			15.151
		.000	97.420	-130.729		1.557	1.092	
		1.075	84.381	-74.114		1.557	1.965	
		2.150	75.134	-7.719		1.557	3.639	
		2.150			3.297			15.151
	MIN							
	ALL	.000			-2.002			-19.384
		.000	54.235	-200.806		.000	-.165	
		1.075	49.078	-113.609		.000	.000	
		2.150	36.590	-38.701		.000	.000	
		2.150			-2.002			-19.384
48	----------							
	MAX & MIN							
	1	.000			.140			.094
		.000	31.271	-35.822		1.093	.999	
		1.075	27.908	-4.013		1.093	2.174	
		2.150	24.545	24.181		1.093	3.349	
		2.150			.140			.094
	MAX							
	2	.000			2.198			6.913
		.000	51.935	-28.033		.766	1.072	
		1.075	42.321	12.030		.766	1.676	
		2.150	34.524	43.615		.766	2.430	
		2.150			2.198			6.913
	MIN							
	2	.000			1.077			-10.598
		.000	30.085	-45.589		.551	.493	
		1.075	22.639	-12.812		.551	1.196	
		2.150	13.191	16.331		.551	1.899	
		2.150			1.077			-10.598

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
	3	.000			3.249			7.511
		.000	51.922	-27.951		.766	1.040	
		1.075	42.307	12.096		.766	1.643	
		2.150	34.511	43.667		.766	2.397	
		2.150			3.249			7.511
	MIN							
	3	.000			2.128			-10.000
		.000	30.071	-45.507		.550	.461	
		1.075	22.625	-12.745		.550	1.164	
		2.150	13.178	16.383		.550	1.866	
		2.150			2.128			-10.000
	MAX							
	4	.000			2.520			13.079
		.000	65.726	-22.923		.838	1.301	
		1.075	51.943	22.658		.838	1.836	
		2.150	41.191	56.520		.838	2.622	
		2.150			2.520			13.079
	MIN							
	4	.000			.651			-16.106
		.000	29.309	-52.183		.479	.337	
		1.075	19.139	-18.744		.479	1.037	
		2.150	5.636	11.047		.479	1.737	
		2.150			.651			-16.106
	MAX & MIN							
	5	.000			-1.507			.000
		.000	48.926	-46.713		.000	.000	
		1.075	44.918	3.728		.000	.000	
		2.150	40.911	49.861		.000	.000	
		2.150			-1.507			.000
	MAX & MIN							
	6	.000			.139			.000
		.000	31.271	-35.822		.000	.000	
		1.075	27.908	-4.013		.000	.000	
		2.150	24.545	24.181		.000	.000	
		2.150			.139			.000
	MAX							
	ALL	.000			3.249			13.079
		.000	65.726	-22.923		1.093	1.301	
		1.075	51.943	22.658		1.093	2.174	
		2.150	41.191	56.520		1.093	3.349	
		2.150			3.249			13.079
	MIN							
	ALL	.000			-1.507			-16.106
		.000	29.309	-52.183		.000	.000	
		1.075	19.139	-18.744		.000	.000	
		2.150	5.636	11.047		.000	.000	
		2.150			-1.507			-16.106
49	----------							
	MAX & MIN							
	1	.000			.124			.031

PROGRAMA:SAP90/FILE:307860.F9F

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	20.097	22.494		.657	1.576	
		1.075	16.735	42.291		.657	2.281	
		2.150	13.372	58.473		.657	2.987	
		2.150			.124			.031
	MAX							
	2	.000			2.484			6.550
		.000	38.957	41.647		.501	1.406	
		1.075	29.227	68.310		.501	1.724	
		2.150	21.354	85.810		.501	2.219	
		2.150			2.484			6.550
	MIN							
	2	.000			1.525			-8.876
		.000	17.631	14.523		.289	.839	
		1.075	9.963	35.300		.289	1.262	
		2.150	.330	52.458		.289	1.685	
		2.150			1.525			-8.876
	MAX							
	3	.000			3.795			6.900
		.000	38.944	41.702		.501	1.374	
		1.075	29.214	68.351		.501	1.692	
		2.150	21.341	85.837		.501	2.187	
		2.150			3.795			6.900
	MIN							
	3	.000			2.835			-8.526
		.000	17.618	14.577		.289	.807	
		1.075	9.950	35.341		.289	1.230	
		2.150	.318	52.485		.289	1.652	
		2.150			2.835			-8.526
	MAX							
	4	.000			2.748			11.837
		.000	51.543	54.361		.573	1.628	
		1.075	37.568	85.615		.573	1.875	
		2.150	26.688	104.007		.573	2.417	
		2.150			2.748			11.837
	MIN							
	4	.000			1.149			-13.873
		.000	15.999	9.154		.218	.682	
		1.075	5.461	30.598		.218	1.104	
		2.150	-8.351	48.421		.218	1.526	
		2.150			1.149			-13.873
	MAX & MIN							
	5	.000			-1.331			.000
		.000	35.852	47.175		.000	.000	
		1.075	31.844	83.562		.000	.000	
		2.150	27.837	115.640		.000	.000	
		2.150			-1.331			.000
	MAX & MIN							
	6	.000			.123			.000
		.000	20.097	22.494		.000	.000	
		1.075	16.735	42.291		.000	.000	
		2.150	13.372	58.473		.000	.000	

PROGRAMA:SAP90/FILE:307860.F9F

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150			.123			.000
	MAX							
	ALL	.000			3.795			11.837
		.000	51.543	54.361		.657	1.628	
		1.075	37.568	85.615		.657	2.281	
		2.150	27.837	115.640		.657	2.987	
		2.150			3.795			11.837
	MIN							
	ALL	.000			-1.331			-13.873
		.000	15.999	9.154		.000	.000	
		1.075	5.461	30.598		.000	.000	
		2.150	-8.351	48.421		.000	.000	
		2.150			-1.331			-13.873
50	----------							
	MAX & MIN							
	1	.000			.119			.007
		.000	8.938	58.129		.219	2.099	
		1.075	5.575	65.929		.219	2.334	
		2.150	2.212	70.115		.219	2.569	
		2.150			.119			.007
	MAX							
	2	.000			3.522			6.268
		.000	25.841	85.424		.238	1.709	
		1.075	16.072	97.612		.238	1.745	
		2.150	8.197	100.319		.238	1.979	
		2.150			3.522			6.268
	MIN							
	2	.000			2.620			-7.291
		.000	4.813	52.077		.025	1.153	
		1.075	-2.994	60.836		.025	1.294	
		2.150	-12.729	65.972		.025	1.435	
		2.150			2.620			-7.291
	MAX							
	3	.000			5.550			6.383
		.000	25.828	85.451		.238	1.676	
		1.075	16.059	97.626		.238	1.713	
		2.150	8.184	100.319		.238	1.947	
		2.150			5.550			6.383
	MIN							
	3	.000			4.648			-7.176
		.000	4.801	52.104		.025	1.120	
		1.075	-3.006	60.850		.025	1.261	
		2.150	-12.742	65.972		.025	1.402	
		2.150			4.648			-7.176
	MAX							
	4	.000			3.764			10.751
		.000	37.122	103.593		.309	1.922	
		1.075	25.083	118.721		.309	1.889	
		2.150	12.199	120.455		.309	2.184	
		2.150			3.764			10.751

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END!	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MIN							
	4	.000			2.260			-11.847
		.000	2.077	48.015		-.045	.995	
		1.075	-8.693	57.427		-.045	1.136	
		2.150	-22.678	63.210		-.045	1.277	
		2.150			2.260			-11.847
	MAX & MIN							
	5	.000			-1.273			.000
		.000	14.443	114.740		.000	.000	
		1.075	10.436	128.113		.000	.000	
		2.150	6.428	137.178		.000	.000	
		2.150			-1.273			.000
	MAX & MIN							
	6	.000			.118			.000
		.000	8.938	58.129		.000	.000	
		1.075	5.575	65.929		.000	.000	
		2.150	2.212	70.115		.000	.000	
		2.150			.118			.000
	MAX							
	ALL	.000			5.550			10.751
		.000	37.122	114.740		.309	2.099	
		1.075	23.083	128.113		.309	2.334	
		2.150	12.199	137.178		.309	2.569	
		2.150			5.550			10.751
	MIN							
	ALL	.000			-1.273			-11.847
		.000	2.077	48.015		-.045	.000	
		1.075	-8.693	57.427		-.045	.000	
		2.150	-22.678	63.210		-.045	.000	
		2.150			-1.273			-11.847
61	----------							
	MAX & MIN							
	1	.000			.380			-19.365
		.000	19.725	-.147		3.156	-3.177	
		1.075	16.648	19.404		3.156	.215	
		2.150	13.571	35.646		3.156	3.608	
		2.150			.380			-19.365
	MAX							
	2	.000			.975			-12.863
		.000	42.599	.806		2.105	-1.277	
		1.075	33.270	33.182		2.105	.337	
		2.150	25.957	58.401		2.105	2.533	
		2.150			.975			-12.863
	MIN							
	2	.000			.735			-42.200
		.000	18.148	-4.022		1.273	-1.914	
		1.075	12.769	18.383		1.273	.269	
		2.150	3.885	33.869		1.273	1.861	
		2.150			.735			-39.407
	MAX							
	3	.000			1.385			-12.264

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END!	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	42.415	.959		1.863	-.906	
		1.075	33.086	33.138		1.863	.448	
		2.150	25.773	58.158		1.863	2.384	
		2.150			1.385			-12.264
	MIN							
	3	.000			1.144			-41.601
		.000	17.964	-3.868		1.031	-1.543	
		1.075	12.585	18.338		1.031	.380	
		2.150	3.701	33.626		1.031	1.712	
		2.150			1.144			-38.808
	MAX							
	4	.000			1.051			-7.155
		.000	57.439	1.796		2.341	-1.077	
		1.075	43.941	42.283		2.341	.358	
		2.150	33.805	73.046		2.341	2.764	
		2.150			1.051			-7.155
	MIN							
	4	.000			.651			-56.050
		.000	16.687	-6.250		.955	-2.139	
		1.075	9.773	17.618		.955	.245	
		2.150	-2.982	32.159		.955	1.645	
		2.150			.651			-51.395
	MAX & MIN							
	5	.000			.012			-16.282
		.000	16.938	.148		-.008	.012	
		1.075	13.861	16.702		-.008	.003	
		2.150	10.785	29.950		-.008	-.005	
		2.150			.012			-16.282
	MAX & MIN							
	6	.000			-.001			-18.600
		.000	19.494	.051		.001	-.001	
		1.075	16.418	19.354		.001	-.000	
		2.150	13.341	35.349		.001	.001	
		2.150			-.001			-18.600
	MAX							
	ALL	.000			1.385			-7.155
		.000	57.439	1.796		3.156	.012	
		1.075	43.941	42.283		3.156	.448	
		2.150	33.805	73.046		3.156	3.608	
		2.150			1.385			-7.155
	MIN							
	ALL	.000			-.001			-56.050
		.000	16.687	-6.250		-.008	-3.177	
		1.075	9.773	16.702		-.008	-.000	
		2.150	-2.982	29.950		-.008	-.005	
		2.150			-.001			-51.395
62	----------							
	MAX & MIN							
	1	.000			3.297			-9.339
		.000	9.902	33.176		2.866	-2.578	
		1.075	6.825	42.167		2.866	.502	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END!	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150	3.749	47.851		2.866	3.583	
		2.150			3.297			-9.339
	MAX							
	2	.000			3.535			-2.293
		.000	29.728	48.005		2.081	-1.187	
		1.075	21.052	65.693		2.081	.421	
		2.150	13.811	75.552		2.081	2.605	
		2.150			3.535			-2.293
	MIN							
	2	.000			2.589			-26.857
		.000	6.348	28.926		1.235	-1.772	
		1.075	.470	38.971		1.235	.343	
		2.150	-8.635	43.972		1.235	1.873	
		2.150			2.589			-24.147
	MAX							
	3	.000			4.147			-1.687
		.000	29.536	48.188		1.932	-.994	
		1.075	20.859	65.669		1.932	.454	
		2.150	13.618	75.321		1.932	2.478	
		2.150			4.147			-1.687
	MIN							
	3	.000			3.200			-26.252
		.000	6.155	29.109		1.086	-1.578	
		1.075	.277	38.946		1.086	.376	
		2.150	-8.827	43.741		1.086	1.745	
		2.150			3.200			-23.542
	MAX							
	4	.000			3.807			3.803
		.000	42.516	58.351		2.322	-.998	
		1.075	30.106	81.375		2.322	.450	
		2.150	20.089	93.556		2.322	2.856	
		2.150			3.807			3.803
	MIN							
	4	.000			2.229			-37.137
		.000	3.549	26.553		.912	-1.972	
		1.075	-4.197	36.838		.912	.319	
		2.150	-17.320	40.922		.912	1.636	
		2.150			2.229			-32.620
	MAX & MIN							
	5	.000			.018			-7.631
		.000	7.231	28.282		-.007	.008	
		1.075	4.155	34.402		-.007	.000	
		2.150	1.078	37.215		-.007	-.008	
		2.150			.018			-7.631
	MAX & MIN							
	6	.000			-.002			-8.561
		.000	9.660	33.427		.001	-.001	
		1.075	6.583	42.158		.001	.000	
		2.150	3.507	47.581		.001	.001	
		2.150			-.002			-8.561

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END!	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
	ALL	.000			4.147			3.803
		.000	42.516	58.351		2.866	.008	
		1.075	30.106	81.375		2.866	.502	
		2.150	20.089	93.556		2.866	3.583	
		2.150			4.147			3.803
	MIN							
	ALL	.000			-.002			-37.137
		.000	3.549	26.553		-.007	-2.578	
		1.075	-4.197	34.402		-.007	.000	
		2.150	-17.320	37.215		-.007	-.008	
		2.150			-.002			-32.620
63	----------							
	MAX & MIN							
	1	.000			6.086			-5.020
		.000	.636	46.478		2.500	-1.861	
		1.075	-2.441	45.507		2.500	.827	
		2.150	-5.518	41.230		2.500	3.515	
		2.150			6.086			-5.020
	MAX							
	2	.000			5.869			2.224
		.000	18.146	69.429		1.951	-.906	
		1.075	9.581	73.348		1.951	.635	
		2.150	2.465	68.268		1.951	2.682	
		2.150			5.869			2.224
	MIN							
	2	.000			4.060			-19.555
		.000	-4.191	39.939		1.108	-1.417	
		1.075	-11.391	40.178		1.108	.486	
		2.150	-20.272	35.252		1.108	1.877	
		2.150			4.060			-17.297
	MAX							
	3	.000			6.519			2.820
		.000	17.946	69.617		1.862	-.806	
		1.075	9.381	73.320		1.862	.640	
		2.150	2.265	68.025		1.862	2.591	
		2.150			6.519			2.820
	MIN							
	3	.000			4.709			-18.959
		.000	-4.392	40.127		1.019	-1.312	
		1.075	-11.591	40.151		1.019	.490	
		2.150	-20.473	35.009		1.019	1.786	
		2.150			4.709			-16.700
	MAX							
	4	.000			6.389			8.436
		.000	29.372	85.240		2.191	-.740	
		1.075	17.147	91.936		2.191	.608	
		2.150	7.338	85.839		2.191	2.958	
		2.150			6.389			8.436
	MIN							
	4	.000			3.374			-27.863

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

REPOSITION 307+860. 3 VANOS 13+17+13 FILE:307860

ELT LOAD ID	DIST END	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
MAX							
2	.000	9.722		-.632			
	.000	-4.198	33.301	1.578	-.244		
	1.075	-12.436	9.965	1.578	1.054		
	2.150	-19.173	-20.105	1.578	2.698		
MIN							
2	.000	6.194		-19.259			
	.000	-27.107	3.128	.733	-.590		
	1.075	-34.213	-16.301	.733	.746		
	2.150	-42.673	-40.828	.733	1.736		
MAX							
3	.000	10.325		-.028			
	.000	-4.396	33.466	1.576	-.206		
	1.075	-12.633	9.918	1.576	1.036		
	2.150	-19.370	-20.364	1.576	2.625		
MIN							
3	.000	6.797		-18.656			
	.000	-27.305	3.293	.681	-.552		
	1.075	-34.410	-16.348	.681	.728		
	2.150	-42.871	-41.087	.681	1.662		
MAX							
4	.000	10.732		4.788			
	.000	4.295	46.751	1.818	-.130		
	1.075	-7.384	21.099	1.818	1.161		
	2.150	-16.561	-13.572	1.818	3.028		
MIN							
4	.000	4.851		-26.258			
	.000	-33.887	-3.537	.410	-.707		
	1.075	-43.679	-22.677	.410	.647		
	2.150	-55.729	-48.110	.410	1.425		
MAX							
5	.000	4.851		-23.053			
MAX & MIN							
	.000	-20.274	-6.444	-.044	.032		
	1.075	-23.351	-29.892	-.044	.015		
	2.150	-26.427	-56.648	-.044	.062		
MAX & MIN							
6	.000			.003			-5.891
	.000	-17.871	14.217	.004	-.003		
	1.075	-20.947	-6.648	.004	.001		
	2.150	-24.024	-30.820	.004	.006		
MAX							
2	.000	10.732		4.788			
ALL	.000	4.295	46.751	1.818	.032		

REPOSITION 307+860. 3 VANOS 13+17+13 FILE:307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT LOAD ID	DIST END	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
MAX							
3	.000	8.558		3.204			
	.000	6.664	64.285	1.712	-.516		
	1.075	-1.756	54.326	1.712	.843		
MIN							
3	.000	5.243		-15.273			
	.000	-15.654	31.506	.932	-1.005		
	1.075	-22.881	21.947	.932	.627		
	2.150	-31.578	7.257	.932	1.829		
MAX							
4	.000	7.924		2.608			
	.000	6.866	64.107	1.774	-.575		
	1.075	-1.555	54.365	1.774	.852		
	2.150	-8.503	36.168	1.774	2.708		
MIN							
4	.000	5.243		-17.334			
	.000	-15.654	31.506	.932	-1.005		
	1.075	-22.881	21.947	.932	.627		
	2.150	-31.578	7.257	.932	1.829		
MAX							
5	.000	8.536		-4.206			
MAX & MIN							
1	.000	8.536		-4.206			
	.000	-8.474	40.185	2.141	-1.191		
	1.075	-11.550	29.422	2.141	1.110		
	2.150	-14.627	15.352	2.141	3.411		
MAX & MIN							
64 ----------							
	2.150			-.002			-24.098
	.000	-33.887	-3.537	.410	-.707		
	1.075	-43.679	-22.677	.410	-.015		
	2.150	-55.729	-48.110	.410	1.425		
MIN							
4	.000	4.851		-26.258			
	.000	-20.274	-6.444	-.044	.032		
	1.075	-23.351	-29.892	-.044	.015		
	2.150	-26.427	-56.648	-.044	.062		
MAX & MIN							
5	.000			-.032			-7.153
	.000	-17.871	14.217	.004	-.003		
	1.075	-20.947	-6.648	.004	.001		
	2.150	-24.024	-30.820	.004	.006		
MAX							
6	.000			.003			-5.891
ALL	.000	10.732		4.788			
	.000	4.295	46.751	1.818	.032		

REPOSITION 307+860. 3 VANOS 13+17+13 FILE:307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT LOAD ID	DIST END	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
MAX							
2	.000	9.722		-.632			
	.000	-4.198	33.301	1.578	-.244		
	1.075	-12.436	9.965	1.578	1.054		
	2.150	-19.173	-20.105	1.578	2.698		
MIN							
2	.000	6.194		-19.259			
	.000	-27.107	3.128	.733	-.590		
	1.075	-34.213	-16.301	.733	.746		
	2.150	-42.673	-40.828	.733	1.736		
MAX							
3	.000	10.325		-.028			
	.000	-4.396	33.466	1.576	-.206		
	1.075	-12.633	9.918	1.576	1.036		
	2.150	-19.370	-20.364	1.576	2.625		
MIN							
3	.000	6.797		-18.656			
	.000	-27.305	3.293	.681	-.552		
	1.075	-34.410	-16.348	.681	.728		
	2.150	-42.871	-41.087	.681	1.662		
MAX							
4	.000	10.732		4.788			
	.000	4.295	46.751	1.818	-.130		
	1.075	-7.384	21.099	1.818	1.161		
	2.150	-16.561	-13.572	1.818	3.028		
MIN							
4	.000	4.851		-26.258			
	.000	-33.887	-3.537	.410	-.707		
	1.075	-43.679	-22.677	.410	.647		
	2.150	-55.729	-48.110	.410	1.425		
MAX							
5	.000	4.851		-23.053			
MAX & MIN							
	.000	-20.274	-6.444	-.044	.032		
	1.075	-23.351	-29.892	-.044	.015		
	2.150	-26.427	-56.648	-.044	.062		
MAX & MIN							
6	.000			.003			-5.891
	.000	-17.871	14.217	.004	-.003		
	1.075	-20.947	-6.648	.004	.001		
	2.150	-24.024	-30.820	.004	.006		
MAX							
2	.000	10.732		4.788			
ALL	.000	4.295	46.751	1.818	.032		

REPOSITION 307+860. 3 VANOS 13+17+13 FILE:307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT LOAD ID	DIST END	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
MAX							
3	.000	8.558		3.204			
	.000	6.664	64.285	1.712	-.516		
	1.075	-1.756	54.326	1.712	.843		
MIN							
3	.000	5.243		-15.273			
	.000	-15.654	31.506	.932	-1.005		
	1.075	-22.881	21.947	.932	.627		
	2.150	-31.578	7.257	.932	1.829		
MAX							
4	.000	7.924		2.608			
	.000	6.866	64.107	1.774	-.575		
	1.075	-1.555	54.365	1.774	.852		
	2.150	-8.503	36.168	1.774	2.708		
MIN							
4	.000	5.243		-17.334			
	.000	-15.654	31.506	.932	-1.005		
	1.075	-22.881	21.947	.932	.627		
	2.150	-31.578	7.257	.932	1.829		
MAX							
5	.000	8.536		-4.206			
MAX & MIN							
1	.000	8.536		-4.206			
	.000	-8.474	40.185	2.141	-1.191		
	1.075	-11.550	29.422	2.141	1.110		
	2.150	-14.627	15.352	2.141	3.411		
MAX & MIN							
64 ----------							
	2.150			-.002			-24.098
	.000	-33.887	-3.537	.410	-.707		
	1.075	-43.679	-22.677	.410	.647		
	2.150	-55.729	-48.110	.410	1.425		
MIN							
4	.000	4.851		-26.258			
	.000	-20.274	-6.444	-.044	.032		
	1.075	-23.351	-29.892	-.044	.015		
	2.150	-26.427	-56.648	-.044	.062		
MAX & MIN							
5	.000			-.032			-7.153
	.000	-17.871	14.217	.004	-.003		
	1.075	-20.947	-6.648	.004	.001		
	2.150	-24.024	-30.820	.004	.006		
MAX							
6	.000			.003			-5.891
ALL	.000	10.732		4.788			
	.000	4.295	46.751	1.818	.032		

REPOSITION 307+860. 3 VANOS 13+17+13 FILE:307860

FRAME ELEMENT FORCES (USING "QUICK" TRUCK RESPONSE CALC)

ELT LOAD ID	DIST END	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
MAX							
2	.000	9.722		-.632			
	.000	-4.198	33.301	1.578	-.244		
	1.075	-12.436	9.965	1.578	1.054		
	2.150	-19.173	-20.105	1.578	2.698		
MIN							
2	.000	6.194		-19.259			
	.000	-27.107	3.128	.733	-.590		
	1.075	-34.213	-16.301	.733	.746		
	2.150	-42.673	-40.828	.733	1.736		
MAX							
3	.000	10.325		-.028			
	.000	-4.396	33.466	1.576	-.206		
	1.075	-12.633	9.918	1.576	1.036		
	2.150	-19.370	-20.364	1.576	2.625		
MIN							
3	.000	6.797		-18.656			
	.000	-27.305	3.293	.681	-.552		
	1.075	-34.410	-16.348	.681	.728		
	2.150	-42.871	-41.087	.681	1.662		
MAX							
4	.000	10.732		4.788			
	.000	4.295	46.751	1.818	-.130		
	1.075	-7.384	21.099	1.818	1.161		
	2.150	-16.561	-13.572	1.818	3.028		
MIN							
4	.000	4.851		-26.258			
	.000	-33.887	-3.537	.410	-.707		
	1.075	-43.679	-22.677	.410	.647		
	2.150	-55.729	-48.110	.410	1.425		
MAX							
5	.000	4.851		-23.053			
MAX & MIN							
	.000	-20.274	-6.444	-.044	.032		
	1.075	-23.351	-29.892	-.044	.015		
	2.150	-26.427	-56.648	-.044	.062		
MAX & MIN							
6	.000			.003			-5.891
	.000	-17.871	14.217	.004	-.003		
	1.075	-20.947	-6.648	.004	.001		
	2.150	-24.024	-30.820	.004	.006		
MAX							
2	.000	10.732		4.788			
ALL	.000	4.295	46.751	1.818	.032		

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150			5.328			-29.290
	MAX & MIN							
	5	.000			-.205			-14.526
		.000	-23.550	-62.813		-.093	.065	
		1.075	-26.627	-89.783		-.093	-.036	
		2.150	-29.703	-120.060		-.093	-.136	
		2.150			-.205			-14.526
	MAX & MIN							
	6	.000			.019			-10.950
		.000	-21.326	-36.076		.009	-.006	
		1.075	-24.402	-60.655		.009	.003	
		2.150	-27.479	-88.541		.009	.013	
		2.150			.019			-10.950
	MAX							
	ALL	.000			12.487			-1.586
		.000	-.369	-20.905		1.598	.110	
		1.075	-11.956	-50.786		1.598	1.522	
		2.150	-21.061	-84.338		1.598	3.073	
		2.150			12.487			-1.586
	MIN							
	ALL	.000			-.205			-31.980
		.000	-38.924	-62.813		-.093	-.206	
		1.075	-48.544	-89.783		-.093	-.036	
		2.150	-60.392	-120.060		-.093	-.136	
		2.150			-.205			-29.290
67	----------							
	MAX & MIN							
	1	.000			13.808			9.817
		.000	28.180	-90.519		1.257	.318	
		1.075	25.103	-61.879		1.257	1.670	
		2.150	22.026	-36.548		1.257	3.021	
		2.150			13.808			9.817
	MAX							
	2	.000			12.434			18.034
		.000	50.193	-88.471		.838	.683	
		1.075	41.940	-56.386		.838	1.390	
		2.150	35.030	-26.557		.838	2.164	
		2.150			12.434			18.034
	MIN							
	2	.000			7.679			-.909
		.000	26.389	-110.702		.653	.095	
		1.075	19.768	-72.591		.653	.807	
		2.150	11.414	-45.239		.653	1.679	
		2.150			7.679			.589
	MAX							
	3	.000			12.997			18.627
		.000	49.945	-88.158		.825	.661	
		1.075	41.691	-56.339		.825	1.393	
		2.150	34.782	-26.778		.825	2.113	
		2.150			12.997			18.627

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MIN							
	3	.000			8.241			-.316
		.000	26.140	-110.388		.640	.073	
		1.075	19.520	-72.545		.640	.851	
		2.150	11.166	-45.460		.640	1.628	
		2.150			8.241			1.183
	MAX							
	4	.000			13.777			25.021
		.000	64.143	-86.410		.902	.921	
		1.075	52.439	-52.807		.902	1.566	
		2.150	42.974	-20.760		.902	2.324	
		2.150			13.777			25.021
	MIN							
	4	.000			5.851			-6.550
		.000	24.469	-123.462		.594	-.059	
		1.075	15.487	-79.816		.594	.729	
		2.150	3.614	-51.897		.594	1.517	
		2.150			5.851			-4.053
	MAX & MIN							
	5	.000			-.871			12.148
		.000	41.643	-129.509		-.093	.136	
		1.075	37.922	-86.742		-.093	.036	
		2.150	34.200	-47.977		-.093	-.065	
		2.150			-.871			12.148
	MAX & MIN							
	6	.000			.080			10.032
		.000	28.297	-90.769		.009	-.013	
		1.075	25.220	-62.004		.009	-.003	
		2.150	22.143	-36.546		.009	.006	
		2.150			.080			10.032
	MAX							
	ALL	.000			13.808			25.021
		.000	64.143	-86.410		1.257	.921	
		1.075	52.439	-52.807		1.257	1.670	
		2.150	42.974	-20.760		1.257	3.021	
		2.150			13.808			25.021
	MIN							
	ALL	.000			-.871			-6.550
		.000	24.469	-129.509		-.093	-.059	
		1.075	15.487	-86.742		-.093	-.003	
		2.150	3.614	-51.897		-.093	-.065	
		2.150			-.871			-4.053
68	----------							
	MAX & MIN							
	1	.000			14.940			5.123
		.000	25.686	-31.061		.902	.863	
		1.075	22.610	-5.102		.902	1.882	
		2.150	19.533	17.550		.902	2.902	
		2.150			14.940			5.123
	MAX							
	2	.000			13.131			12.355

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	46.772	-23.360		.590	.958	
		1.075	38.495	10.639		.590	1.405	
		2.150	31.548	37.970		.590	1.972	
		2.150			13.131			12.355
	MIN							
	2	.000			8.310			-5.927
		.000	23.060	-39.532		.415	.455	
		1.075	16.402	-12.346		.415	.994	
		2.150	8.157	10.825		.415	1.532	
		2.150			8.310			-4.275
	MAX							
	3	.000			13.679			12.813
		.000	46.599	-23.176		.562	.951	
		1.075	38.322	10.637		.562	1.369	
		2.150	31.376	37.783		.562	1.905	
		2.150			13.679			12.813
	MIN							
	3	.000			8.858			-5.468
		.000	22.887	-39.348		.387	.448	
		1.075	16.229	-12.347		.387	.957	
		2.150	7.984	10.638		.387	1.465	
		2.150			8.858			-3.817
	MAX							
	4	.000			14.479			18.403
		.000	60.398	-17.976		.649	1.158	
		1.075	48.654	20.919		.649	1.544	
		2.150	39.128	50.907		.649	2.129	
		2.150			14.479			18.403
	MIN							
	4	.000			6.443			-12.066
		.000	20.878	-44.929		.358	.319	
		1.075	11.833	-17.388		.358	.858	
		2.150	.141	5.666		.358	1.397	
		2.150			6.443			-9.314
	MAX & MIN							
	5	.000			-1.042			6.961
		.000	40.216	-40.502		-.043	.062	
		1.075	36.494	.730		-.043	.015	
		2.150	32.773	37.961		-.043	-.031	
		2.150			-1.042			6.961
	MAX & MIN							
	6	.000			.096			5.154
		.000	25.714	-31.093		.004	-.006	
		1.075	22.637	-5.104		.004	-.001	
		2.150	19.561	17.577		.004	.003	
		2.150			.096			5.154
	MAX							
	ALL	.000			14.940			18.403
		.000	60.398	-17.976		.902	1.158	
		1.075	48.654	20.919		.902	1.832	
		2.150	39.128	50.907		.902	2.802	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150			14.940			18.403
	MIN							
	ALL	.000			-1.042			-12.066
		.000	20.878	-44.929		-.043	-.006	
		1.075	11.833	-17.388		-.043	-.001	
		2.150	.141	5.666		-.043	-.031	
		2.150			-1.042			-9.314
69	----------							
	MAX & MIN							
	1	.000			15.697			1.750
		.000	16.623	18.360		.540	1.344	
		1.075	13.546	34.575		.540	1.925	
		2.150	10.469	47.483		.540	2.506	
		2.150			15.697			1.750
	MAX							
	2	.000			13.477			8.175
		.000	35.758	36.203		.317	1.265	
		1.075	27.395	58.784		.317	1.424	
		2.150	20.390	73.686		.317	1.725	
		2.150			13.477			8.954
	MIN							
	2	.000			8.671			-8.717
		.000	12.456	11.723		.144	.786	
		1.075	5.622	28.966		.144	1.033	
		2.150	-2.684	42.144		.144	1.280	
		2.150			8.671			-7.029
	MAX							
	3	.000			13.963			8.457
		.000	35.654	36.289		.253	1.284	
		1.075	27.291	58.758		.253	1.375	
		2.150	20.286	73.548		.253	1.608	
		2.150			13.963			9.235
	MIN							
	3	.000			9.157			-8.435
		.000	12.352	11.809		.080	.805	
		1.075	5.518	28.940		.080	.984	
		2.150	-2.788	42.006		.080	1.163	
		2.150			9.157			-6.748
	MAX							
	4	.000			14.806			13.215
		.000	48.275	48.162		.375	1.451	
		1.075	36.387	74.727		.375	1.951	
		2.150	26.764	90.700		.375	1.888	
		2.150			14.806			14.512
	MIN							
	4	.000			6.796			-14.938
		.000	9.438	7.361		.086	.653	
		1.075	.100	25.030		.086	.900	
		2.150	-11.693	38.130		.086	1.147	
		2.150			6.796			-12.126

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX & MIN							
5		.000			-1.085			3.011
		.000	28.969	39.309		-.018	.026	
		1.075	25.248	68.450		-.018	.007	
		2.150	21.526	93.591		-.018	-.012	
		2.150			-1.085			3.011
	MAX & MIN							
6		.000			.100			1.750
		.000	16.627	18.360		.002	-.002	
		1.075	13.550	34.581		.002	-.001	
		2.150	10.474	47.494		.002	.001	
		2.150			.100			1.750
	MAX							
	ALL	.000			15.697			13.215
		.000	48.275	48.162		.540	1.451	
		1.075	36.387	74.727		.540	1.925	
		2.150	26.764	93.591		.540	2.506	
		2.150			15.697			14.512
	MIN							
	ALL	.000			-1.085			-14.938
		.000	9.438	7.361		-.018	-.002	
		1.075	.100	25.030		-.018	-.001	
		2.150	-11.693	38.130		-.018	-.012	
		2.150			-1.085			-12.126
70	----------							
	MAX & MIN							
1		.000			16.077			.430
		.000	7.589	47.688		.180	1.776	
		1.075	4.513	54.192		.180	1.970	
		2.150	1.436	57.390		.180	2.163	
		2.150			16.077			.430
	MAX							
2		.000			13.296			6.976
		.000	24.705	72.684		-.007	1.582	
		1.075	16.309	83.073		-.007	1.395	
		2.150	9.302	85.209		-.007	1.369	
		2.150			13.296			8.689
	MIN							
2		.000			8.531			-8.979
		.000	1.653	42.782		-.181	1.117	
		1.075	-5.298	50.149		-.181	1.015	
		2.150	-13.667	53.441		-.181	.914	
		2.150			8.531			-7.273
	MAX							
3		.000			13.535			7.070
		.000	24.664	72.681		-.142	1.649	
		1.075	16.268	83.025		-.142	1.317	
		2.150	9.260	85.117		-.142	1.145	
		2.150			13.535			8.783
	MIN							
3		.000			8.769			-8.885

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000				-.316	1.183	
		1.075	-5.339	50.101		-.316	.937	
		2.150	-13.708	53.349		-.316	.691	
		2.150			8.769			-7.179
	MAX							
4		.000			14.599			11.594
		.000	36.043	89.257		.050	1.760	
		1.075	24.101	102.156		.050	1.516	
		2.150	14.473	103.508		.050	1.539	
		2.150			14.599			14.448
	MIN							
4		.000			6.656			-14.998
		.000	-2.376	39.420		-.239	.984	
		1.075	-11.910	47.283		-.239	.883	
		2.150	-23.808	50.561		-.239	.782	
		2.150			6.656			-12.155
	MAX & MIN							
5		.000			-1.094			.775
		.000	12.212	94.109		-.005	.009	
		1.075	8.491	105.237		-.005	.004	
		2.150	4.769	112.364		-.005	-.001	
		2.150			-1.094			.775
	MAX & MIN							
6		.000			.101			.429
		.000	7.590	47.689		.000	-.001	
		1.075	4.513	54.195		.000	-.000	
		2.150	1.437	57.393		.000	.000	
		2.150			.101			.429
	MAX							
	ALL	.000			16.077			11.594
		.000	36.043	94.109		.180	1.776	
		1.075	24.101	105.237		.180	1.970	
		2.150	14.473	112.364		.180	2.163	
		2.150			16.077			14.448
	MIN							
	ALL	.000			-1.094			-14.998
		.000	-2.376	39.420		-.316	-.001	
		1.075	-11.910	47.283		-.316	-.000	
		2.150	-23.808	50.561		-.316	-.001	
		2.150			-1.094			-12.155
81	----------							
	MAX & MIN							
1		.000			-.122			-10.920
		.000	6.222	-3.843		1.498	-1.540	
		1.075	3.454	1.358		1.498	.070	
		2.150	.687	3.584		1.498	1.680	
		2.150			-.122			-10.920
	MAX							
2		.000			1.776			-8.330
		.000	19.566	-3.545		.919	-.478	
		1.075	11.271	1.767		.919	.208	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150	3.279	6.760		.919	1.150	
		2.150			1.776			-8.330
	MIN							
2		.000			1.168			-19.521
		.000	5.596	-6.239		.523	-.805	
		1.075	-2.286	1.297		.523	.155	
		2.150	-10.176	3.368		.523	.840	
		2.150			1.168			-19.521
	MAX							
3		.000			2.831			-8.073
		.000	19.502	-3.475		.752	-.204	
		1.075	11.207	1.768		.752	.301	
		2.150	3.215	6.692		.752	1.062	
		2.150			2.831			-8.073
	MIN							
3		.000			2.223			-19.264
		.000	5.532	-6.169		.355	-.532	
		1.075	-2.350	1.298		.355	.248	
		2.150	-10.240	3.301		.355	.753	
		2.150			2.223			-19.264
	MAX							
4		.000			1.976			-6.013
		.000	28.316	-3.187		1.032	-.380	
		1.075	16.337	2.042		1.032	.225	
		2.150	4.861	8.724		1.032	1.257	
		2.150			1.976			-6.013
	MIN							
4		.000			.963			-24.665
		.000	5.034	-7.677		.372	-.926	
		1.075	-6.258	1.259		.372	.136	
		2.150	-17.564	3.071		.372	.741	
		2.150			.963			-24.665
	MAX & MIN							
5		.000			.027			-9.499
		.000	5.718	-3.418		-.006	.009	
		1.075	2.951	1.242		-.006	.003	
		2.150	.184	2.927		-.006	-.003	
		2.150			.027			-9.499
	MAX & MIN							
6		.000			-.002			-10.593
		.000	6.140	-3.754		.001	-.001	
		1.075	3.373	1.359		.001	-.000	
		2.150	.606	3.499		.001	.000	
		2.150			-.002			-10.593
	MAX							
	ALL	.000			2.831			-6.013
		.000	28.316	-3.187		1.498	.009	
		1.075	16.337	2.042		1.498	.301	
		2.150	4.861	8.724		1.498	1.680	
		2.150			2.831			-6.013

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MIN							
	ALL	.000			-.122			-24.665
		.000	5.034	-7.677		-.006	-1.540	
		1.075	-6.258	1.242		-.006	-.000	
		2.150	-17.564	2.927		-.006	-.003	
		2.150			-.122			-24.665
82	----------							
	MAX & MIN							
1		.000			2.544			-6.553
		.000	3.818	-.046		1.058	-.875	
		1.075	1.051	2.571		1.058	.263	
		2.150	-1.717	2.213		1.058	1.400	
		2.150			2.544			-6.553
	MAX							
2		.000			2.908			-3.357
		.000	16.017	.397		.720	-.317	
		1.075	7.795	3.630		.720	.236	
		2.150	-.255	4.491		.720	.989	
		2.150			2.908			-3.357
	MIN							
2		.000			2.195			-13.523
		.000	2.709	-.663		.405	-.528	
		1.075	-5.100	2.417		.405	.195	
		2.150	-13.083	2.061		.405	.706	
		2.150			2.195			-13.523
	MAX							
3		.000			3.509			-3.112
		.000	15.974	.441		.632	-.194	
		1.075	7.751	3.628		.632	.264	
		2.150	-.298	4.442		.632	.922	
		2.150			3.509			-3.112
	MIN							
3		.000			2.796			-13.278
		.000	2.666	-.618		.317	-.405	
		1.075	-5.144	2.415		.317	.222	
		2.150	-13.126	2.012		.317	.639	
		2.150			2.796			-13.278
	MAX							
4		.000			3.118			-.660
		.000	24.051	.796		.809	-.250	
		1.075	12.192	4.333		.809	.252	
		2.150	.621	5.901		.809	1.087	
		2.150			3.118			-.660
	MIN							
4		.000			1.929			-17.604
		.000	1.872	-.970		.285	-.602	
		1.075	-9.300	2.312		.285	.182	
		2.150	-20.760	1.851		.285	.615	
		2.150			1.929			-17.604
	MAX & MIN							
5		.000			.008			-5.653

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	3.565	-.154		-.004	.005	
		1.075	.798	2.191		-.004	.000	
		2.150	-1.969	1.562		-.004	-.005	
		2.150			.008			-5.653
	MAX & MIN							
	6	.000			-.001			-6.243
		.000	3.763	.011		.000	-.000	
		1.075	.996	2.569		.000	.000	
		2.150	-1.771	2.152		.000	.000	
		2.150			-.001			-6.243
	MAX							
	ALL	.000			3.509			-.660
		.000	24.051	.796		1.058	.005	
		1.075	12.192	4.333		1.058	.264	
		2.150	.621	5.901		1.058	1.400	
		2.150			3.509			-.660
	MIN							
	ALL	.000			-.001			-17.604
		.000	1.872	-.970		-.004	-.875	
		1.075	-9.300	2.191		-.004	.000	
		2.150	-20.760	1.562		-.004	-.005	
		2.150			-.001			-17.604
83	----------							
	MAX & MIN							
	1	.000			4.736			-3.806
		.000	3.045	.849		.927	-.604	
		1.075	.278	2.636		.927	.393	
		2.150	-2.489	1.447		.927	1.389	
		2.150			4.736			-3.806
	MAX							
	2	.000			4.340			-.274
		.000	15.035	1.878		.704	-.257	
		1.075	6.815	3.848		.704	.307	
		2.150	-1.179	3.452		.704	1.044	
		2.150			4.340			-.274
	MIN							
	2	.000			2.986			-9.578
		.000	1.841	.139		.390	-.432	
		1.075	-5.967	2.384		.390	.237	
		2.150	-13.998	1.217		.390	.732	
		2.150			2.986			-9.578
	MAX							
	3	.000			4.717			-.041
		.000	14.992	1.924		.658	-.201	
		1.075	6.772	3.846		.658	.314	
		2.150	-1.223	3.404		.658	1.001	
		2.150			4.717			-.041
	MIN							
	3	.000			3.362			-9.344
		.000	1.797	.184		.344	-.376	
		1.075	-6.010	2.383		.344	.243	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150	-14.041	1.169		.344	.688	
		2.150			3.362			-9.344
	MAX							
	4	.000			4.729			2.624
		.000	22.929	2.673		.793	-.200	
		1.075	11.073	4.657		.793	.332	
		2.150	-.406	4.682		.793	1.152	
		2.150			4.729			2.624
	MIN							
	4	.000			2.471			-12.882
		.000	.937	-.226		.270	-.492	
		1.075	-10.230	2.218		.270	.215	
		2.150	-21.770	.957		.270	.630	
		2.150			2.471			-12.882
	MAX & MIN							
	5	.000			-.010			-3.340
		.000	2.837	.466		-.006	.005	
		1.075	.070	2.028		-.006	-.001	
		2.150	-2.697	.616		-.006	-.007	
		2.150			-.010			-3.340
	MAX & MIN							
	6	.000			.001			-3.515
		.000	2.990	.909		.001	-.000	
		1.075	.223	2.636		.001	.000	
		2.150	-2.544	1.388		.001	.001	
		2.150			.001			-3.515
	MAX							
	ALL	.000			4.736			2.624
		.000	22.929	2.673		.927	.005	
		1.075	11.073	4.657		.927	.393	
		2.150	-.406	4.682		.927	1.389	
		2.150			4.736			2.624
	MIN							
	ALL	.000			-.010			-12.882
		.000	.937	-.226		-.006	-.604	
		1.075	-10.230	2.028		-.006	-.001	
		2.150	-21.770	.616		-.006	-.007	
		2.150			-.010			-12.882
84	----------							
	MAX & MIN							
	1	.000			6.610			-2.736
		.000	2.430	.734		.793	-.328	
		1.075	-.337	1.859		.793	.524	
		2.150	-3.105	.009		.793	1.377	
		2.150			6.610			-2.736
	MAX							
	2	.000			5.759			.804
		.000	14.243	1.968		.650	-.137	
		1.075	6.028	2.927		.650	.404	
		2.150	-1.911	1.596		.650	1.083	
		2.150			5.759			.804

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MIN							
	2	.000			3.729			-7.931
		.000	1.154	-.085		.336	-.276	
		1.075	-6.648	1.508		.336	.299	
		2.150	-14.725	-.306		.336	.735	
		2.150			3.729			-7.931
	MAX							
	3	.000			6.018			1.035
		.000	14.200	2.013		.621	-.108	
		1.075	5.984	2.925		.621	.402	
		2.150	-1.954	1.548		.621	1.050	
		2.150			6.018			1.035
	MIN							
	3	.000			3.988			-7.700
		.000	1.111	-.040		.307	-.248	
		1.075	-6.692	1.506		.307	.296	
		2.150	-14.768	-.395		.307	.701	
		2.150			3.988			-7.700
	MAX							
	4	.000			6.339			3.706
		.000	22.018	2.900		.740	-.092	
		1.075	10.171	3.641		.740	.441	
		2.150	-1.216	2.548		.740	1.203	
		2.150			6.339			3.706
	MIN							
	4	.000			2.956			-10.852
		.000	.204	-.521		.215	-.324	
		1.075	-10.955	1.275		.215	.265	
		2.150	-22.572	-.622		.215	.622	
		2.150			2.956			-10.852
	MAX & MIN							
	5	.000			-.037			-2.619
		.000	2.262	.066		-.010	.008	
		1.075	-.505	1.011		-.010	-.003	
		2.150	-3.272	-1.020		-.010	-.014	
		2.150			-.037			-2.619
	MAX & MIN							
	6	.000			.003			-2.463
		.000	2.376	.792		.001	-.001	
		1.075	-.392	1.859		.001	.000	
		2.150	-3.159	-.049		.001	.001	
		2.150			.003			-2.463
	MAX							
	ALL	.000			6.610			3.706
		.000	22.018	2.900		.793	.008	
		1.075	10.171	3.641		.793	.524	
		2.150	-1.216	2.548		.793	1.377	
		2.150			6.610			3.706
	MIN							
	ALL	.000			-.037			-10.852
		.000	.204	-.521		-.010	-.328	

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.075	-10.955	1.011		-.010	-.003	
		2.150	-22.572	-1.020		-.010	-.014	
		2.150			-.037			-10.852
85	----------							
	MAX & MIN							
	1	.000			8.188			-2.631
		.000	1.966	-.486		.659	-.074	
		1.075	-.801	.141		.659	.635	
		2.150	-3.568	-2.207		.659	1.343	
		2.150			8.188			-2.631
	MAX							
	2	.000			7.073			.765
		.000	13.643	.624		.583	-.009	
		1.075	5.432	.811		.583	.499	
		2.150	-2.457	-1.168		.583	1.107	
		2.150			7.073			.765
	MIN							
	2	.000			4.361			-7.595
		.000	.653	-1.436		.264	-.109	
		1.075	-7.145	-.319		.264	.352	
		2.150	-15.262	-2.612		.264	.712	
		2.150			4.361			-7.595
	MAX							
	3	.000			7.260			.998
		.000	13.600	.669		.561	.007	
		1.075	5.389	.809		.561	.491	
		2.150	-2.500	-1.216		.561	1.075	
		2.150			7.260			.998
	MIN							
	3	.000			4.548			-7.362
		.000	.609	-1.391		.242	-.093	
		1.075	-7.189	-.320		.242	.344	
		2.150	-15.305	-2.661		.242	.680	
		2.150			4.548			-7.362
	MAX							
	4	.000			7.847			3.586
		.000	21.327	1.477		.674	.024	
		1.075	9.487	1.262		.674	.550	
		2.150	-1.817	-.579		.674	1.242	
		2.150			7.847			3.586
	MIN							
	4	.000			3.327			-10.347
		.000	-.324	-1.956		.142	-.143	
		1.075	-11.476	-.621		.142	.305	
		2.150	-23.159	-2.987		.142	.585	
		2.150			3.327			-10.347
	MAX & MIN							
	5	.000			-.087			-2.906
		.000	1.846	-1.457		-.020	.015	
		1.075	-.921	-.960		-.020	-.007	
		2.150	-3.688	-3.437		-.020	-.028	

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT LOAD ID	ENVE	DIST END	1-2 PLANE SHEAR	MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	MOMENT	AXIAL TORQ
		Z.150			-.239			-5.222
88 ----------								
MAX & MIN								
MAX	1	.000			11.407			1.448
		Z.150						
	2	.000	3.804	-2.396		.334	.502	
		Z.150	-1.731	-.168		.334	1.221	
	3	.000	1.036	.205		.334	.861	
		Z.150	-1.678	.614		-.315		1.927
MIN	1	.000						
		Z.150				-.020	-.014	
	2	.000	1.734	.584		-.020	.007	
		Z.150	-1.678	.614		-.315		1.927
MAX & MIN	5	.000						
MAX	1	.000	5.146	-3.114		-.315		1.927
		Z.150			4.418			
	2	.000	2.099	-3.761		.121	.206	
		Z.150	-20.678	-.988		.121	.597	-4.772
	3	.000	-9.033	-.378		.121	.402	
		Z.150	-20.678	-.988	4.418	.121	.597	-4.772
MIN	4	.000						
		Z.150			10.501			7.945
MAX	4	.000	23.573	-1.374		.238	.997	
		Z.150	11.752	1.247		.238	.727	
		Z.150	.439	2.304		.238	.923	
	5	.000			5.874			-2.371
MIN	3	.000	2.799	-3.228		.130	.269	
		Z.150	-13.081	-.633		.130	.448	
		Z.150	-4.987	-.138		.130	.627	
	1	.000						
		Z.150			9.524			5.259
	2	.000	15.683	-1.766		.200	.504	
		Z.150	7.484	.837		.200	.643	
	3	.000						
		Z.150	-.410	1.342		.200	.823	
MAX	3	.000			9.524			5.259
		Z.150						
	2	.000	2.832	-3.261		.144	.272	
		Z.150	-13.048	-.597		.144	.660	
	1	.000			5.820			-2.529
		Z.150	-4.955	-.136		.144	.466	
MIN	2	.000						
		Z.150			9.470			5.101
	3	.000	15.716	-1.800		.214	.506	
		Z.150	-.378	1.378		.214	.856	
	1	.000						
		Z.150	7.517	.839		.214	.661	
MAX & MIN	2	.000

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX & MIN							
6		.000			.029			1.498
		.000	3.801	-2.394		.002	-.003	
		1.075	1.034	.204		.002	-.001	
		2.150	-1.733	-.172		.002	.001	
		2.150			.029			1.498
	MAX							
	ALL	.000			11.407			7.945
		.000	23.573	-1.324		.334	.597	
		1.075	11.752	1.247		.334	.861	
		2.150	.439	2.304		.334	1.221	
		2.150			11.407			7.945
	MIN							
	ALL	.000			-.315			-4.772
		.000	2.099	-3.761		-.020	-.003	
		1.075	-9.033	-.378		-.020	-.001	
		2.150	-20.678	-.988		-.020	-.014	
		2.150			-.315			-4.772
89	----------							
	MAX & MIN							
1		.000			11.990			.802
		.000	3.426	-.112		.200	.690	
		1.075	.658	2.083		.200	.905	
		2.150	-2.109	1.303		.200	1.120	
		2.150			11.990			.802
	MAX							
2		.000			9.677			4.255
		.000	15.207	.973		.110	.621	
		1.075	7.005	3.118		.110	.670	
		2.150	-.850	3.070		.110	.769	
		2.150			9.677			4.255
	MIN							
2		.000			6.089			-2.907
		.000	2.412	-.519		.044	.404	
		1.075	-5.377	1.823		.044	.407	
		2.150	-13.514	.941		.044	.570	
		2.150			6.089			-2.907
	MAX							
3		.000			9.662			4.353
		.000	15.187	.992		.081	.630	
		1.075	6.985	3.116		.081	.648	
		2.150	-.870	3.046		.081	.715	
		2.150			9.662			4.353
	MIN							
3		.000			6.074			-2.808
		.000	2.392	-.500		.016	.412	
		1.075	-5.397	1.820		.016	.465	
		2.150	-13.534	.916		.016	.517	
		2.150			6.074			-2.808
	MAX							
4		.000			10.683			6.816

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	23.010	1.738		.132	.703	
		1.075	11.185	3.796		.132	.730	
		2.150	-.062	4.180		.132	.839	
		2.150			10.683			6.816
	MIN							
4		.000			4.703			-5.119
		.000	1.685	-.748		.023	.341	
		1.075	-9.452	1.636		.023	.425	
		2.150	-21.168	.630		.023	.508	
		2.150			4.703			-5.119
	MAX & MIN							
5		.000			-.361			1.235
		.000	4.655	.609		-.009	.013	
		1.075	1.243	3.779		-.009	.004	
		2.150	-2.169	3.281		-.009	-.006	
		2.150			-.361			1.235
	MAX & MIN							
6		.000			.033			.821
		.000	3.424	-.111		.001	-.001	
		1.075	.657	2.083		.001	-.000	
		2.150	-2.110	1.302		.001	.001	
		2.150			.033			.821
	MAX							
	ALL	.000			11.990			6.816
		.000	23.010	1.738		.200	.703	
		1.075	11.185	3.796		.200	.905	
		2.150	-.062	4.180		.200	1.120	
		2.150			11.990			6.816
	MIN							
	ALL	.000			-.361			-5.119
		.000	1.685	-.748		-.009	-.001	
		1.075	-9.452	1.636		-.009	-.000	
		2.150	-21.168	.630		-.009	-.006	
		2.150			-.361			-5.119
90	----------							
	MAX & MIN							
1		.000			12.281			.245
		.000	2.991	1.278		.067	.855	
		1.075	.224	3.007		.067	.926	
		2.150	-2.543	1.761		.067	.998	
		2.150			12.281			.245
	MAX							
2		.000			9.650			3.523
		.000	14.621	2.773		.001	.735	
		1.075	6.418	4.263		.001	.669	
		2.150	-1.395	3.501		.001	.663	
		2.150			9.650			3.523
	MIN							
2		.000			6.108			-3.125
		.000	1.926	.987		-.063	.525	
		1.075	-5.864	2.821		-.063	.492	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.150	-14.046	1.441		-.063	.459	
		2.150			6.108			-3.125
	MAX							
3		.000			9.522			3.556
		.000	14.614	2.777		-.046	.758	
		1.075	6.411	4.259		-.046	.642	
		2.150	-1.402	3.489		-.046	.584	
		2.150			9.522			3.556
	MIN							
3		.000			5.981			-3.092
		.000	1.919	.990		-.110	.548	
		1.075	-5.871	2.817		-.110	.464	
		2.150	-14.053	1.430		-.110	.381	
		2.150			5.981			-3.092
	MAX							
4		.000			10.632			5.797
		.000	22.358	3.775		.023	.812	
		1.075	10.531	5.087		.023	.726	
		2.150	-.646	4.630		.023	.737	
		2.150			10.632			5.797
	MIN							
4		.000			4.729			-5.283
		.000	1.199	.798		-.084	.463	
		1.075	-9.940	2.685		-.084	.430	
		2.150	-21.731	1.198		-.084	.397	
		2.150			4.729			-5.283
	MAX & MIN							
5		.000			-.380			.392
		.000	3.841	3.212		-.003	.005	
		1.075	.429	5.507		-.003	.002	
		2.150	-2.983	4.134		-.003	-.000	
		2.150			-.380			.392
	MAX & MIN							
6		.000			.035			.250
		.000	2.991	1.279		.000	-.000	
		1.075	.224	3.007		.000	-.000	
		2.150	-2.543	1.760		.000	.000	
		2.150			.035			.250
	MAX							
	ALL	.000			12.281			5.797
		.000	22.358	3.775		.067	.855	
		1.075	10.531	5.507		.067	.926	
		2.150	-.646	4.630		.067	.998	
		2.150			12.281			5.797
	MIN							
	ALL	.000			-.380			-5.283
		.000	1.199	.798		-.110	-.000	
		1.075	-9.940	2.685		-.110	-.000	
		2.150	-21.731	1.198		-.110	-.000	
		2.150			-.380			-5.283

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
101	----------							
	MAX & MIN							
1		.000			4.561			-3.666
		.000	26.126	-10.266		-2.014	1.665	
		.750	26.126	9.328		-2.014	.154	
		1.500	26.126	28.922		-2.014	-1.357	
		1.500			4.561			-3.666
	MAX							
2		.000			3.314			-2.676
		.000	39.740	-6.817		-1.660	1.633	
		.750	39.740	14.875		-1.660	.002	
		1.500	39.740	44.117		-1.660	-1.360	
		1.500			3.314			-2.676
	MIN							
2		.000			2.033			-8.175
		.000	19.286	-14.366		-2.221	1.314	
		.750	19.286	7.589		-2.221	-.049	
		1.500	19.286	22.063		-2.221	-1.692	
		1.500			2.033			-8.175
	MAX							
3		.000			3.108			-2.744
		.000	40.204	-7.070		-2.080	1.867	
		.750	40.204	14.971		-2.080	-.079	
		1.500	40.204	44.560		-2.080	-1.756	
		1.500			3.108			-2.744
	MIN							
3		.000			1.827			-8.244
		.000	19.750	-14.618		-2.641	1.548	
		.750	19.750	7.684		-2.641	-.130	
		1.500	19.750	22.906		-2.641	-2.088	
		1.500			1.827			-8.244
	MAX							
4		.000			3.678			-2.176
		.000	49.919	-5.113		-1.447	1.749	
		.750	49.919	18.806		-1.447	.020	
		1.500	49.919	55.306		-1.447	-1.260	
		1.500			3.678			-2.176
	MIN							
4		.000			1.543			-11.342
		.000	15.829	-17.694		-2.381	1.217	
		.750	15.829	6.661		-2.381	-.064	
		1.500	15.829	18.549		-2.381	-1.814	
		1.500			1.543			-11.342
	MAX & MIN							
5		.000			-.005			-3.418
		.000	23.201	-9.499		-.015	.009	
		.750	23.201	7.901		-.015	-.003	
		1.500	23.201	25.302		-.015	-.014	
		1.500			-.005			-3.418
	MAX & MIN							
6		.000			.000			-3.754

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	26.733	-10.593		.001	-.001	
		.750	26.733	9.457		.001	.000	
		1.500	26.733	29.507		.001	.001	
		1.500			.000			-3.754
	MAX							
	ALL	.000			4.561			-2.176
		.000	49.919	-5.113		.001	1.867	
		.750	49.919	18.806		.001	.154	
		1.500	49.919	55.306		.001	.001	
		1.500			4.561			-2.176
	MIN							
	ALL	.000			-.005			-11.342
		.000	15.829	-17.694		-2.641	-.001	
		.750	15.829	6.661		-2.641	-.130	
		1.500	15.829	18.549		-2.641	-2.088	
		1.500			-.005			-11.342
102	----------							
	MAX & MIN							
	1	.000			-1.015			-3.345
		.000	-3.183	4.334		-2.628	2.555	
		.750	-3.183	1.947		-2.628	.584	
		1.500	-3.183	-.440		-2.628	-1.387	
		1.500			-1.015			-3.345
	MAX							
	2	.000			-.444			.173
		.000	-2.230	5.937		-1.911	2.208	
		.750	-2.230	4.344		-1.911	.253	
		1.500	-2.230	2.751		-1.911	-1.422	
		1.500			-.444			.173
	MIN							
	2	.000			-.528			-8.222
		.000	-13.616	4.005		-2.679	1.684	
		.750	-13.616	1.379		-2.679	.121	
		1.500	-13.616	-1.270		-2.679	-1.786	
		1.500			-.528			-8.222
	MAX							
	3	.000			-.372			.062
		.000	-2.211	5.947		-2.292	2.349	
		.750	-2.211	4.369		-2.292	.108	
		1.500	-2.211	2.790		-2.292	-1.854	
		1.500			-.372			.062
	MIN							
	3	.000			-.456			-8.332
		.000	-13.596	4.015		-3.061	1.825	
		.750	-13.596	1.404		-3.061	-.024	
		1.500	-13.596	-1.230		-3.061	-2.217	
		1.500			-.456			-8.332
	MAX							
	4	.000			-.420			2.258
		.000	-1.548	7.031		-1.620	2.391	
		.750	-1.548	6.003		-1.620	.306	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.500	-1.548	4.975		-1.620	-1.312	
		1.500			-.420			2.258
	MIN							
	4	.000			-.560			-11.732
		.000	-20.524	3.812		-2.900	1.517	
		.750	-20.524	1.062		-2.900	.086	
		1.500	-20.524	-1.726		-2.900	-1.918	
		1.500			-.560			-11.732
	MAX & MIN							
	5	.000			.001			-3.081
		.000	-3.381	3.847		-.018	.008	
		.750	-3.381	1.311		-.018	-.005	
		1.500	-3.381	-1.225		-.018	-.019	
		1.500			.001			-3.081
	MAX & MIN							
	6	.000			-.000			-3.487
		.000	-3.156	4.350		.002	-.001	
		.750	-3.156	1.983		.002	.001	
		1.500	-3.156	-.384		.002	.002	
		1.500			-.000			-3.487
	MAX							
	ALL	.000			.001			2.258
		.000	-1.548	7.031		.002	2.555	
		.750	-1.548	6.003		.002	.584	
		1.500	-1.548	4.975		.002	.002	
		1.500			.001			2.258
	MIN							
	ALL	.000			-1.015			-11.732
		.000	-20.524	3.812		-3.061	-.001	
		.750	-20.524	1.062		-3.061	-.024	
		1.500	-20.524	-1.726		-3.061	-2.217	
		1.500			-1.015			-11.732
103	----------							
	MAX & MIN							
	1	.000			-1.297			-1.124
		.000	-4.761	2.707		-2.169	1.992	
		.750	-4.761	-.863		-2.169	.365	
		1.500	-4.761	-4.434		-2.169	-1.262	
		1.500			-1.297			-1.124
	MAX							
	2	.000			-.704			2.691
		.000	-4.433	4.015		-1.324	1.697	
		.750	-4.433	.628		-1.324	.213	
		1.500	-4.433	-2.759		-1.324	-.982	
		1.500			-.704			2.691
	MIN							
	2	.000			-.727			-5.092
		.000	-15.563	2.056		-2.021	1.234	
		.750	-15.563	-1.512		-2.021	.126	
		1.500	-15.563	-5.484		-2.021	-1.296	
		1.500			-.727			-5.092

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
	3	.000			-.662			2.598
		.000	-4.433	4.025		-1.481	1.759	
		.750	-4.433	.638		-1.481	.157	
		1.500	-4.433	-2.750		-1.481	-1.156	
		1.500			-.662			2.598
	MIN							
	3	.000			-.685			-5.186
		.000	-15.564	2.067		-2.179	1.296	
		.750	-15.564	-1.503		-2.179	.070	
		1.500	-15.564	-5.474		-2.179	-1.470	
		1.500			-.685			-5.186
	MAX							
	4	.000			-.696			5.017
		.000	-4.215	4.912		-1.059	1.858	
		.750	-4.215	1.646		-1.059	.245	
		1.500	-4.215	-1.619		-1.059	-.886	
		1.500			-.696			5.017
	MIN							
	4	.000			-.735			-7.956
		.000	-22.765	1.647		-2.222	1.086	
		.750	-22.765	-1.921		-2.222	.100	
		1.500	-22.765	-6.160		-2.222	-1.409	
		1.500			-.735			-7.956
	MAX & MIN							
	5	.000			-.001			-1.096
		.000	-4.806	2.312		-.018	.009	
		.750	-4.806	-1.292		-.018	-.004	
		1.500	-4.806	-4.896		-.018	-.018	
		1.500			-.001			-1.096
	MAX & MIN							
	6	.000			.000			-1.243
		.000	-4.761	2.727		.002	-.001	
		.750	-4.761	-.844		.002	.000	
		1.500	-4.761	-4.415		.002	.002	
		1.500			.000			-1.243
	MAX							
	ALL	.000			.000			5.017
		.000	-4.215	4.912		.002	1.992	
		.750	-4.215	1.646		.002	.365	
		1.500	-4.215	-1.619		.002	.002	
		1.500			.000			5.017
	MIN							
	ALL	.000			-1.297			-7.956
		.000	-22.765	1.647		-2.222	-.001	
		.750	-22.765	-1.921		-2.222	-.004	
		1.500	-22.765	-6.160		-2.222	-1.470	
		1.500			-1.297			-7.956
104	----------							
	MAX & MIN							
	1	.000			-1.288			-.478

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	-4.921	1.035		-1.861	1.711	
		.750	-4.921	-2.656		-1.861	.315	
		1.500	-4.921	-6.346		-1.861	-1.080	
		1.500			-1.288			-.478
	MAX							
	2	.000			-.742			3.367
		.000	-4.658	1.819		-.981	1.447	
		.750	-4.658	-1.796		-.981	.222	
		1.500	-4.658	-5.410		-.981	-.709	
		1.500			-.742			3.367
	MIN							
	2	.000			-.750			-4.164
		.000	-15.764	.049		-1.670	.890	
		.750	-15.764	-3.679		-1.670	.140	
		1.500	-15.764	-7.524		-1.670	-1.013	
		1.500			-.750			-4.164
	MAX							
	3	.000			-.724			3.275
		.000	-4.658	1.821		-1.032	1.459	
		.750	-4.658	-1.794		-1.032	.195	
		1.500	-4.658	-5.408		-1.032	-.774	
		1.500			-.724			3.275
	MIN							
	3	.000			-.733			-4.256
		.000	-15.764	.051		-1.721	1.002	
		.750	-15.764	-3.677		-1.721	.114	
		1.500	-15.764	-7.522		-1.721	-1.078	
		1.500			-.733			-4.256
	MAX							
	4	.000			-.738			5.715
		.000	-4.483	2.344		-.719	1.605	
		.750	-4.483	-1.220		-.719	.250	
		1.500	-4.483	-4.783		-.719	-.615	
		1.500			-.738			5.715
	MIN							
	4	.000			-.752			-6.837
		.000	-22.993	-.606		-1.868	.843	
		.750	-22.993	-4.359		-1.868	.114	
		1.500	-22.993	-8.307		-1.868	-1.121	
		1.500			-.752			-6.837
	MAX & MIN							
	5	.000			-.005			-.549
		.000	-4.959	.722		-.028	.015	
		.750	-4.959	-2.998		-.028	-.006	
		1.500	-4.959	-6.717		-.028	-.026	
		1.500			-.005			-.549
	MAX & MIN							
	6	.000			.000			-.596
		.000	-4.920	1.053		.003	-.001	
		.750	-4.920	-2.637		.003	.001	
		1.500	-4.920	-6.327		.003	.002	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			1.500			.000			-.596
		MAX							
		ALL	.000			.000			5.715
			.000	-4.483	2.344		.003	1.711	
			.750	-4.483	-1.220		.003	.315	
			1.500	-4.483	-4.783		.003	.002	
			1.500			.000			5.715
		MIN							
		ALL	.000			-1.288			-6.837
			.000	-22.993	-.606		-1.868	-.001	
			.750	-22.993	-4.359		-1.868	-.006	
			1.500	-22.993	-8.307		-1.868	-1.121	
			1.500			-1.288			-6.837
105									
		MAX & MIN							
		1	.000			-1.286			-.268
			.000	-5.074	.041		-1.565	1.444	
			.750	-5.074	-3.764		-1.565	.270	
			1.500	-5.074	-7.570		-1.565	-.904	
			1.500			-1.286			-.268
		MAX							
		2	.000			-.758			3.540
			.000	-4.849	.467		-.734	1.253	
			.750	-4.849	-3.305		-.734	.208	
			1.500	-4.849	-7.078		-.734	-.534	
			1.500			-.758			3.540
		MIN							
		2	.000			-.767			-3.784
			.000	-15.952	-1.067		-1.427	.796	
			.750	-15.952	-4.934		-1.427	.131	
			1.500	-15.952	-8.812		-1.427	-.845	
			1.500			-.767			-3.784
		MAX							
		3	.000			-.751			3.446
			.000	-4.849	.464		-.740	1.242	
			.750	-4.849	-3.309		-.740	.193	
			1.500	-4.849	-7.081		-.740	-.553	
			1.500			-.751			3.446
		MIN							
		3	.000			-.760			-3.878
			.000	-15.952	-1.070		-1.433	.786	
			.750	-15.952	-4.937		-1.433	.116	
			1.500	-15.952	-8.816		-1.433	-.865	
			1.500			-.760			-3.878
		MAX							
		4	.000			-.755			5.860
			.000	-4.700	.735		-.471	1.411	
			.750	-4.700	-3.016		-.471	.234	
			1.500	-4.700	-6.767		-.471	-.437	
			1.500			-.755			5.860

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			.000	-5.479	.514		-.536	1.045	
			.750	-5.479	-3.692		-.536	.161	
			1.500	-5.479	-7.899		-.536	-.404	
			1.500			-.756			3.001
		MIN							
		3	.000			-.775			-4.204
			.000	-16.595	-.665		-1.205	.618	
			.750	-16.595	-4.994		-1.205	.107	
			1.500	-16.595	-9.408		-1.205	-.727	
			1.500			-.775			-4.204
		MAX							
		4	.000			-.751			5.345
			.000	-5.394	.666		-.291	1.211	
			.750	-5.394	-3.543		-.291	.188	
			1.500	-5.394	-7.751		-.291	-.303	
			1.500			-.751			5.345
		MIN							
		4	.000			-.782			-6.663
			.000	-23.920	-1.301		-1.407	.499	
			.750	-23.920	-5.713		-1.407	.098	
			1.500	-23.920	-10.265		-1.407	-.842	
			1.500			-.782			-6.663
		MAX & MIN							
		5	.000			-.013			-.992
			.000	-5.729	-.029		-.079	.053	
			.750	-5.729	-4.325		-.079	-.006	
			1.500	-5.729	-8.622		-.079	-.066	
			1.500			-.013			-.992
		MAX & MIN							
		6	.000			.001			-.721
			.000	-5.607	.315		.007	-.005	
			.750	-5.607	-3.891		.007	.001	
			1.500	-5.607	-8.096		.007	.006	
			1.500			.001			-.721
		MAX							
		ALL	.000			.001			5.345
			.000	-5.394	.666		.007	1.211	
			.750	-5.394	-3.543		.007	.229	
			1.500	-5.394	-7.751		.007	.006	
			1.500			.001			5.345
		MIN							
		ALL	.000			-1.288			-6.663
			.000	-23.920	-1.301		-1.407	-.005	
			.750	-23.920	-5.713		-1.407	-.006	
			1.500	-23.920	-10.265		-1.407	-.842	
			1.500			-1.288			-6.663
107									
		MAX & MIN							
		1	.000			-1.356			-.116
			.000	-7.247	3.388		-1.050	.975	
			.750	-7.247	-2.047		-1.050	.187	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		MIN							
		4	.000			-.770			-6.347
			.000	-23.204	-1.822		-1.626	.650	
			.750	-23.204	-5.730		-1.626	.106	
			1.500	-23.204	-9.658		-1.626	-.957	
			1.500			-.770			-6.347
		MAX & MIN							
		5	.000			-.010			-.438
			.000	-5.119	-.288		-.050	.029	
			.750	-5.119	-4.127		-.050	-.008	
			1.500	-5.119	-7.966		-.050	-.045	
			1.500			-.010			-.438
		MAX & MIN							
		6	.000			.001			-.381
			.000	-5.073	.073		.005	-.003	
			.750	-5.073	-3.731		.005	.001	
			1.500	-5.073	-7.535		.005	.004	
			1.500			.001			-.381
		MAX							
		ALL	.000			.001			5.860
			.000	-4.700	.735		.005	1.444	
			.750	-4.700	-3.016		.005	.270	
			1.500	-4.700	-6.767		.005	.004	
			1.500			.001			5.860
		MIN							
		ALL	.000			-1.286			-6.347
			.000	-23.204	-1.822		-1.626	-.003	
			.750	-23.204	-5.730		-1.626	-.008	
			1.500	-23.204	-9.658		-1.626	-.957	
			1.500			-1.286			-6.347
106									
		MAX & MIN							
		1	.000			-1.288			-.621
			.000	-5.612	.251		-1.276	1.186	
			.750	-5.612	-3.958		-1.276	.229	
			1.500	-5.612	-8.167		-1.276	-.728	
			1.500			-1.288			-.621
		MAX							
		2	.000			-.758			3.099
			.000	-5.473	.517		-.545	1.062	
			.750	-5.473	-3.685		-.545	.171	
			1.500	-5.473	-7.888		-.545	-.402	
			1.500			-.758			3.099
		MIN							
		2	.000			-.776			-4.106
			.000	-16.589	-.663		-1.214	.635	
			.750	-16.589	-4.987		-1.214	.116	
			1.500	-16.589	-9.397		-1.214	-.725	
			1.500			-.776			-4.106
		MAX							
		3	.000			-.756			3.001

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			1.500	-7.247	-7.482		-1.050	-.600	
			1.500			-1.356			-.116
		MAX							
		2	.000			-.619			3.644
			.000	-7.179	3.840		-.539	.795	
			.750	-6.969	-1.695		-.539	.145	
			1.500	-6.759	-7.007		-.539	-.363	
			1.500			-.619			3.644
		MIN							
		2	.000			-.944			-3.460
			.000	-18.572	2.867		-.876	.549	
			.750	-18.362	-2.681		-.876	.091	
			1.500	-18.152	-8.409		-.876	-.506	
			1.500			-.944			-3.460
		MAX							
		3	.000			-.636			3.552
			.000	-7.175	3.874		-.546	.791	
			.750	-7.049	-1.689		-.546	.136	
			1.500	-6.923	-7.093		-.546	-.376	
			1.500			-.636			3.552
		MIN							
		3	.000			-.960			-3.553
			.000	-18.568	2.901		-.883	.545	
			.750	-18.442	-2.675		-.883	.082	
			1.500	-18.316	-8.495		-.883	-.519	
			1.500			-.960			-3.553
		MAX							
		4	.000			-.526			5.907
			.000	-7.134	4.214		-.413	.886	
			.750	-7.008	-1.470		-.413	.167	
			1.500	-6.882	-6.952		-.413	-.315	
			1.500			-.526			5.907
		MIN							
		4	.000			-1.066			-5.934
			.000	-26.122	2.593		-.974	.475	
			.750	-25.996	-3.113		-.974	.077	
			1.500	-25.870	-9.289		-.974	-.553	
			1.500			-1.066			-5.934
		MAX & MIN							
		5	.000			.000			-.840
			.000	-8.391	4.362		-.072	.091	
			.750	-8.391	-1.931		-.072	.037	
			1.500	-8.391	-8.224		-.072	-.017	
			1.500			.000			-.840
		MAX & MIN							
		6	.000			.000			-.175
			.000	-7.207	3.454		.007	-.008	
			.750	-7.207	-1.952		.007	-.003	
			1.500	-7.207	-7.357		.007	.002	
			1.500			.000			-.175

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
	ALL	.000			.000			5.907
		.000	-7.134	4.362		.007	.975	
		.750	-6.969	-1.470		.007	.187	
		1.500	-6.759	-6.952		.007	.002	
		1.500			.000			5.907
	MIN							
	ALL	.000			-1.356			-5.934
		.000	-26.122	2.593		-1.050	-.008	
		.750	-25.996	-3.113		-1.050	-.003	
		1.500	-25.870	-9.289		-1.050	-.600	
		1.500			-1.356			-5.934
108	----------							
	MAX & MIN							
	1	.000			-1.295			.542
		.000	-5.680	.056		-.849	.773	
		.750	-5.680	-4.204		-.849	.136	
		1.500	-5.680	-8.463		-.849	-.501	
		1.500			-1.295			.542
	MAX							
	2	.000			-.774			4.348
		.000	-5.585	.114		-.480	.573	
		.750	-5.375	-4.160		-.480	.093	
		1.500	-5.165	-8.201		-.480	-.278	
		1.500			-.774			4.348
	MIN							
	2	.000			-.796			-2.741
		.000	-16.689	-.972		-.640	.442	
		.750	-16.479	-5.297		-.640	.065	
		1.500	-16.269	-9.586		-.640	-.387	
		1.500			-.796			-2.741
	MAX							
	3	.000			-.782			4.269
		.000	-5.572	.158		-.517	.592	
		.750	-5.446	-4.138		-.517	.084	
		1.500	-5.320	-8.265		-.517	-.314	
		1.500			-.782			4.269
	MIN							
	3	.000			-.804			-2.821
		.000	-16.677	-.928		-.677	.461	
		.750	-16.551	-5.275		-.677	.056	
		1.500	-16.425	-9.650		-.677	-.424	
		1.500			-.804			-2.821
	MAX							
	4	.000			-.766			6.679
		.000	-5.493	.258		-.422	.621	
		.750	-5.367	-4.088		-.422	.104	
		1.500	-5.241	-8.214		-.422	-.231	
		1.500			-.766			6.679
	MIN							
	4	.000			-.803			-5.136

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	-24.001	-1.551		-.689	.402	
		.750	-23.875	-5.983		-.689	.057	
		1.500	-23.749	-10.523		-.689	-.413	
		1.500			-.803			-5.136
	MAX & MIN							
	5	.000			.013			.523
		.000	-7.073	.500		-.076	.053	
		.750	-7.073	-4.804		-.076	-.005	
		1.500	-7.073	-10.109		-.076	-.062	
		1.500			.013			.523
	MAX & MIN							
	6	.000			-.001			.524
		.000	-5.675	.119		.007	-.005	
		.750	-5.675	-4.137		.007	.000	
		1.500	-5.675	-8.394		.007	.006	
		1.500			-.001			.524
	MAX							
	ALL	.000			.013			6.679
		.000	-5.493	.500		.007	.773	
		.750	-5.367	-4.088		.007	.136	
		1.500	-5.165	-8.201		.007	.006	
		1.500			.013			6.679
	MIN							
	ALL	.000			-1.295			-5.136
		.000	-24.001	-1.551		-.849	-.005	
		.750	-23.875	-5.983		-.849	-.005	
		1.500	-23.749	-10.523		-.849	-.501	
		1.500			-1.295			-5.136
109	----------							
	MAX & MIN							
	1	.000			-1.289			.066
		.000	-5.159	-.707		-.574	.525	
		.750	-5.159	-4.577		-.574	.094	
		1.500	-5.159	-8.446		-.574	-.336	
		1.500			-1.289			.066
	MAX							
	2	.000			-.791			3.654
		.000	-4.978	-.679		-.360	.442	
		.750	-4.768	-4.593		-.360	.055	
		1.500	-4.558	-8.231		-.360	-.232	
		1.500			-.791			3.654
	MIN							
	2	.000			-.802			-3.250
		.000	-16.070	-2.024		-.519	.308	
		.750	-15.860	-5.903		-.519	.035	
		1.500	-15.650	-9.647		-.519	-.332	
		1.500			-.802			-3.250
	MAX							
	3	.000			-.805			3.598
		.000	-4.965	-.620		-.430	.484	
		.750	-4.839	-4.556		-.430	.044	

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
	3	.000			-.805			3.598
	MIN							
	3	.000			-.816			-3.306
		.000	-16.058	-1.965		-.589	.349	
		.750	-15.932	-5.866		-.589	.024	
		1.500	-15.806	-9.695		-.589	-.395	
		1.500			-.816			-3.306
	MAX							
	4	.000			-.788			5.900
		.000	-4.824	-.511		-.302	.485	
		.750	-4.698	-4.514		-.302	.063	
		1.500	-4.572	-8.225		-.302	-.193	
		1.500			-.788			5.900
	MIN							
	4	.000			-.806			-5.607
		.000	-23.311	-2.752		-.568	.261	
		.750	-23.185	-6.698		-.568	.030	
		1.500	-23.059	-10.585		-.568	-.358	
		1.500			-.806			-5.607
	MAX & MIN							
	5	.000			.011			-.005
		.000	-6.333	-.693		-.046	.028	
		.750	-6.333	-5.442		-.046	-.007	
		1.500	-6.333	-10.192		-.046	-.041	
		1.500			.011			-.005
	MAX & MIN							
	6	.000			-.001			.061
		.000	-5.158	-.677		.004	-.003	
		.750	-5.158	-4.545		.004	.001	
		1.500	-5.158	-8.413		.004	.004	
		1.500			-.001			.061
	MAX							
	ALL	.000			.011			5.900
		.000	-4.824	-.511		.004	.525	
		.750	-4.698	-4.514		.004	.094	
		1.500	-4.558	-8.225		.004	.004	
		1.500			.011			5.900
	MIN							
	ALL	.000			-1.289			-5.607
		.000	-23.311	-2.752		-.589	-.003	
		.750	-23.185	-6.698		-.589	-.007	
		1.500	-23.059	-10.585		-.589	-.395	
		1.500			-1.289			-5.607
110	----------							
	MAX & MIN							
	1	.000			-1.289			-.022
		.000	-5.102	-.585		-.287	.263	
		.750	-5.102	-4.411		-.287	.048	
		1.500	-5.102	-8.237		-.287	-.168	
		1.500			-1.289			-.022

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
	2	.000			-.799			3.389
		.000	-4.910	-.543		-.261	.337	
		.750	-4.700	-4.437		-.261	.030	
		1.500	-4.490	-8.029		-.261	-.187	
		1.500			-.799			3.389
	MIN							
	2	.000			-.804			-3.309
		.000	-16.002	-1.958		-.410	.205	
		.750	-15.792	-5.789		-.410	.008	
		1.500	-15.582	-9.462		-.410	-.277	
		1.500			-.804			-3.309
	MAX							
	3	.000			-.817			3.361
		.000	-4.897	-.477		-.373	.413	
		.750	-4.771	-4.393		-.373	.023	
		1.500	-4.645	-8.070		-.373	-.278	
		1.500			-.817			3.361
	MIN							
	3	.000			-.823			-3.337
		.000	-15.989	-1.893		-.522	.282	
		.750	-15.863	-5.745		-.522	.001	
		1.500	-15.737	-9.503		-.522	-.368	
		1.500			-.823			-3.337
	MAX							
	4	.000			-.797			5.589
		.000	-4.748	-.344		-.210	.380	
		.750	-4.622	-4.341		-.210	.038	
		1.500	-4.496	-8.004		-.210	-.155	
		1.500			-.797			5.589
	MIN							
	4	.000			-.806			-5.575
		.000	-23.235	-2.703		-.457	.160	
		.750	-23.109	-6.595		-.457	.001	
		1.500	-22.983	-10.393		-.457	-.304	
		1.500			-.806			-5.575
	MAX & MIN							
	5	.000			.006			-.068
		.000	-6.010	-.843		-.019	.011	
		.750	-6.010	-5.350		-.019	-.003	
		1.500	-6.010	-9.858		-.019	-.018	
		1.500			.006			-.068
	MAX & MIN							
	6	.000			-.001			-.024
		.000	-5.101	-.571		.002	-.001	
		.750	-5.101	-4.396		.002	.000	
		1.500	-5.101	-8.222		.002	.002	
		1.500			-.001			-.024
	MAX							
	ALL	.000			.006			5.589
		.000	-4.748	-.344		.002	.413	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			.750	-4.622	-4.341		.002	.048	
			1.500	-4.490	-8.004		.002	.002	
			1.500			.006			5.589
		MIN							
		ALL	.000			-1.289			-5.575
			.000	-23.235	-2.703		-.522	-.001	
			.750	-23.109	-6.595		-.522	-.003	
			1.500	-22.983	-10.393		-.522	-.368	
			1.500			-1.289			-5.575
111	----------								
		MAX & MIN							
		1	.000			-1.289			.000
			.000	-5.087	-.510		.000	.000	
			.750	-5.087	-4.325		.000	.000	
			1.500	-5.087	-8.140		.000	.000	
			1.500			-1.289			.000
		MAX							
		2	.000			-.772			3.248
			.000	-4.893	-.462		-.082	.261	
			.750	-4.683	-4.352		-.082	.091	
			1.500	-4.473	-7.931		-.082	.008	
			1.500			-.772			3.248
		MIN							
		2	.000			-.775			-3.248
			.000	-15.985	-1.890		-.228	.131	
			.750	-15.775	-5.709		-.228	.069	
			1.500	-15.565	-9.370		-.228	-.080	
			1.500			-.775			-3.248
		MAX							
		3	.000			-.772			3.249
			.000	-4.880	-.395		-.186	.392	
			.750	-4.754	-4.306		-.186	.145	
			1.500	-4.628	-7.970		-.186	-.016	
			1.500			-.772			3.249
		MIN							
		3	.000			-.775			-3.248
			.000	-15.972	-1.823		-.331	.262	
			.750	-15.846	-5.663		-.331	.122	
			1.500	-15.720	-9.409		-.331	-.104	
			1.500			-.775			-3.248
		MAX							
		4	.000			-.770			5.414
			.000	-4.729	-.254		-.034	.305	
			.750	-4.603	-4.251		-.034	.099	
			1.500	-4.477	-7.899		-.034	.037	
			1.500			-.770			5.414
		MIN							
		4	.000			-.776			-5.414
			.000	-23.216	-2.634		-.276	.088	
			.750	-23.090	-6.512		-.276	.062	
			1.500	-22.964	-10.296		-.276	-.109	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			1.500			-.776			-5.414
		MAX & MIN							
		5	.000			.005			.000
			.000	-5.966	-.784		.000	.000	
			.750	-5.966	-5.259		.000	.000	
			1.500	-5.966	-9.733		.000	.000	
			1.500			.005			.000
		MAX & MIN							
		6	.000			-.000			.000
			.000	-5.086	-.500		.000	.000	
			.750	-5.086	-4.315		.000	.000	
			1.500	-5.086	-8.129		.000	.000	
			1.500			-.000			.000
		MAX							
		ALL	.000			.005			5.414
			.000	-4.729	-.254		.000	.392	
			.750	-4.603	-4.251		.000	.145	
			1.500	-4.473	-7.899		.000	.037	
			1.500			.005			5.414
		MIN							
		ALL	.000			-1.289			-5.414
			.000	-23.216	-2.634		-.331	.000	
			.750	-23.090	-6.512		-.331	.000	
			1.500	-22.964	-10.296		-.331	-.109	
			1.500			-1.289			-5.414
122	----------								
		MAX & MIN							
		1	.000			1.417			-3.418
			.000	6.862	11.088		-2.340	1.800	
			.750	6.862	16.234		-2.340	.045	
			1.500	6.862	21.380		-2.340	-1.710	
			1.500			1.417			-3.418
		MAX							
		2	.000			.639			.369
			.000	14.484	17.868		-1.220	1.222	
			.750	14.484	28.352		-1.220	-.101	
			1.500	14.484	39.215		-1.220	-1.154	
			1.500			.639			.369
		MIN							
		2	.000			.146			-7.966
			.000	2.352	10.594		-1.834	.879	
			.750	2.352	14.293		-1.834	-.167	
			1.500	2.352	16.640		-1.834	-1.493	
			1.500			.146			-7.966
		MAX							
		3	.000			.270			.148
			.000	14.775	17.723		-1.223	1.115	
			.750	14.775	28.425		-1.223	-.211	
			1.500	14.775	39.506		-1.223	-1.266	
			1.500			.270			.148

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		MIN							
		3	.000			-.222			-8.187
			.000	2.643	10.449		-1.837	.772	
			.750	2.643	14.366		-1.837	-.276	
			1.500	2.643	16.931		-1.837	-1.605	
			1.500			-.222			-8.187
		MAX							
		4	.000			.786			2.377
			.000	20.248	22.064		-.986	1.342	
			.750	20.248	36.618		-.986	-.078	
			1.500	20.248	51.804		-.986	-1.048	
			1.500			.786			2.377
		MIN							
		4	.000			-.035			-11.515
			.000	.029	9.941		-2.010	.771	
			.750	.029	13.186		-2.010	-.187	
			1.500	.029	14.179		-2.010	-1.613	
			1.500			-.035			-11.515
		MAX & MIN							
		5	.000			-.013			-3.270
			.000	6.263	9.020		-.003	-.002	
			.750	6.263	13.717		-.003	-.004	
			1.500	6.263	18.414		-.003	-.006	
			1.500			-.013			-3.270
		MAX & MIN							
		6	.000			.001			-3.704
			.000	7.239	10.907		.000	.000	
			.750	7.239	16.336		.000	.000	
			1.500	7.239	21.765		.000	.001	
			1.500			.001			-3.704
		MAX							
		ALL	.000			1.417			2.377
			.000	20.248	22.064		.000	1.800	
			.750	20.248	36.618		.000	.045	
			1.500	20.248	51.804		.000	.001	
			1.500			1.417			2.377
		MIN							
		ALL	.000			-.222			-11.515
			.000	.029	9.020		-2.340	-.002	
			.750	.029	13.186		-2.340	-.276	
			1.500	.029	14.179		-2.340	-1.710	
			1.500			-.222			-11.515
123	----------								
		MAX & MIN							
		1	.000			-.725			-4.718
			.000	.510	9.611		-5.581	4.776	
			.750	.510	9.994		-5.581	.590	
			1.500	.510	10.377		-5.581	-3.596	
			1.500			-.725			-4.718
		MAX							
		2	.000			-.114			4.300

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			.000	7.674	17.531		-3.023	3.331	
			.750	7.674	22.786		-3.023	.031	
			1.500	7.674	27.831		-3.023	-2.682	
			1.500			-.114			4.300
		MIN							
		2	.000			-.225			-14.139
			.000	-2.760	8.422		-4.582	2.370	
			.750	-2.760	8.526		-4.582	-.203	
			1.500	-2.760	8.704		-4.582	-3.459	
			1.500			-.225			-14.139
		MAX							
		3	.000			.053			3.766
			.000	7.685	17.558		-3.125	3.076	
			.750	7.685	22.821		-3.125	-.300	
			1.500	7.685	27.875		-3.125	-3.090	
			1.500			.053			3.766
		MIN							
		3	.000			-.058			-14.674
			.000	-2.750	8.449		-4.684	2.114	
			.750	-2.750	8.561		-4.684	-.535	
			1.500	-2.750	8.748		-4.684	-3.867	
			1.500			-.058			-14.674
		MAX							
		4	.000			-.077			9.067
			.000	12.478	22.889		-2.429	3.664	
			.750	12.478	31.413		-2.429	.121	
			1.500	12.478	39.588		-2.429	-2.444	
			1.500			-.077			9.067
		MIN							
		4	.000			-.262			-21.666
			.000	-4.913	7.707		-5.028	2.061	
			.750	-4.913	7.647		-5.028	-.270	
			1.500	-4.913	7.709		-5.028	-3.739	
			1.500			-.262			-21.666
		MAX & MIN							
		5	.000			.002			-4.748
			.000	.172	7.426		-.012	-.006	
			.750	.172	7.555		-.012	-.015	
			1.500	.172	7.684		-.012	-.024	
			1.500			.002			-4.748
		MAX & MIN							
		6	.000			-.000			-5.409
			.000	.525	9.655		.001	.001	
			.750	.525	10.048		.001	.001	
			1.500	.525	10.442		.001	.002	
			1.500			-.000			-5.409
		MAX							
		ALL	.000			.053			9.067
			.000	12.478	22.889		.001	4.776	
			.750	12.478	31.413		.001	.590	
			1.500	12.478	39.588		.001	.002	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.500			.053			9.067
	MIN							
	ALL	.000			-.725			-21.666
		.000	-4.913	7.426		-5.581	-.006	
		.750	-4.913	7.555		-5.581	-.535	
		1.500	-4.913	7.684		-5.581	-3.867	
		1.500			-.725			-21.666
124	----------							
	MAX & MIN							
	1	.000			-.938			-1.407
		.000	-1.625	-.132		-4.972	4.166	
		.750	-1.625	-1.351		-4.972	.438	
		1.500	-1.625	-2.570		-4.972	-3.291	
		1.500			-.938			-1.407
	MAX							
	2	.000			-.380			7.389
		.000	4.180	4.240		-2.556	3.166	
		.750	4.180	4.693		-2.556	.167	
		1.500	4.180	7.430		-2.556	-2.132	
		1.500			-.380			7.389
	MIN							
	2	.000			-.436			-8.995
		.000	-5.440	-4.037		-4.122	2.219	
		.750	-5.440	-3.308		-4.122	.043	
		1.500	-5.440	-3.874		-4.122	-2.904	
		1.500			-.436			-8.995
	MAX							
	3	.000			-.278			6.876
		.000	4.172	4.255		-2.592	3.054	
		.750	4.172	4.701		-2.592	.028	
		1.500	4.172	7.432		-2.592	-2.298	
		1.500			-.278			6.876
	MIN							
	3	.000			-.334			-9.508
		.000	-5.449	-4.022		-4.157	2.106	
		.750	-5.449	-3.299		-4.157	-.096	
		1.500	-5.449	-3.872		-4.157	-3.069	
		1.500			-.334			-9.508
	MAX							
	4	.000			-.361			12.061
		.000	8.031	7.197		-1.960	3.491	
		.750	8.031	8.749		-1.960	.218	
		1.500	8.031	14.109		-1.960	-1.888	
		1.500			-.361			12.061
	MIN							
	4	.000			-.454			-15.246
		.000	-8.003	-6.598		-4.569	1.912	
		.750	-8.003	-4.585		-4.569	.012	
		1.500	-8.003	-4.731		-4.569	-3.174	
		1.500			-.454			-15.246

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX & MIN							
	5	.000			-.004			-1.854
		.000	-1.719	-1.300		-.017	-.002	
		.750	-1.719	-2.589		-.017	-.015	
		1.500	-1.719	-3.878		-.017	-.028	
		1.500			-.004			-1.854
	MAX & MIN							
	6	.000			.000			-2.072
		.000	-1.637	-.105		.002	.000	
		.750	-1.637	-1.332		.002	.001	
		1.500	-1.637	-2.560		.002	.003	
		1.500			.000			-2.072
	MAX							
	ALL	.000			.000			12.061
		.000	8.031	7.197		.002	4.166	
		.750	8.031	8.749		.002	.438	
		1.500	8.031	14.109		.002	.003	
		1.500			.000			12.061
	MIN							
	ALL	.000			-.938			-15.246
		.000	-8.003	-6.598		-4.972	-.002	
		.750	-8.003	-4.585		-4.972	-.096	
		1.500	-8.003	-4.731		-4.972	-3.291	
		1.500			-.938			-15.246
125	----------							
	MAX & MIN							
	1	.000			-.929			-.414
		.000	-1.953	-5.536		-4.313	3.615	
		.750	-1.953	-7.000		-4.313	.380	
		1.500	-1.953	-8.465		-4.313	-2.855	
		1.500			-.929			-.414
	MAX							
	2	.000			-.479			8.041
		.000	3.702	-3.171		-2.081	2.883	
		.750	3.702	-3.463		-2.081	.228	
		1.500	3.702	-.687		-2.081	-1.700	
		1.500			-.479			8.041
	MIN							
	2	.000			-.501			-7.211
		.000	-5.731	-10.902		-3.644	1.936	
		.750	-5.731	-10.618		-3.644	.118	
		1.500	-5.731	-10.381		-3.644	-2.468	
		1.500			-.501			-7.211
	MAX							
	3	.000			-.435			7.527
		.000	3.701	-3.172		-2.063	2.802	
		.750	3.701	-3.464		-2.063	.161	
		1.500	3.701	-.688		-2.063	-1.752	
		1.500			-.435			7.527
	MIN							
	3	.000			-.457			-7.725

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	-5.732	-10.902		-3.625	1.855	
		.750	-5.732	-10.619		-3.625	.052	
		1.500	-5.732	-10.383		-3.625	-2.521	
		1.500			-.457			-7.725
	MAX							
	4	.000			-.470			12.486
		.000	7.470	-1.595		-1.486	3.207	
		.750	7.470	-1.105		-1.486	.269	
		1.500	7.470	4.498		-1.486	-1.456	
		1.500			-.470			12.486
	MIN							
	4	.000			-.506			-12.934
		.000	-8.251	-14.479		-4.090	1.629	
		.750	-8.251	-13.031		-4.090	.087	
		1.500	-8.251	-11.661		-4.090	-2.737	
		1.500			-.506			-12.934
	MAX & MIN							
	5	.000			-.014			-1.061
		.000	-2.021	-6.436		-.036	.002	
		.750	-2.021	-7.951		-.036	-.025	
		1.500	-2.021	-9.467		-.036	-.053	
		1.500			-.014			-1.061
	MAX & MIN							
	6	.000			.001			-1.086
		.000	-1.958	-5.515		.003	-.000	
		.750	-1.958	-6.983		.003	.002	
		1.500	-1.958	-8.451		.003	.005	
		1.500			.001			-1.086
	MAX							
	ALL	.000			.001			12.486
		.000	7.470	-1.595		.003	3.615	
		.750	7.470	-1.105		.003	.380	
		1.500	7.470	4.498		.003	.005	
		1.500			.001			12.486
	MIN							
	ALL	.000			-.929			-12.934
		.000	-8.251	-14.479		-4.313	-.000	
		.750	-8.251	-13.031		-4.313	-.025	
		1.500	-8.251	-11.661		-4.313	-2.855	
		1.500			-.929			-12.934
126	----------							
	MAX & MIN							
	1	.000			-.925			-.555
		.000	-2.067	-10.052		-3.649	3.063	
		.750	-2.067	-11.603		-3.649	.327	
		1.500	-2.067	-13.153		-3.649	-2.410	
		1.500			-.925			-.555
	MAX							
	2	.000			-.517			7.289
		.000	3.508	-9.039		-1.644	2.554	
		.750	3.508	-9.053		-1.644	.245	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.500	3.508	-6.421		-1.644	-1.352	
		1.500			-.517			7.289
	MIN							
	2	.000			-.543			-6.759
		.000	-5.846	-16.106		-3.192	1.622	
		.750	-5.846	-16.022		-3.192	.135	
		1.500	-5.846	-15.938		-3.192	-2.131	
		1.500			-.543			-6.759
	MAX							
	3	.000			-.499			6.773
		.000	3.512	-9.054		-1.598	2.484	
		.750	3.512	-9.065		-1.598	.210	
		1.500	3.512	-6.431		-1.598	-1.352	
		1.500			-.499			6.773
	MIN							
	3	.000			-.526			-7.275
		.000	-5.843	-16.121		-3.146	1.552	
		.750	-5.843	-16.034		-3.146	.100	
		1.500	-5.843	-15.947		-3.146	-2.131	
		1.500			-.526			-7.275
	MAX							
	4	.000			-.509			11.331
		.000	7.242	-8.413		-1.055	2.872	
		.750	7.242	-7.389		-1.055	.288	
		1.500	7.242	-1.958		-1.055	-1.109	
		1.500			-.509			11.331
	MIN							
	4	.000			-.554			-12.083
		.000	-8.349	-20.191		-3.635	1.319	
		.750	-8.349	-19.004		-3.635	.105	
		1.500	-8.349	-17.818		-3.635	-2.408	
		1.500			-.554			-12.083
	MAX & MIN							
	5	.000			-.034			-1.411
		.000	-2.099	-11.366		-.092	.014	
		.750	-2.099	-12.940		-.092	-.055	
		1.500	-2.099	-14.514		-.092	-.124	
		1.500			-.034			-1.411
	MAX & MIN							
	6	.000			.003			-1.243
		.000	-2.088	-9.988		.008	-.001	
		.750	-2.088	-11.554		.008	.005	
		1.500	-2.088	-13.120		.008	.011	
		1.500			.003			-1.243
	MAX							
	ALL	.000			.003			11.331
		.000	7.242	-8.413		.008	3.063	
		.750	7.242	-7.389		.008	.327	
		1.500	7.242	-1.958		.008	.011	
		1.500			.003			11.331

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		MIN							
	ALL		.000			-.925			-12.083
			.000	-8.349	-20.191		-3.649	-.001	
			.750	-8.349	-19.004		-3.649	-.055	
			1.500	-8.349	-17.818		-3.649	-2.410	
			1.500			-.925			-12.083
127	----------								
	MAX & MIN								
	1		.000			-.925			-5.295
			.000	-8.221	-13.411		-2.987	2.526	
			.750	-8.221	-19.577		-2.987	.285	
			1.500	-8.221	-25.742		-2.987	-1.955	
			1.500			-.925			-5.295
	MAX								
	2		.000			-.503			1.403
			.000	-3.955	-12.766		-1.255	2.173	
			.750	-3.955	-18.170		-1.255	.249	
			1.500	-3.955	-21.136		-1.255	-1.041	
			1.500			-.503			1.403
	MIN								
	2		.000			-.569			-11.826
			.000	-13.243	-18.960		-2.728	1.318	
			.750	-13.243	-24.631		-2.728	.104	
			1.500	-13.243	-30.302		-2.728	-1.878	
			1.500			-.569			-11.826
	MAX								
	3		.000			-.500			.872
			.000	-3.981	-12.801		-1.200	2.112	
			.750	-3.981	-18.225		-1.200	.229	
			1.500	-3.981	-21.210		-1.200	-1.020	
			1.500			-.500			.872
	MIN								
	3		.000			-.565			-12.356
			.000	-13.269	-18.995		-2.673	1.257	
			.750	-13.269	-24.686		-2.673	.083	
			1.500	-13.269	-30.377		-2.673	-1.857	
			1.500			-.565			-12.356
	MAX								
	4		.000			-.480			4.660
			.000	-1.089	-12.527		-.699	2.465	
			.750	-1.089	-17.407		-.699	.303	
			1.500	-1.089	-18.224		-.699	-.803	
			1.500			-.480			4.660
	MIN								
	4		.000			-.588			-17.388
			.000	-16.570	-22.852		-3.154	1.040	
			.750	-16.570	-28.176		-3.154	.061	
			1.500	-16.570	-33.501		-3.154	-2.198	
			1.500			-.588			-17.388
	MAX & MIN								
	5		.000			-.062			-7.157

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			.000	-8.606	-15.994		-.252	.061	
			.750	-8.606	-22.449		-.252	-.129	
			1.500	-8.606	-28.903		-.252	-.318	
			1.500			-.062			-7.157
	MAX & MIN								
	6		.000			.006			-5.978
			.000	-8.305	-13.155		.023	-.006	
			.750	-8.305	-19.384		.023	.012	
			1.500	-8.305	-25.613		.023	.029	
			1.500			.006			-5.978
		MAX							
		ALL	.000			.006			4.660
			.000	-1.089	-12.527		.023	2.526	
			.750	-1.089	-17.407		.023	.303	
			1.500	-1.089	-18.224		.023	-.029	
			1.500			.006			4.660
		MIN							
		ALL	.000			-.925			-17.388
			.000	-16.570	-22.852		-3.154	-.006	
			.750	-16.570	-28.176		-3.154	-.129	
			1.500	-16.570	-33.501		-3.154	-2.198	
			1.500			-.925			-17.388
128	----------								
	MAX & MIN								
	1		.000			-1.185			-2.071
			.000	-63.511	13.163		-2.367	2.089	
			.750	-63.511	-34.471		-2.367	.314	
			1.500	-63.511	-82.105		-2.367	-1.461	
			1.500			-1.185			-2.071
		MAX							
		2	.000			.018			5.762
			.000	-61.525	17.041		-1.015	1.671	
			.750	-61.315	-32.400		-1.015	.332	
			1.500	-61.105	-78.362		-1.015	-.534	
			1.500			.018			5.762
		MIN							
		2	.000			-1.194			-7.531
			.000	-79.941	12.334		-2.139	1.130	
			.750	-79.731	-38.339		-2.139	.049	
			1.500	-79.521	-91.240		-2.139	-1.540	
			1.500			-1.194			-7.531
		MAX							
		3	.000			-.042			5.305
			.000	-61.746	17.002		-.986	1.634	
			.750	-61.620	-32.636		-.986	.316	
			1.500	-61.494	-78.858		-.986	-.529	
			1.500			-.042			5.305
		MIN							
		3	.000			-1.254			-7.988
			.000	-80.162	12.296		-2.110	1.093	
			.750	-80.036	-38.574		-2.110	.033	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			1.500	-79.910	-91.736		-2.110	-1.535	
			1.500			-1.254			-7.988
		MAX							
		4	.000			.369			9.510
			.000	-60.949	19.406		-.649	1.879	
			.750	-60.823	-31.884		-.649	.429	
			1.500	-60.697	-77.544		-.649	-.233	
			1.500			.369			9.510
		MIN							
		4	.000			-1.652			-12.645
			.000	-91.641	11.562		-2.522	.977	
			.750	-91.515	-41.782		-2.522	-.042	
			1.500	-91.389	-99.008		-2.522	-1.909	
			1.500			-1.652			-12.645
		MAX & MIN							
		5	.000			.000			-10.289
			.000	-79.738	18.450		-.739	.254	
			.750	-79.738	-41.353		-.739	-.300	
			1.500	-79.738	-101.156		-.739	-.854	
			1.500			.000			-10.289
		MAX & MIN							
		6	.000			.000			-2.403
			.000	-62.982	13.625		.068	-.023	
			.750	-62.982	-33.612		.068	.028	
			1.500	-62.982	-80.848		.068	.079	
			1.500			.000			-2.403
		MAX							
		ALL	.000			.369			9.510
			.000	-60.949	19.406		.068	2.089	
			.750	-60.823	-31.884		.068	.429	
			1.500	-60.697	-77.544		.068	.079	
			1.500			.369			9.510
		MIN							
		ALL	.000			-1.652			-12.645
			.000	-91.641	11.562		-2.522	-.023	
			.750	-91.515	-41.782		-2.522	-.300	
			1.500	-91.389	-101.156		-2.522	-1.909	
			1.500			-1.652			-12.645
129	----------								
	MAX & MIN								
	1		.000			-.948			5.962
			.000	-9.161	-13.525		-1.950	1.634	
			.750	-9.161	-20.396		-1.950	.171	
			1.500	-9.161	-27.267		-1.950	-1.291	
			1.500			-.948			5.962
		MAX							
		2	.000			-.558			14.982
			.000	-4.749	-13.275		-1.041	1.162	
			.750	-4.539	-19.156		-1.041	.131	
			1.500	-4.329	-22.481		-1.041	-.659	
			1.500			-.558			14.982

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		MIN							
		2	.000			-.633			1.295
			.000	-14.191	-19.309		-1.440	.916	
			.750	-13.981	-25.500		-1.440	.009	
			1.500	-13.771	-31.533		-1.440	-1.019	
			1.500			-.633			1.295
		MAX							
		3	.000			-.583			14.484
			.000	-4.791	-13.219		-1.083	1.158	
			.750	-4.665	-19.162		-1.083	.096	
			1.500	-4.539	-22.614		-1.083	-.725	
			1.500			-.583			14.484
		MIN							
		3	.000			-.657			.796
			.000	-14.233	-19.253		-1.482	.913	
			.750	-14.107	-25.507		-1.482	-.026	
			1.500	-13.981	-31.666		-1.482	-1.085	
			1.500			-.657			.796
		MAX							
		4	.000			-.531			19.690
			.000	-1.970	-12.998		-.899	1.265	
			.750	-1.844	-18.424		-.899	.173	
			1.500	-1.718	-19.760		-.899	-.516	
			1.500			-.531			19.690
		MIN							
		4	.000			-.655			-3.123
			.000	-17.707	-23.055		-1.564	.855	
			.750	-17.581	-28.998		-1.564	-.029	
			1.500	-17.455	-34.847		-1.564	-1.116	
			1.500			-.655			-3.123
		MAX & MIN							
		5	.000			.063			7.997
			.000	-13.089	-15.296		-.248	.064	
			.750	-13.089	-25.113		-.248	-.122	
			1.500	-13.089	-34.929		-.248	-.308	
			1.500			.063			7.997
		MAX & MIN							
		6	.000			-.006			5.977
			.000	-9.246	-13.271		.023	-.006	
			.750	-9.246	-20.205		.023	.011	
			1.500	-9.246	-27.140		.023	.028	
			1.500			-.006			5.977
		MAX							
		ALL	.000			.063			19.690
			.000	-1.970	-12.998		.023	1.634	
			.750	-1.844	-18.424		.023	.173	
			1.500	-1.718	-19.760		.023	.028	
			1.500			.063			19.690
		MIN							
		ALL	.000			-.948			-3.123
			.000	-17.707	-23.055		-1.950	-.006	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.750	-17.581	-28.998		-1.950	-.122	
		1.500	-17.455	-34.929		-1.950	-1.291	
		1.500			-.948			-3.123
130	----------							
	MAX & MIN							
	1	.000			-.932			.822
		.000	-2.203	-11.882		-1.324	1.110	
		.750	-2.203	-13.534		-1.324	.117	
		1.500	-2.203	-15.186		-1.324	-.876	
		1.500			-.932			.822
	MAX							
	2	.000			-.620			7.925
		.000	3.579	-11.989		-.819	.844	
		.750	3.789	-11.380		-.819	-.014	
		1.500	3.999	-8.460		-.819	-.643	
		1.500			-.620			7.925
	MIN							
	2	.000			-.654			-4.343
		.000	-5.770	-18.483		-1.159	.579	
		.750	-5.560	-18.257		-1.159	-.063	
		1.500	-5.350	-17.873		-1.159	-.894	
		1.500			-.654			-4.343
	MAX							
	3	.000			-.669			7.595
		.000	3.494	-11.856		-.947	.866	
		.750	3.620	-11.343		-.947	-.089	
		1.500	3.746	-8.581		-.947	-.814	
		1.500			-.669			7.595
	MIN							
	3	.000			-.704			-4.673
		.000	-5.856	-18.349		-1.287	.600	
		.750	-5.730	-18.219		-1.287	-.138	
		1.500	-5.604	-17.994		-1.287	-1.065	
		1.500			-.704			-4.673
	MAX							
	4	.000			-.609			11.778
		.000	7.209	-11.730		-.703	.937	
		.750	7.335	-9.867		-.703	.002	
		1.500	7.461	-4.318		-.703	-.550	
		1.500			-.609			11.778
	MIN							
	4	.000			-.666			-8.669
		.000	-8.373	-22.553		-1.270	.495	
		.750	-8.247	-21.327		-1.270	-.079	
		1.500	-8.121	-20.007		-1.270	-.968	
		1.500			-.666			-8.669
	MAX & MIN							
	5	.000			.036			1.343
		.000	-2.529	-14.142		-.088	.016	
		.750	-2.529	-16.039		-.088	-.050	
		1.500	-2.529	-17.936		-.088	-.116	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.500			.036			1.343
	MAX & MIN							
	6	.000			-.003			.843
		.000	-2.224	-11.818		.008	-.001	
		.750	-2.224	-13.486		.008	.005	
		1.500	-2.224	-15.154		.008	.011	
		1.500			-.003			.843
	MAX							
	ALL	.000			.036			11.778
		.000	7.209	-11.730		.008	1.110	
		.750	7.335	-9.867		.008	.117	
		1.500	7.461	-4.318		.008	.011	
		1.500			.036			11.778
	MIN							
	ALL	.000			-.932			-8.669
		.000	-8.373	-22.553		-1.324	-.001	
		.750	-8.247	-21.327		-1.324	-.138	
		1.500	-8.121	-20.007		-1.324	-1.065	
		1.500			-.932			-8.669
131	----------							
	MAX & MIN							
	1	.000			-.931			.165
		.000	-2.214	-9.559		-.665	.557	
		.750	-2.214	-11.220		-.665	.058	
		1.500	-2.214	-12.880		-.665	-.441	
		1.500			-.931			.165
	MAX							
	2	.000			-.686			6.117
		.000	3.609	-9.477		-.771	.611	
		.750	3.819	-8.720		-.771	-.215	
		1.500	4.029	-5.777		-.771	-.815	
		1.500			-.686			6.117
	MIN							
	2	.000			-.703			-4.917
		.000	-5.789	-16.007		-1.102	.342	
		.750	-5.579	-15.712		-1.102	-.244	
		1.500	-5.369	-15.260		-1.102	-1.042	
		1.500			-.703			-4.917
	MAX							
	3	.000			-.776			5.953
		.000	3.517	-9.329		-1.129	.703	
		.750	3.643	-8.673		-1.129	-.392	
		1.500	3.769	-5.894		-1.129	-1.261	
		1.500			-.776			5.953
	MIN							
	3	.000			-.793			-5.080
		.000	-5.882	-15.859		-1.460	.434	
		.750	-5.756	-15.665		-1.460	-.421	
		1.500	-5.630	-15.376		-1.460	-1.487	
		1.500			-.793			-5.080

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
	4	.000			-.681			9.648
		.000	7.246	-9.035		-.660	.702	
		.750	7.372	-6.934		-.660	-.206	
		1.500	7.498	-1.359		-.660	-.758	
		1.500			-.681			9.648
	MIN							
	4	.000			-.709			-8.742
		.000	-8.418	-19.918		-1.211	.253	
		.750	-8.292	-18.587		-1.211	-.254	
		1.500	-8.166	-17.162		-1.211	-1.115	
		1.500			-.709			-8.742
	MAX & MIN							
	5	.000			.019			.450
		.000	-.027	-12.094		-.029	.003	
		.750	-.027	-12.114		-.029	-.018	
		1.500	-.027	-12.134		-.029	-.040	
		1.500			.019			.450
	MAX & MIN							
	6	.000			-.002			.172
		.000	-2.217	-9.543		.003	-.000	
		.750	-2.217	-11.206		.003	.002	
		1.500	-2.217	-12.868		.003	.004	
		1.500			-.002			.172
	MAX							
	ALL	.000			.019			9.648
		.000	7.246	-9.035		.003	.703	
		.750	7.372	-6.934		.003	.058	
		1.500	7.498	-1.359		.003	.004	
		1.500			.019			9.648
	MIN							
	ALL	.000			-.931			-8.742
		.000	-8.418	-19.918		-1.460	-.000	
		.750	-8.292	-18.587		-1.460	-.421	
		1.500	-8.166	-17.162		-1.460	-1.487	
		1.500			-.931			-8.742
132	----------							
	MAX & MIN							
	1	.000			-.931			.000
		.000	-2.212	-8.996		.000	.000	
		.750	-2.212	-10.654		.000	.000	
		1.500	-2.212	-12.313		.000	.000	
		1.500			-.931			.000
	MAX							
	2	.000			-.553			4.924
		.000	3.614	-8.899		-1.415	.688	
		.750	3.824	-8.069		-1.415	-.618	
		1.500	4.034	-5.122		-1.415	-1.704	
		1.500			-.553			4.924
	MIN							
	2	.000			-.563			-4.924

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	-5.785	-15.384		-1.742	.418	
		.750	-5.575	-15.081		-1.742	-.644	
		1.500	-5.365	-14.621		-1.742	-1.926	
		1.500			-.563			-4.924
	MAX							
	3	.000			-.553			4.923
		.000	3.521	-8.749		-2.468	1.057	
		.750	3.647	-8.020		-2.468	-1.039	
		1.500	3.773	-5.238		-2.468	-2.914	
		1.500			-.553			4.923
	MIN							
	3	.000			-.563			-4.924
		.000	-5.878	-15.234		-2.794	.786	
		.750	-5.752	-15.032		-2.794	-1.065	
		1.500	-5.626	-14.736		-2.794	-3.136	
		1.500			-.563			-4.924
	MAX							
	4	.000			-.549			8.206
		.000	7.250	-8.437		-1.307	.778	
		.750	7.376	-6.217		-1.307	-.609	
		1.500	7.502	-.638		-1.307	-1.630	
		1.500			-.549			8.206
	MIN							
	4	.000			-.566			-8.206
		.000	-8.415	-19.245		-1.850	.328	
		.750	-8.289	-17.904		-1.850	-.653	
		1.500	-8.163	-16.469		-1.850	-2.000	
		1.500			-.566			-8.206
	MAX & MIN							
	5	.000			.015			.000
		.000	.242	-11.284		.000	.000	
		.750	.242	-11.103		.000	.000	
		1.500	.242	-10.922		.000	.000	
		1.500			.015			.000
	MAX & MIN							
	6	.000			-.001			.000
		.000	-2.212	-8.987		.000	.000	
		.750	-2.212	-10.646		.000	.000	
		1.500	-2.212	-12.306		.000	.000	
		1.500			-.001			.000
	MAX							
	ALL	.000			.015			8.206
		.000	7.250	-8.437		.000	1.057	
		.750	7.376	-6.217		.000	.000	
		1.500	7.502	-.638		.000	.000	
		1.500			.015			8.206
	MIN							
	ALL	.000			-.931			-8.206
		.000	-8.415	-19.245		-2.794	.000	
		.750	-8.289	-17.904		-2.794	-1.065	
		1.500	-8.163	-16.469		-2.794	-3.136	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.500			-.931			-8.206
143								
	MAX & MIN							
	1	.000			-2.059			3.990
		.000	-7.616	22.150		-2.327	1.709	
		.750	-7.616	16.438		-2.327	-.037	
		1.500	-7.616	10.726		-2.327	-1.782	
		1.500			-2.059			3.990
	MAX							
	2	.000			-1.568			10.260
		.000	-4.269	41.168		-1.114	1.090	
		.750	-4.269	28.867		-1.114	-.154	
		1.500	-4.269	22.387		-1.114	-1.123	
		1.500			-1.568			10.260
	MIN							
	2	.000			-2.048			1.084
		.000	-16.401	21.240		-1.728	.753	
		.750	-16.401	15.516		-1.728	-.217	
		1.500	-16.401	8.367		-1.728	-1.468	
		1.500			-2.048			1.084
	MAX							
	3	.000			-1.893			10.038
		.000	-3.974	40.862		-1.052	.934	
		.750	-3.974	28.783		-1.052	-.263	
		1.500	-3.974	22.524		-1.052	-1.185	
		1.500			-1.893			10.038
	MIN							
	3	.000			-2.373			.861
		.000	-16.106	20.935		-1.666	.597	
		.750	-16.106	15.432		-1.666	-.326	
		1.500	-16.106	8.504		-1.666	-1.530	
		1.500			-2.373			.861
	MAX							
	4	.000			-1.386			13.926
		.000	-1.360	53.161		-.879	1.208	
		.750	-1.360	36.976		-.879	-.132	
		1.500	-1.360	30.494		-.879	-1.014	
		1.500			-1.386			13.926
	MIN							
	4	.000			-2.186			-1.368
		.000	-21.579	19.949		-1.903	.647	
		.750	-21.579	14.725		-1.903	-.237	
		1.500	-21.579	7.126		-1.903	-1.589	
		1.500			-2.186			-1.368
	MAX & MIN							
	5	.000			-.013			3.270
		.000	-6.263	18.414		.003	-.006	
		.750	-6.263	13.717		.003	-.004	
		1.500	-6.263	9.020		.003	-.002	
		1.500			-.013			3.270

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX & MIN							
	6	.000			.001			3.704
		.000	-7.239	21.765		-.000	.001	
		.750	-7.239	16.336		-.000	.000	
		1.500	-7.239	10.907		-.000	.000	
		1.500			.001			3.704
	MAX							
	ALL	.000			.001			13.926
		.000	-1.360	53.161		.003	1.709	
		.750	-1.360	36.976		.003	.000	
		1.500	-1.360	30.494		.003	.000	
		1.500			.001			13.926
	MIN							
	ALL	.000			-2.373			-1.368
		.000	-21.579	18.414		-2.327	-.006	
		.750	-21.579	13.717		-2.327	-.326	
		1.500	-21.579	7.126		-2.327	-1.782	
		1.500			-2.373			-1.368
144								
	MAX & MIN							
	1	.000			-.729			6.100
		.000	-.539	10.507		-5.582	3.631	
		.750	-.539	10.102		-5.582	-.556	
		1.500	-.539	9.698		-5.582	-4.742	
		1.500			-.729			6.100
	MAX							
	2	.000			-.140			19.285
		.000	7.697	28.156		-2.491	2.111	
		.750	7.697	23.054		-2.491	-.740	
		1.500	7.697	25.126		-2.491	-2.924	
		1.500			-.140			19.285
	MIN							
	2	.000			-.255			-.792
		.000	-7.749	9.481		-4.050	1.333	
		.750	-7.749	9.168		-4.050	-.955	
		1.500	-7.749	8.855		-4.050	-3.894	
		1.500			-.255			-.792
	MAX							
	3	.000			.032			18.748
		.000	7.709	28.101		-2.239	1.604	
		.750	7.709	23.008		-2.239	-1.057	
		1.500	7.709	25.089		-2.239	-3.053	
		1.500			.032			18.748
	MIN							
	3	.000			-.083			-1.329
		.000	-7.737	9.426		-3.798	.826	
		.750	-7.737	9.122		-3.798	-1.272	
		1.500	-7.737	8.818		-3.798	-4.022	
		1.500			-.083			-1.329
	MAX							
	4	.000			-.104			26.831

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	13.214	39.814		-1.895	2.392	
		.750	13.214	31.600		-1.895	-.667	
		1.500	13.214	35.342		-1.895	-2.616	
		1.500			-.104			26.831
	MIN							
	4	.000			-.296			-6.630
		.000	-12.530	8.690		-4.494	1.095	
		.750	-12.530	8.457		-4.494	-1.025	
		1.500	-12.530	8.224		-4.494	-4.231	
		1.500			-.296			-6.630
	MAX & MIN							
	5	.000			.002			4.748
		.000	-.172	7.684		.012	-.024	
		.750	-.172	7.555		.012	-.015	
		1.500	-.172	7.426		.012	-.006	
		1.500			.002			4.748
	MAX & MIN							
	6	.000			-.000			5.409
		.000	-.525	10.442		-.001	.002	
		.750	-.525	10.048		-.001	.001	
		1.500	-.525	9.655		-.001	.001	
		1.500			-.000			5.409
	MAX							
	ALL	.000			.032			26.831
		.000	13.214	39.814		.012	3.631	
		.750	13.214	31.600		.012	.001	
		1.500	13.214	35.342		.012	.001	
		1.500			.032			26.831
	MIN							
	ALL	.000			-.729			-6.630
		.000	-12.530	7.684		-5.582	-.024	
		.750	-12.530	7.555		-5.582	-1.272	
		1.500	-12.530	7.426		-5.582	-4.742	
		1.500			-.729			-6.630
145								
	MAX & MIN							
	1	.000			-.497			2.736
		.000	1.649	-2.550		-4.981	3.311	
		.750	1.649	-1.313		-4.981	-.424	
		1.500	1.649	-.077		-4.981	-4.160	
		1.500			-.497			2.736
	MAX							
	2	.000			-.116			12.935
		.000	10.969	7.465		-2.228	2.260	
		.750	10.969	4.770		-2.228	-.425	
		1.500	10.969	9.891		-2.228	-2.362	
		1.500			-.116			12.935
	MIN							
	2	.000			-.172			-4.025
		.000	-4.124	-10.006		-3.793	1.499	
		.750	-4.124	-2.625		-3.793	-.546	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.500	-4.124	-.982		-3.793	-3.311	
		1.500			-.172			-4.025
	MAX							
	3	.000			-.014			12.421
		.000	10.960	7.457		-2.041	1.994	
		.750	10.960	4.757		-2.041	-.551	
		1.500	10.960	9.871		-2.041	-2.348	
		1.500			-.014			12.421
	MIN							
	3	.000			-.069			-4.539
		.000	-4.132	-10.013		-3.607	1.233	
		.750	-4.132	-2.639		-3.607	-.672	
		1.500	-4.132	-1.001		-3.607	-3.298	
		1.500			-.069			-4.539
	MAX							
	4	.000			-.097			18.542
		.000	17.162	14.134		-1.629	2.523	
		.750	17.162	8.805		-1.629	-.389	
		1.500	17.162	16.500		-1.629	-2.056	
		1.500			-.097			18.542
	MIN							
	4	.000			-.189			-9.724
		.000	-7.992	-14.984		-4.239	1.255	
		.750	-7.992	-3.522		-4.239	-.591	
		1.500	-7.992	-1.621		-4.239	-3.638	
		1.500			-.189			-9.724
	MAX & MIN							
	5	.000			-.004			1.854
		.000	1.719	-3.878		.017	-.028	
		.750	1.719	-2.589		.017	-.015	
		1.500	1.719	-1.300		.017	-.002	
		1.500			-.004			1.854
	MAX & MIN							
	6	.000			.000			2.072
		.000	1.637	-2.560		-.002	.003	
		.750	1.637	-1.332		-.002	.001	
		1.500	1.637	-.105		-.002	.000	
		1.500			.000			2.072
	MAX							
	ALL	.000			.000			18.542
		.000	17.162	14.134		.017	3.311	
		.750	17.162	8.805		.017	.001	
		1.500	17.162	16.500		.017	.000	
		1.500			.000			18.542
	MIN							
	ALL	.000			-.497			-9.724
		.000	-7.992	-14.984		-4.981	-.028	
		.750	-7.992	-3.522		-4.981	-.672	
		1.500	-7.992	-1.621		-4.981	-4.160	
		1.500			-.497			-9.724

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
146								
	MAX & MIN							
1		.000			-.493			1.758
		.000	1.962	-8.437		-4.324	2.873	
		.750	1.962	-6.965		-4.324	-.370	
		1.500	1.962	-5.494		-4.324	-3.613	
		1.500			-.493			1.758
	MAX							
2		.000			-.217			10.874
		.000	11.278	-.669		-1.916	2.161	
		.750	11.278	-3.437		-1.916	-.290	
		1.500	11.278	2.320		-1.916	-1.986	
		1.500			-.217			10.874
	MIN							
2		.000			-.239			-4.665
		.000	-3.691	-17.951		-3.479	1.407	
		.750	-3.691	-10.368		-3.479	-.400	
		1.500	-3.691	-6.832		-3.479	-2.932	
		1.500			-.239			-4.665
	MAX							
3		.000			-.174			10.360
		.000	11.277	-.671		-1.784	2.008	
		.750	11.277	-3.440		-1.784	-.343	
		1.500	11.277	2.316		-1.784	-1.940	
		1.500			-.174			10.360
	MIN							
3		.000			-.196			-5.179
		.000	-3.692	-17.953		-3.346	1.254	
		.750	-3.692	-10.371		-3.346	-.453	
		1.500	-3.692	-6.836		-3.346	-2.886	
		1.500			-.196			-5.179
	MAX							
4		.000			-.208			15.760
		.000	17.487	4.515		-1.319	2.421	
		.750	17.487	-1.082		-1.319	-.258	
		1.500	17.487	7.532		-1.319	-1.680	
		1.500			-.208			15.760
	MIN							
4		.000			-.245			-10.138
		.000	-7.462	-24.289		-3.923	1.163	
		.750	-7.462	-12.632		-3.923	-.442	
		1.500	-7.462	-7.722		-3.923	-3.256	
		1.500			-.245			-10.138
	MAX & MIN							
5		.000			-.014			1.061
		.000	2.021	-9.467		.036	-.053	
		.750	2.021	-7.951		.036	-.025	
		1.500	2.021	-6.434		.036	.002	
		1.500			-.014			1.061
	MAX & MIN							
6		.000			.001			1.086

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	1.958	-8.451		-.003	.009	
		.750	1.958	-6.983		-.003	.002	
		1.500	1.958	-5.515		-.003	-.000	
		1.500			.001			1.086
	MAX							
	ALL	.000			.001			15.760
		.000	17.487	4.515		.036	2.873	
		.750	17.487	-1.082		.036	.002	
		1.500	17.487	7.532		.036	.002	
		1.500			.001			15.760
	MIN							
	ALL	.000			-.493			-10.138
		.000	-7.462	-24.289		-4.324	-.053	
		.750	-7.462	-12.632		-4.324	-.453	
		1.500	-7.462	-7.722		-4.324	-3.613	
		1.500			-.493			-10.138
147								
	MAX & MIN							
1		.000			-.491			1.932
		.000	2.110	-13.088		-3.668	2.437	
		.750	2.110	-11.505		-3.668	-.314	
		1.500	2.110	-9.923		-3.668	-3.065	
		1.500			-.491			1.932
	MAX							
2		.000			-.254			10.266
		.000	11.409	-6.417		-1.571	1.977	
		.750	11.409	-9.043		-1.571	-.209	
		1.500	11.409	-3.270		-1.571	-1.646	
		1.500			-.254			10.266
	MIN							
2		.000			-.281			-3.890
		.000	-3.502	-23.740		-3.119	1.228	
		.750	-3.502	-16.074		-3.119	-.324	
		1.500	-3.502	-11.685		-3.119	-2.576	
		1.500			-.281			-3.890
	MAX							
3		.000			-.237			9.752
		.000	11.413	-6.413		-1.468	1.877	
		.750	11.413	-9.036		-1.468	-.231	
		1.500	11.413	-3.259		-1.468	-1.590	
		1.500			-.237			9.752
	MIN							
3		.000			-.263			-4.404
		.000	-3.497	-23.736		-3.016	1.128	
		.750	-3.497	-16.066		-3.016	-.346	
		1.500	-3.497	-11.674		-3.016	-2.521	
		1.500			-.263			-4.404
	MAX							
4		.000			-.246			14.633
		.000	17.623	-1.940		-.979	2.235	
		.750	17.623	-7.360		-.979	-.178	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.500	17.623	1.219		-.979	-1.343	
		1.500			-.246			14.633
	MIN							
4		.000			-.290			-8.961
		.000	-7.228	-30.811		-3.559	.986	
		.750	-7.228	-19.078		-3.559	-.370	
		1.500	-7.228	-12.806		-3.559	-2.894	
		1.500			-.290			-8.961
	MAX & MIN							
5		.000			-.034			1.411
		.000	2.099	-14.514		.092	-.124	
		.750	2.099	-12.940		.092	-.055	
		1.500	2.099	-11.366		.092	.014	
		1.500			-.034			1.411
	MAX & MIN							
6		.000			.003			1.243
		.000	2.088	-13.120		-.008	.011	
		.750	2.088	-11.554		-.008	.005	
		1.500	2.088	-9.988		-.008	-.001	
		1.500			.003			1.243
	MAX							
	ALL	.000			.003			14.633
		.000	17.623	-1.940		.092	2.437	
		.750	17.623	-7.360		.092	.005	
		1.500	17.623	1.219		.092	.014	
		1.500			.003			14.633
	MIN							
	ALL	.000			-.491			-8.961
		.000	-7.228	-30.811		-3.668	-.124	
		.750	-7.228	-19.078		-3.668	-.370	
		1.500	-7.228	-12.806		-3.668	-3.065	
		1.500			-.491			-8.961
148								
	MAX & MIN							
1		.000			-.487			6.660
		.000	8.390	-25.484		-3.034	2.016	
		.750	8.390	-19.192		-3.034	-.260	
		1.500	8.390	-12.900		-3.034	-2.536	
		1.500			-.487			6.660
	MAX							
2		.000			-.257			15.264
		.000	18.842	-21.253		-1.237	1.798	
		.750	18.842	-18.183		-1.237	-.121	
		1.500	18.842	-7.215		-1.237	-1.343	
		1.500			-.257			15.264
	MIN							
2		.000			-.326			2.036
		.000	4.093	-38.918		-2.711	1.021	
		.750	4.093	-25.717		-2.711	-.279	
		1.500	4.093	-15.333		-2.711	-2.181	
		1.500			-.326			2.036

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
3		.000			-.251			14.747
		.000	18.853	-21.218		-1.151	1.722	
		.750	18.853	-18.140		-1.151	-.133	
		1.500	18.853	-7.164		-1.151	-1.290	
		1.500			-.251			14.747
	MIN							
3		.000			-.319			1.519
		.000	4.105	-38.884		-2.624	.944	
		.750	4.105	-25.674		-2.624	-.291	
		1.500	4.105	-15.282		-2.624	-2.128	
		1.500			-.319			1.519
	MAX							
4		.000			-.237			19.778
		.000	25.794	-18.232		-.670	2.081	
		.750	25.794	-17.323		-.670	-.074	
		1.500	25.794	-3.251		-.670	-1.065	
		1.500			-.237			19.778
	MIN							
4		.000			-.351			-2.269
		.000	1.213	-47.674		-3.126	.785	
		.750	1.213	-29.880		-3.126	-.336	
		1.500	1.213	-16.781		-3.126	-2.462	
		1.500			-.351			-2.269
	MAX & MIN							
5		.000			-.062			7.157
		.000	8.606	-28.903		.252	-.318	
		.750	8.606	-22.449		.252	-.129	
		1.500	8.606	-15.994		.252	.061	
		1.500			-.062			7.157
	MAX & MIN							
6		.000			.006			5.978
		.000	8.305	-25.613		-.023	.029	
		.750	8.305	-19.384		-.023	.012	
		1.500	8.305	-13.155		-.023	-.006	
		1.500			.006			5.978
	MAX							
	ALL	.000			.006			19.778
		.000	25.794	-18.232		.252	2.081	
		.750	25.794	-17.323		.252	.012	
		1.500	25.794	-3.251		.252	.061	
		1.500			.006			19.778
	MIN							
	ALL	.000			-.487			-2.269
		.000	1.213	-47.674		-3.126	-.318	
		.750	1.213	-29.880		-3.126	-.336	
		1.500	1.213	-16.781		-3.126	-2.536	
		1.500			-.487			-2.269
149								
	MAX & MIN							
1		.000			-.236			2.734

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT LOAD ID ENVE	DIST END	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	.000	62.454	-79.592		-2.504	1.621	
	.750	62.454	-32.752		-2.504	-.257	
	1.500	62.454	14.088		-2.504	-2.135	
	1.500			-.236			2.734
MAX							
2	.000			.321			13.607
	.000	83.538	-80.440		-1.125	1.579	
	.750	83.328	-33.370		-1.125	-.024	
	1.500	83.118	22.862		-1.125	-1.198	
	1.500			.321			13.607
MIN							
2	.000			-.891			-2.663
	.000	62.866	-106.529		-2.151	.656	
	.750	62.656	-44.496		-2.151	-.319	
	1.500	62.446	13.119		-2.151	-1.652	
	1.500			-.891			-2.663
MAX							
3	.000			.368			12.962
	.000	83.140	-79.933		-1.075	1.530	
	.750	83.014	-33.130		-1.075	-.036	
	1.500	82.888	22.897		-1.075	-1.173	
	1.500			.368			12.962
MIN							
3	.000			-.845			-3.308
	.000	62.467	-106.022		-2.102	.607	
	.750	62.341	-44.257		-2.102	-.330	
	1.500	62.215	13.154		-2.102	-1.627	
	1.500			-.845			-3.308
MAX							
4	.000			.778			19.567
	.000	96.408	-79.339		-.762	1.913	
	.750	96.282	-32.920		-.762	.075	
	1.500	96.156	28.934		-.762	-1.046	
	1.500			.778			19.567
MIN							
4	.000			-1.242			-7.549
	.000	61.954	-122.820		-2.472	.374	
	.750	61.828	-51.464		-2.472	-.416	
	1.500	61.702	12.696		-2.472	-1.803	
	1.500			-1.242			-7.549
MAX & MIN							
5	.000			.000			10.289
	.000	79.738	-101.156		.739	-.854	
	.750	79.738	-41.353		.739	-.300	
	1.500	79.738	18.450		.739	.254	
	1.500			.000			10.289
MAX & MIN							
6	.000			.000			2.403
	.000	62.982	-80.048		-.068	.079	
	.750	62.982	-33.612		-.068	.028	
	1.500	62.982	13.625		-.068	-.023	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT LOAD ID ENVE	DIST END	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	1.500			.000			2.403
MAX							
ALL	.000			.778			19.567
	.000	96.408	-79.339		.739	1.913	
	.750	96.282	-32.752		.739	.075	
	1.500	96.156	28.934		.739	.254	
	1.500			.778			19.567
MIN							
ALL	.000			-1.242			-7.549
	.000	61.954	-122.820		-2.504	-.854	
	.750	61.828	-51.464		-2.504	-.416	
	1.500	61.702	12.696		-2.504	-2.135	
	1.500			-1.242			-7.549
150 ----------							
MAX & MIN							
1	.000			-.484			-5.992
	.000	9.330	-27.012		-1.996	1.349	
	.750	9.330	-20.015		-1.996	-.148	
	1.500	9.330	-13.017		-1.996	-1.645	
	1.500			-.484			-5.992
MAX							
2	.000			-.302			1.937
	.000	20.291	-23.104		-.971	.872	
	.750	20.081	-18.997		-.971	-.080	
	1.500	19.871	-7.191		-.971	-.943	
	1.500			-.302			1.937
MIN							
2	.000			-.373			-12.545
	.000	5.581	-40.732		-1.354	.562	
	.750	5.371	-26.525		-1.354	-.211	
	1.500	5.161	-15.048		-1.354	-1.163	
	1.500			-.373			-12.545
MAX							
3	.000			-.323			1.454
	.000	20.041	-22.927		-.917	.802	
	.750	19.915	-18.976		-.917	-.110	
	1.500	19.789	-7.262		-.917	-.933	
	1.500			-.323			1.454
MIN							
3	.000			-.394			-13.029
	.000	5.331	-40.555		-1.301	.492	
	.750	5.205	-26.504		-1.301	-.241	
	1.500	5.079	-15.120		-1.301	-1.153	
	1.500			-.394			-13.029
MAX							
4	.000			-.281			5.903
	.000	27.027	-20.073		-.845	.970	
	.750	26.901	-18.238		-.845	-.038	
	1.500	26.775	-3.402		-.845	-.897	
	1.500			-.281			5.903

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT LOAD ID ENVE	DIST END	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
MIN							
4	.000			-.400			-18.235
	.000	2.510	-49.453		-1.485	.453	
	.750	2.384	-30.785		-1.485	-.257	
	1.500	2.258	-16.497		-1.485	-1.264	
	1.500			-.400			-18.235
MAX & MIN							
5	.000			.063			-7.997
	.000	13.089	-34.929		.248	-.308	
	.750	13.089	-25.113		.248	-.122	
	1.500	13.089	-15.296		.248	.064	
	1.500			.063			-7.997
MAX & MIN							
6	.000			-.006			-5.977
	.000	9.246	-27.140		-.023	.028	
	.750	9.246	-20.205		-.023	.011	
	1.500	9.246	-13.271		-.023	-.006	
	1.500			-.006			-5.977
MAX							
ALL	.000			.063			5.903
	.000	27.027	-20.073		.248	1.349	
	.750	26.901	-18.238		.248	.011	
	1.500	26.775	-3.402		.248	.064	
	1.500			.063			5.903
MIN							
ALL	.000			-.484			-18.235
	.000	2.510	-49.453		-1.996	-.308	
	.750	2.384	-30.785		-1.996	-.257	
	1.500	2.258	-16.497		-1.996	-1.645	
	1.500			-.484			-18.235
151 ----------							
MAX & MIN							
1	.000			-.496			-.865
	.000	2.246	-15.123		-1.340	.898	
	.750	2.246	-13.438		-1.340	-.108	
	1.500	2.246	-11.754		-1.340	-1.113	
	1.500			-.496			-.865
MAX							
2	.000			-.355			6.805
	.000	12.206	-9.043		-.454	.397	
	.750	11.996	-11.148		-.454	-.144	
	1.500	11.786	-5.020		-.454	-.518	
	1.500			-.355			6.805
MIN							
2	.000			-.390			-6.305
	.000	-2.702	-26.360		-.786	.176	
	.750	-2.912	-18.172		-.786	-.200	
	1.500	-3.122	-13.411		-.786	-.779	
	1.500			-.390			-6.305
MAX							
3	.000			-.405			6.477

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT LOAD ID ENVE	DIST END	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	.000	11.951	-8.916		-.323	.224	
	.750	11.825	-11.181		-.323	-.219	
	1.500	11.699	-5.149		-.323	-.494	
	1.500			-.405			6.477
MIN							
3	.000			-.440			-6.633
	.000	-2.957	-26.232		-.654	.003	
	.750	-3.083	-18.204		-.654	-.275	
	1.500	-3.209	-13.540		-.654	-.755	
	1.500			-.440			-6.633
MAX							
4	.000			-.343			11.034
	.000	18.175	-4.653		-.345	.470	
	.750	18.049	-9.705		-.345	-.123	
	1.500	17.923	-.866		-.345	-.437	
	1.500			-.343			11.034
MIN							
4	.000			-.401			-10.817
	.000	-6.672	-33.514		-.897	.103	
	.750	-6.798	-21.410		-.897	-.216	
	1.500	-6.924	-14.851		-.897	-.872	
	1.500			-.401			-10.817
MAX & MIN							
5	.000			.036			-1.343
	.000	2.529	-17.936		.088	-.116	
	.750	2.529	-16.039		.088	-.050	
	1.500	2.529	-14.142		.088	.016	
	1.500			.036			-1.343
MAX & MIN							
6	.000			-.003			-.843
	.000	2.224	-15.154		-.008	.011	
	.750	2.224	-13.486		-.008	.005	
	1.500	2.224	-11.818		-.008	-.001	
	1.500			-.003			-.843
MAX							
ALL	.000			.036			11.034
	.000	18.175	-4.653		.088	.898	
	.750	18.049	-9.705		.088	.005	
	1.500	17.923	-.866		.088	.016	
	1.500			.036			11.034
MIN							
ALL	.000			-.496			-10.817
	.000	-6.672	-33.514		-1.340	-.116	
	.750	-6.798	-21.410		-1.340	-.275	
	1.500	-6.924	-14.851		-1.340	-1.113	
	1.500			-.496			-10.817
152 ----------							
MAX & MIN							
1	.000			-.494			-.179
	.000	2.220	-12.856		-.671	.448	
	.750	2.220	-11.191		-.671	-.055	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		MAX							
	ALL		.000			.019			10.438
			.000	18.213	-1.696		.653	.448	
			.750	18.087	-6.778		.653	.002	
			1.500	17.961	2.230		.653	.027	
			1.500			.019			10.438
		MIN							
	ALL		.000			-.530			-9.167
			.000	-6.713	-30.449		-.671	-.947	
			.750	-6.839	-18.297		-.671	-.489	
			1.500	-6.965	-12.113		-.671	-.558	
			1.500			-.530			-9.167
153	----------								
		MAX & MIN							
	1		.000			-.493			.000
			.000	2.213	-12.299		.000	.000	
			.750	2.213	-10.639		.000	.000	
			1.500	2.213	-8.979		.000	.000	
			1.500			-.493			.000
		MAX							
	2		.000			-.290			5.545
			.000	12.232	-5.690		1.739	-1.709	
			.750	12.022	-7.815		1.739	-.615	
			1.500	11.812	-1.569		1.739	.688	
			1.500			-.290			5.545
		MIN							
	2		.000			-.300			-5.544
			.000	-2.728	-22.927		1.418	-1.921	
			.750	-2.938	-14.707		1.418	-.647	
			1.500	-3.148	-10.234		1.418	.418	
			1.500			-.300			-5.544
		MAX							
	3		.000			-.290			5.545
			.000	11.971	-5.575		2.792	-2.919	
			.750	11.845	-7.864		2.792	-1.036	
			1.500	11.719	-1.719		2.792	1.056	
			1.500			-.290			5.545
		MIN							
	3		.000			-.300			-5.544
			.000	-2.989	-22.812		2.470	-3.131	
			.750	-3.115	-14.756		2.470	-1.068	
			1.500	-3.241	-10.384		2.470	.786	
			1.500			-.300			-5.544
		MAX							
	4		.000			-.286			9.241
			.000	18.214	-.975		1.847	-1.638	
			.750	18.088	-6.061		1.847	-.605	
			1.500	17.962	2.973		1.847	.778	
			1.500			-.286			9.241
		MIN							
	4		.000			-.303			-9.241

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			1.500	2.220	-9.526		-.671	-.558	
			1.500			-.494			-.179
		MAX							
	2		.000			-.423			6.453
			.000	12.232	-6.349		.294	-.291	
			.750	12.022	-8.470		.294	-.277	
			1.500	11.812	-2.239		.294	-.066	
			1.500			-.423			6.453
		MIN							
	2		.000			-.440			-5.310
			.000	-2.724	-23.601		-.029	-.501	
			.750	-2.934	-15.382		-.029	-.313	
			1.500	-3.144	-10.845		-.029	-.334	
			1.500			-.440			-5.310
		MAX							
	3		.000			-.513			6.290
			.000	11.971	-6.231		.653	-.736	
			.750	11.845	-8.516		.653	-.454	
			1.500	11.719	-2.385		.653	.027	
			1.500			-.513			6.290
		MIN							
	3		.000			-.530			-5.473
			.000	-2.984	-23.483		.330	-.947	
			.750	-3.110	-15.428		.330	-.489	
			1.500	-3.236	-10.991		.330	-.242	
			1.500			-.530			-5.473
		MAX							
	4		.000			-.417			10.438
			.000	18.213	-1.696		.402	-.219	
			.750	18.087	-6.778		.402	-.264	
			1.500	17.961	2.230		.402	.022	
			1.500			-.417			10.438
		MIN							
	4		.000			-.445			-9.167
			.000	-6.713	-30.449		-.137	-.570	
			.750	-6.839	-18.297		-.137	-.322	
			1.500	-6.965	-12.113		-.137	-.425	
			1.500			-.445			-9.167
		MAX & MIN							
	5		.000			.019			-.450
			.000	.027	-12.134		.029	-.040	
			.750	.027	-12.114		.029	-.018	
			1.500	.027	-12.094		.029	.003	
			1.500			.019			-.450
		MAX & MIN							
	6		.000			-.002			-.172
			.000	2.217	-12.868		-.003	.004	
			.750	2.217	-11.206		-.003	.002	
			1.500	2.217	-9.543		-.003	-.000	
			1.500			-.002			-.172

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			.000	-6.718	-29.703		1.311	-1.992	
			.750	-6.844	-17.548		1.311	-.658	
			1.500	-6.970	-11.469		1.311	.328	
			1.500			-.303			-9.241
		MAX & MIN							
	5		.000			.015			.000
			.000	-.242	-10.922		.000	.000	
			.750	-.242	-11.103		.000	.000	
			1.500	-.242	-11.284		.000	.000	
			1.500			.015			.000
		MAX & MIN							
	6		.000			-.001			.000
			.000	2.212	-12.306		.000	.000	
			.750	2.212	-10.646		.000	.000	
			1.500	2.212	-8.987		.000	.000	
			1.500			-.001			.000
		MAX							
	ALL		.000			.015			9.241
			.000	18.214	-.975		2.792	.000	
			.750	18.088	-6.061		2.792	.000	
			1.500	17.962	2.973		2.792	1.056	
			1.500			.015			9.241
		MIN							
	ALL		.000			-.493			-9.241
			.000	-6.718	-29.703		.000	-3.131	
			.750	-6.844	-17.548		.000	-1.068	
			1.500	-6.970	-11.469		.000	.000	
			1.500			-.493			-9.241
164	----------								
		MAX & MIN							
	1		.000			-5.214			3.843
			.000	-27.341	30.091		-1.947	1.395	
			.750	-27.341	9.585		-1.947	-.065	
			1.500	-27.341	-10.920		-1.947	-1.525	
			1.500			-5.214			3.843
		MAX							
	2		.000			-2.860			8.626
			.000	-22.659	60.186		-.285	.500	
			.750	-22.659	20.955		-.285	-.137	
			1.500	-22.659	-9.864		-.285	-.469	
			1.500			-2.860			8.626
		MIN							
	2		.000			-4.141			3.126
			.000	-52.308	28.529		-.862	.148	
			.750	-52.308	9.142		-.862	-.184	
			1.500	-52.308	-10.510		-.862	-.794	
			1.500			-4.141			3.126
		MAX							
	3		.000			-2.943			8.556
			.000	-22.180	59.724		.186	.067	
			.750	-22.180	20.853		.186	-.217	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			1.500	-22.180	-9.606		.186	-.195	
			1.500			-2.943			8.556
		MIN							
	3		.000			-4.224			3.056
			.000	-51.829	28.067		-.391	-.285	
			.750	-51.829	9.040		-.391	-.263	
			1.500	-51.829	-10.253		-.391	-.520	
			1.500			-4.224			3.056
		MAX							
	4		.000			-2.372			11.655
			.000	-18.450	79.208		-.073	.640	
			.750	-18.450	28.309		-.073	-.121	
			1.500	-18.450	-8.569		-.073	-.372	
			1.500			-2.372			11.655
		MIN							
	4		.000			-4.507			2.489
			.000	-67.865	26.446		-1.034	.053	
			.750	-67.865	8.621		-1.034	-.198	
			1.500	-67.865	-22.980		-1.034	-.913	
			1.500			-4.507			2.489
		MAX & MIN							
	5		.000			-.005			3.418
			.000	-23.201	25.302		.015	-.014	
			.750	-23.201	7.901		.015	-.003	
			1.500	-23.201	-9.499		.015	.009	
			1.500			-.005			3.418
		MAX & MIN							
	6		.000			.000			3.754
			.000	-26.733	29.507		-.001	.001	
			.750	-26.733	9.457		-.001	.000	
			1.500	-26.733	-10.593		-.001	-.001	
			1.500			.000			3.754
		MAX							
	ALL		.000			.000			11.655
			.000	-18.450	79.208		.186	1.395	
			.750	-18.450	28.309		.186	.000	
			1.500	-18.450	-8.569		.186	.009	
			1.500			.000			11.655
		MIN							
	ALL		.000			-5.214			2.489
			.000	-67.865	25.302		-1.947	-.285	
			.750	-67.865	7.901		-1.947	-.263	
			1.500	-67.865	-22.980		-1.947	-1.525	
			1.500			-5.214			2.489
165	----------								
		MAX & MIN							
	1		.000			-.439			3.630
			.000	3.130	-.328		-2.666	1.444	
			.750	3.130	2.019		-2.666	-.555	
			1.500	3.130	4.367		-2.666	-2.555	
			1.500			-.439			3.630

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
	2	.000			-.117			8.949
		.000	13.483	6.171		-.678	.500	
		.750	13.483	6.926		-.678	-.516	
		1.500	13.483	7.680		-.678	-1.157	
		1.500			-.117			8.949
	MIN							
	2	.000			-.205			.554
		.000	1.006	-.996		-1.446	.116	
		.750	1.006	1.800		-1.446	-.639	
		1.500	1.006	4.186		-1.446	-1.674	
		1.500			-.205			.554
	MAX							
	3	.000			-.037			8.837
		.000	13.504	6.128		-.224	.029	
		.750	13.504	6.898		-.224	-.647	
		1.500	13.504	7.668		-.224	-.947	
		1.500			-.037			8.837
	MIN							
	3	.000			-.125			.442
		.000	1.027	-1.039		-.992	-.355	
		.750	1.027	1.772		-.992	-.769	
		1.500	1.027	4.174		-.992	-1.464	
		1.500			-.125			.442
	MAX							
	4	.000			-.085			12.237
		.000	20.432	10.410		-.384	.652	
		.750	20.432	10.138		-.384	-.482	
		1.500	20.432	9.865		-.384	-.991	
		1.500			-.085			12.237
	MIN							
	4	.000			-.232			-1.754
		.000	-.363	-1.535		-1.665	.013	
		.750	-.363	1.594		-1.665	-.686	
		1.500	-.363	4.042		-1.665	-1.853	
		1.500			-.232			-1.754
	MAX & MIN							
	5	.000			.001			3.081
		.000	3.381	-1.225		.018	-.019	
		.750	3.381	1.311		.018	-.005	
		1.500	3.381	3.847		.018	.008	
		1.500			.001			3.081
	MAX & MIN							
	6	.000			-.000			3.487
		.000	3.156	-.384		-.002	.002	
		.750	3.156	1.983		-.002	.001	
		1.500	3.156	4.350		-.002	-.001	
		1.500			-.000			3.487
	MAX							
	ALL	.000			.001			12.237
		.000	20.432	10.410		.018	1.444	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.750	20.432	10.138		.018	.001	
		1.500	20.432	9.865		.018	.008	
		1.500			.001			12.237
	MIN							
	ALL	.000			-.439			-1.754
		.000	-.363	-1.535		-2.666	-.355	
		.750	-.363	1.311		-2.666	-.769	
		1.500	-.363	3.847		-2.666	-2.555	
		1.500			-.439			-1.754
166	----------							
	MAX & MIN							
	1	.000			-.131			1.363
		.000	4.762	-4.396		-2.192	1.284	
		.750	4.762	-.824		-2.192	-.360	
		1.500	4.762	2.747		-2.192	-2.004	
		1.500			-.131			1.363
	MAX							
	2	.000			-.004			5.704
		.000	15.566	-.281		-.762	.730	
		.750	15.566	2.525		-.762	-.274	
		1.500	15.566	5.331		-.762	-.964	
		1.500			-.004			5.704
	MIN							
	2	.000			-.027			-2.080
		.000	3.741	-5.410		-1.460	.416	
		.750	3.741	-1.255		-1.460	-.361	
		1.500	3.741	2.566		-1.460	-1.421	
		1.500			-.027			-2.080
	MAX							
	3	.000			.038			5.610
		.000	15.565	-.293		-.538	.517	
		.750	15.565	2.513		-.538	-.319	
		1.500	15.565	5.319		-.538	-.840	
		1.500			.038			5.610
	MIN							
	3	.000			.015			-2.174
		.000	3.741	-5.421		-1.236	.203	
		.750	3.741	-1.267		-1.236	-.406	
		1.500	3.741	2.554		-1.236	-1.298	
		1.500			.015			-2.174
	MAX							
	4	.000			.004			8.381
		.000	22.767	2.440		-.495	.844	
		.750	22.767	4.735		-.495	-.247	
		1.500	22.767	7.030		-.495	-.815	
		1.500			.004			8.381
	MIN							
	4	.000			-.034			-4.592
		.000	3.060	-6.107		-1.658	.321	
		.750	3.060	-1.564		-1.658	-.392	
		1.500	3.060	2.422		-1.658	-1.579	

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.500			-.034			-4.592
	MAX & MIN							
	5	.000			-.001			1.096
		.000	4.806	-4.896		.018	-.018	
		.750	4.806	-1.292		.018	-.004	
		1.500	4.806	2.312		.018	.009	
		1.500			-.001			1.096
	MAX & MIN							
	6	.000			.000			1.243
		.000	4.761	-4.415		-.002	.002	
		.750	4.761	-.844		-.002	.000	
		1.500	4.761	2.727		-.002	-.001	
		1.500			.000			1.243
	MAX							
	ALL	.000			.038			8.381
		.000	22.767	2.440		.018	1.284	
		.750	22.767	4.735		.018	.000	
		1.500	22.767	7.030		.018	.009	
		1.500			.038			8.381
	MIN							
	ALL	.000			-.131			-4.592
		.000	3.060	-6.107		-2.192	-.018	
		.750	3.060	-1.564		-2.192	-.406	
		1.500	3.060	2.312		-2.192	-2.004	
		1.500			-.131			-4.592
167	----------							
	MAX & MIN							
	1	.000			-.134			.713
		.000	4.919	-6.308		-1.874	1.093	
		.750	4.919	-2.619		-1.874	-.312	
		1.500	4.919	1.070		-1.874	-1.718	
		1.500			-.134			.713
	MAX							
	2	.000			-.049			4.768
		.000	15.762	-3.009		-.736	.764	
		.750	15.762	-.052		-.736	-.201	
		1.500	15.762	2.905		-.736	-.869	
		1.500			-.049			4.768
	MIN							
	2	.000			-.057			-2.763
		.000	3.943	-7.488		-1.425	.467	
		.750	3.943	-3.206		-1.425	-.284	
		1.500	3.943	.855		-1.425	-1.321	
		1.500			-.057			-2.763
	MAX							
	3	.000			-.032			4.675
		.000	15.762	-3.013		-.619	.660	
		.750	15.762	-.055		-.619	-.217	
		1.500	15.762	2.902		-.619	-.796	
		1.500			-.032			4.675

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MIN							
	3	.000			-.040			-2.856
		.000	3.943	-7.491		-1.308	.363	
		.750	3.943	-3.209		-1.308	-.300	
		1.500	3.943	.853		-1.308	-1.248	
		1.500			-.040			-2.856
	MAX							
	4	.000			-.045			7.256
		.000	22.991	-.812		-.473	.868	
		.750	22.991	1.657		-.473	-.175	
		1.500	22.991	4.126		-.473	-.722	
		1.500			-.045			7.256
	MIN							
	4	.000			-.059			-5.296
		.000	3.292	-8.277		-1.621	.372	
		.750	3.292	-3.599		-1.621	-.314	
		1.500	3.292	.711		-1.621	-1.475	
		1.500			-.059			-5.296
	MAX & MIN							
	5	.000			-.005			.549
		.000	4.959	-6.717		.028	-.026	
		.750	4.959	-2.998		.028	-.006	
		1.500	4.959	.722		.028	.015	
		1.500			-.005			.549
	MAX & MIN							
	6	.000			.000			.596
		.000	4.920	-6.327		-.003	.002	
		.750	4.920	-2.637		-.003	.001	
		1.500	4.920	1.053		-.003	-.001	
		1.500			.000			.596
	MAX							
	ALL	.000			.000			7.256
		.000	22.991	-.812		.028	1.093	
		.750	22.991	1.657		.028	.001	
		1.500	22.991	4.126		.028	.015	
		1.500			.000			7.256
	MIN							
	ALL	.000			-.134			-5.296
		.000	3.292	-8.277		-1.874	-.026	
		.750	3.292	-3.599		-1.874	-.314	
		1.500	3.292	.711		-1.874	-1.718	
		1.500			-.134			-5.296
168	----------							
	MAX & MIN							
	1	.000			-.134			.495
		.000	5.071	-7.501		-1.578	.916	
		.750	5.071	-3.698		-1.578	-.268	
		1.500	5.071	.106		-1.578	-1.451	
		1.500			-.134			.495
	MAX							
	2	.000			-.065			4.386

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	15.950	-4.631		-.625	.729	
		.750	15.950	-1.528		-.625	-.158	
		1.500	15.950	1.575		-.625	-.743	
		1.500			-.065			4.306
	MIN							
	2	.000			-.073			-2.938
		.000	4.137	-8.786		-1.318	.428	
		.750	4.137	-4.380		-1.318	-.237	
		1.500	4.137	-.185		-1.318	-1.193	
		1.500			-.073			-2.938
	MAX							
	3	.000			-.058			4.293
		.000	15.950	-4.628		-.553	.670	
		.750	15.950	-1.525		-.553	-.162	
		1.500	15.950	1.577		-.553	-.694	
		1.500			-.058			4.293
	MIN							
	3	.000			-.067			-3.031
		.000	4.137	-8.783		-1.245	.369	
		.750	4.137	-4.377		-1.245	-.241	
		1.500	4.137	-.183		-1.245	-1.143	
		1.500			-.067			-3.031
	MAX							
	4	.000			-.063			6.762
		.000	23.202	-2.700		-.360	.834	
		.750	23.202	-.065		-.360	-.133	
		1.500	23.202	2.570		-.360	-.597	
		1.500			-.063			6.762
	MIN							
	4	.000			-.076			-5.445
		.000	3.513	-9.625		-1.514	.332	
		.750	3.513	-4.817		-1.514	-.264	
		1.500	3.513	-.363		-1.514	-1.346	
		1.500			-.076			-5.445
	MAX & MIN							
	5	.000			-.010			.438
		.000	5.119	-7.966		.050	-.045	
		.750	5.119	-4.127		.050	-.008	
		1.500	5.119	-.288		.050	.029	
		1.500			-.010			.438
	MAX & MIN							
	6	.000			.001			.381
		.000	5.073	-7.535		-.005	.004	
		.750	5.073	-3.731		-.005	.001	
		1.500	5.073	.073		-.005	-.003	
		1.500			.001			.381
	MAX							
	ALL	.000			.001			6.762
		.000	23.202	-2.700		.050	.916	
		.750	23.202	-.065		.050	.001	
		1.500	23.202	2.570		.050	.029	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		1.500			.001			6.762
	MIN							
	ALL	.000			-.134			-5.445
		.000	3.513	-9.625		-1.578	-.048	
		.750	3.513	-4.817		-1.578	-.268	
		1.500	3.513	-.363		-1.578	-1.451	
		1.500			-.134			-5.445
169	----------							
	MAX & MIN							
	1	.000			-.132			.821
		.000	5.602	-8.025		-1.292	.742	
		.750	5.602	-3.823		-1.292	-.227	
		1.500	5.602	.378		-1.292	-1.196	
		1.500			-.132			.821
	MAX							
	2	.000			-.069			4.716
		.000	16.607	-5.454		-.487	.658	
		.750	16.607	-1.859		-.487	-.132	
		1.500	16.607	1.736		-.487	-.611	
		1.500			-.069			4.716
	MIN							
	2	.000			-.089			-2.489
		.000	4.793	-9.368		-1.157	.347	
		.750	4.793	-4.521		-1.157	-.189	
		1.500	4.793	.111		-1.157	-1.025	
		1.500			-.089			-2.489
	MAX							
	3	.000			-.067			4.618
		.000	16.603	-5.443		-.432	.615	
		.750	16.603	-1.850		-.432	-.133	
		1.500	16.603	1.742		-.432	-.571	
		1.500			-.067			4.618
	MIN							
	3	.000			-.086			-2.587
		.000	4.790	-9.357		-1.102	.304	
		.750	4.790	-4.513		-1.102	-.190	
		1.500	4.790	.116		-1.102	-.985	
		1.500			-.086			-2.587
	MAX							
	4	.000			-.063			7.077
		.000	23.928	-3.690		-.231	.767	
		.750	23.928	-.511		-.231	-.113	
		1.500	23.928	2.668		-.231	-.475	
		1.500			-.063			7.077
	MIN							
	4	.000			-.096			-4.931
		.000	4.239	-10.214		-1.346	.249	
		.750	4.239	-4.949		-1.346	-.208	
		1.500	4.239	-.041		-1.346	-1.165	
		1.500			-.096			-4.931

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX & MIN							
	5	.000			-.013			.992
		.000	5.729	-8.622		.079	-.066	
		.750	5.729	-4.325		.079	-.006	
		1.500	5.729	-.029		.079	.053	
		1.500			-.013			.992
	MAX & MIN							
	6	.000			.001			.721
		.000	5.607	-8.096		-.007	.006	
		.750	5.607	-3.891		-.007	.001	
		1.500	5.607	.315		-.007	-.005	
		1.500			.001			.721
	MAX							
	ALL	.000			.001			7.077
		.000	23.928	-3.690		.079	.767	
		.750	23.928	-.511		.079	.001	
		1.500	23.928	2.668		.079	.053	
		1.500			.001			7.077
	MIN							
	ALL	.000			-.132			-4.931
		.000	4.239	-10.214		-1.346	-.066	
		.750	4.239	-4.949		-1.346	-.227	
		1.500	4.239	-.041		-1.346	-1.196	
		1.500			-.132			-4.931
170	----------							
	MAX & MIN							
	1	.000			-.065			.234
		.000	7.167	-7.231		-1.064	.605	
		.750	7.167	-1.856		-1.064	-.193	
		1.500	7.167	3.519		-1.064	-.991	
		1.500			-.065			.234
	MAX							
	2	.000			.084			4.012
		.000	18.923	-4.987		-.475	.434	
		.750	18.713	.272		-.475	-.117	
		1.500	18.503	5.374		-.475	-.532	
		1.500			.084			4.012
	MIN							
	2	.000			-.240			-3.092
		.000	7.118	-8.688		-.812	.296	
		.750	6.908	-2.378		-.812	-.161	
		1.500	6.698	3.475		-.812	-.743	
		1.500			-.240			-3.092
	MAX							
	3	.000			.096			3.913
		.000	18.759	-4.902		-.436	.400	
		.750	18.633	.266		-.436	-.120	
		1.500	18.507	5.340		-.436	-.506	
		1.500			.096			3.913
	MIN							
	3	.000			-.228			-3.192

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.000	6.954	-8.602		-.772	.262	
		.750	6.828	-2.384		-.772	-.165	
		1.500	6.702	3.441		-.772	-.716	
		1.500			-.228			-3.192
	MAX							
	4	.000			.206			6.294
		.000	26.314	-3.229		-.344	.477	
		.750	26.188	1.702		-.344	-.103	
		1.500	26.062	6.538		-.344	-.459	
		1.500			.206			6.294
	MIN							
	4	.000			-.334			-5.547
		.000	6.637	-9.396		-.906	.248	
		.750	6.511	-2.716		-.906	-.178	
		1.500	6.385	3.373		-.906	-.810	
		1.500			-.334			-5.547
	MAX & MIN							
	5	.000			.000			.840
		.000	8.391	-8.224		.072	-.017	
		.750	8.391	-1.931		.072	.037	
		1.500	8.391	4.362		.072	.091	
		1.500			.000			.840
	MAX & MIN							
	6	.000			.000			.175
		.000	7.207	-7.357		-.007	.002	
		.750	7.207	-1.952		-.007	-.003	
		1.500	7.207	3.454		-.007	-.008	
		1.500			.000			.175
	MAX							
	ALL	.000			.206			6.294
		.000	26.314	-3.229		.072	.605	
		.750	26.188	1.702		.072	.037	
		1.500	26.062	6.538		.072	.091	
		1.500			.206			6.294
	MIN							
	ALL	.000			-.334			-5.547
		.000	6.637	-9.396		-1.064	-.017	
		.750	6.511	-2.716		-1.064	-.193	
		1.500	6.385	3.373		-1.064	-.991	
		1.500			-.334			-5.547
171	----------							
	MAX & MIN							
	1	.000			-.128			-.506
		.000	5.670	-8.324		-.864	.513	
		.750	5.670	-4.071		-.864	-.134	
		1.500	5.670	.182		-.864	-.782	
		1.500			-.128			-.506
	MAX							
	2	.000			-.081			3.160
		.000	17.046	-5.948		-.396	.292	
		.750	16.836	-2.093		-.396	-.086	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			1.500	16.626	1.605		-.396	-.406	
			1.500			-.081			3.160
		MIN							
		2	.000			-.102			-3.929
			.000	5.245	-9.819		-.545	.195	
			.750	5.035	-4.712		-.545	-.114	
			1.500	4.825	.013		-.545	-.518	
			1.500			-.102			-3.929
		MAX							
		3	.000			-.087			3.081
			.000	16.888	-5.885		-.357	.257	
			.750	16.762	-2.116		-.357	-.092	
			1.500	16.636	1.558		-.357	-.382	
			1.500			-.087			3.081
		MIN							
		3	.000			-.109			-4.008
			.000	5.088	-9.756		-.507	.161	
			.750	4.962	-4.735		-.507	-.120	
			1.500	4.836	-.034		-.507	-.495	
			1.500			-.109			-4.008
		MAX							
		4	.000			-.074			5.396
			.000	24.212	-4.177		-.348	.318	
			.750	24.086	-.816		-.348	-.078	
			1.500	23.960	2.450		-.348	-.377	
			1.500			-.074			5.396
		MIN							
		4	.000			-.109			-6.419
			.000	4.544	-10.629		-.597	.157	
			.750	4.418	-5.181		-.597	-.125	
			1.500	4.292	-.202		-.597	-.564	
			1.500			-.109			-6.419
		MAX & MIN							
		5	.000			.013			-.523
			.000	7.073	-10.109		.076	-.062	
			.750	7.073	-4.804		.076	-.005	
			1.500	7.073	.500		.076	.053	
			1.500			.013			-.523
		MAX & MIN							
		6	.000			-.001			-.524
			.000	5.675	-8.394		-.007	.006	
			.750	5.675	-4.137		-.007	.000	
			1.500	5.675	.119		-.007	-.005	
			1.500			-.001			-.524
		MAX							
		ALL	.000			.013			5.396
			.000	24.212	-4.177		.076	.513	
			.750	24.086	-.816		.076	.000	
			1.500	23.960	2.450		.076	.053	
			1.500			.013			5.396

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		MIN							
		ALL	.000			-.128			-6.419
			.000	4.544	-10.629		-.864	-.062	
			.750	4.418	-5.181		-.864	-.134	
			1.500	4.292	-.202		-.864	-.782	
			1.500			-.128			-6.419
172	----------								
		MAX & MIN							
		1	.000			-.134			-.056
			.000	5.156	-8.380		-.583	.344	
			.750	5.156	-4.513		-.583	-.093	
			1.500	5.156	-.646		-.583	-.530	
			1.500			-.134			-.056
		MAX							
		2	.000			-.096			3.533
			.000	16.425	-5.791		-.171	.150	
			.750	16.215	-2.400		-.171	-.063	
			1.500	16.005	.834		-.171	-.195	
			1.500			-.096			3.533
		MIN							
		2	.000			-.107			-3.371
			.000	4.627	-9.848		-.322	.060	
			.750	4.417	-5.168		-.322	-.086	
			1.500	4.207	-.885		-.322	-.321	
			1.500			-.107			-3.371
		MAX							
		3	.000			-.110			3.478
			.000	16.270	-5.743		-.101	.088	
			.750	16.144	-2.437		-.101	-.073	
			1.500	16.018	.775		-.101	-.153	
			1.500			-.110			3.478
		MIN							
		3	.000			-.121			-3.426
			.000	4.471	-9.800		-.253	-.002	
			.750	4.345	-5.205		-.253	-.096	
			1.500	4.219	-.944		-.253	-.279	
			1.500			-.121			-3.426
		MAX							
		4	.000			-.092			5.779
			.000	23.523	-3.929		-.121	.176	
			.750	23.397	-1.081		-.121	-.056	
			1.500	23.271	1.671		-.121	-.154	
			1.500			-.092			5.779
		MIN							
		4	.000			-.110			-5.728
			.000	3.859	-10.689		-.374	.027	
			.750	3.733	-5.695		-.374	-.094	
			1.500	3.607	-1.193		-.374	-.363	
			1.500			-.110			-5.728
		MAX & MIN							
		5	.000			.011			.005

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			.000	6.333	-10.192		.046	-.041	
			.750	6.333	-5.442		.046	-.007	
			1.500	6.333	-.693		.046	.028	
			1.500			.011			.005
		MAX & MIN							
		6	.000			-.001			-.061
			.000	5.158	-8.413		-.004	.004	
			.750	5.158	-4.545		-.004	.001	
			1.500	5.158	-.677		-.004	-.003	
			1.500			-.001			-.061
		MAX							
		ALL	.000			.011			5.779
			.000	23.523	-3.929		.046	.344	
			.750	23.397	-1.081		.046	.001	
			1.500	23.271	1.671		.046	.028	
			1.500			.011			5.779
		MIN							
		ALL	.000			-.134			-5.728
			.000	3.859	-10.689		-.583	-.041	
			.750	3.733	-5.695		-.583	-.076	
			1.500	3.607	-1.193		-.583	-.530	
			1.500			-.134			-5.728
173	----------								
		MAX & MIN							
		1	.000			-.133			.025
			.000	5.100	-8.207		-.291	.171	
			.750	5.100	-4.382		-.291	-.047	
			1.500	5.100	-.557		-.291	-.265	
			1.500			-.133			.025
		MAX							
		2	.000			-.104			3.451
			.000	16.356	-5.489		.064	.006	
			.750	16.146	-2.151		.064	-.028	
			1.500	15.936	1.030		.064	.019	
			1.500			-.104			3.451
		MIN							
		2	.000			-.110			-3.247
			.000	4.556	-9.642		-.080	-.077	
			.750	4.346	-5.007		-.080	-.051	
			1.500	4.136	-.747		-.080	-.108	
			1.500			-.110			-3.247
		MAX							
		3	.000			-.123			3.423
			.000	16.201	-5.448		.175	-.085	
			.750	16.075	-2.195		.175	-.035	
			1.500	15.949	.964		.175	.096	
			1.500			-.123			3.423
		MIN							
		3	.000			-.129			-3.275
			.000	4.401	-9.601		.032	-.167	
			.750	4.275	-5.051		.032	-.058	

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD ID	ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			1.500	4.149	-.813		.032	-.032	
			1.500			-.129			-3.275
		MAX							
		4	.000			-.102			5.661
			.000	23.447	-3.564		.111	.032	
			.750	23.321	-.777		.111	-.020	
			1.500	23.195	1.916		.111	.062	
			1.500			-.102			5.661
		MIN							
		4	.000			-.112			-5.503
			.000	3.780	-10.486		-.128	-.105	
			.750	3.654	-5.537		-.128	-.059	
			1.500	3.528	-1.046		-.128	-.151	
			1.500			-.112			-5.503
		MAX & MIN							
		5	.000			.006			.068
			.000	6.010	-9.858		.019	-.018	
			.750	6.010	-5.350		.019	-.003	
			1.500	6.010	-.843		.019	.011	
			1.500			.006			.068
		MAX & MIN							
		6	.000			-.001			.024
			.000	5.101	-8.222		-.002	.002	
			.750	5.101	-4.396		-.002	.000	
			1.500	5.101	-.571		-.002	-.001	
			1.500			-.001			.024
		MAX							
		ALL	.000			.006			5.661
			.000	23.447	-3.564		.175	.171	
			.750	23.321	-.777		.175	.000	
			1.500	23.195	1.916		.175	.096	
			1.500			.006			5.661
		MIN							
		ALL	.000			-.133			-5.503
			.000	3.780	-10.486		-.291	-.167	
			.750	3.654	-5.537		-.291	-.059	
			1.500	3.528	-1.046		-.291	-.265	
			1.500			-.133			-5.503
174	----------								
		MAX & MIN							
		1	.000			-.133			.000
			.000	5.085	-8.119		.000	.000	
			.750	5.085	-4.305		.000	.000	
			1.500	5.085	-.491		.000	.000	
			1.500			-.133			.000
		MAX							
		2	.000			-.078			3.248
			.000	16.339	-5.360		.225	.005	
			.750	16.129	-2.036		.225	.092	
			1.500	15.919	1.131		.225	.260	
			1.500			-.078			3.248

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MIN							
2		.000			-.081			-3.248
		.000	4.537	-9.543		.085	-.077	
		.750	4.327	-4.919		.085	.068	
		1.500	4.117	-.661		.085	.133	
		1.500			-.081			-3.248
	MAX							
3		.000			-.078			3.248
		.000	16.184	-5.321		.328	-.019	
		.750	16.058	-2.081		.328	.145	
		1.500	15.932	1.064		.328	.391	
		1.500			-.078			3.248
	MIN							
3		.000			-.081			-3.249
		.000	4.383	-9.504		.188	-.101	
		.750	4.257	-4.964		.188	.122	
		1.500	4.131	-.728		.188	.263	
		1.500			-.081			-3.249
	MAX							
4		.000			-.076			5.414
		.000	23.428	-3.414		.271	.032	
		.750	23.302	-.642		.271	.100	
		1.500	23.176	2.035		.271	.303	
		1.500			-.076			5.414
	MIN							
4		.000			-.082			-5.414
		.000	3.759	-10.386		.038	-.104	
		.750	3.633	-5.447		.038	.061	
		1.500	3.507	-.951		.038	.090	
		1.500			-.082			-5.414
	MAX & MIN							
5		.000			.005			.000
		.000	5.966	-9.733		.000	.000	
		.750	5.966	-5.259		.000	.000	
		1.500	5.966	-.784		.000	.000	
		1.500			.005			.000
	MAX & MIN							
6		.000			-.000			.000
		.000	5.086	-8.129		.000	.000	
		.750	5.086	-4.315		.000	.000	
		1.500	5.086	-.500		.000	.000	
		1.500			-.000			.000
	MAX							
ALL		.000			.005			5.414
		.000	23.428	-3.414		.328	.032	
		.750	23.302	-.642		.328	.145	
		1.500	23.176	2.035		.328	.391	
		1.500			.005			5.414
	MIN							
ALL		.000			-.133			-5.414
		.000	3.759	-10.386		.000	-.104	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.750	3.633	-5.447		.000	.000	
		1.500	3.507	-.951		.000	.000	
		1.500			-.133			-5.414
5001	----------							
	MAX & MIN							
1		.000			-32.185			.015
		.000	6.724	-.336		-2.064	.103	
		.025	6.724	-.168		-2.064	.052	
		.050	6.724	.000		-2.064	.000	
		.050			-32.185			.015
	MAX							
2		.000			-24.448			.011
		.000	5.076	-.189		-3.061	.207	
		.025	5.076	-.094		-3.061	.103	
		.050	5.076	.000		-3.061	.000	
		.050			-24.448			.011
	MIN							
2		.000			-50.466			.007
		.000	3.409	-.249		-4.135	.156	
		.025	3.409	-.125		-4.135	.078	
		.050	3.409	.000		-4.135	.000	
		.050			-50.466			.007
	MAX							
3		.000			-24.974			.011
		.000	5.000	-.185		-4.524	.280	
		.025	5.000	-.093		-4.524	.140	
		.050	5.000	.000		-4.524	.000	
		.050			-24.974			.011
	MIN							
3		.000			-50.992			.006
		.000	3.333	-.245		-5.598	.229	
		.025	3.333	-.123		-5.598	.115	
		.050	3.333	.000		-5.598	.000	
		.050			-50.992			.006
	MAX							
4		.000			-20.540			.013
		.000	5.552	-.169		-2.698	.224	
		.025	5.552	-.085		-2.698	.112	
		.050	5.552	.000		-2.698	.000	
		.050			-20.540			.013
	MIN							
4		.000			-63.904			.005
		.000	2.773	-.270		-4.487	.140	
		.025	2.773	-.135		-4.487	.070	
		.050	2.773	.000		-4.487	.000	
		.050			-63.904			.005
	MAX & MIN							
5		.000			-28.919			.000
		.000	.000	.000		-.042	.002	
		.025	.000	.000		-.042	.001	
		.050	.000	.000		-.042	.000	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		.050			-28.919			.000
	MAX & MIN							
6		.000			-32.874			.000
		.000	.000	.000		.004	-.000	
		.025	.000	.000		.004	.000	
		.050	.000	.000		.004	.000	
		.050			-32.874			.000
	MAX							
ALL		.000			-20.540			.015
		.000	6.724	.000		.004	.280	
		.025	6.724	.000		.004	.140	
		.050	6.724	.000		.004	.000	
		.050			-20.540			.015
	MIN							
ALL		.000			-63.904			.000
		.000	.000	-.336		-5.598	-.000	
		.025	.000	-.168		-5.598	.000	
		.050	.000	.000		-5.598	.000	
		.050			-63.904			.000
5021	----------							
	MAX & MIN							
1		.000			-32.185			-.015
		.000	6.724	-.336		2.064	-.103	
		.025	6.724	-.168		2.064	-.052	
		.050	6.724	.000		2.064	.000	
		.050			-32.185			-.015
	MAX							
2		.000			-24.474			-.008
		.000	5.063	-.188		-.349	.068	
		.025	5.063	-.094		-.349	.034	
		.050	5.063	.000		-.349	.000	
		.050			-24.474			-.008
	MIN							
2		.000			-50.492			-.012
		.000	3.396	-.249		-1.423	.017	
		.025	3.396	-.124		-1.423	.009	
		.050	3.396	.000		-1.423	.000	
		.050			-50.492			-.012
	MAX							
3		.000			-25.017			-.008
		.000	4.978	-.184		-1.876	.145	
		.025	4.978	-.092		-1.876	.072	
		.050	4.978	.000		-1.876	.000	
		.050			-25.017			-.008
	MIN							
3		.000			-51.035			-.013
		.000	3.311	-.244		-2.949	.094	
		.025	3.311	-.122		-2.949	.047	
		.050	3.311	.000		-2.949	.000	
		.050			-51.035			-.013

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT ID	LOAD ENVE	DIST END1	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	MAX							
4		.000			-20.566			-.006
		.000	5.538	-.169		.003	.084	
		.025	5.538	-.084		.003	.042	
		.050	5.538	.000		.003	.000	
		.050			-20.566			-.006
	MIN							
4		.000			-63.929			-.014
		.000	2.759	-.269		-1.786	-.000	
		.025	2.759	-.135		-1.786	.000	
		.050	2.759	.000		-1.786	.000	
		.050			-63.929			-.014
	MAX & MIN							
5		.000			-28.919			.000
		.000	.000	.000		.042	-.002	
		.025	.000	.000		.042	-.001	
		.050	.000	.000		.042	.000	
		.050			-28.919			.000
	MAX & MIN							
6		.000			-32.874			.000
		.000	.000	.000		-.004	.000	
		.025	.000	.000		-.004	.000	
		.050	.000	.000		-.004	.000	
		.050			-32.874			.000
	MAX							
ALL		.000			-20.566			.000
		.000	6.724	.000		2.064	.145	
		.025	6.724	.000		2.064	.072	
		.050	6.724	.000		2.064	.000	
		.050			-20.566			.000
	MIN							
ALL		.000			-63.929			-.015
		.000	.000	-.336		-2.949	-.103	
		.025	.000	-.168		-2.949	-.052	
		.050	.000	.000		-2.949	.000	
		.050			-63.929			-.015
5049	----------							
	MAX & MIN							
1		.000			-235.248			.269
		.000	.775	-5.170		1.563	-6.188	
		6.000	.775	-.519		1.563	3.189	
		12.000	.775	4.133		1.563	12.566	
		12.000			-235.248			.269
	MAX							
2		.000			-232.227			.242
		.000	1.894	5.299		3.573	1.837	
		6.000	1.894	.877		3.573	7.654	
		12.000	1.894	6.851		3.573	29.095	
		12.000			-232.227			.242
	MIN							
2		.000			-290.023			.113

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD	DIST	1-2 PLANE		AXIAL	1-3 PLANE		AXIAL
ID	ENVE	END1	SHEAR	MOMENT	FORCE	SHEAR	MOMENT	TORQ
		.000	-1.770	-5.096		-.407	-13.787	
		6.000	-1.770	-5.172		-.407	-.604	
		12.000	-1.770	-15.644		-.407	-3.045	
		12.000			-290.023			.113
	MAX							
	3	.000			-232.210			.235
		.000	2.055	4.693		3.483	2.407	
		6.000	2.055	1.238		3.483	7.440	
		12.000	2.055	8.179		3.483	28.577	
		12.000			-232.210			.235
	MIN							
	3	.000			-290.006			.107
		.000	-1.608	-5.703		-.497	-13.217	
		6.000	-1.608	-4.811		-.497	-.578	
		12.000	-1.608	-14.315		-.497	-3.563	
		12.000			-290.006			.107
	MAX							
	4	.000			-230.229			.278
		.000	3.276	9.283		5.004	6.617	
		6.000	3.276	2.633		5.004	10.605	
		12.000	3.276	13.308		5.004	40.632	
		12.000			-230.229			.278
	MIN							
	4	.000			-326.557			.064
		.000	-2.830	-8.043		-1.629	-19.422	
		6.000	-2.830	-7.450		-1.629	-3.159	
		12.000	-2.830	-24.183		-1.629	-12.934	
		12.000			-326.557			.064
	MAX & MIN							
	5	.000			-298.916			.000
		.000	.000	.000		6.796	-26.835	
		6.000	.000	.000		6.796	13.942	
		12.000	.000	.000		6.796	54.718	
		12.000			-298.916			.000
	MAX & MIN							
	6	.000			-235.248			.000
		.000	.000	.000		1.563	-6.188	
		6.000	.000	.000		1.563	3.189	
		12.000	.000	.000		1.563	12.566	
		12.000			-235.248			.000
	MAX							
	ALL	.000			-230.229			.278
		.000	3.276	9.283		6.796	6.617	
		6.000	3.276	2.633		6.796	13.942	
		12.000	3.276	13.308		6.796	54.718	
		12.000			-230.229			.278
	MIN							
	ALL	.000			-326.557			.000
		.000	-2.830	-8.043		-1.629	-26.835	
		6.000	-2.830	-7.450		-1.629	-3.159	
		12.000	-2.830	-24.183		-1.629	-12.934	

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD	DIST	1-2 PLANE		AXIAL	1-3 PLANE		AXIAL
ID	ENVE	END1	SHEAR	MOMENT	FORCE	SHEAR	MOMENT	TORQ
		12.000			-326.557			.000
5085	----------							
	MAX & MIN							
	1	.000			-33.562			.015
		.000	6.712	-.336		2.069	-.103	
		.025	6.712	-.168		2.069	-.052	
		.050	6.712	.000		2.069	.000	
		.050			-33.562			.015
	MAX							
	2	.000			-28.395			.012
		.000	5.055	-.188		-.319	.067	
		.025	5.055	-.094		-.319	.033	
		.050	5.055	.000		-.319	.000	
		.050			-28.395			.012
	MIN							
	2	.000			-60.807			.008
		.000	3.388	-.248		-1.401	.016	
		.025	3.388	-.124		-1.401	.008	
		.050	3.388	.000		-1.401	.000	
		.050			-60.807			.008
	MAX							
	3	.000			-27.852			.012
		.000	4.970	-.184		-1.845	.143	
		.025	4.970	-.092		-1.845	.072	
		.050	4.970	.000		-1.845	.000	
		.050			-27.852			.012
	MIN							
	3	.000			-60.264			.008
		.000	3.303	-.244		-2.927	.092	
		.025	3.303	-.122		-2.927	.046	
		.050	3.303	.000		-2.927	.000	
		.050			-60.264			.008
	MAX							
	4	.000			-23.716			.014
		.000	5.531	-.168		.050	.082	
		.025	5.531	-.084		.050	.041	
		.050	5.531	.000		.050	.000	
		.050			-23.716			.014
	MIN							
	4	.000			-77.736			.006
		.000	2.752	-.269		-1.753	-.002	
		.025	2.752	-.135		-1.753	-.001	
		.050	2.752	.000		-1.753	.000	
		.050			-77.736			.006
	MAX & MIN							
	5	.000			-28.919			.000
		.000	-.000	.000		-.042	.002	
		.025	-.000	.000		-.042	.001	
		.050	-.000	.000		-.042	.000	
		.050			-28.919			.000

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F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD	DIST	1-2 PLANE		AXIAL	1-3 PLANE		AXIAL
ID	ENVE	END1	SHEAR	MOMENT	FORCE	SHEAR	MOMENT	TORQ
	MAX & MIN							
	6	.000			-32.874			.000
		.000	.000	.000		.004	-.000	
		.025	.000	.000		.004	.000	
		.050	.000	.000		.004	.000	
		.050			-32.874			.000
	MAX							
	ALL	.000			-23.716			.015
		.000	6.712	.000		2.069	.143	
		.025	6.712	.000		2.069	.072	
		.050	6.712	.000		2.069	.000	
		.050			-23.716			.015
	MIN							
	ALL	.000			-77.736			.000
		.000	-.000	-.336		-2.927	-.103	
		.025	-.000	-.168		-2.927	-.052	
		.050	-.000	.000		-2.927	.000	
		.050			-77.736			.000
5105	----------							
	MAX & MIN							
	1	.000			-33.562			-.015
		.000	6.712	-.336		-2.069	.103	
		.025	6.712	-.168		-2.069	.052	
		.050	6.712	.000		-2.069	.000	
		.050			-33.562			-.015
	MAX							
	2	.000			-28.420			-.007
		.000	5.069	-.188		-3.084	.208	
		.025	5.069	-.094		-3.084	.104	
		.050	5.069	.000		-3.084	.000	
		.050			-28.420			-.007
	MIN							
	2	.000			-60.832			-.011
		.000	3.402	-.249		-4.165	.157	
		.025	3.402	-.124		-4.165	.079	
		.050	3.402	.000		-4.165	.000	
		.050			-60.832			-.011
	MAX							
	3	.000			-27.894			-.006
		.000	4.993	-.185		-4.547	.281	
		.025	4.993	-.092		-4.547	.141	
		.050	4.993	.000		-4.547	.000	
		.050			-27.894			-.006
	MIN							
	3	.000			-60.306			-.011
		.000	3.326	-.245		-5.628	.231	
		.025	3.326	-.123		-5.628	.115	
		.050	3.326	.000		-5.628	.000	
		.050			-60.306			-.011
	MAX							
	4	.000			-23.742			-.005

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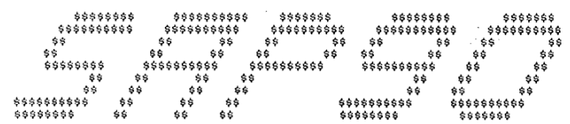
F R A M E E L E M E N T F O R C E S (USING "QUICK" TRUCK RESPONSE CALC)

ELT	LOAD	DIST	1-2 PLANE		AXIAL	1-3 PLANE		AXIAL
ID	ENVE	END1	SHEAR	MOMENT	FORCE	SHEAR	MOMENT	TORQ
		.000	5.544	-.169		-2.731	.227	
		.025	5.544	-.084		-2.731	.113	
		.050	5.544	.000		-2.731	.000	
		.050			-23.742			-.005
	MIN							
	4	.000			-77.762			-.013
		.000	2.766	-.270		-4.534	.142	
		.025	2.766	-.135		-4.534	.071	
		.050	2.766	.000		-4.534	.000	
		.050			-77.762			-.013
	MAX & MIN							
	5	.000			-28.919			.000
		.000	-.000	.000		.042	-.002	
		.025	-.000	.000		.042	-.001	
		.050	-.000	.000		.042	.000	
		.050			-28.919			.000
	MAX & MIN							
	6	.000			-32.874			.000
		.000	.000	.000		-.004	.000	
		.025	.000	.000		-.004	.000	
		.050	.000	.000		-.004	.000	
		.050			-32.874			.000
	MAX							
	ALL	.000			-23.742			.000
		.000	6.712	.000		.042	.281	
		.025	6.712	.000		.042	.141	
		.050	6.712	.000		.042	.000	
		.050			-23.742			.000
	MIN							
	ALL	.000			-77.762			-.015
		.000	-.000	-.336		-5.628	-.002	
		.025	-.000	-.168		-5.628	-.001	
		.050	-.000	.000		-5.628	.000	
		.050			-77.762			-.015



STRUCTURAL ANALYSIS PROGRAMS

VERSION 5.40

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REPOSICION 307+860. 3 VANOS 13+17+13 FILE=307860

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
1	-.1699E-06	-.7048E-09	-.1622E-03	-.2384E-03	.7870E-03	.2433E-08
2	-.000000	.000000	-.001938	-.000105	.000626	.000000
3	-.000000	.000000	-.002935	-.000026	.000231	.000000
4	-.000000	.000000	-.003008	.000020	-.000178	.000000
5	-.000000	.000000	-.002316	.000052	-.000437	.000000
6	-.000000	.000000	-.001384	.000083	-.000369	.000000
7	-.000000	.000000	-.001113	.000111	-.000173	.000000
8	-.000000	.000000	-.002148	.000092	.000726	.000000
9	.000000	.000000	-.003848	.000072	.000782	.000000
10	.000000	.000000	-.005255	.000061	.000479	.000000
11	.000000	.000000	-.005787	.000058	.000000	.000000
22	-.1756E-06	-.5034E-09	-.5297E-03	-.1502E-03	.7570E-03	.1468E-08
23	-.000000	.000000	-.002056	-.000055	.000589	.000000
24	-.000000	.000000	-.002955	-.000012	.000217	.000000
25	-.000000	.000000	-.002978	.000009	-.000184	.000000
26	-.000000	.000000	-.002249	.000026	-.000442	.000000
27	-.000000	.000000	-.001268	.000056	-.000376	.000000
28	-.1683E-06	.4216E-11	-.9308E-03	.1104E-03	.1716E-03	.1457E-07
29	-.000000	.000000	-.002023	.000060	.000731	.000000
30	.000000	.000000	-.003759	.000034	.000782	.000000
31	.000000	.000000	-.005180	.000025	.000479	.000000
32	.000000	.000000	-.005717	.000023	.000000	.000000
43	-.1772E-06	.0000E+00	-.6629E-03	.0000E+00	.7233E-03	.0000E+00
44	-.000000	.000000	-.002100	.000000	.000572	.000000
45	-.000000	.000000	-.002963	.000000	.000211	.000000
46	-.000000	.000000	-.002970	.000000	-.000187	.000000
47	-.000000	.000000	-.002227	.000000	-.000445	.000000
48	-.000000	.000000	-.001217	.000000	-.000395	.000000
49	-.2289E-06	.0000E+00	-.7667E-03	.0000E+00	.1640E-03	.0000E+00
50	-.000000	.000000	-.001967	.000000	.000751	.000000
51	.000000	.000000	-.003732	.000000	.000785	.000000
52	.000000	.000000	-.005160	.000000	.000479	.000000
53	.000000	.000000	-.005698	.000000	.000000	.000000
64	-.1756E-06	.5034E-09	-.5297E-03	.1502E-03	.7570E-03	-.1468E-08
65	-.000000	.000000	-.002056	.000055	.000589	.000000
66	-.000000	.000000	-.002955	.000012	.000217	.000000
67	-.000000	.000000	-.002978	-.000009	-.000184	.000000
68	-.000000	.000000	-.002249	-.000026	-.000442	.000000
69	-.000000	.000000	-.001268	-.000056	-.000376	.000000
70	-.1683E-06	-.4216E-11	-.9308E-03	-.1104E-03	.1716E-03	-.1457E-07
71	-.000000	.000000	-.002023	-.000060	.000731	.000000
72	.000000	.000000	-.003759	-.000034	.000782	.000000
73	.000000	.000000	-.005180	-.000025	.000479	.000000
74	.000000	.000000	-.005717	-.000023	.000000	.000000
85	-.1699E-06	.7048E-09	-.1622E-03	.2384E-03	.7870E-03	-.2433E-08
86	-.000000	.000000	-.001938	.000105	.000626	.000000
87	-.000000	.000000	-.002935	.000026	.000231	.000000
88	-.000000	.000000	-.003008	-.000020	-.000178	.000000
89	-.000000	.000000	-.002316	-.000052	-.000437	.000000
90	-.000000	.000000	-.001384	-.000083	-.000369	.000000

REPOSICION 307+860. 3 VANOS 13+17+13 FILE=307860

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
91	-.000000	.000000	-.001113	-.000111	.000173	.000000
92	-.000000	.000000	-.002148	-.000092	.000726	.000000
93	.000000	.000000	-.003848	-.000072	.000782	.000000
94	.000000	.000000	-.005255	-.000061	.000479	.000000
95	.000000	.000000	-.005787	-.000058	.000000	.000000

REPOSICION 307+860. 3 VANOS 13+17+13 FILE=307860

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	-.1144E-07	-.4748E-10	-.1165E-04	-.1436E-04	.5735E-04	.1639E-09
2	-.1164E-07	.4497E-11	-.1409E-03	-.4161E-05	.4545E-04	.7526E-10
3	-.1170E-07	-.7121E-11	-.2136E-03	.1828E-05	.1701E-04	.6717E-10
4	-.1163E-07	-.2691E-10	-.2198E-03	.5194E-05	-.1234E-04	.1084E-09
5	-.1135E-07	-.6097E-10	-.1710E-03	.7549E-05	-.3104E-04	.2143E-09
6	-.1072E-07	-.1026E-09	-.1048E-03	.9830E-05	-.2617E-04	.4396E-09
7	-.9497E-08	.0000E+00	-.8598E-04	.1181E-04	.1266E-04	.7931E-09
8	-.7746E-08	.1062E-09	-.1607E-03	.1050E-04	.5223E-04	.4351E-09
9	-.5434E-08	.6665E-10	-.2830E-03	.9077E-05	.5621E-04	.2031E-09
10	-.2788E-08	.3724E-10	-.3841E-03	.8295E-05	.3444E-04	.7956E-10
11	.0000E+00	.2854E-10	-.4223E-03	.8057E-05	.0000E+00	.0000E+00
22	-.1183E-07	-.3392E-10	-.3439E-04	-.9091E-05	.5481E-04	.9892E-10
23	-.1186E-07	-.2391E-11	-.1449E-03	-.2443E-05	.4274E-04	.4808E-10
24	-.1191E-07	-.4837E-11	-.2104E-03	.6250E-06	.1605E-04	.4664E-10
25	-.1196E-07	-.1791E-10	-.2129E-03	.2151E-05	-.1280E-04	.8094E-10
26	-.1199E-07	-.4201E-10	-.1614E-03	.3387E-05	-.3133E-04	.1742E-09
27	-.1190E-07	-.7770E-10	-.9175E-04	.5502E-05	-.2673E-04	.4090E-09
28	-.1134E-07	.0000E+00	-.6805E-04	.9434E-05	.1252E-04	.9812E-09
29	-.8925E-08	.8014E-10	-.1468E-03	.5835E-05	.5264E-04	.4102E-09
30	-.6038E-08	.4578E-10	-.2717E-03	.3986E-05	.5626E-04	.1682E-09
31	-.3032E-08	.2454E-10	-.3739E-03	.3358E-05	.3442E-04	.6168E-10
32	.0000E+00	.1852E-10	-.4124E-03	.3204E-05	.0000E+00	.0000E+00
43	-.1194E-07	.0000E+00	-.4258E-04	.0000E+00	.5235E-04	.0000E+00
44	-.1195E-07	.0000E+00	-.1468E-03	.0000E+00	.4152E-04	.0000E+00
45	-.1202E-07	.0000E+00	-.2097E-03	.0000E+00	.1558E-04	.0000E+00
46	-.1219E-07	.0000E+00	-.2111E-03	.0000E+00	-.1305E-04	.0000E+00
47	-.1253E-07	.0000E+00	-.1584E-03	.0000E+00	-.3162E-04	.0000E+00
48	-.1334E-07	.0000E+00	-.8682E-04	.0000E+00	-.2808E-04	.0000E+00
49	-.1542E-07	.0000E+00	-.5502E-04	.0000E+00	.1197E-04	.0000E+00
50	-.1037E-07	.0000E+00	-.1415E-03	.0000E+00	.5403E-04	.0000E+00
51	-.6568E-08	.0000E+00	-.2685E-03	.0000E+00	.5645E-04	.0000E+00
52	-.3211E-08	.0000E+00	-.3711E-03	.0000E+00	.3446E-04	.0000E+00
53	.0000E+00	.0000E+00	-.4098E-03	.0000E+00	.0000E+00	.0000E+00
64	-.1183E-07	.3392E-10	-.3439E-04	.9091E-05	.5481E-04	-.9892E-10
65	-.1186E-07	-.2391E-11	-.1449E-03	.2443E-05	.4274E-04	-.4808E-10
66	-.1191E-07	.4837E-11	-.2104E-03	-.6250E-06	.1605E-04	-.4664E-10
67	-.1196E-07	.1791E-10	-.2129E-03	-.2151E-05	-.1280E-04	-.8094E-10
68	-.1199E-07	.4201E-10	-.1614E-03	-.3387E-05	-.3133E-04	-.1742E-09
69	-.1190E-07	.7770E-10	-.9175E-04	-.5502E-05	-.2673E-04	-.4090E-09
70	-.1134E-07	.0000E+00	-.6805E-04	-.9434E-05	.1252E-04	-.9812E-09
71	-.8925E-08	-.8014E-10	-.1468E-03	-.5835E-05	.5264E-04	-.4102E-09
72	-.6038E-08	-.4578E-10	-.2717E-03	-.3986E-05	.5626E-04	-.1682E-09
73	-.3032E-08	-.2454E-10	-.3739E-03	-.3358E-05	.3442E-04	-.6168E-10
74	.0000E+00	-.1852E-10	-.4124E-03	-.3204E-05	.0000E+00	.0000E+00
85	-.1144E-07	.4748E-10	-.1165E-04	.1436E-04	.5735E-04	-.1639E-09
86	-.1164E-07	-.4497E-11	-.1409E-03	.4161E-05	.4545E-04	-.7526E-10
87	-.1170E-07	.7121E-11	-.2136E-03	-.1828E-05	.1701E-04	-.6717E-10
88	-.1163E-07	.2691E-10	-.2198E-03	-.5194E-05	-.1234E-04	-.1084E-09
89	-.1135E-07	.6097E-10	-.1710E-03	-.7549E-05	-.3104E-04	-.2143E-09
90	-.1072E-07	.1026E-09	-.1048E-03	-.9830E-05	-.2617E-04	-.4396E-09

REPOSICION 307+860. 3 VANOS 13+17+13 FILE=307860

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)
91	-.9497E-08	.0000E+00	-.8598E-04	-.1181E-04	.1266E-04	-.7931E-09
92	-.7746E-08	-.1062E-09	-.1607E-03	-.1050E-04	.5223E-04	-.4351E-09
93	-.5434E-08	-.6665E-10	-.2830E-03	-.9077E-05	.5421E-04	-.2031E-09
94	-.2788E-08	-.3724E-10	-.3841E-03	-.8295E-05	.3444E-04	-.7956E-10
95	.0000E+00	-.2854E-10	-.4223E-03	-.8057E-05	.0000E+00	.0000E+00

REPOSICION 307+860. 3 VANOS 13+17+13 FILE=307860

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 3 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
91	-.2882E-07	-.1989E-11	-.3862E-03	-.8605E-04	.4955E-04	-.2407E-08
92	-.2351E-07	-.3222E-09	-.6694E-03	-.8142E-04	.1966E-03	-.1321E-08
93	.000000	.000000	-.001129	-.000076	.000211	.000000
94	.000000	.000000	-.001508	-.000073	.000129	.000000
95	.000000	.000000	-.001652	-.000072	.000000	.000000

REPOSICION 307+860. 3 VANOS 13+17+13 FILE=307860

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 3 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
1	-.3472E-07	-.1442E-09	-.4356E-04	-.2393E-04	.2233E-03	.4975E-09
2	-.3532E-07	.1365E-10	-.5453E-03	.2127E-04	.1753E-03	.2284E-09
3	-.3551E-07	-.2161E-10	-.8289E-03	.4644E-04	.6846E-04	.2039E-09
4	-.3529E-07	-.8166E-10	-.8630E-03	.6017E-04	-.4160E-04	.3290E-09
5	-.3444E-07	-.1850E-09	-.6900E-03	.6950E-04	-.1120E-03	.6505E-09
6	-.3252E-07	-.3113E-09	-.4505E-03	.7834E-04	-.9458E-04	.1334E-08
7	-.2882E-07	.1989E-11	-.3862E-03	.8605E-04	.4955E-04	.2407E-08
8	-.2351E-07	.3222E-09	-.6696E-03	.8142E-04	.1966E-03	.1321E-08
9	.000000	.000000	-.001129	.000076	.000211	.000000
10	.000000	.000000	-.001508	.000073	.000129	.000000
11	.000000	.000000	-.001652	.000072	.000000	.000000
22	-.3589E-07	-.1030E-09	-.8938E-04	-.1599E-04	.2096E-03	.3003E-09
23	-.3599E-07	.7255E-11	-.5121E-03	.6883E-05	.1644E-03	.1459E-09
24	-.3615E-07	-.1468E-10	-.7668E-03	.1805E-04	.6463E-04	.1416E-09
25	-.3631E-07	-.5436E-10	-.7862E-03	.2379E-04	-.4345E-04	.2456E-09
26	-.3640E-07	-.1275E-09	-.6026E-03	.2849E-04	-.1132E-03	.5288E-09
27	-.3613E-07	-.2358E-09	-.3499E-03	.3647E-04	-.9673E-04	.1241E-08
28	-.3441E-07	.0000E+00	-.2670E-03	.5124E-04	.4895E-04	.2978E-08
29	-.2709E-07	.2432E-09	-.5652E-03	.3794E-04	.1981E-03	.1245E-08
30	.000000	.000000	-.001034	.000031	.000211	.000000
31	.000000	.000000	-.001418	.000029	.000129	.000000
32	.000000	.000000	-.001562	.000028	.000000	.000000
43	-.3622E-07	.0000E+00	-.1057E-03	.0000E+00	.2002E-03	.0000E+00
44	-.3627E-07	.0000E+00	-.5059E-03	.0000E+00	.1601E-03	.0000E+00
45	-.3649E-07	.0000E+00	-.7516E-03	.0000E+00	.6289E-04	.0000E+00
46	-.3699E-07	.0000E+00	-.7665E-03	.0000E+00	-.4439E-04	.0000E+00
47	-.3804E-07	.0000E+00	-.5793E-03	.0000E+00	-.1143E-03	.0000E+00
48	-.4049E-07	.0000E+00	-.3185E-03	.0000E+00	-.1018E-03	.0000E+00
49	-.4680E-07	.0000E+00	-.2053E-03	.0000E+00	.4677E-04	.0000E+00
50	-.3147E-07	.0000E+00	-.5323E-03	.0000E+00	.2033E-03	.0000E+00
51	.000000	.000000	-.001009	.000000	.000212	.000000
52	.000000	.000000	-.001394	.000000	.000129	.000000
53	.000000	.000000	-.001539	.000000	.000000	.000000
64	-.3589E-07	.1030E-09	-.8938E-04	.1599E-04	.2096E-03	-.3003E-09
65	-.3599E-07	-.7255E-11	-.5121E-03	-.6883E-05	.1644E-03	-.1459E-09
66	-.3615E-07	.1468E-10	-.7668E-03	-.1805E-04	.6463E-04	-.1416E-09
67	-.3631E-07	.5436E-10	-.7862E-03	-.2379E-04	-.4345E-04	-.2456E-09
68	-.3640E-07	.1275E-09	-.6026E-03	-.2849E-04	-.1132E-03	-.5288E-09
69	-.3613E-07	.2358E-09	-.3499E-03	-.3647E-04	-.9673E-04	-.1241E-08
70	-.3441E-07	.0000E+00	-.2670E-03	-.5124E-04	.4895E-04	-.2978E-08
71	-.2709E-07	-.2432E-09	-.5652E-03	-.3794E-04	.1981E-03	-.1245E-08
72	.000000	.000000	-.001034	-.000031	.000211	.000000
73	.000000	.000000	-.001418	-.000029	.000129	.000000
74	.000000	.000000	-.001562	-.000028	.000000	.000000
85	-.3472E-07	.1442E-09	-.4356E-04	.2393E-04	.2233E-03	-.4975E-09
86	-.3532E-07	-.1365E-10	-.5453E-03	-.2127E-04	.1753E-03	-.2284E-09
87	-.3551E-07	.2161E-10	-.8289E-03	-.4644E-04	.6846E-04	-.2039E-09
88	-.3529E-07	.8166E-10	-.8630E-03	-.6017E-04	-.4160E-04	-.3290E-09
89	-.3444E-07	.1850E-09	-.6900E-03	-.6950E-04	-.1120E-03	-.6505E-09
90	-.3252E-07	.3113E-09	-.4505E-03	-.7834E-04	-.9458E-04	-.1334E-08

REPOSICION 307+860. 3 VANOS 13+17+13 FILE=307860

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 4 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
1	.1164E-03	.3763E-03	.4553E-05	-.1403E-05	-.4615E-05	.4329E-04
2	.1165E-03	.4794E-03	.2326E-04	-.7220E-05	-.4986E-05	.4233E-04
3	.1126E-03	.5763E-03	.3916E-04	-.1275E-04	-.4541E-05	.4044E-04
4	.1055E-03	.6673E-03	.5462E-04	-.1792E-04	-.4537E-05	.3768E-04
5	.9560E-04	.7503E-03	.6998E-04	-.2278E-04	-.4551E-05	.3399E-04
6	.8334E-04	.8236E-03	.8494E-04	-.2707E-04	-.4334E-05	.2952E-04
7	.6914E-04	.8857E-03	.9695E-04	-.3023E-04	-.2280E-05	.2450E-04
8	.5336E-04	.9359E-03	.1004E-03	-.3222E-04	-.2024E-06	.1896E-04
9	.3630E-04	.9726E-03	.1009E-03	-.3309E-04	.1942E-07	.1289E-04
10	.1837E-04	.9950E-03	.1010E-03	-.3342E-04	.7475E-08	.6519E-05
11	.000000	.001003	.000101	-.000034	.000000	.000000
22	.5738E-04	.3787E-03	.3621E-05	-.2781E-05	-.3524E-05	.4247E-04
23	.5720E-04	.4790E-03	.1204E-04	-.7906E-05	-.2924E-05	.4174E-04
24	.5534E-04	.5758E-03	.1977E-04	-.1312E-04	-.2811E-05	.4008E-04
25	.5190E-04	.6668E-03	.2748E-04	-.1827E-04	-.2843E-05	.3736E-04
26	.4706E-04	.7498E-03	.3534E-04	-.2341E-04	-.2912E-05	.3371E-04
27	.4105E-04	.8231E-03	.4340E-04	-.2835E-04	-.2890E-05	.2929E-04
28	.3406E-04	.8851E-03	.5043E-04	-.3206E-04	-.1420E-05	.2431E-04
29	.2628E-04	.9354E-03	.5113E-04	-.3350E-04	.6685E-07	.1881E-04
30	.1788E-04	.9721E-03	.5078E-04	-.3371E-04	.9429E-07	.1279E-04
31	.9047E-05	.9945E-03	.5062E-04	-.3371E-04	.3015E-07	.6469E-05
32	.000000	.001002	.000051	-.000034	.000000	.000000
43	-.2626E-07	.3794E-03	-.1047E-10	-.3873E-05	.3299E-10	.4223E-04
44	-.1926E-07	.4788E-03	-.7956E-10	-.8179E-05	.3039E-10	.4136E-04
45	-.1159E-07	.5756E-03	-.1375E-09	-.1321E-04	.2230E-10	.3979E-04
46	-.7113E-08	.6664E-03	-.1721E-09	-.1836E-04	.8665E-11	.3711E-04
47	-.4691E-08	.7496E-03	-.1717E-09	-.2366E-04	-.1039E-10	.3351E-04
48	-.3371E-08	.8229E-03	-.1249E-09	-.2932E-04	-.3453E-10	.2912E-04
49	-.2527E-08	.8848E-03	-.1790E-10	-.3643E-04	-.7185E-10	.2411E-04
50	-.1788E-08	.9351E-03	.1059E-09	-.3448E-04	-.4841E-10	.1870E-04
51	-.1114E-08	.9719E-03	.1928E-09	-.3395E-04	-.3250E-10	.1271E-04
52	-.5353E-09	.9943E-03	.2452E-09	-.3378E-04	-.1628E-10	.6430E-05
53	.000000	.001002	.000000	-.000034	.000000	.000000
64	-.5744E-04	.3784E-03	-.3621E-05	-.2781E-05	.3524E-05	.4243E-04
65	-.5722E-04	.4786E-03	-.1204E-04	-.7906E-05	.2924E-05	.4172E-04
66	-.5535E-04	.5754E-03	-.1977E-04	-.1312E-04	.2811E-05	.4007E-04
67	-.5190E-04	.6664E-03	-.2748E-04	-.1827E-04	.2843E-05	.3735E-04
68	-.4707E-04	.7495E-03	-.3534E-04	-.2341E-04	.2912E-05	.3371E-04
69	-.4105E-04	.8227E-03	-.4340E-04	-.2835E-04	.2890E-05	.2929E-04
70	-.3406E-04	.8848E-03	-.5043E-04	-.3206E-04	.1420E-05	.2430E-04
71	-.2629E-04	.9350E-03	-.5113E-04	-.3350E-04	-.6695E-07	.1881E-04
72	-.1788E-04	.9717E-03	-.5078E-04	-.3371E-04	-.9435E-07	.1279E-04
73	-.9047E-05	.9941E-03	-.5062E-04	-.3371E-04	-.3018E-07	.6469E-05
74	.000000	.001002	-.000051	-.000034	.000000	.000000
85	-.1162E-03	.3757E-03	-.4553E-05	-.1403E-05	.4615E-05	.4277E-04
86	-.1164E-03	.4785E-03	-.2326E-04	-.7220E-05	.4986E-05	.4228E-04
87	-.1126E-03	.5754E-03	-.3917E-04	-.1275E-04	.4541E-05	.4043E-04
88	-.1055E-03	.6664E-03	-.5462E-04	-.1792E-04	.4537E-05	.3767E-04
89	-.9560E-04	.7494E-03	-.6998E-04	-.2278E-04	.4551E-05	.3398E-04
90	-.8334E-04	.8227E-03	-.8494E-04	-.2707E-04	.4334E-05	.2952E-04

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 4 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
91	-.6914E-04	.8847E-03	-.9695E-04	-.3023E-04	.2280E-05	.2450E-04
92	-.5936E-04	.9349E-03	-.1004E-03	-.3222E-04	.2023E-06	.1896E-04
93	-.3630E-04	.9717E-03	-.1009E-03	-.3509E-04	-.1949E-07	.1289E-04
94	-.1837E-04	.9941E-03	-.1010E-03	-.3942E-04	-.7508E-08	.6519E-05
95	.000000	.001002	-.000101	-.000034	.000000	.000000

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 5 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
1	.4471E-05	.1128E-04	.8838E-05	-.2748E-05	-.8955E-05	.1617E-05
2	.4494E-05	.1511E-04	.4516E-04	-.1409E-04	-.9677E-05	.1614E-05
3	.4380E-05	.1882E-04	.7607E-04	-.2493E-04	-.8810E-05	.1570E-05
4	.4142E-05	.2240E-04	.1062E-03	-.3529E-04	-.8788E-05	.1490E-05
5	.3779E-05	.2576E-04	.1362E-03	-.4554E-04	-.8803E-05	.1368E-05
6	.3292E-05	.2881E-04	.1666E-03	-.5593E-04	-.9080E-05	.1193E-05
7	.2684E-05	.3140E-04	.1989E-03	-.6649E-04	-.9420E-05	.9507E-06
8	.2015E-05	.3316E-04	.2292E-03	-.7554E-04	-.8261E-05	.6813E-06
9	.1342E-05	.3437E-04	.2525E-03	-.8257E-04	-.5618E-05	.4487E-06
10	.6705E-06	.3509E-04	.2666E-03	-.8699E-04	-.2805E-05	.2238E-06
11	.0000E+00	.3533E-04	.2713E-03	-.8848E-04	.0000E+00	.0000E+00
22	.2220E-05	.1136E-04	.7013E-05	-.5394E-05	-.6835E-05	.1610E-05
23	.2214E-05	.1512E-04	.2333E-04	-.1533E-04	-.5668E-05	.1596E-05
24	.2154E-05	.1882E-04	.3829E-04	-.2543E-04	-.5431E-05	.1557E-05
25	.2034E-05	.2240E-04	.5313E-04	-.3541E-04	-.5439E-05	.1477E-05
26	.1855E-05	.2576E-04	.6800E-04	-.4540E-04	-.5443E-05	.1355E-05
27	.1616E-05	.2881E-04	.8291E-04	-.5556E-04	-.5541E-05	.1188E-05
28	.1323E-05	.3141E-04	.9837E-04	-.6625E-04	-.5904E-05	.9439E-06
29	.9990E-06	.3316E-04	.1146E-03	-.7612E-04	-.5328E-05	.6768E-06
30	.6679E-06	.3437E-04	.1268E-03	-.8386E-04	-.3572E-05	.4476E-06
31	.3343E-06	.3509E-04	.1340E-03	-.8860E-04	-.1769E-05	.2235E-06
32	.0000E+00	.3533E-04	.1364E-03	-.9018E-04	.0000E+00	.0000E+00
43	.0000E+00	.1139E-04	.0000E+00	-.7501E-05	.0000E+00	.1607E-05
44	.0000E+00	.1512E-04	.0000E+00	-.1585E-04	.0000E+00	.1585E-05
45	.0000E+00	.1882E-04	.0000E+00	-.2557E-04	.0000E+00	.1546E-05
46	.0000E+00	.2240E-04	.0000E+00	-.3542E-04	.0000E+00	.1466E-05
47	.0000E+00	.2576E-04	.0000E+00	-.4528E-04	.0000E+00	.1345E-05
48	.0000E+00	.2881E-04	.0000E+00	-.5495E-04	.0000E+00	.1182E-05
49	.0000E+00	.3145E-04	.0000E+00	-.6309E-04	.0000E+00	.9402E-06
50	.0000E+00	.3316E-04	.0000E+00	-.7580E-04	.0000E+00	.6728E-06
51	.0000E+00	.3437E-04	.0000E+00	-.8417E-04	.0000E+00	.4469E-06
52	.0000E+00	.3509E-04	.0000E+00	-.8906E-04	.0000E+00	.2233E-06
53	.0000E+00	.3533E-04	.0000E+00	-.9068E-04	.0000E+00	.0000E+00
64	-.2220E-05	.1136E-04	-.7013E-05	-.5394E-05	.6835E-05	.1610E-05
65	-.2214E-05	.1512E-04	-.2333E-04	-.1533E-04	.5668E-05	.1596E-05
66	-.2154E-05	.1882E-04	-.3829E-04	-.2543E-04	.5431E-05	.1557E-05
67	-.2034E-05	.2240E-04	-.5313E-04	-.3541E-04	.5439E-05	.1477E-05
68	-.1855E-05	.2576E-04	-.6800E-04	-.4540E-04	.5443E-05	.1355E-05
69	-.1616E-05	.2881E-04	-.8291E-04	-.5556E-04	.5541E-05	.1188E-05
70	-.1323E-05	.3141E-04	-.9837E-04	-.6625E-04	.5904E-05	.9439E-06
71	-.9990E-06	.3316E-04	-.1146E-03	-.7612E-04	.5328E-05	.6768E-06
72	-.6679E-06	.3437E-04	-.1268E-03	-.8386E-04	.3572E-05	.4476E-06
73	-.3343E-06	.3509E-04	-.1340E-03	-.8860E-04	.1769E-05	.2235E-06
74	.0000E+00	.3533E-04	-.1364E-03	-.9018E-04	.0000E+00	.0000E+00
85	-.4471E-05	.1128E-04	-.8838E-05	-.2748E-05	.8955E-05	.1617E-05
86	-.4494E-05	.1511E-04	-.4516E-04	-.1409E-04	.9677E-05	.1614E-05
87	-.4380E-05	.1882E-04	-.7607E-04	-.2493E-04	.8810E-05	.1570E-05
88	-.4142E-05	.2240E-04	-.1062E-03	-.3529E-04	.8788E-05	.1490E-05
89	-.3779E-05	.2576E-04	-.1362E-03	-.4554E-04	.8803E-05	.1368E-05
90	-.3292E-05	.2881E-04	-.1666E-03	-.5593E-04	.9080E-05	.1193E-05

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:30/860

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 5 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
91	-.2684E-05	.3140E-04	-.1989E-03	-.6649E-04	.9420E-05	.9507E-06
92	-.2015E-05	.3316E-04	-.2292E-03	-.7554E-04	.8261E-05	.6813E-06
93	-.1342E-05	.3437E-04	-.2525E-03	-.8257E-04	.5618E-05	.4487E-06
94	-.6705E-06	.3509E-04	-.2666E-03	-.8699E-04	.2805E-05	.2238E-06
95	.0000E+00	.3533E-04	-.2713E-03	-.8848E-04	.0000E+00	.0000E+00

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 6 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
1	.2103E-03	.6372E-06	.1407E-06	.2386E-06	-.2124E-05	-.2516E-05
2	.2143E-03	-.1829E-06	.4770E-05	.1324E-06	-.1963E-05	-.8751E-06
3	.2166E-03	-.1063E-06	.8544E-05	.7219E-07	-.1444E-05	-.3426E-06
4	.2183E-03	-.4461E-07	.1084E-04	.4697E-07	-.6086E-06	-.1504E-06
5	.2196E-03	-.1815E-07	.1097E-04	.4280E-07	.5611E-06	-.7093E-07
6	.2208E-03	-.5085E-08	.8172E-05	.4451E-07	.2081E-05	-.4074E-07
7	.2219E-03	.6487E-08	.2103E-05	-.1396E-07	.3377E-05	-.3953E-07
8	.2229E-03	.2191E-07	-.3348E-05	-.5884E-07	.1545E-05	-.7503E-07
9	.2238E-03	.4669E-07	-.4708E-05	-.3778E-07	-.1789E-06	-.1571E-06
10	.2244E-03	.7691E-07	-.3088E-05	-.1660E-07	-.1202E-05	-.3234E-06
11	.2246E-03	.0000E+00	.0000E+00	.0000E+00	-.1541E-05	-.5814E-06
22	.2162E-03	.4497E-06	.5010E-06	.1498E-06	-.2102E-05	-.1450E-05
23	.2168E-03	-.1078E-06	.4924E-05	.6621E-07	-.1931E-05	-.5272E-06
24	.2177E-03	-.6491E-07	.8623E-05	.3181E-07	-.1431E-05	-.2151E-06
25	.2188E-03	-.2754E-07	.1089E-04	.2233E-07	-.6029E-06	-.9724E-07
26	.2199E-03	-.1130E-07	.1102E-04	.3272E-07	.5595E-06	-.4650E-07
27	.2210E-03	-.3247E-08	.8273E-05	.7446E-07	.2070E-05	-.2640E-07
28	.2221E-03	.4297E-08	.2073E-05	-.2274E-07	.3500E-05	-.2350E-07
29	.2232E-03	.1469E-07	-.3475E-05	-.9279E-07	.1531E-05	-.5620E-07
30	.2243E-03	.3225E-07	-.4763E-05	-.3426E-07	-.1818E-06	-.1288E-06
31	.2253E-03	.5835E-07	-.3109E-05	-.1090E-07	-.1199E-05	-.3042E-06
32	.2260E-03	.0000E+00	.0000E+00	.0000E+00	-.1537E-05	-.7246E-06
43	.2175E-03	.0000E+00	.6324E-06	.0000E+00	-.2073E-05	.0000E+00
44	.2176E-03	.0000E+00	.4977E-05	.0000E+00	-.1916E-05	.0000E+00
45	.2182E-03	.0000E+00	.8648E-05	.0000E+00	-.1426E-05	.0000E+00
46	.2190E-03	.0000E+00	.1091E-04	.0000E+00	-.6017E-06	.0000E+00
47	.2200E-03	.0000E+00	.1105E-04	.0000E+00	.5484E-06	.0000E+00
48	.2210E-03	.0000E+00	.8411E-05	.0000E+00	.2000E-05	.0000E+00
49	.2221E-03	.0000E+00	.2036E-05	.0000E+00	.4501E-05	.0000E+00
50	.2233E-03	.0000E+00	-.3632E-05	.0000E+00	.1449E-05	.0000E+00
51	.2247E-03	.0000E+00	-.4791E-05	.0000E+00	-.1954E-06	.0000E+00
52	.2264E-03	.0000E+00	-.3117E-05	.0000E+00	-.1200E-05	.0000E+00
53	.2290E-03	.0000E+00	.0000E+00	.0000E+00	-.1537E-05	.0000E+00
64	.2162E-03	-.4497E-06	.5010E-06	-.1498E-06	-.2102E-05	.1450E-05
65	.2168E-03	.1078E-06	.4924E-05	-.6621E-07	-.1931E-05	.5272E-06
66	.2177E-03	.6491E-07	.8623E-05	-.3181E-07	-.1431E-05	.2151E-06
67	.2188E-03	.2754E-07	.1089E-04	-.2233E-07	-.6029E-06	.9724E-07
68	.2199E-03	.1130E-07	.1102E-04	-.3272E-07	.5595E-06	.4650E-07
69	.2210E-03	.3247E-08	.8273E-05	-.7446E-07	.2070E-05	.2640E-07
70	.2221E-03	-.4297E-08	.2073E-05	.2274E-07	.3500E-05	.2350E-07
71	.2232E-03	-.1469E-07	-.3475E-05	.9279E-07	.1531E-05	.5620E-07
72	.2243E-03	-.3225E-07	-.4763E-05	.3426E-07	-.1818E-06	.1288E-06
73	.2253E-03	-.5835E-07	-.3109E-05	.1090E-07	-.1199E-05	.3042E-06
74	.2260E-03	.0000E+00	.0000E+00	.0000E+00	-.1537E-05	.7246E-06
85	.2103E-03	-.6372E-06	.1407E-06	-.2386E-06	-.2124E-05	.2516E-05
86	.2143E-03	.1829E-06	.4770E-05	-.1324E-06	-.1963E-05	.8751E-06
87	.2166E-03	.1063E-06	.8544E-05	-.7219E-07	-.1444E-05	.3426E-06
88	.2183E-03	.4461E-07	.1084E-04	-.4697E-07	-.6086E-06	.1504E-06
89	.2196E-03	.1815E-07	.1097E-04	-.4280E-07	.5611E-06	.7093E-07
90	.2208E-03	.5085E-08	.8172E-05	-.4451E-07	.2081E-05	.4074E-07

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 6 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
91	.2219E-03	-.6487E-08	.2103E-05	.1396E-07	.3377E-05	.3953E-07
92	.2229E-03	-.2191E-07	-.3348E-05	.5884E-07	.1545E-05	.7583E-07
93	.2238E-03	-.4669E-07	-.4708E-05	.3778E-07	-.1789E-06	.1571E-06
94	.2244E-03	-.7691E-07	-.3088E-05	.1660E-07	-.1202E-05	.3234E-06
95	.2246E-03	.0000E+00	.0000E+00	.0000E+00	-.1541E-05	.5814E-06

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J O I N T D I S P L A C E M E N T S

LOAD CONDITION 7 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
1	.2555E-05	.1061E-07	.2616E-04	.4478E-04	-.3407E-03	-.3658E-07
2	.2599E-05	-.1002E-08	.7701E-03	.2533E-04	-.3107E-03	-.1680E-07
3	.000003	.000000	.001355	.000015	-.000214	.000000
4	.000003	.000000	.001663	.000012	-.000059	.000000
5	.000003	.000000	.001568	.000014	.000159	.000000
6	.2393E-05	.2291E-07	.9313E-03	.2369E-04	.4400E-03	-.9815E-07
7	.2121E-05	-.1463E-09	-.4014E-03	.3900E-04	.7946E-03	-.1771E-06
8	.000002	.000000	-.002481	.000038	.001082	.000000
9	.000001	.000000	-.004808	.000030	.001015	.000000
10	.000001	.000000	-.006616	.000023	.000610	.000000
11	.000000	.000000	-.007293	.000021	.000000	.000000
22	.2641E-05	.7575E-08	.9364E-04	.2809E-04	-.3365E-03	-.2208E-07
23	.2648E-05	-.5325E-09	.7996E-03	.1256E-04	-.3048E-03	-.1073E-07
24	.000003	.000000	.001371	.000006	-.000212	.000000
25	.000003	.000000	.001676	.000005	-.000058	.000000
26	.000003	.000000	.001584	.000007	.000158	.000000
27	.2658E-05	.1735E-07	.9612E-03	.1544E-04	.4361E-03	-.9133E-07
28	.2532E-05	-.6340E-10	-.3369E-03	.3940E-04	.7849E-03	-.2191E-06
29	.000002	.000000	-.002426	.000025	.001082	.000000
30	.000001	.000000	-.004769	.000013	.001014	.000000
31	.000001	.000000	-.006590	.000005	.000610	.000000
32	.000000	.000000	-.007272	.000002	.000000	.000000
43	.2665E-05	.0000E+00	.1183E-03	.0000E+00	-.3312E-03	.0000E+00
44	.2668E-05	.0000E+00	.8096E-03	.0000E+00	-.3020E-03	.0000E+00
45	.000003	.000000	.001376	.000000	-.000211	.000000
46	.000003	.000000	.001680	.000000	-.000058	.000000
47	.000003	.000000	.001589	.000000	.000157	.000000
48	.2979E-05	.0000E+00	.9734E-03	.0000E+00	.4311E-03	.0000E+00
49	.3444E-05	.0000E+00	-.2779E-03	.0000E+00	.7511E-03	.0000E+00
50	.000002	.000000	-.002400	.000000	.001091	.000000
51	.000001	.000000	-.004759	.000000	.001014	.000000
52	.000001	.000000	-.006591	.000000	.000611	.000000
53	.000000	.000000	-.007274	.000000	.000000	.000000
64	.2641E-05	-.7575E-08	.9364E-04	-.2809E-04	-.3365E-03	.2208E-07
65	.2648E-05	.5325E-09	.7996E-03	-.1256E-04	-.3048E-03	.1073E-07
66	.000003	.000000	.001371	-.000006	-.000212	.000000
67	.000003	.000000	.001676	-.000005	-.000058	.000000
68	.000003	.000000	.001584	-.000007	.000158	.000000
69	.2658E-05	-.1735E-07	.9612E-03	-.1544E-04	.4361E-03	.9133E-07
70	.2532E-05	.6340E-10	-.3369E-03	-.3940E-04	.7849E-03	.2191E-06
71	.000002	.000000	-.002426	-.000025	.001082	.000000
72	.000001	.000000	-.004769	-.000013	.001014	.000000
73	.000001	.000000	-.006590	-.000005	.000610	.000000
74	.000000	.000000	-.007272	-.000002	.000000	.000000
85	.2555E-05	-.1061E-07	.2616E-04	-.4478E-04	-.3407E-03	.3658E-07
86	.2599E-05	.1002E-08	.7701E-03	-.2533E-04	-.3107E-03	.1680E-07
87	.000003	.000000	.001355	-.000015	-.000214	.000000
88	.000003	.000000	.001663	-.000012	-.000059	.000000
89	.000003	.000000	.001568	-.000014	.000159	.000000
90	.2393E-05	-.2291E-07	.9313E-03	-.2369E-04	.4400E-03	.9815E-07

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J O I N T D I S P L A C E M E N T S

LOAD CONDITION 7 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
91	.2121E-05	.1463E-09	-.4014E-03	-.3900E-04	.7946E-03	.1771E-06
92	.000002	.000000	-.002481	-.000038	.001082	.000000
93	.000001	.000000	-.004808	-.000030	.001015	.000000
94	.000001	.000000	-.006616	-.000023	.000610	.000000
95	.000000	.000000	-.007293	-.000021	.000000	.000000

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

R E A C T I O N S A N D A P P L I E D F O R C E S

LOAD CONDITION 1 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
1001	.0030	.0000	24.5266	.0000	.0002	.0000
1049	-.3126	.0000	175.6217	.0000	4.5570	.0000
1085	.0030	-.0000	24.5266	.0000	.0002	.0000
TOTAL	-.3066E+00	.6471E-14	.2247E+03	-.3657E-12	.4557E+01	-.6825E-14

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

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(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
1001	.0002	.0000	1.7613	.0000	.0000	.0000
1049	-.0211	.0000	12.6025	.0000	.3324	.0000
1085	.0002	.0000	1.7613	.0000	.0000	.0000
TOTAL	-.2065E-01	.7107E-15	.1612E+02	-.2720E-13	.3324E+00	-.5003E-15

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

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 3 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
1001	.0006	.0000	6.5857	.0000	.0000	.0000
1049	-.0639	.0000	47.0286	.0000	1.2984	.0000
1085	.0006	.0000	6.5857	.0000	.0000	.0000
TOTAL	-.6268E-01	.2559E-14	.6020E+02	-.1052E-12	.1298E+01	-.1946E-14

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

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 4 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
1001	-2.0683	-6.7241	-.6884	.3362	-.1034	-.0151
1049	.0000	-.7753	.0000	5.1724	.0000	-.2258
1085	2.0692	-6.7121	.6884	.3356	.1033	-.0150
TOTAL	-.3153E-02	-.1421E+02	.1543E-13	.5844E+01	-.1421E-03	-.2559E+00

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

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 5 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
1001	-.0794	-.2016	-1.3363	.0101	-.0040	-.0006
1049	.0000	.4031	.0000	-1.5155	.0000	-.0288
1085	.0794	-.2016	1.3363	.0101	.0040	-.0006
TOTAL	.4163E-14	-.4632E-13	.3553E-13	-.1495E+01	.1623E-13	-.2991E-01

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

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 6 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
1001	-3.7369	-.0114	-.0213	.0006	-.1868	.0009
1049	-.2263	.0000	-.0443	.0000	-1.4242	.0000
1085	-3.7369	.0114	-.0213	-.0006	-.1868	-.0009
TOTAL	-.7700E+01	.5751E-14	-.8680E-01	-.2625E-14	-.1798E+01	-.2331E-16

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:307860

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 7 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
1001	-.0454	-.0002	-3.9548	.0000	-.0023	.0000
1049	4.7024	.0000	63.7097	.0000	20.6469	.0000
1085	-.0454	.0002	-3.9548	.0000	-.0023	-.0000
TOTAL	.4612E+01	.1083E-13	.5580E+02	-.4108E-12	.2064E+02	-.7617E-14

LINEA DE ALTA VELOCIDAD

MADRID – BARCELONA – FRONTERA FRANCESA

TRAMO: LLEIDA – MARTORELL, SUBTRAMO III-A

PLATAFORMA

ESTRUCTURA E-8. PASO SUPERIOR P.K. 307+860

ANEJO DE PRUEBA DE CARGA

LINEA DE ALTA VELOCIDAD
MADRID – BARCELONA – FRONTERA FRANCESA
TRAMO: LLEIDA – MARTORELL, SUBTRAMO III A,
PLATAFORMA

ESTRUCTURA E-8. PASO SUPERIOR P.K. 307+860

ANEJO DE PRUEBA DE CARGA

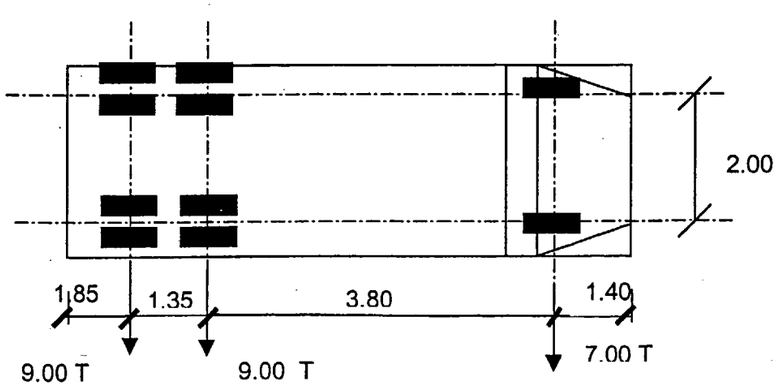
1.- GENERALIDADES

Se calculan en este Anejo los esfuerzos producidos por la acción de un tren de cargas de prueba formado por camiones tipo, que se disponen en una serie de posiciones estudiadas de modo que dan lugar a unos esfuerzos próximos al 80% de los teóricos correspondientes a la envolvente de sobrecarga de uso (sobrecarga uniforme + vehículo pesado) obtenida en el cálculo del tablero.

La estructura analizada es una losa de hormigón armado con luces de 13.00 + 17.00 +13.00 y un ancho de 7.70 m.

2.- TREN DE CARGAS

Se formará mediante camiones tipo de 25 toneladas. La distribución de ejes y pesos se refleja en el siguiente esquema:



En todas las posiciones del tren de cargas, los camiones se dispondrán en 2 hileras en pararelo, ocupando todo el ancho del tablero.

La prueba de carga consistirá en la disposición de los camiones en las situaciones siguientes:

- Posición 1: 4 camiones en vano 1
- Posición 2: 4 camiones en vano 2.

Los resultados del cálculo y los croquis de disposición de camiones se incluyen en el apartado 4 del presente Anejo.

3.- REALIZACION DE LA PRUEBA DE CARGA

En primer lugar se efectuará una detallada inspección de la obra que incluirá no sólo la estructura sino también los aparatos de apoyos y juntas.

Antes de comenzar el ensayo se anotarán las características de los vehículos a utilizar (matrícula, dimensiones y pesos por eje).

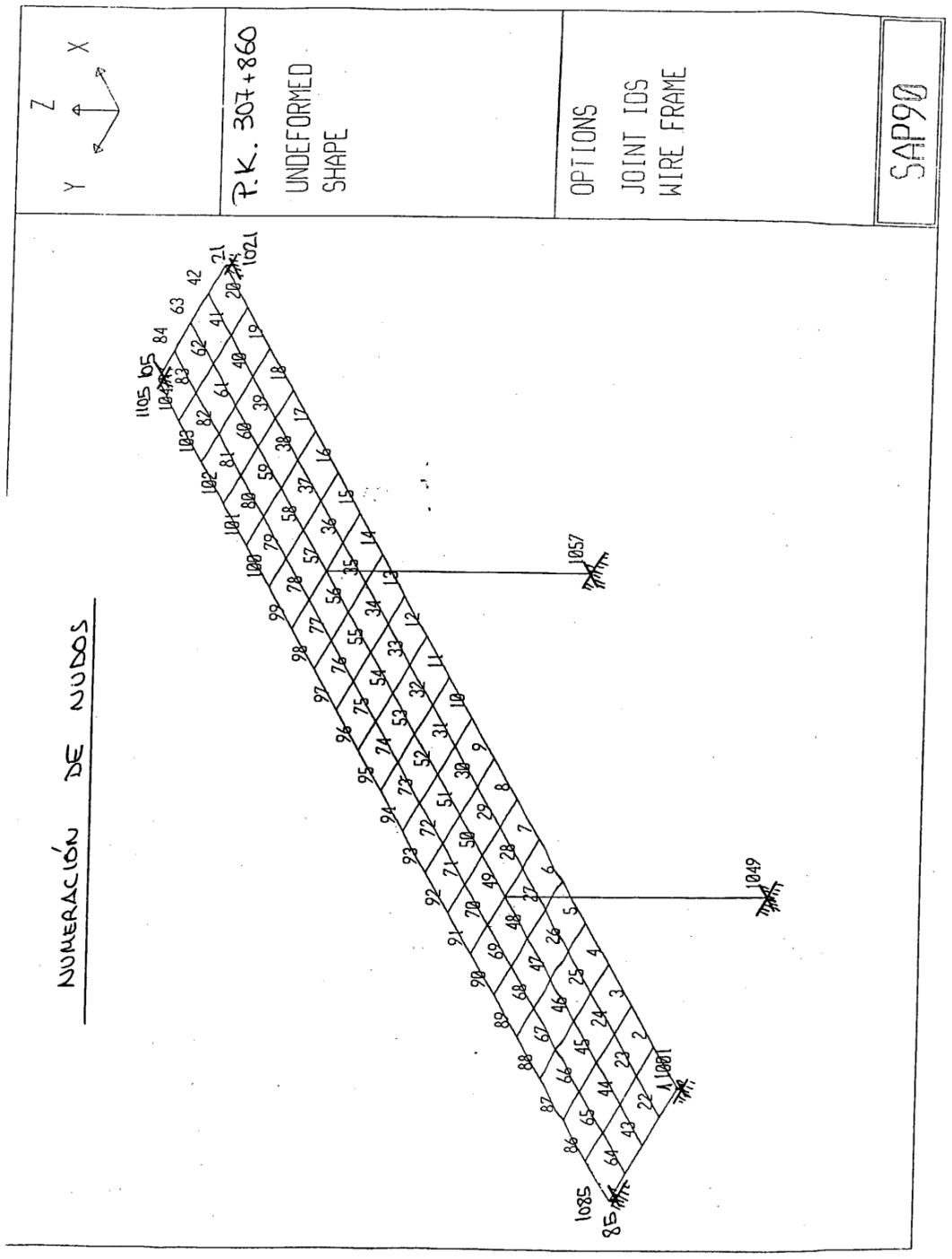
La medición de las deformaciones se efectuará en el centro de la luz del vano (con una precisión de ±0.5 mm) y para su lectura se utilizarán flexímetros.

Las lecturas se realizarán en cada situación de carga de la forma siguiente:

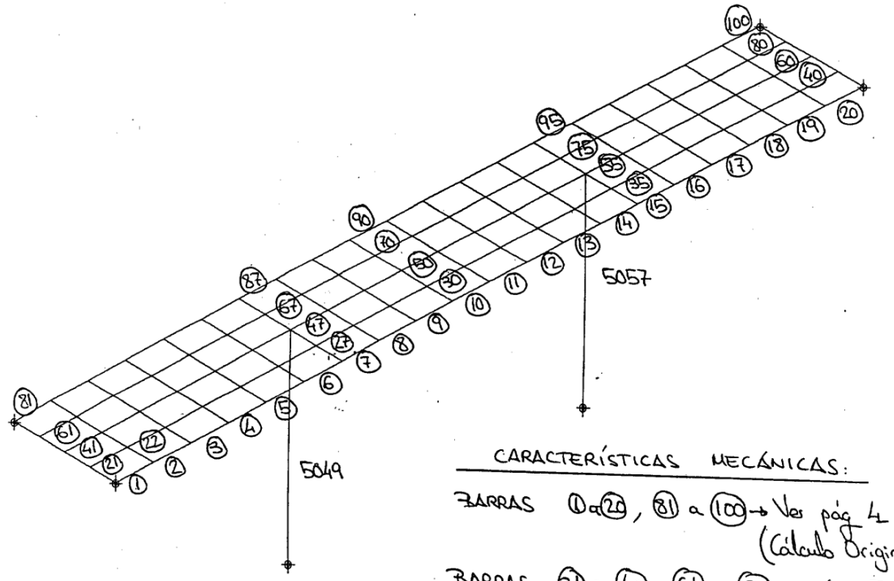
1ª lectura:	En vacío.
2ª lectura:	A los 20 minutos de posicionar la carga.
3ª lectura:	A los 35 minutos de posicionar la carga.
	Se comprobará que las flechas obtenidas en estas dos últimas lecturas estén estabilizadas, admitiéndose una variación de +5%.
4ª lectura:	A los 15 minutos de retirar la carga.

4.- CALCULO DE ESFUERZOS Y DEFORMACIONES

Se utiliza el mismo modelo de cálculo y programa que el empleado para el dimensionamiento de la estructura. Los correspondientes listados, esfuerzos y deformaciones obtenidos se acompañan a continuación.



NUMERACIÓN DE BARRAS (LONGITUDINALES Y PILARES)



Z
Y X

P.K. 307+860
UNDEFORMED SHAPE

OPTIONS
RESTRAINTS
WIRE FRAME

SAP90

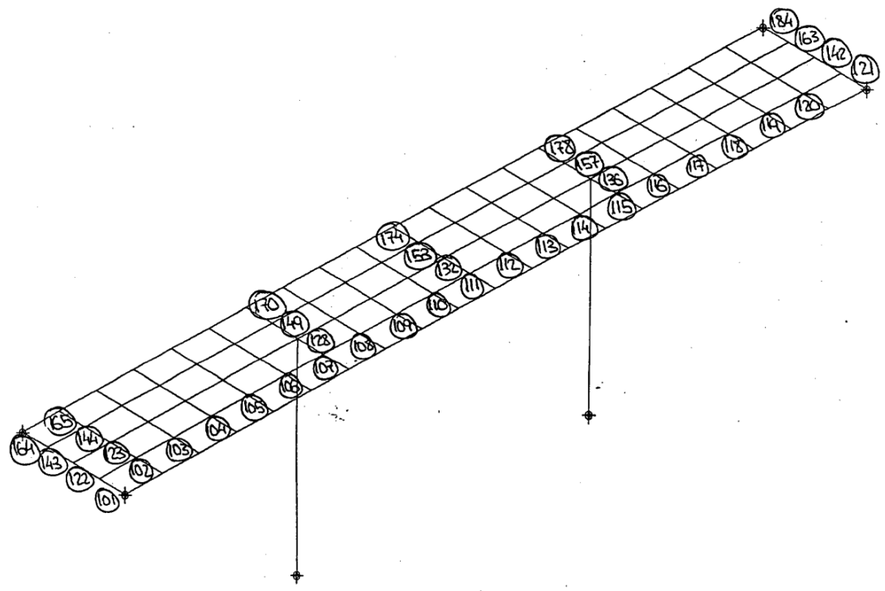
CARACTERÍSTICAS MECÁNICAS:

BARRAS 1 a 20, 81 a 100 → Ver pág 4 (Cálculo Original)

BARRAS 21 a 40, 61 a 80 → pág 5

BARRAS 41 a 60 ⟶ pág 6

NUMERACIÓN DE BARRAS (TRANSVERSALES)



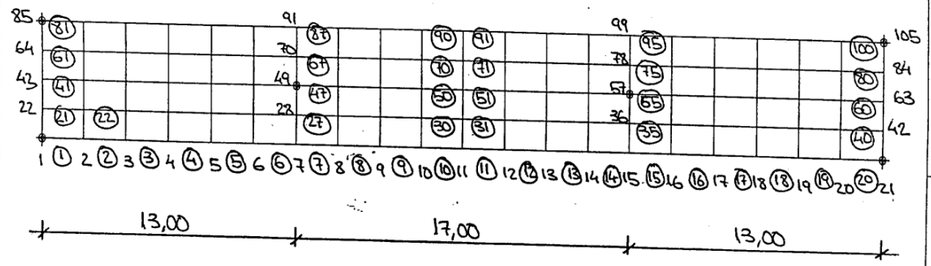
Z
Y X

P.K. 307+860
UNDEFORMED SHAPE

OPTIONS
RESTRAINTS
WIRE FRAME

SAP90

PLANTA



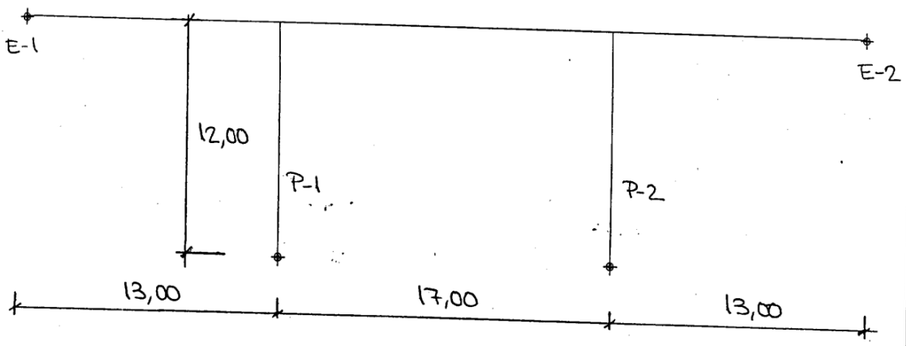
Y
X

P.K. 307+860
UNDEFORMED SHAPE

OPTIONS
RESTRAINTS
WIRE FRAME

SAP90

ALZADO



Z
X

P.K. 307+860
UNDEFORMED SHAPE

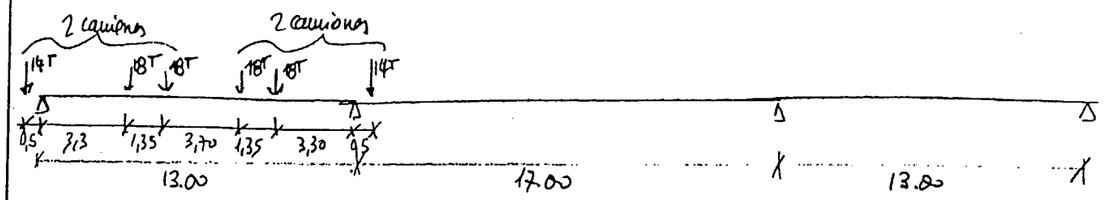
OPTIONS
RESTRAINTS
WIRE FRAME

SAP90

FECHA
FIRMA:
Hoja ..... de .....

PRUEBA DE CARGA

Pos.1=



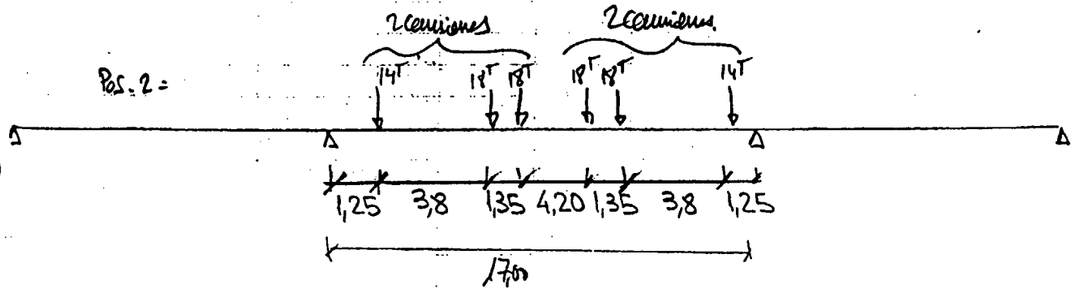
Posición 1: Centro Vano 1:

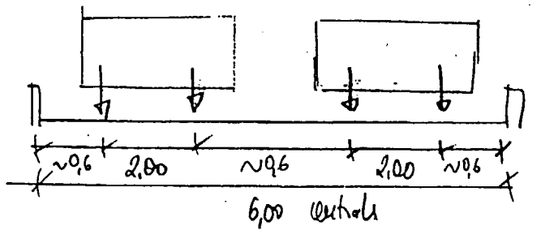
Máxima sobrecarga: $0,4 \times 13 \times 7,70 + 60 = 100,04^T \Rightarrow$ 4 camiones.

Posición 2: Centro de vano 2.

Máxima sobrecarga: $0,4 \times 17 \times 7,70 + 60 = 112^T \Rightarrow$ 4 camiones.

Pos. 2 =

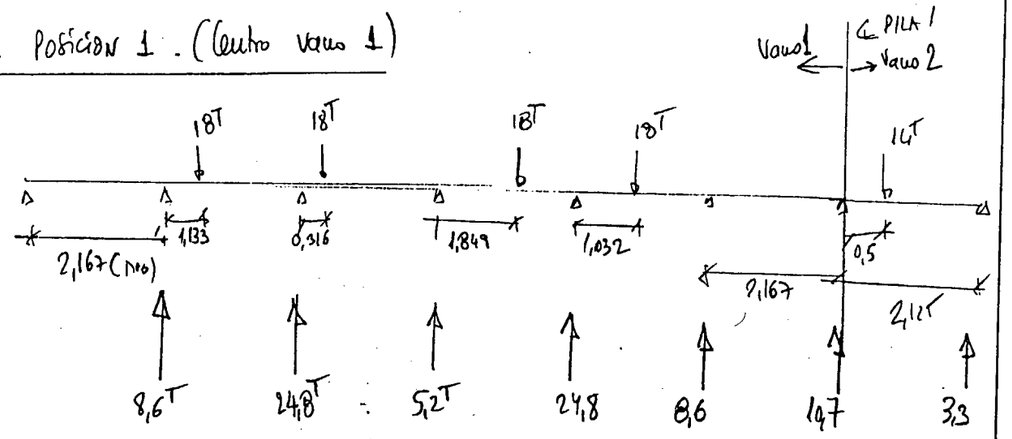




FECHA
FIRMA:
Hoja ..... de .....

Cargas en nudos

HIP1: Posición 1. (Centro vano 1)



Nudos	Carga (TON)
23	2,15
24	6,20
25	1,30
26	6,20
27	2,15
28	2,675
29	0,825

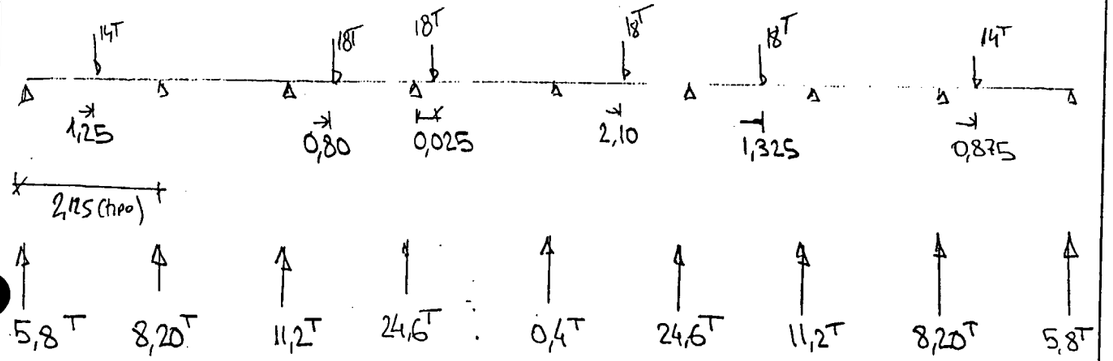
Nudo	Carga (TON)
44	4,30
45	12,40
46	2,60
47	12,40
48.	4,30
49	5,35
50	1,65T

Nudo	Carga (TON)
65	2,15
66	6,20
67	1,30
68	6,20
69	2,15
70	2,07T
71	0,82T

Σ Cargas: 80 TON

FECHA
FIRMA:
Hoja ..... de .....

HIP 2: Posición 2 (Centro vano 2)



Carga en nudos.

Nudo	25% Carga (TON)
28	1,45
29	2,05
30	2,8
31	6,15
32	0,1
33	6,15
34	2,8
35	2,05
36	1,45

Nudo	50% Carga (TON)
49	2,9
50	4,1
51	5,6
52	12,3
53	0,2
54	12,3
55	5,6
56	4,1
57	2,9

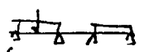
Nudo	25% Carga (TON)
70	1,45
71	2,05
72	2,8
73	6,15
74	0,1
75	6,15
76	2,8
77	2,05
78	1,45

Σ Cargas = 100 TON

FECHA
FIRMA.
Hoja . . . de . .

A continuación se detallan los momentos flectores producidos por la sobrecarga vuelve más el carro de la Destrucción, tenidos en cuenta en el Proyecto Original.

Estos esfuerzos corresponden a la hipótesis "B", módulo Bridge del Programa "SAP-90"



Centro vano 1

Barra 4	4,2	TXM
24	52'6	
44	63,6	
64	52'6	
84	4,2	
	177,2	TXM

Centro vano 2

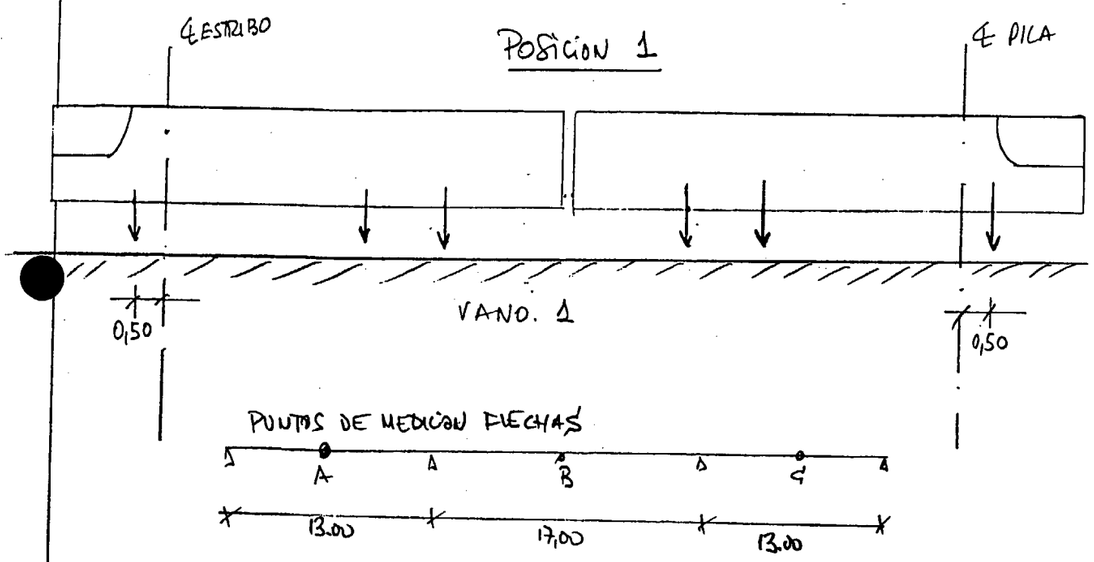
Barra 10	4,8	TXM
30	58,0	
50	70	
70	58	
90	4,8	
	195'6	

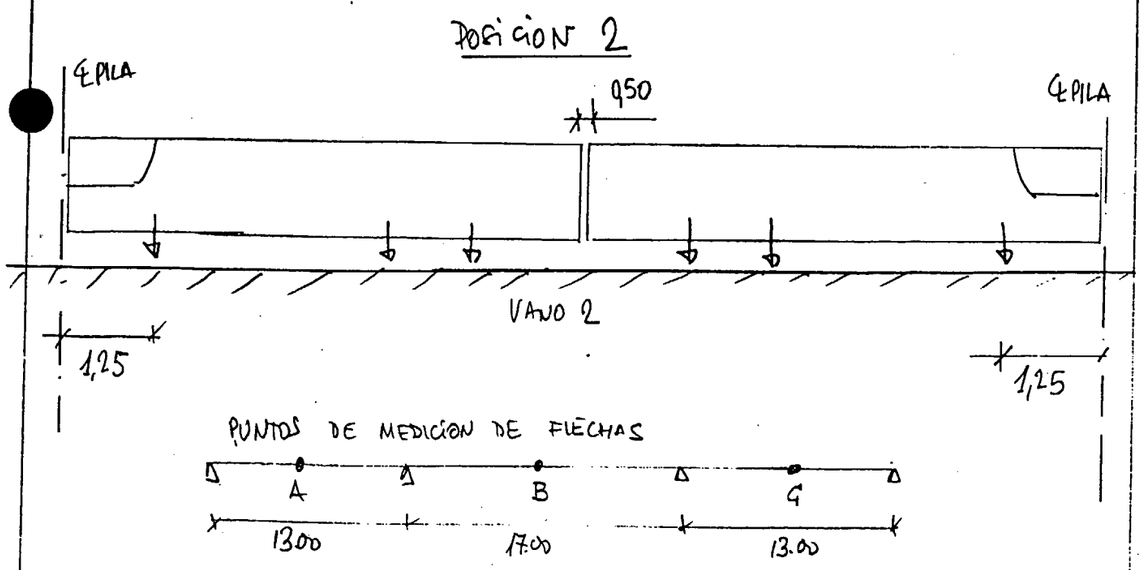
		FECHA
		FIRMA.
		Hoja de

PK 312+917,600

PRUEBA DE CARGA

CROQUIS DE DISPOSICIÓN DE CAMIONES





En las dos posiciones del tren de cargas, los 4 camiones se dispondrán en dos hileras en paralelo, ocupando todo el ancho del tablero.

```
C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE    1
                                          PROGRAM:SAP90/FILE:PCARGA.SAP
 REPOSICION 307+860. 3 VANOS 13+17+13 FILE:PCARGA. PRUEBA DE CARGA.

 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
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REPOSICION 307+860. 3 VANOS 13+17+13 FILE:PCARGA. PRUEBA DE CARGA.

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	12.000
2	2.167	.000	12.000
3	4.333	.000	12.000
4	6.500	.000	12.000
5	8.667	.000	12.000
6	10.833	.000	12.000
7	13.000	.000	12.000
8	15.125	.000	12.000
9	17.250	.000	12.000
10	19.375	.000	12.000
11	21.500	.000	12.000
12	23.625	.000	12.000
13	25.750	.000	12.000
14	27.875	.000	12.000
15	30.000	.000	12.000
16	32.167	.000	12.000
17	34.333	.000	12.000
18	36.500	.000	12.000
19	38.667	.000	12.000
20	40.833	.000	12.000
21	43.000	.000	12.000
22	.000	1.500	12.000
23	2.167	1.500	12.000
24	4.333	1.500	12.000
25	6.500	1.500	12.000
26	8.667	1.500	12.000
27	10.833	1.500	12.000
28	13.000	1.500	12.000
29	15.125	1.500	12.000
30	17.250	1.500	12.000
31	19.375	1.500	12.000
32	21.500	1.500	12.000
33	23.625	1.500	12.000
34	25.750	1.500	12.000
35	27.875	1.500	12.000
36	30.000	1.500	12.000
37	32.167	1.500	12.000
38	34.333	1.500	12.000
39	36.500	1.500	12.000
40	38.667	1.500	12.000
41	40.833	1.500	12.000
42	43.000	1.500	12.000
43	.000	3.000	12.000
44	2.167	3.000	12.000
45	4.333	3.000	12.000
46	6.500	3.000	12.000
47	8.667	3.000	12.000
48	10.833	3.000	12.000
49	13.000	3.000	12.000
50	15.125	3.000	12.000
51	17.250	3.000	12.000
52	19.375	3.000	12.000

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:PCARGA. PRUEBA DE CARGA.

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
53	21.500	3.000	12.000
54	23.625	3.000	12.000
55	25.750	3.000	12.000
56	27.875	3.000	12.000
57	30.000	3.000	12.000
58	32.167	3.000	12.000
59	34.333	3.000	12.000
60	36.500	3.000	12.000
61	38.667	3.000	12.000
62	40.833	3.000	12.000
63	43.000	3.000	12.000
64	.000	4.500	12.000
65	2.167	4.500	12.000
66	4.333	4.500	12.000
67	6.500	4.500	12.000
68	8.667	4.500	12.000
69	10.833	4.500	12.000
70	13.000	4.500	12.000
71	15.125	4.500	12.000
72	17.250	4.500	12.000
73	19.375	4.500	12.000
74	21.500	4.500	12.000
75	23.625	4.500	12.000
76	25.750	4.500	12.000
77	27.875	4.500	12.000
78	30.000	4.500	12.000
79	32.167	4.500	12.000
80	34.333	4.500	12.000
81	36.500	4.500	12.000
82	38.667	4.500	12.000
83	40.833	4.500	12.000
84	43.000	4.500	12.000
85	.000	6.000	12.000
86	2.167	6.000	12.000
87	4.333	6.000	12.000
88	6.500	6.000	12.000
89	8.667	6.000	12.000
90	10.833	6.000	12.000
91	13.000	6.000	12.000
92	15.125	6.000	12.000
93	17.250	6.000	12.000
94	19.375	6.000	12.000
95	21.500	6.000	12.000
96	23.625	6.000	12.000
97	25.750	6.000	12.000
98	27.875	6.000	12.000
99	30.000	6.000	12.000
100	32.167	6.000	12.000
101	34.333	6.000	12.000
102	36.500	6.000	12.000
103	38.667	6.000	12.000
104	40.833	6.000	12.000

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
105	43.000	6.000	12.000
1001	.000	.000	11.950
1021	43.000	.000	11.950
1049	13.000	3.000	.000
1057	30.000	3.000	.000
1085	.000	6.000	11.950
1105	43.000	6.000	11.950

R E S T R A I N T D A T A

JOINT	RX	RY	RZ	RXX	RYY	RZZ
1001	1	1	1	1	1	1
1021	1	1	1	1	1	1
1049	1	1	1	1	1	1
1057	1	1	1	1	1	1
1085	1	1	1	1	1	1
1105	1	1	1	1	1	1

F R A M E C O N T R O L D A T A

NUMBER OF MEMBER SECTION PROPERTIES	12
NUMBER OF SPAN LOADING PATTERNS	0
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

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	.134E+01	.34060E+00	.89100E-01	.25150E+00	.107E+01	.107E+01
2	.123E+01	.28660E+00	.74000E-01	.21260E+00	.983E+00	.983E+00
3	.571E+00	.12880E+00	.63000E-02	.12250E+00	.457E+00	.457E+00
4	.934E+00	.11926E+00	.57832E-01	.91372E-01	.778E+00	.778E+00
5	.119E+01	.10097E+00	.30045E-01	.46640E+00	.993E+00	.993E+00
6	.190E+01	.36439E+00	.12223E+00	.74454E+00	.159E+01	.159E+01
7	.118E+01	.99804E-01	.29753E-01	.45297E+00	.984E+00	.984E+00
8	.188E+01	.35966E+00	.12104E+00	.72311E+00	.157E+01	.157E+01
9	.117E+01	.98640E-01	.29462E-01	.43980E+00	.974E+00	.974E+00
10	.187E+01	.35493E+00	.11986E+00	.70209E+00	.155E+01	.155E+01
11	.785E+00	.98175E-01	.49087E-01	.49087E-01	.393E+00	.393E+00
12	.800E-01	.73242E-03	.10667E-02	.26667E-03	.667E-01	.667E-01

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	.3500E+07	.1346E+07	.3354E+01	.0000E+00	.1000E-04
2	.3500E+07	.1346E+07	.3073E+01	.0000E+00	.1000E-04
3	.3500E+07	.1346E+07	.1427E+01	.0000E+00	.1000E-04
4	.3500E+07	.1346E+07	.0000E+00	.0000E+00	.0000E+00
5	.3500E+07	.1346E+07	.0000E+00	.0000E+00	.0000E+00
6	.3500E+07	.1346E+07	.0000E+00	.0000E+00	.0000E+00
7	.3500E+07	.1346E+07	.0000E+00	.0000E+00	.0000E+00
8	.3500E+07	.1346E+07	.0000E+00	.0000E+00	.0000E+00
9	.3500E+07	.1346E+07	.0000E+00	.0000E+00	.0000E+00
10	.3500E+07	.1346E+07	.0000E+00	.0000E+00	.0000E+00
11	.3500E+07	.1346E+07	.0000E+00	.0000E+00	.0000E+00
12	.4300E+05	.9000E+02	.0000E+00	.0000E+00	.0000E+00

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	-2	0	3	3	0	000000	.00	2.17
2	2	3	-2	0	3	3	0	000000	.00	2.17
3	3	4	-2	0	3	3	0	000000	.00	2.17
4	4	5	-2	0	3	3	0	000000	.00	2.17
5	5	6	-2	0	3	3	0	000000	.00	2.17
6	6	7	-2	0	3	3	0	000000	.00	2.17
7	7	8	-2	0	3	3	0	000000	.00	2.13
8	8	9	-2	0	3	3	0	000000	.00	2.13
9	9	10	-2	0	3	3	0	000000	.00	2.13
10	10	11	-2	0	3	3	0	000000	.00	2.13
11	11	12	-2	0	3	3	0	000000	.00	2.13
12	12	13	-2	0	3	3	0	000000	.00	2.13
13	13	14	-2	0	3	3	0	000000	.00	2.13
14	14	15	-2	0	3	3	0	000000	.00	2.13
15	15	16	-2	0	3	3	0	000000	.00	2.17
16	16	17	-2	0	3	3	0	000000	.00	2.17
17	17	18	-2	0	3	3	0	000000	.00	2.17
18	18	19	-2	0	3	3	0	000000	.00	2.17
19	19	20	-2	0	3	3	0	000000	.00	2.17
20	20	21	-2	0	3	3	0	000000	.00	2.17
21	22	23	-2	0	2	2	0	000000	.00	2.17
22	23	24	-2	0	2	2	0	000000	.00	2.17
23	24	25	-2	0	2	2	0	000000	.00	2.17
24	25	26	-2	0	2	2	0	000000	.00	2.17
25	26	27	-2	0	2	2	0	000000	.00	2.17
26	27	28	-2	0	2	2	0	000000	.00	2.17
27	28	29	-2	0	2	2	0	000000	.00	2.13
28	29	30	-2	0	2	2	0	000000	.00	2.13
29	30	31	-2	0	2	2	0	000000	.00	2.13
30	31	32	-2	0	2	2	0	000000	.00	2.13
31	32	33	-2	0	2	2	0	000000	.00	2.13
32	33	34	-2	0	2	2	0	000000	.00	2.13
33	34	35	-2	0	2	2	0	000000	.00	2.13
34	35	36	-2	0	2	2	0	000000	.00	2.13
35	36	37	-2	0	2	2	0	000000	.00	2.17
36	37	38	-2	0	2	2	0	000000	.00	2.17
37	38	39	-2	0	2	2	0	000000	.00	2.17
38	39	40	-2	0	2	2	0	000000	.00	2.17
39	40	41	-2	0	2	2	0	000000	.00	2.17
40	41	42	-2	0	2	2	0	000000	.00	2.17
41	43	44	-2	0	1	1	0	000000	.00	2.17
42	44	45	-2	0	1	1	0	000000	.00	2.17
43	45	46	-2	0	1	1	0	000000	.00	2.17
44	46	47	-2	0	1	1	0	000000	.00	2.17
45	47	48	-2	0	1	1	0	000000	.00	2.17
46	48	49	-2	0	1	1	0	000000	.00	2.17
47	49	50	-2	0	1	1	0	000000	.00	2.13
48	50	51	-2	0	1	1	0	000000	.00	2.13
49	51	52	-2	0	1	1	0	000000	.00	2.13
50	52	53	-2	0	1	1	0	000000	.00	2.13
51	53	54	-2	0	1	1	0	000000	.00	2.13

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
52	54	55	-2	0	1	1	0	000000	.00	2.13
53	55	56	-2	0	1	1	0	000000	.00	2.13
54	56	57	-2	0	1	1	0	000000	.00	2.13
55	57	58	-2	0	1	1	0	000000	.00	2.17
56	58	59	-2	0	1	1	0	000000	.00	2.17
57	59	60	-2	0	1	1	0	000000	.00	2.17
58	60	61	-2	0	1	1	0	000000	.00	2.17
59	61	62	-2	0	1	1	0	000000	.00	2.17
60	62	63	-2	0	1	1	0	000000	.00	2.17
61	64	65	-2	0	2	2	0	000000	.00	2.17
62	65	66	-2	0	2	2	0	000000	.00	2.17
63	66	67	-2	0	2	2	0	000000	.00	2.17
64	67	68	-2	0	2	2	0	000000	.00	2.17
65	68	69	-2	0	2	2	0	000000	.00	2.17
66	69	70	-2	0	2	2	0	000000	.00	2.17
67	70	71	-2	0	2	2	0	000000	.00	2.13
68	71	72	-2	0	2	2	0	000000	.00	2.13
69	72	73	-2	0	2	2	0	000000	.00	2.13
70	73	74	-2	0	2	2	0	000000	.00	2.13
71	74	75	-2	0	2	2	0	000000	.00	2.13
72	75	76	-2	0	2	2	0	000000	.00	2.13
73	76	77	-2	0	2	2	0	000000	.00	2.13
74	77	78	-2	0	2	2	0	000000	.00	2.13
75	78	79	-2	0	2	2	0	000000	.00	2.17
76	79	80	-2	0	2	2	0	000000	.00	2.17
77	80	81	-2	0	2	2	0	000000	.00	2.17
78	81	82	-2	0	2	2	0	000000	.00	2.17
79	82	83	-2	0	2	2	0	000000	.00	2.17
80	83	84	-2	0	2	2	0	000000	.00	2.17
81	85	86	-2	0	3	3	0	000000	.00	2.17
82	86	87	-2	0	3	3	0	000000	.00	2.17
83	87	88	-2	0	3	3	0	000000	.00	2.17
84	88	89	-2	0	3	3	0	000000	.00	2.17
85	89	90	-2	0	3	3	0	000000	.00	2.17
86	90	91	-2	0	3	3	0	000000	.00	2.17
87	91	92	-2	0	3	3	0	000000	.00	2.13
88	92	93	-2	0	3	3	0	000000	.00	2.13
89	93	94	-2	0	3	3	0	000000	.00	2.13
90	94	95	-2	0	3	3	0	000000	.00	2.13
91	95	96	-2	0	3	3	0	000000	.00	2.13
92	96	97	-2	0	3	3	0	000000	.00	2.13
93	97	98	-2	0	3	3	0	000000	.00	2.13
94	98	99	-2	0	3	3	0	000000	.00	2.13
95	99	100	-2	0	3	3	0	000000	.00	2.17
96	100	101	-2	0	3	3	0	000000	.00	2.17
97	101	102	-2	0	3	3	0	000000	.00	2.17
98	102	103	-2	0	3	3	0	000000	.00	2.17
99	103	104	-2	0	3	3	0	000000	.00	2.17
100	104	105	-2	0	3	3	0	000000	.00	2.17
101	1	22	3	0	4	4	0	000000	.00	1.50
102	2	23	3	0	5	5	0	000000	.00	1.50

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
103	3	24	3	0	5	5	0	000000	.00	1.50
104	4	25	3	0	5	5	0	000000	.00	1.50
105	5	26	3	0	5	5	0	000000	.00	1.50
106	6	27	3	0	5	5	0	000000	.00	1.50
107	7	28	3	0	7	7	0	000000	.00	1.50
108	8	29	3	0	9	9	0	000000	.00	1.50
109	9	30	3	0	9	9	0	000000	.00	1.50
110	10	31	3	0	9	9	0	000000	.00	1.50
111	11	32	3	0	9	9	0	000000	.00	1.50
112	12	33	3	0	9	9	0	000000	.00	1.50
113	13	34	3	0	9	9	0	000000	.00	1.50
114	14	35	3	0	9	9	0	000000	.00	1.50
115	15	36	3	0	7	7	0	000000	.00	1.50
116	16	37	3	0	5	5	0	000000	.00	1.50
117	17	38	3	0	5	5	0	000000	.00	1.50
118	18	39	3	0	5	5	0	000000	.00	1.50
119	19	40	3	0	5	5	0	000000	.00	1.50
120	20	41	3	0	5	5	0	000000	.00	1.50
121	21	42	3	0	4	4	0	000000	.00	1.50
122	22	43	3	0	4	4	0	000000	.00	1.50
123	23	44	3	0	6	6	0	000000	.00	1.50
124	24	45	3	0	6	6	0	000000	.00	1.50
125	25	46	3	0	6	6	0	000000	.00	1.50
126	26	47	3	0	6	6	0	000000	.00	1.50
127	27	48	3	0	6	6	0	000000	.00	1.50
128	28	49	3	0	8	8	0	000000	.00	1.50
129	29	50	3	0	10	10	0	000000	.00	1.50
130	30	51	3	0	10	10	0	000000	.00	1.50
131	31	52	3	0	10	10	0	000000	.00	1.50
132	32	53	3	0	10	10	0	000000	.00	1.50
133	33	54	3	0	10	10	0	000000	.00	1.50
134	34	55	3	0	10	10	0	000000	.00	1.50
135	35	56	3	0	10	10	0	000000	.00	1.50
136	36	57	3	0	8	8	0	000000	.00	1.50
137	37	58	3	0	6	6	0	000000	.00	1.50
138	38	59	3	0	6	6	0	000000	.00	1.50
139	39	60	3	0	6	6	0	000000	.00	1.50
140	40	61	3	0	6	6	0	000000	.00	1.50
141	41	62	3	0	6	6	0	000000	.00	1.50
142	42	63	3	0	4	4	0	000000	.00	1.50
143	43	64	3	0	4	4	0	000000	.00	1.50
144	44	65	3	0	6	6	0	000000	.00	1.50
145	45	66	3	0	6	6	0	000000	.00	1.50
146	46	67	3	0	6	6	0	000000	.00	1.50
147	47	68	3	0	6	6	0	000000	.00	1.50
148	48	69	3	0	6	6	0	000000	.00	1.50
149	49	70	3	0	8	8	0	000000	.00	1.50
150	50	71	3	0	10	10	0	000000	.00	1.50
151	51	72	3	0	10	10	0	000000	.00	1.50
152	52	73	3	0	10	10	0	000000	.00	1.50
153	53	74	3	0	10	10	0	000000	.00	1.50

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
154	54	75	3	0	10	10	0	000000	.00	1.50
155	55	76	3	0	10	10	0	000000	.00	1.50
156	56	77	3	0	10	10	0	000000	.00	1.50
157	57	78	3	0	8	8	0	000000	.00	1.50
158	58	79	3	0	6	6	0	000000	.00	1.50
159	59	80	3	0	6	6	0	000000	.00	1.50
160	60	81	3	0	6	6	0	000000	.00	1.50
161	61	82	3	0	6	6	0	000000	.00	1.50
162	62	83	3	0	6	6	0	000000	.00	1.50
163	63	84	3	0	4	4	0	000000	.00	1.50
164	64	85	3	0	4	4	0	000000	.00	1.50
165	65	86	3	0	5	5	0	000000	.00	1.50
166	66	87	3	0	5	5	0	000000	.00	1.50
167	67	88	3	0	5	5	0	000000	.00	1.50
168	68	89	3	0	5	5	0	000000	.00	1.50
169	69	90	3	0	5	5	0	000000	.00	1.50
170	70	91	3	0	7	7	0	000000	.00	1.50
171	71	92	3	0	9	9	0	000000	.00	1.50
172	72	93	3	0	9	9	0	000000	.00	1.50
173	73	94	3	0	9	9	0	000000	.00	1.50
174	74	95	3	0	9	9	0	000000	.00	1.50
175	75	96	3	0	9	9	0	000000	.00	1.50
176	76	97	3	0	9	9	0	000000	.00	1.50
177	77	98	3	0	9	9	0	000000	.00	1.50
178	78	99	3	0	7	7	0	000000	.00	1.50
179	79	100	3	0	5	5	0	000000	.00	1.50
180	80	101	3	0	5	5	0	000000	.00	1.50
181	81	102	3	0	5	5	0	000000	.00	1.50
182	82	103	3	0	5	5	0	000000	.00	1.50
183	83	104	3	0	5	5	0	000000	.00	1.50
184	84	105	3	0	4	4	0	000000	.00	1.50
5001	1001	1	3	0	12	12	0	010010	.00	.05
5021	1021	21	3	0	12	12	0	010010	.00	.05
5049	1049	49	3	0	11	11	0	000000	.00	12.00
5057	1057	57	3	0	11	11	0	000000	.00	12.00
5085	1085	85	3	0	12	12	0	010010	.00	.05
5105	1105	105	3	0	12	12	0	010010	.00	.05

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	144.2220	.0000
2	264.2350	.0000
3	122.7005	.0000
4	.0000	.0000
5	.0000	.0000
6	.0000	.0000
7	.0000	.0000
8	.0000	.0000
9	.0000	.0000
10	.0000	.0000
11	.0000	.0000
12	.0000	.0000
TOTAL	531.1575	.0000

J O I N T L O A D S

JOINT	LOAD	FX	FY	FZ	MX	MY	MZ
23	1	.000E+00	.000E+00	-.215E+01	.000E+00	.000E+00	.000E+00
24	1	.000E+00	.000E+00	-.620E+01	.000E+00	.000E+00	.000E+00
25	1	.000E+00	.000E+00	-.130E+01	.000E+00	.000E+00	.000E+00
26	1	.000E+00	.000E+00	-.620E+01	.000E+00	.000E+00	.000E+00
27	1	.000E+00	.000E+00	-.215E+01	.000E+00	.000E+00	.000E+00
28	1	.000E+00	.000E+00	-.267E+01	.000E+00	.000E+00	.000E+00
29	1	.000E+00	.000E+00	-.825E+00	.000E+00	.000E+00	.000E+00
44	1	.000E+00	.000E+00	-.430E+01	.000E+00	.000E+00	.000E+00
45	1	.000E+00	.000E+00	-.124E+02	.000E+00	.000E+00	.000E+00
46	1	.000E+00	.000E+00	-.260E+01	.000E+00	.000E+00	.000E+00
47	1	.000E+00	.000E+00	-.124E+02	.000E+00	.000E+00	.000E+00
48	1	.000E+00	.000E+00	-.430E+01	.000E+00	.000E+00	.000E+00
49	1	.000E+00	.000E+00	-.535E+01	.000E+00	.000E+00	.000E+00
50	1	.000E+00	.000E+00	-.165E+01	.000E+00	.000E+00	.000E+00
65	1	.000E+00	.000E+00	-.215E+01	.000E+00	.000E+00	.000E+00
66	1	.000E+00	.000E+00	-.620E+01	.000E+00	.000E+00	.000E+00
67	1	.000E+00	.000E+00	-.130E+01	.000E+00	.000E+00	.000E+00
68	1	.000E+00	.000E+00	-.620E+01	.000E+00	.000E+00	.000E+00
69	1	.000E+00	.000E+00	-.215E+01	.000E+00	.000E+00	.000E+00
70	1	.000E+00	.000E+00	-.267E+01	.000E+00	.000E+00	.000E+00
71	1	.000E+00	.000E+00	-.825E+00	.000E+00	.000E+00	.000E+00
28	2	.000E+00	.000E+00	-.145E+01	.000E+00	.000E+00	.000E+00
29	2	.000E+00	.000E+00	-.205E+01	.000E+00	.000E+00	.000E+00
30	2	.000E+00	.000E+00	-.280E+01	.000E+00	.000E+00	.000E+00
31	2	.000E+00	.000E+00	-.615E+01	.000E+00	.000E+00	.000E+00
32	2	.000E+00	.000E+00	-.100E+00	.000E+00	.000E+00	.000E+00
33	2	.000E+00	.000E+00	-.615E+01	.000E+00	.000E+00	.000E+00
34	2	.000E+00	.000E+00	-.280E+01	.000E+00	.000E+00	.000E+00
35	2	.000E+00	.000E+00	-.205E+01	.000E+00	.000E+00	.000E+00
36	2	.000E+00	.000E+00	-.145E+01	.000E+00	.000E+00	.000E+00
49	2	.000E+00	.000E+00	-.290E+01	.000E+00	.000E+00	.000E+00
50	2	.000E+00	.000E+00	-.410E+01	.000E+00	.000E+00	.000E+00
51	2	.000E+00	.000E+00	-.560E+01	.000E+00	.000E+00	.000E+00
52	2	.000E+00	.000E+00	-.123E+02	.000E+00	.000E+00	.000E+00
53	2	.000E+00	.000E+00	-.200E+00	.000E+00	.000E+00	.000E+00
54	2	.000E+00	.000E+00	-.123E+02	.000E+00	.000E+00	.000E+00
55	2	.000E+00	.000E+00	-.560E+01	.000E+00	.000E+00	.000E+00
56	2	.000E+00	.000E+00	-.410E+01	.000E+00	.000E+00	.000E+00
57	2	.000E+00	.000E+00	-.290E+01	.000E+00	.000E+00	.000E+00
70	2	.000E+00	.000E+00	-.145E+01	.000E+00	.000E+00	.000E+00
71	2	.000E+00	.000E+00	-.205E+01	.000E+00	.000E+00	.000E+00
72	2	.000E+00	.000E+00	-.280E+01	.000E+00	.000E+00	.000E+00
73	2	.000E+00	.000E+00	-.615E+01	.000E+00	.000E+00	.000E+00
74	2	.000E+00	.000E+00	-.100E+00	.000E+00	.000E+00	.000E+00
75	2	.000E+00	.000E+00	-.615E+01	.000E+00	.000E+00	.000E+00
76	2	.000E+00	.000E+00	-.280E+01	.000E+00	.000E+00	.000E+00
77	2	.000E+00	.000E+00	-.205E+01	.000E+00	.000E+00	.000E+00
78	2	.000E+00	.000E+00	-.145E+01	.000E+00	.000E+00	.000E+00

J O I N T A N D E L E M E N T O U T P U T S E L E C T I O N

TYPE		FIRST ID	LAST ID	ID INC	CODE
1	(JOINT DISPL)	1	105	1	1
2	(JOINT REACT)	1001	1021	20	1
2	(JOINT REACT)	1085	1105	20	1
2	(JOINT REACT)	1049	1057	8	1
5	(FRAME ELEMT)	5049	5049	1	1
5	(FRAME ELEMT)	5001	5001	1	1
5	(FRAME ELEMT)	5021	5021	1	1
5	(FRAME ELEMT)	1	10	1	1
5	(FRAME ELEMT)	21	30	1	1
5	(FRAME ELEMT)	41	50	1	1
5	(FRAME ELEMT)	61	70	1	1
5	(FRAME ELEMT)	81	90	1	1

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:PCARGA. PRUEBA DE CARGA.

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
1	-.7057E-03	-.1327E-07	-.2185E-03	-.1179E-03	.5331E-03	.4300E-07
2	-.000706	.000000	-.001389	-.000070	.000454	.000000
3	-.000706	.000000	-.002157	-.000039	.000220	.000000
4	-.000706	.000000	-.002345	-.000020	-.000052	.000000
5	-.000706	.000000	-.001967	-.000009	-.000290	.000000
6	-.000706	.000000	-.001175	.000004	-.000411	.000000
7	-.7058E-03	-.7323E-10	-.3284E-03	.1326E-04	-.3418E-03	.4812E-07
8	-.7057E-03	.7096E-08	.2581E-03	.9499E-05	-.2073E-03	.2728E-07
9	-.7056E-03	.4708E-08	.5820E-03	.5236E-05	-.1002E-03	.1321E-07
10	-.7054E-03	.2687E-08	.7040E-03	.2644E-05	-.1825E-04	.5610E-08
11	-.7053E-03	.1957E-08	.6757E-03	.1166E-05	.4073E-04	.7894E-09
12	-.7051E-03	.2279E-08	.5459E-03	.2443E-06	.7708E-04	-.3618E-08
13	-.7050E-03	.3709E-08	.3627E-03	-.5191E-06	.9081E-04	-.9783E-08
14	-.7049E-03	.5461E-08	.1749E-03	-.1340E-05	.8174E-04	-.2070E-07
15	-.7048E-03	-.1950E-09	.2877E-04	-.1708E-05	.5357E-04	-.3664E-07
16	-.7047E-03	-.5499E-08	-.6001E-04	-.9789E-06	.2921E-04	-.2029E-07
17	-.7046E-03	-.3744E-08	-.1026E-03	-.6379E-06	.1086E-04	-.9048E-08
18	-.7046E-03	-.2560E-08	-.1099E-03	-.6172E-06	-.3311E-05	-.2334E-08
19	-.7046E-03	-.2834E-08	-.9062E-04	-.9117E-06	-.1350E-04	.3528E-08
20	-.7045E-03	-.3589E-08	-.5320E-04	-.1656E-05	-.1991E-04	.1361E-07
21	-.7044E-03	.1133E-07	-.5445E-05	-.2876E-05	-.2185E-04	.3934E-07
22	-.7058E-03	-.9171E-08	-.3997E-03	-.7613E-04	.5163E-03	.2732E-07
23	-.000706	.000000	-.001472	-.000034	.000433	.000000
24	-.000706	.000000	-.002202	-.000017	.000212	.000000
25	-.000706	.000000	-.002368	-.000008	-.000056	.000000
26	-.000706	.000000	-.001979	-.000004	-.000292	.000000
27	-.000706	.000000	-.001167	.000007	-.000414	.000000
28	-.7059E-03	-.8073E-10	-.2997E-03	.2154E-04	-.3397E-03	.6240E-07
29	-.7058E-03	.5200E-08	.2722E-03	.8460E-05	-.2040E-03	.2677E-07
30	-.7056E-03	.3096E-08	.5882E-03	.2980E-05	-.9927E-04	.1139E-07
31	-.7055E-03	.1688E-08	.7069E-03	.1160E-05	-.1805E-04	.4511E-08
32	-.7053E-03	.1209E-08	.6769E-03	.4349E-06	.4064E-04	.5937E-09
33	-.7051E-03	.1428E-08	.5461E-03	.3937E-07	.7689E-04	-.2962E-08
34	-.7050E-03	.2436E-08	.3620E-03	-.3901E-06	.9068E-04	-.8501E-08
35	-.7048E-03	.4005E-08	.1727E-03	-.1282E-05	.8190E-04	-.2043E-07
36	-.7047E-03	-.1447E-09	.2560E-04	-.2108E-05	.5263E-04	-.4786E-07
37	-.7046E-03	-.4007E-08	-.6115E-04	-.5561E-06	.2903E-04	-.1984E-07
38	-.7046E-03	-.2435E-08	-.1033E-03	-.2520E-06	.1089E-04	-.7882E-08
39	-.7046E-03	-.1574E-08	-.1105E-03	-.2206E-06	-.3202E-05	-.2117E-08
40	-.7046E-03	-.1674E-08	-.9158E-04	-.3528E-06	-.1327E-04	.2114E-08
41	-.7046E-03	-.2078E-08	-.5515E-04	-.7832E-06	-.1934E-04	.8372E-08
42	-.7045E-03	.7788E-08	-.9877E-05	-.1851E-05	-.2143E-04	.2446E-07
43	-.7059E-03	.0000E+00	-.4668E-03	.0000E+00	.5012E-03	.0000E+00
44	-.000706	.000000	-.001501	.000000	.000425	.000000
45	-.000706	.000000	-.002218	.000000	.000210	.000000
46	-.000706	.000000	-.002375	.000000	-.000057	.000000
47	-.000706	.000000	-.001984	.000000	-.000293	.000000
48	-.000706	.000000	-.001160	.000000	-.000419	.000000
49	-.7062E-03	.0000E+00	-.2631E-03	.0000E+00	-.3320E-03	.0000E+00
50	-.7059E-03	.0000E+00	.2800E-03	.0000E+00	-.1996E-03	.0000E+00

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:PCARGA. PRUEBA DE CARGA.

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
51	-.7057E-03	.0000E+00	.5905E-03	.0000E+00	-.9862E-04	.0000E+00
52	-.7055E-03	.0000E+00	.7078E-03	.0000E+00	-.1789E-04	.0000E+00
53	-.7053E-03	.0000E+00	.6773E-03	.0000E+00	.4068E-04	.0000E+00
54	-.7051E-03	.0000E+00	.5461E-03	.0000E+00	.7690E-04	.0000E+00
55	-.7049E-03	.0000E+00	.3617E-03	.0000E+00	.9079E-04	.0000E+00
56	-.7047E-03	.0000E+00	.1711E-03	.0000E+00	.8259E-04	.0000E+00
57	-.7045E-03	.0000E+00	.2221E-04	.0000E+00	.4830E-04	.0000E+00
58	-.7046E-03	.0000E+00	-.6140E-04	.0000E+00	.2891E-04	.0000E+00
59	-.7046E-03	.0000E+00	-.1035E-03	.0000E+00	.1089E-04	.0000E+00
60	-.7046E-03	.0000E+00	-.1107E-03	.0000E+00	-.3178E-05	.0000E+00
61	-.7046E-03	.0000E+00	-.9185E-04	.0000E+00	-.1320E-04	.0000E+00
62	-.7046E-03	.0000E+00	-.5579E-04	.0000E+00	-.1914E-04	.0000E+00
63	-.7046E-03	.0000E+00	-.1151E-04	.0000E+00	-.2104E-04	.0000E+00
64	-.7058E-03	.9171E-08	-.3997E-03	.7613E-04	.5163E-03	-.2732E-07
65	-.000706	.000000	-.001472	.000034	.000433	.000000
66	-.000706	.000000	-.002202	.000017	.000212	.000000
67	-.000706	.000000	-.002368	.000008	-.000056	.000000
68	-.000706	.000000	-.001979	.000004	-.000292	.000000
69	-.000706	.000000	-.001167	.000007	-.000414	.000000
70	-.7059E-03	.8073E-10	-.2997E-03	-.2154E-04	-.3397E-03	-.6240E-07
71	-.7058E-03	-.5200E-08	.2722E-03	-.8460E-05	-.2040E-03	-.2677E-07
72	-.7056E-03	-.3096E-08	.5882E-03	-.2980E-05	-.9927E-04	-.1139E-07
73	-.7055E-03	-.1688E-08	.7069E-03	-.1160E-05	-.1805E-04	-.4511E-08
74	-.7053E-03	-.1209E-08	.6769E-03	-.4349E-06	.4064E-04	-.5937E-09
75	-.7051E-03	-.1428E-08	.5461E-03	-.3937E-07	.7689E-04	.2962E-08
76	-.7050E-03	-.2436E-08	.3620E-03	.3901E-06	.9068E-04	.8501E-08
77	-.7048E-03	-.4005E-08	.1727E-03	.1282E-05	.8190E-04	.2043E-07
78	-.7047E-03	.1447E-09	.2560E-04	.2108E-05	.5263E-04	.4786E-07
79	-.7046E-03	.4007E-08	-.6115E-04	.5561E-06	.2903E-04	.1984E-07
80	-.7046E-03	.2435E-08	-.1033E-03	.2520E-06	.1089E-04	.7882E-08
81	-.7046E-03	.1574E-08	-.1105E-03	.2206E-06	-.3202E-05	.2117E-08
82	-.7046E-03	.1674E-08	-.9158E-04	.3528E-06	-.1327E-04	-.2114E-08
83	-.7046E-03	.2078E-08	-.5515E-04	.7832E-06	-.1934E-04	-.8372E-08
84	-.7045E-03	-.7788E-08	-.9877E-05	.1851E-05	-.2143E-04	-.2446E-07
85	-.7057E-03	.1327E-07	-.2185E-03	.1179E-03	.5331E-03	-.4300E-07
86	-.000706	.000000	-.001389	.000070	.000454	.000000
87	-.000706	.000000	-.002157	.000039	.000220	.000000
88	-.000706	.000000	-.002345	.000020	-.000052	.000000
89	-.000706	.000000	-.001967	.000009	-.000290	.000000
90	-.000706	.000000	-.001175	-.000004	-.000411	.000000
91	-.7058E-03	.7323E-10	-.3284E-03	-.1326E-04	-.3418E-03	-.4812E-07
92	-.7057E-03	-.7096E-08	.2581E-03	-.9499E-05	-.2073E-03	-.2728E-07
93	-.7056E-03	-.4708E-08	.5820E-03	-.5236E-05	-.1002E-03	-.1321E-07
94	-.7054E-03	-.2687E-08	.7040E-03	-.2644E-05	-.1825E-04	-.5610E-08
95	-.7053E-03	-.1957E-08	.6757E-03	-.1166E-05	.4073E-04	-.7894E-09
96	-.7051E-03	-.2279E-08	.5459E-03	-.2443E-06	.7708E-04	.3618E-08
97	-.7050E-03	-.3709E-08	.3627E-03	.5191E-06	.9081E-04	.9783E-08
98	-.7049E-03	-.5461E-08	.1749E-03	.1340E-05	.8174E-04	.2070E-07
99	-.7048E-03	.1950E-09	.2877E-04	.1708E-05	.5357E-04	.3664E-07
100	-.7047E-03	.5499E-08	-.6001E-04	.9789E-06	.2921E-04	.2029E-07

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:PCARGA. PRUEBA DE CARGA.

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
101	-.7046E-03	.3744E-08	-.1026E-03	.6379E-06	.1086E-04	.9048E-08
102	-.7046E-03	.2560E-08	-.1099E-03	.6172E-06	-.3311E-05	.2334E-08
103	-.7046E-03	.2834E-08	-.9062E-04	.9117E-06	-.1350E-04	-.3528E-08
104	-.7045E-03	.3589E-08	-.5320E-04	.1656E-05	-.1991E-04	-.1361E-07
105	-.7044E-03	-.1133E-07	-.5445E-05	.2876E-05	-.2185E-04	-.3934E-07

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:PCARGA. PRUEBA DE CARGA.

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	.1442E-05	.2166E-08	.4556E-04	.2423E-04	-.1778E-03	-.4083E-08
2	.1440E-05	.8410E-09	.4342E-03	.1414E-04	-.1615E-03	-.4032E-08
3	.1431E-05	.1886E-08	.7361E-03	.8149E-05	-.1078E-03	-.6647E-08
4	.1410E-05	.4164E-08	.8857E-03	.6173E-05	-.2242E-04	-.1310E-07
5	.1366E-05	.8501E-08	.8124E-03	.7235E-05	.9670E-04	-.2649E-07
6	.1281E-05	.1358E-07	.4404E-03	.1125E-04	.2518E-03	-.5351E-07
7	.1129E-05	.2992E-09	-.3125E-03	.1599E-04	.4411E-03	-.9453E-07
8	.000001	.000000	-.001419	.000009	.000571	.000000
9	.000001	.000000	-.002604	.000001	.000509	.000000
10	.000000	.000000	-.003477	-.000004	.000288	.000000
11	.000000	.000000	-.003785	-.000004	.000000	.000000
12	-.000000	.000000	-.003477	-.000004	-.000288	.000000
13	-.000001	.000000	-.002604	.000001	-.000509	.000000
14	-.000001	.000000	-.001419	.000009	-.000571	.000000
15	-.1129E-05	.2992E-09	-.3125E-03	.1599E-04	-.4411E-03	.9453E-07
16	-.1281E-05	.1358E-07	.4404E-03	.1125E-04	-.2518E-03	.5351E-07
17	-.1366E-05	.8501E-08	.8124E-03	.7235E-05	-.9670E-04	.2649E-07
18	-.1410E-05	.4164E-08	.8857E-03	.6173E-05	.2242E-04	.1310E-07
19	-.1431E-05	.1886E-08	.7361E-03	.8149E-05	.1078E-03	.6647E-08
20	-.1440E-05	.8410E-09	.4342E-03	.1414E-04	.1615E-03	.4032E-08
21	-.1442E-05	.2166E-08	.4556E-04	.2423E-04	.1778E-03	.4083E-08
22	.1452E-05	.1543E-08	.8285E-04	.1558E-04	-.1743E-03	-.3188E-08
23	.1453E-05	.5045E-09	.4508E-03	.6662E-05	-.1568E-03	-.2913E-08
24	.1453E-05	.1164E-08	.7447E-03	.3162E-05	-.1060E-03	-.4962E-08
25	.1454E-05	.2625E-08	.8922E-03	.2343E-05	-.2174E-04	-.1027E-07
26	.1453E-05	.5591E-08	.8206E-03	.3459E-05	.9627E-04	-.2247E-07
27	.1439E-05	.9959E-08	.4559E-03	.8422E-05	.2488E-03	-.5185E-07
28	.1368E-05	.2514E-09	-.2814E-03	.2166E-04	.4375E-03	-.1230E-06
29	.000001	.000000	-.001405	.000009	.000573	.000000
30	.000001	.000000	-.002604	.000000	.000509	.000000
31	.000000	.000000	-.003484	-.000003	.000287	.000000
32	.000000	.000000	-.003790	-.000002	.000000	.000000
33	-.000000	.000000	-.003484	-.000003	-.000287	.000000
34	-.000001	.000000	-.002604	.000000	-.000509	.000000
35	-.000001	.000000	-.001405	.000009	-.000573	.000000
36	-.1368E-05	.2514E-09	-.2814E-03	.2166E-04	-.4375E-03	.1230E-06
37	-.1439E-05	.9959E-08	.4559E-03	.8422E-05	-.2488E-03	.5185E-07
38	-.1453E-05	.5591E-08	.8206E-03	.3459E-05	-.9627E-04	.2247E-07
39	-.1454E-05	.2625E-08	.8922E-03	.2343E-05	.2174E-04	.1027E-07
40	-.1453E-05	.1164E-08	.7447E-03	.3162E-05	.1060E-03	.4962E-08
41	-.1453E-05	.5045E-09	.4508E-03	.6662E-05	.1568E-03	.2913E-08
42	-.1452E-05	.1543E-08	.8285E-04	.1558E-04	.1743E-03	.3188E-08
43	.1458E-05	.0000E+00	.9661E-04	.0000E+00	-.1710E-03	.0000E+00
44	.1459E-05	.0000E+00	.4562E-03	.0000E+00	-.1552E-03	.0000E+00
45	.1466E-05	.0000E+00	.7472E-03	.0000E+00	-.1055E-03	.0000E+00
46	.1482E-05	.0000E+00	.8941E-03	.0000E+00	-.2164E-04	.0000E+00
47	.1522E-05	.0000E+00	.8232E-03	.0000E+00	.9582E-04	.0000E+00
48	.1620E-05	.0000E+00	.4633E-03	.0000E+00	.2452E-03	.0000E+00
49	.1879E-05	.0000E+00	-.2456E-03	.0000E+00	.4241E-03	.0000E+00
50	.000001	.000000	-.001396	.000000	.000578	.000000

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:PCARGA. PRUEBA DE CARGA.

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 2 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
51	.000001	.000000	-.002605	.000000	.000510	.000000
52	.000000	.000000	-.003489	.000000	.000287	.000000
53	.000000	.000000	-.003792	.000000	.000000	.000000
54	-.000000	.000000	-.003489	.000000	-.000287	.000000
55	-.000001	.000000	-.002605	.000000	-.000510	.000000
56	-.000001	.000000	-.001396	.000000	-.000578	.000000
57	-.1879E-05	.0000E+00	-.2456E-03	.0000E+00	-.4241E-03	.0000E+00
58	-.1620E-05	.0000E+00	.4633E-03	.0000E+00	-.2452E-03	.0000E+00
59	-.1522E-05	.0000E+00	.8232E-03	.0000E+00	-.9582E-04	.0000E+00
60	-.1482E-05	.0000E+00	.8941E-03	.0000E+00	.2164E-04	.0000E+00
61	-.1466E-05	.0000E+00	.7472E-03	.0000E+00	.1055E-03	.0000E+00
62	-.1459E-05	.0000E+00	.4562E-03	.0000E+00	.1552E-03	.0000E+00
63	-.1458E-05	.0000E+00	.9661E-04	.0000E+00	.1710E-03	.0000E+00
64	.1452E-05	-.1543E-08	.8285E-04	-.1558E-04	-.1743E-03	.3188E-08
65	.1453E-05	-.5045E-09	.4508E-03	-.6662E-05	-.1568E-03	.2913E-08
66	.1453E-05	-.1164E-08	.7447E-03	-.3162E-05	-.1060E-03	.4962E-08
67	.1454E-05	-.2625E-08	.8922E-03	-.2343E-05	-.2174E-04	.1027E-07
68	.1453E-05	-.5591E-08	.8206E-03	-.3459E-05	.9627E-04	.2247E-07
69	.1439E-05	-.9959E-08	.4559E-03	-.8422E-05	.2488E-03	.5185E-07
70	.1368E-05	-.2514E-09	-.2814E-03	-.2166E-04	.4375E-03	.1230E-06
71	.000001	.000000	-.001405	-.000009	.000573	.000000
72	.000001	.000000	-.002604	-.000000	.000509	.000000
73	.000000	.000000	-.003484	.000003	.000287	.000000
74	.000000	.000000	-.003790	.000002	.000000	.000000
75	-.000000	.000000	-.003484	.000003	-.000287	.000000
76	-.000001	.000000	-.002604	-.000000	-.000509	.000000
77	-.000001	.000000	-.001405	-.000009	-.000573	.000000
78	-.1368E-05	-.2514E-09	-.2814E-03	-.2166E-04	-.4375E-03	-.1230E-06
79	-.1439E-05	-.9959E-08	.4559E-03	-.8422E-05	-.2488E-03	-.5185E-07
80	-.1453E-05	-.5591E-08	.8206E-03	-.3459E-05	-.9627E-04	-.2247E-07
81	-.1454E-05	-.2625E-08	.8922E-03	-.2343E-05	.2174E-04	-.1027E-07
82	-.1453E-05	-.1164E-08	.7447E-03	-.3162E-05	.1060E-03	-.4962E-08
83	-.1453E-05	-.5045E-09	.4508E-03	-.6662E-05	.1568E-03	-.2913E-08
84	-.1452E-05	-.1543E-08	.8285E-04	-.1558E-04	.1743E-03	-.3188E-08
85	.1442E-05	-.2166E-08	.4556E-04	-.2423E-04	-.1778E-03	.4083E-08
86	.1440E-05	-.8410E-09	.4342E-03	-.1414E-04	-.1615E-03	.4032E-08
87	.1431E-05	-.1886E-08	.7361E-03	-.8149E-05	-.1078E-03	.6647E-08
88	.1410E-05	-.4164E-08	.8857E-03	-.6173E-05	-.2242E-04	.1310E-07
89	.1366E-05	-.8501E-08	.8124E-03	-.7235E-05	.9670E-04	.2649E-07
90	.1281E-05	-.1358E-07	.4404E-03	-.1125E-04	.2518E-03	.5351E-07
91	.1129E-05	-.2992E-09	-.3125E-03	-.1599E-04	.4411E-03	.9453E-07
92	.000001	.000000	-.001419	-.000009	.000571	.000000
93	.000001	.000000	-.002604	-.000001	.000509	.000000
94	.000000	.000000	-.003477	.000004	.000288	.000000
95	.000000	.000000	-.003785	.000004	.000000	.000000
96	-.000000	.000000	-.003477	.000004	-.000288	.000000
97	-.000001	.000000	-.002604	-.000001	-.000509	.000000
98	-.000001	.000000	-.001419	-.000009	-.000571	.000000
99	-.1129E-05	-.2992E-09	-.3125E-03	-.1599E-04	-.4411E-03	-.9453E-07
100	-.1281E-05	-.1358E-07	.4404E-03	-.1125E-04	-.2518E-03	-.5351E-07

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:PCARGA. PRUEBA DE CARGA.

J O I N T D I S P L A C E M E N T S

LOAD CONDITION 2 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	U(Z)	R(X)	R(Y)	R(Z)
101	-.1366E-05	-.8501E-08	.8124E-03	-.7235E-05	-.9670E-04	-.2649E-07
102	-.1410E-05	-.4164E-08	.8857E-03	-.6173E-05	.2242E-04	-.1310E-07
103	-.1431E-05	-.1886E-08	.7361E-03	-.8149E-05	.1078E-03	-.6647E-08
104	-.1440E-05	-.8410E-09	.4342E-03	-.1414E-04	.1615E-03	-.4032E-08
105	-.1442E-05	-.2166E-08	.4556E-04	-.2423E-04	.1778E-03	-.4083E-08

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:PCARGA. PRUEBA DE CARGA.

R E A C T I O N S A N D A P P L I E D F O R C E S

LOAD CONDITION 1 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
1001	.0847	.0000	15.0339	.0000	.0042	.0000
1021	.0845	.0000	.3746	.0000	.0042	.0000
1049	-1.4933	.0000	60.2607	.0000	-4.2074	.0000
1057	1.1550	.0000	-5.0878	.0000	6.2385	.0000
1085	.0847	.0000	15.0339	.0000	.0042	.0000
1105	.0845	.0000	.3746	.0000	.0042	.0000
TOTAL	-.2290E-11	.7106E-13	.8599E+02	-.4134E-12	.2048E+01	-.1869E-12

REPOSICION 307+860. 3 VANOS 13+17+13 FILE:PCARGA. PRUEBA DE CARGA.

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(X)	F(Y)	F(Z)	M(X)	M(Y)	M(Z)
1001	-.0002	.0000	-3.1348	.0000	.0000	.0000
1021	.0002	.0000	-3.1348	.0000	.0000	.0000
1049	2.9539	.0000	56.2697	.0000	11.6511	.0000
1057	-2.9539	.0000	56.2697	.0000	-11.6511	.0000
1085	-.0002	.0000	-3.1348	.0000	.0000	.0000
1105	.0002	.0000	-3.1348	.0000	.0000	.0000
TOTAL	.3653E-14	.6766E-15	.1000E+03	.4042E-13	.1693E-14	.1491E-13

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			-.060			3.850
		.000	2.393	-1.792		-.009	.015	
		1.083	2.393	.800		-.009	.005	
		2.167	2.393	3.393		-.009	-.005	
		2.167			-.060			3.850
	2	.000			-.002			-.808
		.000	-.503	.378		.001	-.001	
		1.083	-.503	-.166		.001	.000	
		2.167	-.503	-.710		.001	.001	
		2.167			-.002			-.808
2								
	1	.000			-.035			2.466
		.000	.894	1.413		-.006	.008	
		1.083	.894	2.381		-.006	.002	
		2.167	.894	3.350		-.006	-.005	
		2.167			-.035			2.466
	2	.000			-.008			-.479
		.000	-.242	-.284		.002	-.002	
		1.083	-.242	-.546		.002	.001	
		2.167	-.242	-.808		.002	.003	
		2.167			-.008			-.479
3								
	1	.000			-.019			1.503
		.000	.137	2.627		-.004	.005	
		1.083	.137	2.776		-.004	.000	
		2.167	.137	2.924		-.004	-.004	
		2.167			-.019			1.503
	2	.000			-.019			-.158
		.000	-.204	-.648		.004	-.003	
		1.083	-.204	-.869		.004	.001	
		2.167	-.204	-1.090		.004	.006	
		2.167			-.019			-.158
4								
	1	.000			-.004			.906
		.000	-.176	2.611		-.005	.005	
		1.083	-.176	2.420		-.005	-.001	
		2.167	-.176	2.229		-.005	-.007	
		2.167			-.004			.906
	2	.000			-.040			.085
		.000	-.170	-1.028		.009	-.007	
		1.083	-.170	-1.212		.009	.003	
		2.167	-.170	-1.396		.009	.012	

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
		2.167			-.040			.085
5								
	1	.000			.018			1.001
		.000	-.791	2.085		-.009	.007	
		1.083	-.791	1.228		-.009	-.003	
		2.167	-.791	.371		-.009	-.012	
		2.167			.018			1.001
	2	.000			-.079			.321
		.000	-.132	-1.435		.017	-.013	
		1.083	-.132	-1.578		.017	.005	
		2.167	-.132	-1.721		.017	.023	
		2.167			-.079			.321
6								
	1	.000			.051			.766
		.000	-.742	.103		-.014	.011	
		1.083	-.742	-.701		-.014	-.004	
		2.167	-.742	-1.505		-.014	-.019	
		2.167			.051			.766
	2	.000			-.140			.379
		.000	.055	-1.986		.027	-.021	
		1.083	.055	-1.927		.027	.008	
		2.167	.055	-1.867		.027	.037	
		2.167			-.140			.379
7								
	1	.000			.081			-.307
		.000	-.079	-1.313		-.014	.019	
		1.063	-.079	-1.396		-.014	.004	
		2.125	-.079	-1.479		-.014	-.010	
		2.125			.081			-.307
	2	.000			-.199			-.566
		.000	.791	-2.189		.027	-.037	
		1.063	.791	-1.349		.027	-.008	
		2.125	.791	-.509		.027	.020	
		2.125			-.199			-.566
8								
	1	.000			.111			-.348
		.000	.071	-1.187		-.009	.012	
		1.063	.071	-1.111		-.009	.003	
		2.125	.071	-1.035		-.009	-.006	
		2.125			.111			-.348
	2	.000			-.258			-.654
		.000	.936	-.353		.017	-.023	
		1.063	.936	.642		.017	-.006	

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
		2.125	.936	1.636		.017	.012	
		2.125			-.258			-.654
9								
	1	.000			.130			-.212
		.000	.096	-.953		-.004	.006	
		1.063	.096	-.850		-.004	.002	
		2.125	.096	-.748		-.004	-.003	
		2.125			.130			-.212
	2	.000			-.294			-.392
		.000	.645	1.614		.008	-.011	
		1.063	.645	2.299		.008	-.003	
		2.125	.645	2.984		.008	.005	
		2.125			-.294			-.392
10								
	1	.000			.138			-.121
		.000	.111	-.730		-.001	.002	
		1.063	.111	-.612		-.001	.001	
		2.125	.111	-.494		-.001	-.001	
		2.125			.138			-.121
	2	.000			-.310			.000
		.000	.060	2.922		.002	-.004	
		1.063	.060	2.985		.002	-.002	
		2.125	.060	3.049		.002	.000	
		2.125			-.310			.000
21								
	1	.000			-.022			7.509
		.000	9.079	.178		-.011	.018	
		1.083	9.079	10.013		-.011	.006	
		2.167	9.079	19.848		-.011	-.006	
		2.167			-.022			7.509
	2	.000			.001			-1.589
		.000	-1.897	-.033		.002	-.002	
		1.083	-1.897	-2.088		.002	.000	
		2.167	-1.897	-4.144		.002	.002	
		2.167			.001			-1.589
22								
	1	.000			-.035			3.003
		.000	6.366	19.413		-.007	.009	
		1.083	6.366	26.310		-.007	.002	
		2.167	6.366	33.206		-.007	-.006	
		2.167			-.035			3.003
	2	.000			.001			-.623
		.000	-1.872	-4.039		.003	-.003	

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
		1.083	-1.872	-6.067		.003	.001	
		2.167	-1.872	-8.095		.003	.004	
		2.167			.001			-.623
23								
	1	.000			-.040			1.570
		.000	-.869	33.003		-.006	.006	
		1.083	-.869	32.061		-.006	-.000	
		2.167	-.869	31.120		-.006	-.007	
		2.167			-.040			1.570
	2	.000			.002			-.146
		.000	-1.849	-8.075		.006	-.005	
		1.083	-1.849	-10.077		.006	.002	
		2.167	-1.849	-12.080		.006	.009	
		2.167			.002			-.146
24								
	1	.000			-.040			.837
		.000	-2.604	31.023		-.008	.007	
		1.083	-2.604	28.202		-.008	-.002	
		2.167	-2.604	25.381		-.008	-.011	
		2.167			-.040			.837
	2	.000			-.002			.199
		.000	-1.843	-12.110		.014	-.011	
		1.083	-1.843	-14.107		.014	.004	
		2.167	-1.843	-16.103		.014	.019	
		2.167			-.002			.199
25								
	1	.000			-.028			1.798
		.000	-9.726	25.122		-.016	.012	
		1.083	-9.726	14.585		-.016	-.005	
		2.167	-9.726	4.049		-.016	-.022	
		2.167			-.028			1.798
	2	.000			-.027			.884
		.000	-1.870	-16.210		.031	-.023	
		1.083	-1.870	-18.236		.031	.010	
		2.167	-1.870	-20.262		.031	.043	
		2.167			-.027			.884
26								
	1	.000			.029			2.675
		.000	-10.402	2.421		-.033	.023	
		1.083	-10.402	-8.847		-.033	-.012	
		2.167	-10.402	-20.116		-.033	-.048	
		2.167			.029			2.675
	2	.000			-.141			2.357

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
		.000	-1.269	-21.179		.065	-.046	
		1.083	-1.269	-22.554		.065	.024	
		2.167	-1.269	-23.929		.065	.095	
		2.167			-.141			2.357
27								
	1	.000			.258			-2.374
		.000	1.210	-17.822		-.033	.048	
		1.063	1.210	-16.537		-.033	.012	
		2.125	1.210	-15.252		-.033	-.023	
		2.125			.258			-2.374
	2	.000			-.593			-2.343
		.000	10.757	-27.925		.066	-.094	
		1.063	10.757	-16.496		.066	-.025	
		2.125	10.757	-5.067		.066	.045	
		2.125			-.593			-2.343
28								
	1	.000			.315			-.995
		.000	1.306	-14.149		-.016	.022	
		1.063	1.306	-12.762		-.016	.005	
		2.125	1.306	-11.375		-.016	-.012	
		2.125			.315			-.995
	2	.000			-.706			-1.518
		.000	10.554	-3.433		.031	-.044	
		1.063	10.554	7.780		.031	-.011	
		2.125	10.554	18.994		.031	.022	
		2.125			-.706			-1.518
29								
	1	.000			.328			-.331
		.000	1.274	-11.252		-.007	.010	
		1.063	1.274	-9.898		-.007	.002	
		2.125	1.274	-8.545		-.007	-.005	
		2.125			.328			-.331
	2	.000			-.733			-.631
		.000	7.239	19.368		.013	-.019	
		1.063	7.239	27.060		.013	-.005	
		2.125	7.239	34.752		.013	.009	
		2.125			-.733			-.631
30								
	1	.000			.331			-.132
		.000	1.276	-8.509		-.002	.004	
		1.063	1.276	-7.153		-.002	.001	
		2.125	1.276	-5.798		-.002	-.001	
		2.125			.331			-.132

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
	2	.000			-.738			.114
		.000	.178	34.790		.004	-.007	
		1.063	.178	34.979		.004	-.003	
		2.125	.178	35.169		.004	.001	
		2.125			-.738			.114
41								
	1	.000			-.005			.000
		.000	7.124	3.229		.000	.000	
		1.083	7.124	10.947		.000	.000	
		2.167	7.124	18.665		.000	.000	
		2.167			-.005			.000
	2	.000			.003			.000
		.000	-1.470	-.691		.000	.000	
		1.083	-1.470	-2.283		.000	.000	
		2.167	-1.470	-3.876		.000	.000	
		2.167			.003			.000
42								
	1	.000			-.029			.000
		.000	6.948	23.495		.000	.000	
		1.083	6.948	31.022		.000	.000	
		2.167	6.948	38.549		.000	.000	
		2.167			-.029			.000
	2	.000			.014			.000
		.000	-2.042	-4.938		.000	.000	
		1.083	-2.042	-7.150		.000	.000	
		2.167	-2.042	-9.363		.000	.000	
		2.167			.014			.000
43								
	1	.000			-.052			.000
		.000	-1.868	40.400		.000	.000	
		1.083	-1.868	38.377		.000	.000	
		2.167	-1.868	36.354		.000	.000	
		2.167			-.052			.000
	2	.000			.035			.000
		.000	-2.165	-9.723		.000	.000	
		1.083	-2.165	-12.068		.000	.000	
		2.167	-2.165	-14.414		.000	.000	
		2.167			.035			.000
44								
	1	.000			-.083			.000
		.000	-2.973	37.174		.000	.000	
		1.083	-2.973	33.954		.000	.000	
		2.167	-2.973	30.734		.000	.000	

F R A M E E L E M E N T F O R C E S

ELT	LOAD	DIST	1-2 PLANE		AXIAL	1-3 PLANE		AXIAL
ID	COND	ENDI	SHEAR	MOMENT	FORCE	SHEAR	MOMENT	TORQ
		2.167			-.083			.000
	2	.000			.085			.000
		.000	-2.244	-14.476		.000	.000	
		1.083	-2.244	-16.907		.000	.000	
		2.167	-2.244	-19.338		.000	.000	
		2.167			.085			.000
45								
	1	.000			-.151			.000
		.000	-12.298	31.541		.000	.000	
		1.083	-12.298	18.218		.000	.000	
		2.167	-12.298	4.895		.000	.000	
		2.167			-.151			.000
	2	.000			.213			.000
		.000	-2.266	-19.046		.000	.000	
		1.083	-2.266	-21.501		.000	.000	
		2.167	-2.266	-23.956		.000	.000	
		2.167			.213			.000
46								
	1	.000			-.329			.000
		.000	-19.645	8.687		.000	.000	
		1.083	-19.645	-12.595		.000	.000	
		2.167	-19.645	-33.877		.000	.000	
		2.167			-.329			.000
	2	.000			.562			.000
		.000	-3.841	-21.591		.000	.000	
		1.083	-3.841	-25.752		.000	.000	
		2.167	-3.841	-29.913		.000	.000	
		2.167			.562			.000
47								
	1	.000			.648			.000
		.000	5.376	-25.136		.000	.000	
		1.063	5.376	-19.424		.000	.000	
		2.125	5.376	-13.712		.000	.000	
		2.125			.648			.000
	2	.000			-1.371			.000
		.000	21.105	-45.074		.000	.000	
		1.063	21.105	-22.650		.000	.000	
		2.125	21.105	-.225		.000	.000	
		2.125			-1.371			.000
48								
	1	.000			.472			.000
		.000	1.585	-16.502		.000	.000	
		1.063	1.585	-14.818		.000	.000	

F R A M E E L E M E N T F O R C E S

ELT	LOAD	DIST	1-2 PLANE		AXIAL	1-3 PLANE		AXIAL
ID	COND	ENDI	SHEAR	MOMENT	FORCE	SHEAR	MOMENT	TORQ
		2.125	1.585	-13.135		.000	.000	
		2.125			.472			.000
	2	.000			-1.025			.000
		.000	13.021	-3.804		.000	.000	
		1.063	13.021	10.030		.000	.000	
		2.125	13.021	23.864		.000	.000	
		2.125			-1.025			.000
49								
	1	.000			.408			.000
		.000	1.598	-13.546		.000	.000	
		1.063	1.598	-11.848		.000	.000	
		2.125	1.598	-10.150		.000	.000	
		2.125			.408			.000
	2	.000			-.900			.000
		.000	9.032	23.159		.000	.000	
		1.063	9.032	32.755		.000	.000	
		2.125	9.032	42.351		.000	.000	
		2.125			-.900			.000
50								
	1	.000			.386			.000
		.000	1.565	-10.258		.000	.000	
		1.063	1.565	-8.595		.000	.000	
		2.125	1.565	-6.932		.000	.000	
		2.125			.386			.000
	2	.000			-.858			.000
		.000	-.275	42.399		.000	.000	
		1.063	-.275	42.106		.000	.000	
		2.125	-.275	41.814		.000	.000	
		2.125			-.858			.000
61								
	1	.000			-.022			-7.509
		.000	9.079	.178		.011	-.018	
		1.083	9.079	10.013		.011	-.006	
		2.167	9.079	19.848		.011	.006	
		2.167			-.022			-7.509
	2	.000			.001			1.589
		.000	-1.897	-.033		-.002	.002	
		1.083	-1.897	-2.088		-.002	.000	
		2.167	-1.897	-4.144		-.002	-.002	
		2.167			.001			1.589
62								
	1	.000			-.035			-3.003
		.000	6.366	19.413		.007	-.009	

F R A M E E L E M E N T F O R C E S

ELT	LOAD ID	COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			1.083	6.366	26.310		.007	-.002	
			2.167	6.366	33.206		.007	.006	
			2.167			-.035			-3.003
	2		.000			.001			.623
			.000	-1.872	-4.039		-.003	.003	
			1.083	-1.872	-6.067		-.003	-.001	
			2.167	-1.872	-8.095		-.003	-.004	
			2.167			.001			.623
63									
	1		.000			-.040			-1.570
			.000	-.869	33.003		.006	-.006	
			1.083	-.869	32.061		.006	.000	
			2.167	-.869	31.120		.006	.007	
			2.167			-.040			-1.570
	2		.000			.002			.146
			.000	-1.849	-8.075		-.006	.005	
			1.083	-1.849	-10.077		-.006	-.002	
			2.167	-1.849	-12.080		-.006	-.009	
			2.167			.002			.146
64									
	1		.000			-.040			-.837
			.000	-2.604	31.023		.008	-.007	
			1.083	-2.604	28.202		.008	.002	
			2.167	-2.604	25.381		.008	.011	
			2.167			-.040			-.837
	2		.000			-.002			-.199
			.000	-1.843	-12.110		-.014	.011	
			1.083	-1.843	-14.107		-.014	-.004	
			2.167	-1.843	-16.103		-.014	-.019	
			2.167			-.002			-.199
65									
	1		.000			-.028			-1.798
			.000	-9.726	25.122		.016	-.012	
			1.083	-9.726	14.585		.016	.005	
			2.167	-9.726	4.049		.016	.022	
			2.167			-.028			-1.798
	2		.000			-.027			-.884
			.000	-1.870	-16.210		-.031	.023	
			1.083	-1.870	-18.236		-.031	-.010	
			2.167	-1.870	-20.262		-.031	-.043	
			2.167			-.027			-.884
66									
	1		.000			.029			-2.675

F R A M E E L E M E N T F O R C E S

ELT	LOAD ID	COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			.000	-10.402	2.421		.033	-.023	
			1.083	-10.402	-8.847		.033	.012	
			2.167	-10.402	-20.116		.033	.048	
			2.167			.029			-2.675
	2		.000			-.141			-2.357
			.000	-1.269	-21.179		-.065	.046	
			1.083	-1.269	-22.554		-.065	-.024	
			2.167	-1.269	-23.929		-.065	-.095	
			2.167			-.141			-2.357
67									
	1		.000			.258			2.374
			.000	1.210	-17.822		.033	-.048	
			1.063	1.210	-16.537		.033	-.012	
			2.125	1.210	-15.252		.033	.023	
			2.125			.258			2.374
	2		.000			-.593			2.343
			.000	10.757	-27.925		-.066	.094	
			1.063	10.757	-16.496		-.066	.025	
			2.125	10.757	-5.067		-.066	-.045	
			2.125			-.593			2.343
68									
	1		.000			.315			.995
			.000	1.306	-14.149		.016	-.022	
			1.063	1.306	-12.762		.016	-.005	
			2.125	1.306	-11.375		.016	.012	
			2.125			.315			.995
	2		.000			-.706			1.518
			.000	10.554	-3.433		-.031	.044	
			1.063	10.554	7.780		-.031	.011	
			2.125	10.554	18.994		-.031	-.022	
			2.125			-.706			1.518
69									
	1		.000			.328			.331
			.000	1.274	-11.252		.007	-.010	
			1.063	1.274	-9.898		.007	-.002	
			2.125	1.274	-8.545		.007	.005	
			2.125			.328			.331
	2		.000			-.733			.631
			.000	7.239	19.368		-.013	.019	
			1.063	7.239	27.060		-.013	.005	
			2.125	7.239	34.752		-.013	-.009	
			2.125			-.733			.631

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
70								
	1	.000			.331			.132
		.000	1.276	-8.509		.002	-.004	
		1.063	1.276	-7.153		.002	-.001	
		2.125	1.276	-5.798		.002	.001	
		2.125			.331			.132
	2	.000			-.738			-.114
		.000	.178	34.790		-.004	.007	
		1.063	.178	34.979		-.004	.003	
		2.125	.178	35.169		-.004	-.001	
		2.125			-.738			-.114
81								
	1	.000			-.060			-3.850
		.000	2.393	-1.792		.009	-.015	
		1.083	2.393	.800		.009	-.005	
		2.167	2.393	3.393		.009	.005	
		2.167			-.060			-3.850
	2	.000			-.002			.808
		.000	-.503	.378		-.001	.001	
		1.083	-.503	-.166		-.001	.000	
		2.167	-.503	-.710		-.001	-.001	
		2.167			-.002			.808
82								
	1	.000			-.035			-2.466
		.000	.894	1.413		.006	-.008	
		1.083	.894	2.381		.006	-.002	
		2.167	.894	3.350		.006	.005	
		2.167			-.035			-2.466
	2	.000			-.008			.479
		.000	-.242	-.284		-.002	.002	
		1.083	-.242	-.546		-.002	-.001	
		2.167	-.242	-.808		-.002	-.003	
		2.167			-.008			.479
83								
	1	.000			-.019			-1.503
		.000	.137	2.627		.004	-.005	
		1.083	.137	2.776		.004	.000	
		2.167	.137	2.924		.004	.004	
		2.167			-.019			-1.503
	2	.000			-.019			.158
		.000	-.204	-.648		-.004	.003	
		1.083	-.204	-.869		-.004	-.001	
		2.167	-.204	-1.090		-.004	-.006	

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
		2.167			-.019			.158
84								
	1	.000			-.004			-.906
		.000	-.176	2.611		.005	-.005	
		1.083	-.176	2.420		.005	.001	
		2.167	-.176	2.229		.005	.007	
		2.167			-.004			-.906
	2	.000			-.040			-.085
		.000	-.170	-1.028		-.009	.007	
		1.083	-.170	-1.212		-.009	-.003	
		2.167	-.170	-1.396		-.009	-.012	
		2.167			-.040			-.085
85								
	1	.000			.018			-1.001
		.000	-.791	2.085		.009	-.007	
		1.083	-.791	1.228		.009	.003	
		2.167	-.791	.371		.009	.012	
		2.167			.018			-1.001
	2	.000			-.079			-.321
		.000	-.132	-1.435		-.017	.013	
		1.083	-.132	-1.578		-.017	-.005	
		2.167	-.132	-1.721		-.017	-.023	
		2.167			-.079			-.321
86								
	1	.000			.051			-.766
		.000	-.742	.103		.014	-.011	
		1.083	-.742	-.701		.014	.004	
		2.167	-.742	-1.505		.014	.019	
		2.167			.051			-.766
	2	.000			-.140			-.379
		.000	.055	-1.986		-.027	.021	
		1.083	.055	-1.927		-.027	-.008	
		2.167	.055	-1.867		-.027	-.037	
		2.167			-.140			-.379
87								
	1	.000			.081			.307
		.000	-.079	-1.313		.014	-.019	
		1.063	-.079	-1.396		.014	-.004	
		2.125	-.079	-1.479		.014	.010	
		2.125			.081			.307
	2	.000			-.199			.566
		.000	.791	-2.189		-.027	.037	
		1.063	.791	-1.349		-.027	.008	

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
		2.125	.791	-.509		-.027	-.020	
		2.125			-.199			.566
88								
	1	.000			.111			.348
		.000	.071	-1.187		.009	-.012	
		1.063	.071	-1.111		.009	-.003	
		2.125	.071	-1.035		.009	.006	
		2.125			.111			.348
	2	.000			-.258			.654
		.000	.936	-.353		-.017	.023	
		1.063	.936	.642		-.017	.006	
		2.125	.936	1.636		-.017	-.012	
		2.125			-.258			.654
89								
	1	.000			.130			.212
		.000	.096	-.953		.004	-.006	
		1.063	.096	-.850		.004	-.002	
		2.125	.096	-.748		.004	.003	
		2.125			.130			.212
	2	.000			-.294			.392
		.000	.645	1.614		-.008	.011	
		1.063	.645	2.299		-.008	.003	
		2.125	.645	2.984		-.008	-.005	
		2.125			-.294			.392
90								
	1	.000			.138			.121
		.000	.111	-.730		.001	-.002	
		1.063	.111	-.612		.001	-.001	
		2.125	.111	-.494		.001	.001	
		2.125			.138			.121
	2	.000			-.310			-.000
		.000	.060	2.922		-.002	.004	
		1.063	.060	2.985		-.002	.002	
		2.125	.060	3.049		-.002	-.000	
		2.125			-.310			-.000
5001								
	1	.000			-15.034			.000
		.000	.000	.000		.085	-.004	
		.025	.000	.000		.085	-.002	
		.050	.000	.000		.085	.000	
		.050			-15.034			.000
	2	.000			3.135			.000
		.000	.000	.000		-.000	.000	

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
		.025	.000	.000		-.000	.000	
		.050	.000	.000		-.000	.000	
		.050			3.135			.000
5021								
	1	.000			-.375			.000
		.000	.000	.000		.085	-.004	
		.025	.000	.000		.085	-.002	
		.050	.000	.000		.085	.000	
		.050			-.375			.000
	2	.000			3.135			.000
		.000	.000	.000		.000	.000	
		.025	.000	.000		.000	.000	
		.050	.000	.000		.000	.000	
		.050			3.135			.000
5049								
	1	.000			-60.261			.000
		.000	.000	.000		-1.493	4.207	
		6.000	.000	.000		-1.493	-4.753	
		12.000	.000	.000		-1.493	-13.713	
		12.000			-60.261			.000
	2	.000			-56.270			.000
		.000	.000	.000		2.954	-11.651	
		6.000	.000	.000		2.954	6.072	
		12.000	.000	.000		2.954	23.796	
		12.000			-56.270			.000

5.- CONCLUSIONES

Los esfuerzos y deformaciones que se producen en las distintas posiciones del tren de cargas resultan como sigue:

Momentos flectores

Posición	Punto	M_{prueba}	$M_{cálculo}$	Relación
1	A	104.4	177.2	58.9 %
2	B	118.8	195.6	60.7 %

Debido a las dimensiones de los camiones empleados en la prueba de carga se consideran aceptables los anteriores porcentajes, comprobándose que en ningún caso se supera el 90% del valor del momento de cálculo.

Deformaciones (en mm, + gravitatorias)

POSICION	PUNTO	DEFORMACION (mm)
1	A	2
1	B	-1
1	C	0
2	A	-1
2	B	4
2	C	-1

El punto A corresponde al centro de del primer vano, el B al centro del segundo vano y el C al centro del tercer vano.

Madrid, 15 de Noviembre de 1999

Modificación de la sección transversal de los Pasos Superiores

MODIFICACIÓN PASOS SUPERIORES

1.-Sección transversal

Se modifica la sección transversal de los pasos superiores, tanto de reposición de caminos como de carreteras, con objeto de eliminar el vuelo de la imposta sobre el tablero, manteniendo el mismo ancho de plataforma.

Las armaduras existentes son válidas, puesto que la armadura que podría verse afectada, que es la armadura transversal - superior del ala, va bastante sobrada, como se puede deducir del cálculo adjunto.

Pasos superiores E-4, E-5, E-5A y E-8

* Cambio en la anchura del tablero de 7,70 a 8,70 m.

Se da por válido el cálculo longitudinal del tablero, por lo que no es necesario proceder a su recálculo.

A consecuencia de las modificaciones introducidas en la sección el vuelo pasa de 1,50 a 2,03 y el canto en la unión del ala con el alma pasa de 0,30 a 0,335 m.

El incremento debido a la mayor longitud del vuelo será:

$$\Delta Q_A = 1,5 \times (0,30 \times 0,53 \times 2,5) = 0,60 \text{ t/m.}$$

$$\Delta M_A = 1,5 \times (0,30 \times 0,53 \times 2,5) \times \left(\frac{0,53}{2} + 1,50\right) = 1,05 \text{ m.t/m.}$$

Luego:

$$M_A = 6,66 \text{ m.t/m} + 1,05 \text{ m.t/m} = 7,71 \text{ m.t/m.}$$

$$Q_A = 17,06 \text{ t/m} + 0,60 \text{ t/m} = 17,66 \text{ m.t/m.}$$

Flexión.

$$U_0 = 0,85 \times \frac{3000}{1,5} \times 1,00 \times 0,285 = 484,5 \text{ t.}$$

$$U_{s_1} = 484,5 \times \left(1 - \sqrt{1 - \frac{2 \times 7,71}{484,5 \times 0,285}}\right) = 27,85 \text{ m.t/m.}$$

La armadura transversal es $\phi 16/20$, equivalente a 44,58 m.t/m. Luego se da por válida la armadura transversal.

Cortante

$$V_{cu} = 0,10 \times \xi \times (100 \times \rho_1 \times f_{ck})^{1/3} \times 60 \times d.$$

$$\left.\begin{array}{l} \xi = 1,877. \\ \rho_1 = \dfrac{15,7}{100 \cdot 0,285} = 0,0055 \end{array}\right\} \rightarrow V_{cu} = 13,62 \text{ t/m.}$$

$$V_{su} = 17,66 - 13,62 = 4,04 \text{ t/m} \quad \underline{OK}$$

Pasos superiores E-6 y E-7.

* Cambio en la anchura del tablero de 11,70 a 12,40 m.

Se da por válido el cálculo longitudinal del tablero, por lo que no es necesario proceder a su recálculo.

Se procede a la comprobación de la armadura transversal de las alas.

A consecuencia de las modificaciones introducidas en ella sección el vuelo pasa de 3,50 a 3,38 y el canto en la unión del ala con el alma pasa de 0,60 a 0,425 m.

Para quedarnos del lado de la seguridad procedemos al recálculo con los mismos esfuerzos pero con el canto reducido a 0,425 m.

Así:

Momento mayorado: $M_A = 28,8$ tm/m.

$$V_0 = 0,85 \times \frac{3000}{1,5} \times 0,375 = 637,5 \text{ t/m.}$$

$$V_{S_1} = 637,5 \cdot \left(1 - \sqrt{1 - \frac{2 \times 28,8}{637,5 \times 0,375}}\right) = 82,08 \text{ t/m.}$$

La armadura transversal es $\phi 25/20$, equivalente a 108,85 t/m. Luego se da por válida la armadura transversal.

Cortante Mayorado: $Q_A = 18,44$ t/m.

$\xi = 1,6$

$\rho_1 = \frac{15,7}{100 \cdot 37,5} = 0,0042$

$b_0 = 1$ m.

$d = 0,375$ m

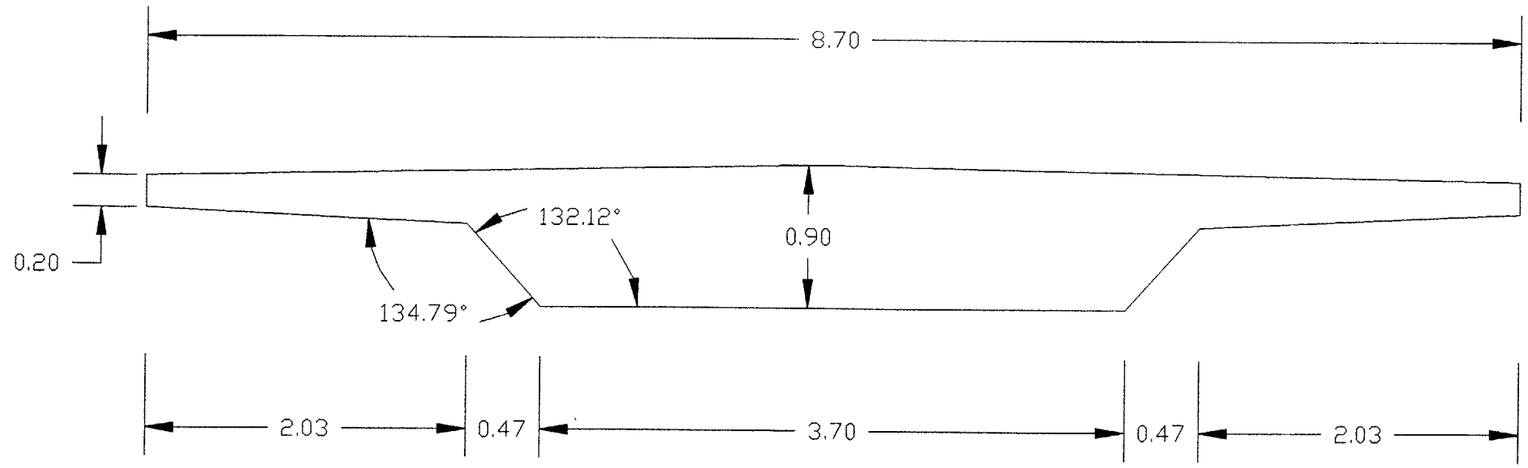
$$V_{cu} = 0,1 \cdot \xi \cdot (100 \cdot \rho_1 \cdot f_{cm})^{1/3} \cdot b_0 \cdot d =$$

$$= 0,1 \cdot 1,6 \cdot (100 \cdot 0,0042 \cdot 30)^{1/3} \cdot 37,5 =$$

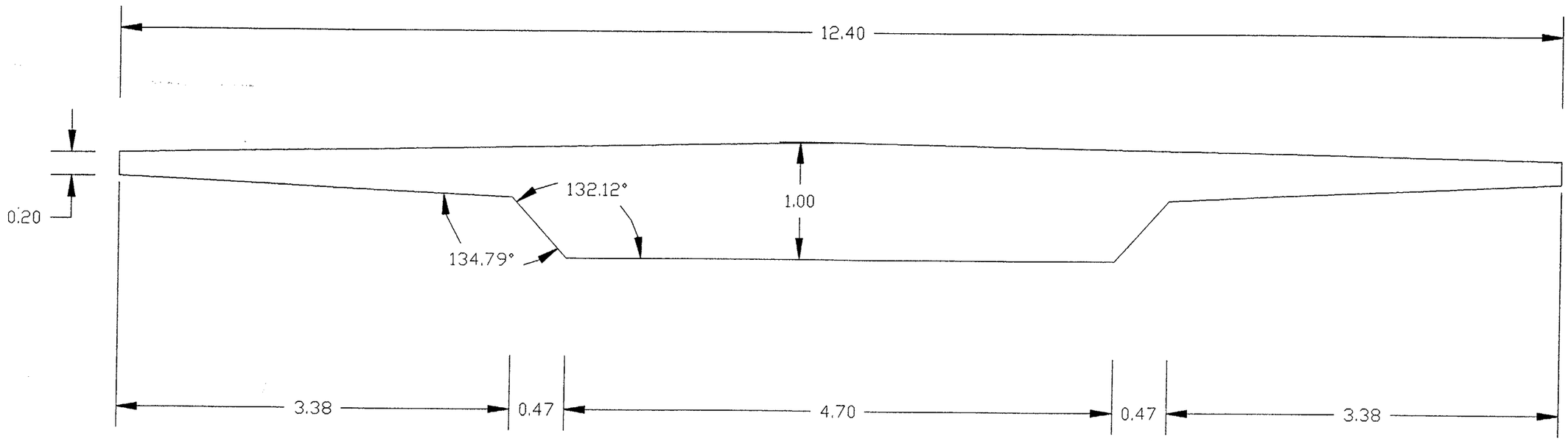
$$= 13,96 \text{ t/m.}$$

$$V_{su} = V_{rd} - V_{cu} = 18,44 - 13,96 = \underline{\underline{4,48}} \text{ t/m.}$$

OK.



PASOS SUPERIORES E-4, E-5, E-5A Y E-8



PASOS SUPERIORES E-6 Y E-7

2.-Estructura E-7 P.K. 304+615

2.1.- Trazado en alzado

Las cotas de la rasante de la reposición señaladas en el plano de estructuras no coinciden con los del trazado en alzado de la reposición nº6 (antigua LP – 7032), existiendo una diferencia de alrededor 55 centímetros.

Se mantiene el mismo trazado proyectado para la reposición y se disminuye la altura de los estribos y de las pilas de la estructura en unos 55 centímetros. El gálibo resulta ser de 7,25 metros.

.2.1.1.- Listado de vértices

N$	P.K. Cota	TE TS	Cota TE Cota TS	pE(%) pS(%)	Longi. Flecha	Kv Theta(%)
1	0.000					
	526.560	0.000	526.560	2.3959		
2	24.000	1.487	526.596	2.3959	45.025	400
	527.135	46.513	530.208	13.6514	0.633	11.2555
3	133.000	49.649	530.636	13.6514	166.702	-800
	542.015	216.351	536.025	-7.1865	-4.342	-20.8379
4	251.000	226.139	535.322	-7.1865	49.722	500
	533.535	275.861	534.221	2.7588	0.618	9.9453
5	280.000	280.000	534.335	2.7588		
	534.335					

2.1.2.- Puntos fijos cada 10 metros

	P.K.	Cota	p(%)	Cv	L	Kv	Flecha	Theta(%)
	0.000	526.560	2.3959					
TE	1.487	526.596	2.3959					
	10.000	526.890	4.5239					
	20.000	527.468	7.0237					
V	24.000	527.768	8.0236	527.135	45.025	400	0.633	11.2555
	30.000	528.295	9.5235					
	40.000	529.372	12.0234					
TS	46.513	530.208	13.6514					
TE	49.649	530.636	13.6514					

	50.000	530.684	13.6075						
	60.000	531.983	12.3575						
	70.000	533.156	11.1075						
	80.000	534.204	9.8575						
	90.000	535.127	8.6075						
	100.000	535.926	7.3575						
	110.000	536.599	6.1075						
	120.000	537.147	4.8575						
	130.000	537.570	3.6075						
V	133.000	537.673	3.2325	542.015	166.702	-800	-4.342	-20.8379	
	140.000	537.869	2.3574						
	150.000	538.042	1.1074						
	160.000	538.090	-0.1426						
	170.000	538.013	-1.3926						
	180.000	537.812	-2.6426						
	190.000	537.485	-3.8926						
	200.000	537.033	-5.1426						
	210.000	536.456	-6.3926						
TS	216.351	536.025	-7.1865						
	220.000	535.763							
TE	226.139	535.322	-7.1865						
	230.000	535.059	-6.4142						
	240.000	534.518	-4.4140						
	250.000	534.176	-2.4139						
V	251.000	534.153	-2.2138	533.535	49.722	500	0.618	9.9453	
	260.000	534.035	-0.4137						
	270.000	534.094	1.5865						
TS	275.861	534.221	2.7588						
	280.000	534.335	2.7588						

3.-Estructura E-8 P.K. 307+860

3.1.- Antecedentes

Con objeto de reponer el camino de la Coma d'en Segarra afectado por la realización de las obras en el P.K. 307+860 se ha proyectado el paso superior E-8 que resuelve perfectamente el cruce de dicho camino sobre la Línea de Alta Velocidad.

La estructura E-8 se resuelve mediante una losa maciza armada cuya sección transversal tiene forma de "ala de gaviota" de 0,90 m de canto y 7,70 m de plataforma. El vano central es de 17,00 metros y los dos extremos de 13,00 m. El sistema constructivo previsto en proyecto es mediante cimbrado y hormigonado "in situ" del tablero. El gálibo bajo dicha estructura resulta ser de 8,9 metros

A consecuencia de la modificación de la rasante, la cota en el P.K. 307+860 pasa a ser la 555,21 en lugar de la 549,38, es decir la rasante en dicho punto aumenta en casi 6 metros, por lo que la estructura proyectada pasa a no cumplir las características en cuánto a gálibo prescrito por el G.I.F. (gálibo mínimo de 7 metros).

Debido a esto es necesario rediseñar dicha estructura para lo cual se han contemplado varias alternativas:

- Mantener la estructura en su posición actual considerando un gálibo de 7 metros bajo la estructura, lo cual implica aumentar hasta un 7,3 % la pendiente del terraplén de acceso a la estructura puesto que el trazado de la reposición queda condicionado por el paso inferior existente bajo la autopista A-2.

- Realizar en la posición actual un paso inferior de características similares a los proyectados. El inconveniente principal de dicha solución es la imposibilidad de tener un drenaje natural de las aguas puesto que el punto más bajo que se crearía, debido a la orografía del terreno, estaría situado a la entrada de la estructura proyectada.

- Desplazar la estructura existente hasta el P.K. 307+800. Solución adoptada finalmente

3.2.- Descripción de la obra

Se trata de una estructura para el paso del Camino d'en Segarra sobre la L.A.V. que sustituye a la proyectada en un principio en el P.K. 307+860, y que, al variar el trazado en alzado del tronco, es necesario cambiarla de ubicación para llegar a unos parámetros análogos a los previstos

La estructura se diseña teniendo en cuenta los gálibos mínimos prescritos por el G.I.F. para el vano central, para los vanos laterales la longitud se determina en función del desmonte (3:2) y bermas de 4 m cada 10 m de altura. De este modo las luces resultantes son de 13,00, 17,00 Y 13,00 m respectivamente.

La sección transversal presenta una calzada de 6,00 m y aceras de 1,35 m, con un total de 8,70 m.

El tablero se resuelve mediante losa maciza armada de canto 0,90 m, sobre la cual se extiende una capa de aglomerado asfáltico en caliente de 4 cm. La sección transversal es un núcleo central de base superior 4,70 m, base inferior de 3,70 m y dos alas voladas de 1,50 m.

Dichos tableros se empotran en pilas centrales únicas de sección circular de 1,00 m de diámetro, que se cimientan en zapatas de 3,00 x 3,00 m.

Al principio y final de la estructura se disponen estribos de hormigón armado.

3.3.- Cálculos estructurales

Los cálculos de la estructura son los mismos que aparecen en el Proyecto inicial, puesto que no se varían las características resistentes de la misma, únicamente sufre variación la definición de las cotas absolutas respecto al nuevo terreno donde se ubica y por lo tanto la definición y cálculo de los estribos a partir de las cargas que les transmite el tablero.

Para ello se han considerado las mismas características del terreno que aparecen en el Proyecto de referencia y se han analizado las mismas hipótesis de carga.

.3.3.1.- Cálculo de estribos

DATOS DEL ESTRIBO

ESTRIBO 1.

ESTRIBO 2.

-Datos geometricos:

Ver croquis adjunto.

-Caracteristicas de los materiales:

Peso especifico del hormigon (t/m3)	γ_h	= 2.50
Resistencia del hormigon del alzado (Kp/cm²)	fck	= 250
Resistencia del hormigón de la zapata (Kp/cm²)	fck'	= 250
Limite elastico del acero (Kp/cm²)	fyk	= 5100
Recubrimiento de las armaduras (m)	c	= 0.05
Se incluyen las cuantias geométricas minimas		
Coeficiente de minoración resistencia hormigon	γ_c	= 1.50
Coeficiente de minoracion resistencia acero	γ_s	= 1.15
Coeficiente de mayoracion de las acciones	γ_f	= 1.60

-Caracteristicas del terreno:

Terreno sobre talón:

Peso especifico de las tierras (t/m3)	γ_t	= 1.80
Angulo de rozamiento interno de las tierras (°)	ϕ	= 30.00
Angulo de rozamiento entre las tierras y el muro (°)	δ	= 0.00
Coeficiente de empuje activo calculado segun Coulomb ...	Kax	= 0.333
Cohesion de las tierras (t/m²)	c	= 0.00

Terreno sobre puntera :

Peso especifico de las tierras (t/m3)	γ_t	= 1.80
Angulo de rozamiento interno de las tierras (°)	ϕ	= 30.00
Angulo de rozamiento entre las tierras y el muro (°)	δ	= 0.00
Coeficiente de empuje pasivo de las tierras	Kpx	= 3.000

Terreno de cimentacion :

Coeficiente de rozamiento entre el cimiento y el suelo ..	μ	= 0.577
Adherencia entre el cimiento y el suelo (t/m²)	a	= 0.00
Angulo de la superficie del terreno con la horizontal ...	β	= 0.00°

-Sobrecargas:

Carga por unidad de longitud de talud (t/m²) ..... q = 1.00

No se considera la accion sísmica .....

-Acciones del tablero sobre el estribo :

Reacciones verticales (t) y excentricidades transversales (m) :

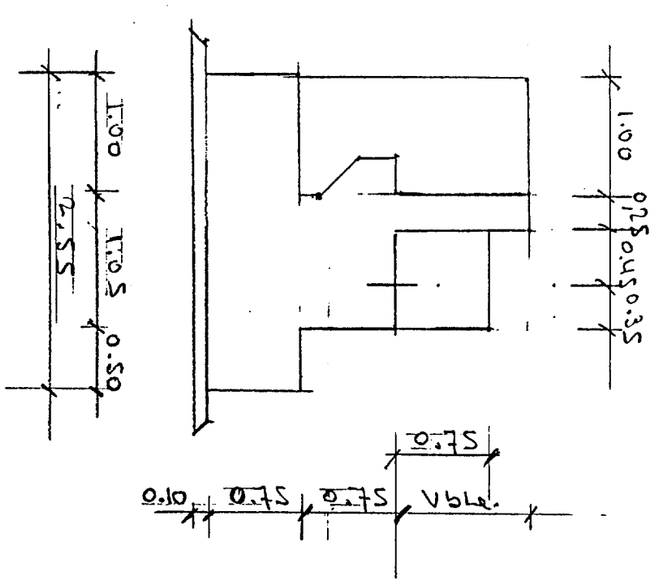
Reaccion del peso propio del tablero ...	Rpp	= 49.00	, Exc.=	0.00
Reacción del peso de la superestructura.	Rse	= 16.68	, Exc.=	0.00
Reaccion hiperestática de pretensado ...	Rhp	= 0.00	, Exc.=	0.00
Reaccion máxima de la sobrecarga	Rma	= 62.06	, Exc.=	0.00
Reaccion minima de la sobrecarga	Rmi	= -7.91	, Exc.=	0.00
Reaccion debida al gradiente termico ...	Rgt	= 0.00	, Exc.=	0.00
Reacción debidas a otras acciones	Rot	= 0.00	, Exc.=	0.00

Reacciones horizontales longitudinales (t) :

Reacción debida al frenado (+ -)	Rfx	= 7.55
Reaccion debida a las deformaciones impuestas	Rdx	= 0.00
Reacciones debidas a otras causas (Rozam.,sismo,etc) .	Rox	= 0.00

Reacciones horizontales transversales (t) :

Reaccion debida al viento	Rvy	= 13.63
Reacción debida a la fuerza centrifuga	Rcy	= 0.00
Reacciones debidas a otras causas (Rozam.,sismo,etc) .	Roy	= 0.00


0.10
0.30
0.55
3.00
3.00
0.55
0.30
0.10
7.90
0.50
0.35
0.45
0.75
1.00
2.55

ASUNTO | FECHA | REF. | HOJA 1

1.- ESTRIBO EN VACIO.

Empuje debido a los terr. $\frac{1}{2} \times 1.8 \times 2,55^2 \times 0,33 = 1.93$ t/m

Empuje debido a la sobrecarga. $1,00 \times 2,55 \times 0,33 = 0,84$ t/m

Momento de vuelco. $1.93 \times 2.55/3 + 0.84 \times \frac{2.55}{2} = 2,71$ mt/m

Es decir: $F_H = (1.93 + 0,84) = 2,77$ t/m

$M_V = 2,71$ mt/m

$F_V = 11.65$ t/m

$M_e = 17,74$ mt/m

Coef. estabilidad al vuelco. $C_V = 17,74/2,71 = 6,55$

Coef. estabilidad deslizamiento $C_d = \frac{11.65 \times 0,577}{2,77} = 2,43$

Tensiones. $e_b = 1.290$ m $> 2.55/3 \rightarrow e_0 = -0,015$ m

$$\sigma = \frac{11.65}{2,55}\left(1 \pm \frac{6 \times (-0,015)}{2.55}\right) = \begin{matrix} 4,41 \text{ t/m}^2 \\ 4,73 \text{ t/m}^2 \end{matrix}$$

2.- ESTRIBO CON TABLERO.

$F_H = 2,77$ t/m

$M_V = 2,71$ mt/m

$F_V = 11,65 + 49,00/7,90 = 17,85$ t/m

$M_e = 17,74 + 49,00/7,90 \times 0,85 = 23,01$ mt/m

Coef. estabilidad al vuelco $C_V = 23,01/2,71 = 8,49$

Coef. estabilidad deslizamiento $C_d = \frac{17,85 \times 0,577}{2,77} = 3,72$

Tensiones. $e_b = 1,137$ m $> \frac{2.55}{3} \rightarrow e_0 = 0,138$ m

$$\sigma = \frac{17,85}{2,55}\left(1 \pm \frac{6 \times 0.138}{2.55}\right) = \begin{matrix} 9,27 \text{ t/m}^2 \\ 4,73 \text{ t/m}^2 \end{matrix}$$

Se supone la influencia de los esfuerzos transversales

ASUNTO | FECHA | REF. | HOJA 2

3.- ESTRIBO CON TABLERO Y SUPERESTRUCTURA.

$F_H = 2,77$ t/m

$M_V = 2,71$ mt/m

$F_V = 17,85 + 16,68/7,90 = 19,96$ t/m

$M_e = 23,01 + 16,68/7,90 \times 0,85 = 24,80$ mt/m

Coef. estabilidad al vuelco $C_V = 24,80/2,71 = 9,15$

Coef. estabilidad deslizamiento $C_d = \frac{19,96 \times 0,577}{2,77} = 4,16$

Tensiones. $e_b = 1.107$ m $> \frac{2.55}{3} \rightarrow e_0 = 0,168$ m

$$\sigma = \frac{19,96}{2,55}\left(1 \pm \frac{6 \times 0.168}{2,55}\right) = \begin{matrix} 10,92 \text{ t/m}^2 \\ 9,73 \text{ t/m}^2 \end{matrix}$$

Se supone la influencia de los esfuerzos transversales

4.- ESTRIBO CON TABLERO, SUPERESTRUCTURA Y SOBRECARGA.

$F_H = 2,77 + 7,55/7,90 = 3,73$ t/m

$M_V = 2,71 + 7,55/7,90 \times 1.50 = 4,14$ mt/m

$F_V = 19,96 + (62,06 - 7,91)/7,90 = 26,81$ t/m

$M_e = 24,80 + [\quad] \times 0,85 = 30,63$ mt/m

Coef. estabilidad al vuelco. $C_V = 30,63/4,14 = 7,40$

Coef. estabilidad deslizamiento $C_d = \frac{26,81 \times 0,577}{3,73} = 4,15$

Tensión. $e_b = 0,985$ m $> \frac{2.55}{3} \rightarrow e_0 = 0,290$ m

$$\sigma = \frac{26,81}{2,55}\left(1 \pm \frac{6 \times 0,290}{2,55}\right) = \begin{matrix} 17,69 \text{ t/m}^2 \\ 5,34 \text{ t/m}^2 \end{matrix}$$

La influencia de los esfuerzos transversales. $\sigma_{máx} = 17,69$ t/m² < Tadmisible terreno.

5.- ARMADURAS.

a/ Espaldoncillo.

$Md = 1.6\left(\frac{1}{2}\times 1.8\times 1.05^2\times 0,33\times 1.05/3 + 1.00\times 1.05\times 0,33\times 1.05/2\right) = 0,47$ mt/m

$\gamma = 1.00\times 0,20\times 0,9\times 2.500/1.5 = 300$ t/m

$\gamma_{f\,min} = 0,04\times 300 = 12,00$ t/m

$\gamma_f = 2,19$ t/m

Disponemos 5 ϕ 12 p/m. Reparto ϕ 8 a 20 cm

b/ Espaldón.

$Md = 1.6\left(\frac{1}{2}\times 1.8\times 1.80^2\times 0,33\times 1.80/3 + 1.00\times 1.80\times 0,33\times 1.80/2\right) = 1,78$ mt/m

$\gamma = 1.00\times 1.00\times 0,9\times 2500/1.5 = 1.500$ t/m

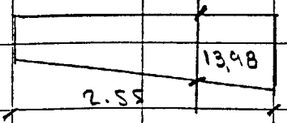
$\gamma_{f\,min} = 0,04\times 1.500 = 60$ t/m

$\gamma_f = 1.73$ t/m

Disponemos 5 ϕ 20 p/m. R. ϕ 16 a 20 cm lado tierra

5 ϕ 12 p/m R. ϕ 16 a 20 cm lado libre

c/ Zapata. Cara inferior



$Md = 1.6\left(13,98\times 0,66^2/2 + \frac{1}{2}\times 3,71\times 0,66^2\times\frac{2}{3}\right) = 5,73$

$\gamma = 1.00\times 0,70\times 2500/1.5 = 1.167$ t/m

$\gamma_{f\,min} = 0,04\times 1.167 = 47$ t/m $\gamma_f = 8$ t/m

Disponemos 5 ϕ 16 p/m. R. ϕ 16 a 20 cm

Zapata, cara Superior.

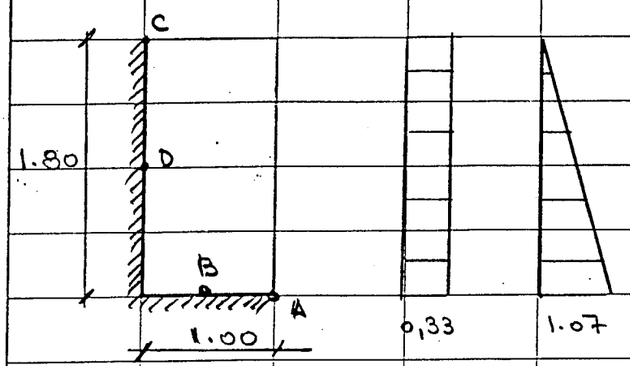
$Md = 1.6\left(0,75\times 2,5 + 1.80\times 1.8 + 1.00\right)\times 1,16^2/2 = 6,58$ mt/m

$\gamma = 1,00\times 0,70\times 2500/1.5 = 1.167$ t/m

$\gamma_{f\,min} = 0,04\times 1.167 = 47,$ t/m $\gamma_f = 9$ t/m

Disponemos 5 ϕ 16 p/m R. ϕ 16 a 20 cm

6.- ARMADURAS ALETAS.



$\delta = 1,00/1,80 = 0,56$

(A) M_y ① $= 0,1297\times 0,33\times 1.80^2 = 0,14$

M_y ② $= 0,0630\times 1,07\times 1.80^2 = 0,22$ } $-0,36$ mt/m

(B) My ① $= 0,0671\times 0,33\times 1,80^2 = 0,07$.

My ② $= 0,0323\times 1,07\times 1,80^2 = 0,13$ } $-0,20$ mt/m

(C) Mx ① $= 0,4115\times 0,33\times 1,00^2 = 0.14$

Mx ② $= 0,0870\times 1,07\times 1,00^2 = 0,09$ } $-0,23$ mt/m

(D) Mx ① $= 0,3295\times 0,33\times 1,00^2 = 0,11$

Mx ② $= 0,1211\times 1,07\times 1,00^2 = 0,13$ } $-0,24$ mt/m

Armadura vertical. C.1. $Md = 0,36\times 1.6 = 0,58$ mt/m

$\gamma = 1.00\times 0,25\times 0,9\times 2500/1.5 = 375$ t/m $\gamma_{f\,min} = 15$ t/m

Disponemos 5 ϕ 12 p/m R. ϕ 12 a 20 cm.

Armadura horizontal: $Md = 0,24\times 1.6 = 0,38$ mt/m

$\gamma = 1,00\times 0,25\times 0,9\times 2500/1.5 = 375$ t/m $\gamma_{f\,min} = 15$ t/m

Disponemos 5 ϕ 12 p/m R ϕ 12 a 20 cm

4.-Estructura E-5A P.K. 303+958,627

4.1.- Descripción de la obra

Se trata de una estructura que tiene por objeto reponer un camino existente que queda cortado por la L.A.V. y que aparece como nueva ante la necesidad de aumentar la permeabilidad de la traza, al tratarse de una zona con fuertes desmontes, que originan una trinchera de grandes dimensiones.

La estructura se diseña teniendo en cuenta los gálibos mínimos prescritos por el G.I.F. para el vano central; la longitud de los vanos laterales se determina en función del desmonte (3:2) y de las bermas de 4,00 m cada 10,00 m de altura. De este modo las luces resultantes son de 13,00 - 17,00 - 13,00 m, respectivamente para los tres vanos.

La sección transversal de la estructura presenta una calzada de 6,00 m y dos aceras de 1,35 m, con un total de 8,70 m.

El tablero se resuelve mediante una losa maciza armada, de canto 0,90 m, encima de la cual se extiende una capa de aglomerado asfáltico en caliente de 4 cm. Su sección transversal presenta un núcleo central de base superior 4,70 m, base inferior 3,70 m y dos alas voladas de 1,50 m.

Dicho tablero se empotra en pilas centrales únicas de sección circular de 1,00 m de diámetro, que se cimientan en zapatas de 3,00 x 3,00 m.

La estructura apoya, en sus extremos, en dos estribos de hormigón armado que transmite las cargas al terreno.

4.2.- Cálculos estructurales

Los cálculos de la estructura son los mismos que aparecen en el Proyecto Original para la estructura E-8, puesto que presenta la misma geometría y no varían las características resistentes de la misma únicamente sufre variación en las cotas absolutas de sus elementos, en la ligera variación de la altura de las pilas y en la geometría de los estribos.

El desarrollo de los cálculos correspondientes al Paso Superior del P .K. 303+958,627, que se proyecta como nueva Estructura para aumentar la permeabilidad de la traza del ferrocarril de Alta Velocidad, conserva el mismo índice y contenido que el Paso Superior del P .K. 307+860 del Proyecto Original, y que transcribimos a continuación:

- Características Mecánicas de la Sección
- Cargas y Modelo de Cálculo de Tablero
- Datos de Entrada SAP-90
- Sección Transversal
  - Armado Longitudinal
  - Cortante
  - Torsión
  - Armado Transversal
- Viga de Estribo
- Comprobación Anchura Fisura
- Reacciones para Cálculo de estribos
- Cálculo de Estribos
- Salida Resultados SAP-90

Al tratarse de una estructura idéntica a la proyectada, salvo una ligera variación en la altura de las pilas, se considera que todos los cálculos que aparecen en el Proyecto Original, son válidos, a excepción de los estribos que tienen otra geometría.

Por lo tanto, únicamente se realiza el nuevo cálculo de estos elementos, a partir de las reacciones sobre los mismos, dadas en el Proyecto Original, al que nos remitimos para el resto de la estructura.

4.2.1.- Cálculo de estribos

DATOS DEL ESTRIBO

ESTRIBO 1.

ESTRIBO 2.

-Datos geometricos:

Ver croquis adjunto.

-Caracteristicas de los materiales:

Peso especifico del hormigon (t/m3)	γh	= 2.50
Resistencia del hormigon del alzado (Kp/cm²)	fck	= 250
Resistencia del hormigón de la zapata (Kp/cm²)	fck'	= 250
Limite elastico del acero (Kp/cm²)	fyk	= 5100
Recubrimiento de las armaduras (m)	c	= 0.05
Se incluyen las cuantias geométricas minimas		
Coeficiente de minoración resistencia hormigon	γc	= 1.50
Coeficiente de minoracion resistencia acero	γs	= 1.15
Coeficiente de mayoracion de las acciones	γf	= 1.60

-Caracteristicas del terreno:

Terreno sobre talón:		
Peso especifico de las tierras (t/m3)	γt	= 1.80
Angulo de rozamiento interno de las tierras (°)	φ	= 30.00
Angulo de rozamiento entre las tierras y el muro (°)	δ	= 0.00
Coeficiente de empuje activo calculado segun Coulomb ...	Kax	= 0.333
Cohesión de las tierras (t/m²)	c	= 0.00
Terreno sobre puntera :		
Peso especifico de las tierras (t/m3)	γt	= 1.80
Angulo de rozamiento interno de las tierras (°)	φ	= 30.00
Angulo de rozamiento entre las tierras y el muro (°)	δ	= 0.00
Coeficiente de empuje pasivo de las tierras	Kpx	= 3.000

Terreno de cimentacion :

Coeficiente de rozamiento entre el cimiento y el suelo ..	μ	= 0.577
Adherencia entre el cimiento y el suelo (t/m²)	a	= 0.00
Angulo de la superficie del terreno con la horizontal ...	β	= 0.00°

-Sobrecargas:

Carga por unidad de longitud de talud (t/m²)	q	= 1.00
No se consigera la accion sísmica		

-Acciones del tablero sobre el estribo :

Reacciones verticales (t) y excentricidades transversales (m) :

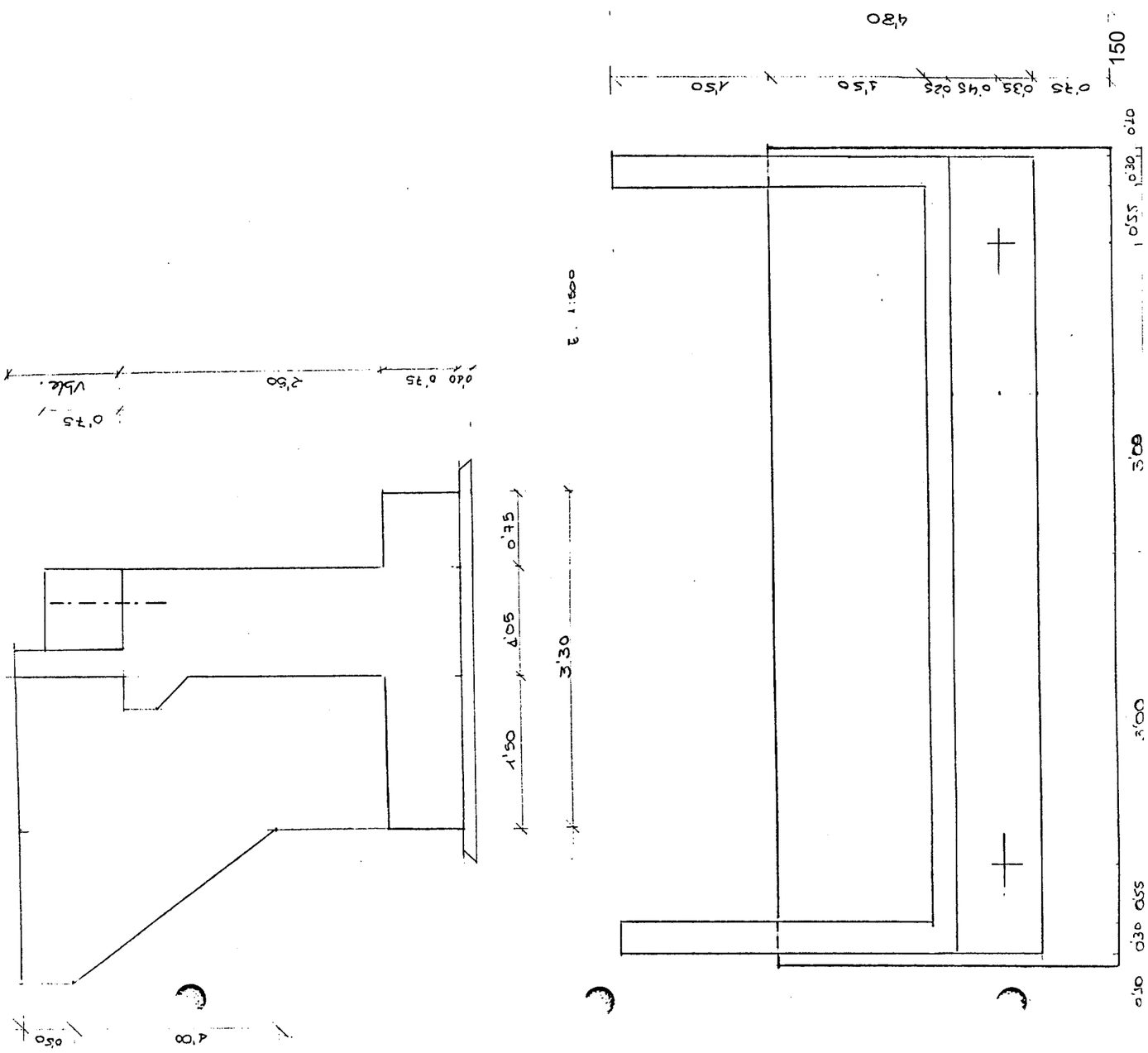
Reaccion del peso propio del tablero ...	Rpp	= 49.00	, Exc.=	0.00
Reacción del peso de la superestructura.	Rse	= 16.68	, Exc.=	0.00
Reacción hiperestática de pretensado ...	Rhp	= 0.00	, Exc.=	0.00
Reaccion máxima de la sobrecarga	Rma	= 62.06	, Exc.=	0.00
Reaccion mínima de la sobrecarga	Rmi	= -7.91	, Exc.=	0.00
Reacción debida al gradiente termico ...	Rgt	= 0.00	, Exc.=	0.00
Reacción debidas a otras acciones	Rot	= 0.00	, Exc.=	0.00

Reacciones horizontales longitudinales (t) :

Reacción debida al frenado (+ -)	Rfx	= 7.55
Reacción debida a las deformaciones impuestas	Rdx	= 0.00
Reacciones debidas a otras causas (Rozam.,sismo,etc) .	Rox	= 0.00

Reacciones horizontales transversales (t) :

Reaccion debida al viento	Rvy	= 13.63
Reacción debida a la fuerza centrifuga	Rcy	= 0.00
Reacciones debidas a otras causas (Rozam.,sismo,etc) .	Roy	= 0.00


E. 1:500
3'30
1'50
0'75
0'05
0'25 0'45 0'35
1'50
0'50
4'00
0'75
2'50
0'40
vide.
0'75
0'30 0'35 0'45 0'25
1'50
4'80
150
0'30 0'30 0'55 1'00
3'00
3'00

1- ESTRIBO EN VACIO

Empuje debido a las tierras $\frac{1}{2}\ 0'33 \times 1'8 \times 4'35^2 = 5'62$ t/m

Empuje debido a la S.C $1'00 \times 4'35 \times 0'33 = 1'435$ t/m

Momento de vuelco $5'62 \times 4'35/3 + 1'435 \times \frac{4'35}{2} = 11'27$ mt/m

Es decir: $F_H = 5'62 + 1'435 = 7'055$ t/m

$M_r = 11'27$ mt/m.

$F_r = (0'75 \times 3'30 + 2'50 \times 1'05 + 0'25 \times 11'02) \times 2'5 +$

$+ 1'50 \times 3'60 \times 1'80 + 1'00 \times 1'50 = 24'66$ t/m

$M_e = (2'1475 \times 3'3/2 + 2'625 \times 1'275 + 0'2755 \times 1'675) \times 2'5$

$+ 9'72 \times 2'55 + 1'50 \times 2'55 = 48'34$ mt/m

Coef estabilidad al vuelco = $48'34 / 11'27 = 4'29$

Coef estabilidad deslizamiento $C_d = \frac{24'66 \times 0'577}{7'055} = 2'02$

Terrenos $e_b = 1'503 > 1'1 \rightarrow e_o = 0'147$ m

$\sigma = \frac{24'66}{3'30}\left(1 \pm \frac{6 \cdot 0'147}{3'30}\right) = \begin{cases} 9'47 \text{ t/m}^2 \\ 5'48 \text{ t/m}^2 \end{cases}$

2- ESTRIBO CON TABLERO

$F_H = 7'055$ t/m

$M_r = 11'27$ mt/m

$F_r = 24'66 + 4'90/7'9 = 36'86$ t/m.

$M_e = 48'34 + 4'90/7'9 \times 1'1 = 55'16$ mt/m.

Coef. estabilidad al vuelco $C_r = 55'16/11'27 = 4'89$

Coef estabilidad deslizamiento $C_d = \frac{30'86 \times 0'577}{7'055} = 2'52$

Terrenos $e_b = 1'42$ m $> 3'3/3 \rightarrow e_o = 0'228$

$\sigma = \frac{30'86}{3'30}\left(1 \pm \frac{6 \cdot 0'228}{3'30}\right) = \begin{cases} 13'23 \text{ t/m}^2 \\ 5'47 \text{ t/m}^2 \end{cases}$

Se desprecia la influencia de los esf. Transversales.

3- ESTRIBO CON TABLERO Y SUPERESTRUCTURA

$F_H = 7'055$ t/m

$M_r = 11'27$ mt/m

$F_r = 30'86 + 16'68/7'9 = 32'97$ t/m

$M_e = 55'16 + 16'68/7'9 \times 1'1 = 57'48$ mt/m

Coef. de estabilidad al vuelco $C_r = 57'48/11'27 =$

Coef. de estabilidad al deslizamiento $C_d = \frac{32'97 \times 0'577}{7'055} =$

Terrenos $e_b = 1'40 > 3'3/3$ $e_o = 0'248$

$\sigma = \frac{32'97}{3'3}\left(1 \pm \frac{6 \cdot 0'248}{3'30}\right) = \begin{cases} 14'5 \text{ t/m}^2 \\ 5'5 \text{ t/m}^2 \end{cases}$

Se desprecia la influencia de los esf. transversales.

4- ESTRIBO CON TABLERO, SUPERESTRUCTURA Y SOBRECARGA.

$F_H = 7'055 + 7'55/7'90 = 8'01$ t/m.

$M_r = 11'27 + 7'55/7'90 \times 3'25 = 14'38$ mt/m.

$F_r = 32'97 + (62'06 - 7'911)/7'90 = 39'82$ t/m

$M_e = 57'48 + (62'06 - 7'911)/7'90 \times 1'10 = 65'02$ mt/m.

Coef. de estabilidad al vuelco $C_r = 65'02/14'38 =$

Coef de estabilidad al deslizamiento $C_d = \frac{39'82 \times 0'577}{8'01} =$

Terrenos $e_b = 1'77 > 3'3/3$ $e_o = 0'378$ m

$\sigma = \frac{39'82}{3'30}\left(1 \pm \frac{6 \times 0'378}{3'30}\right) = \begin{cases} 20'37 \text{ t/m}^2 \\ 3'77 \text{ t/m}^2 \end{cases}$

Se desprecia la influencia de los esf. transversales

$\sigma_{máx} = 20'37$ t/m^2 < Terreno tenso

5- ARMADURAS · ESTRIBO

a/ Hastial

$Md = 1'50 \times \left(\frac{1}{2} \times 1'8 \times 0'33 \times 3'6^2 \times \left(\frac{3'6}{3}\right) \right) + 1'6 \times \left(1 \times 0'33 \times \frac{3'6^2}{2} \right) =$

$= 10'35$ mt/m.

$Uc = 1'00 \times 1'00 \times d^9 \times \frac{7500}{1'5} = 1500$ t/m.

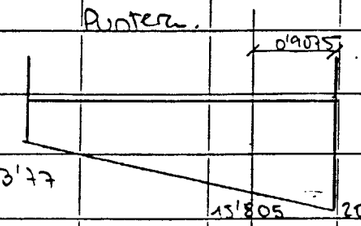
$Us\,min = 0'04 \times 1500 = 60$ t/m

Disponemos $5\phi 20$ pml R $\phi 16$ a 20cm U. tierra

$5\phi 12$ pml R $\phi 16$ a 20 cm U. libre

b) Zapata.

Puntera.



$Md = 1'6 \cdot \left(15'805 \times \frac{0'9075^2}{2} + \frac{1}{3} 4'565 \times 0'9075^2 \times 2/3 \right) = 12'42$ mt/m

$Uc = 1'00 \times 0'70 \times \frac{2500}{1'5} = 1166'67$ t/m

$Us\,min = 46'67$ t/m.

Talón

$Md = 1'6 \left(0'75 \times 2'5^2 + 1'80 \times 3'6 + 1'00 \right) \times 1'66^2/2 = 20'56$ mt/m

$Uc = 1'00 \times 0'70 \times 2500 / 1'5 = 1167$ t/m.

$Us\,min = 46'68$ t/m

Disponemos $5\phi 16$ pml R $\phi 16$ a 20 cm.

c/ Espaldoncillo

$Md = 0'6 \left(\frac{1}{2} \times 1'8 \times 1'102^2 \times 0'33 \times 1'102/3 + 1'00 \times \frac{1'102^2}{2} \times 0'33 \right)$

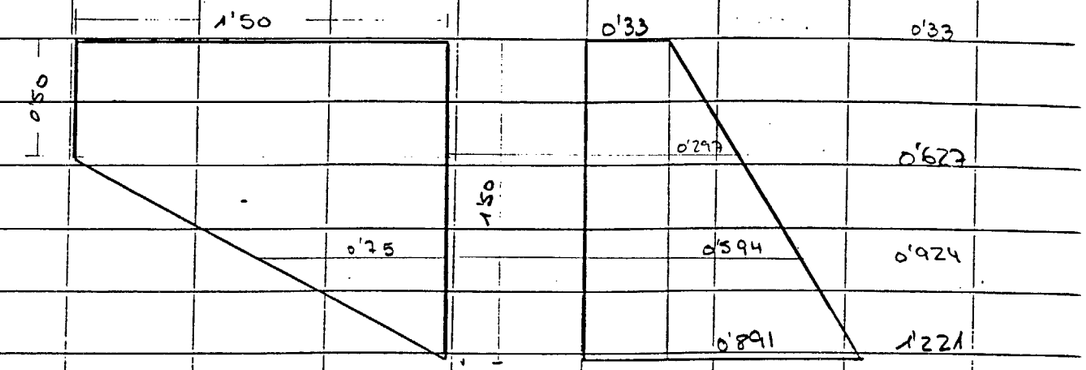
$= 0'53$ mt/m. $\quad Uc = \frac{1'00 \times 0'20 \times 0'90 \times 2500}{1'5} = 300$ t/m

$Us\,min = 12'00$ t/m

Disponemos $5\phi 12$ pml. Reparti $\phi 8$ a 20 cm.

6. ARMADURAS ALETAS.

ALETAS EN VOLADIZO



$H = 0'5$ m · $M = \frac{0'33 + 0'627}{2} \times 1'50 \times 0'50 \times \frac{1'50}{2} = 0'269$ mt

$H = 1'0$ m $\quad M = \frac{0'627 + 0'924}{2} \times 0'50 \times \frac{1'50 + 0'75}{2} \times \frac{1'5 + 0'75}{4} = 0'2$ mt

$H = 1'5$m $\quad M = \frac{0'924 + 1'221}{2} \times 0'50 \times \frac{0'75}{2} \times \frac{0'75}{3} = 0'050$ m

$\Sigma M = 0'5648$ mt $\quad$ Momento Medio $= 0'5648/1'5 = 0'377$ mt/m

$Uc = 1'00 \times 0'25 \times 0'9 \times 7500/1'5 = 375$ t/m

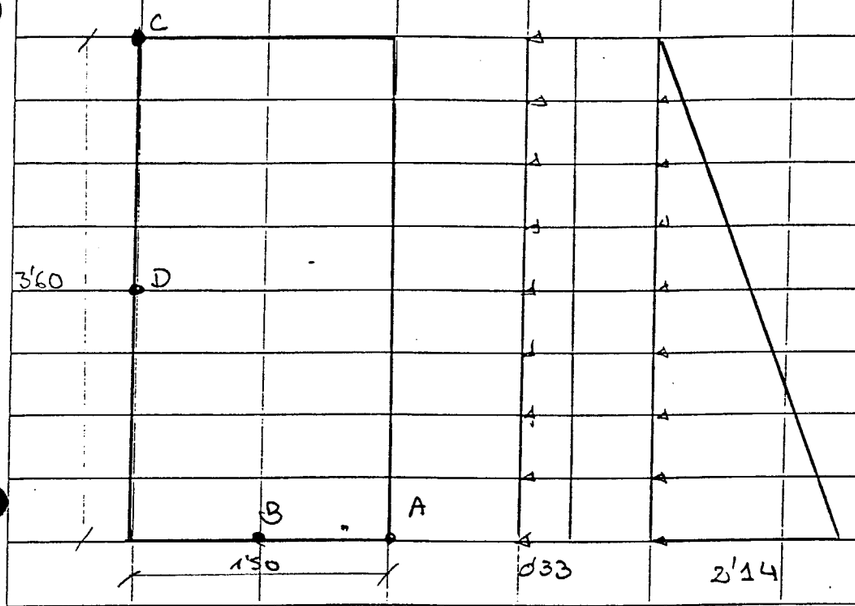
$Md = 1'6 \times 0'377 = 0'602$ mt/m

$Us\,min = 0'04 \times 375 = 15$ t/m.

Disponemos $5\phi 12$ pml R $\phi 12$ a 20 cm

ASUNTO | FECHA | REF. | HOJA 5

ALETAS



$\gamma = \frac{1'50}{3'60} = 0'41$

(A)
$M_y^1 = -0'0743 \times 0'33 \times 3'6^2 = -0'3177$
$M_y^2 = -0'04181 \times 2'14 \times 3'6^2 = -1'1596$
$\Big\} -1'477$ mt/m

(B)
$M_y^1 = -0'02979 \times 0'33 \times 3'6^2 = -0'1274$
$M_y^2 = -0'0113 \times 2'14 \times 3'6^2 = -0'3134$
$\Big\} -0'4408$ mt/m

(C)
$M_x^1 = -0'4475 \times 0'33 \times 1'8^2 = -0'3323$
$M_y^2 = -0'0840 \times 2'14 \times 1'8^2 = -0'4045$
$\Big\} -0'7368 - 0'377 = -1'11$ mt/m

(D)
$M_x^1 = -0'3591 \times 0'33 \times 1'8^2 = -0'2666$
$M_y^2 = -0'1564 \times 2'14 \times 1'8^2 = -0'7531$
$\Big\} -1'02 - 0'377 = -1'40$ mt/m

Armadura vertical $M_d = 1'477 \times 1'6 = 2'36$ mt/m

$U_c = 3'75$ t/m $\quad U_{s\,min} = 15$ t/m $\quad 5\phi 12$ pml R $\phi 12$ c 20

Armadura horizontal $M_d = -1'40 \times 1'6 = 2'24$ mt/m

$U_c = 3'75$ t/m $\quad U_{s\,min} = 15$ t/m $\quad 5\phi 12$ pml R $\phi 12$ c 20

Estructura E-9 (PK 301+080)

ESTRUCTURA E - 9

PASO INFERIOR D.O. 301+080

ÍNDICE

1. INTRODUCCIÓN

2. BASES DE CÁLCULO

3. PÓRTICO

4. MUROS

1. INTRODUCCIÓN

1. INTRODUCCIÓN

Corresponde el presente anejo al cálculo de un pórtico en la D.O. 301+080 de la Línea de Alta Velocidad, MADRID-BARCELONA-FRONTERA FRANCESA, TRAMO LLEIDA-MARTORELL. SUBTRAMO III.

Se trata de un pórtico con una longitud de 14.00 m. y unas dimensiones libres de 9.00 x 9.00 m. Consta de dintel de 1.00 m de espesor y hastiales de 0.90 m. La cimentación se resuelve mediante zapatas de hormigón armado de 3.00 m de ancho y 1.00 m de canto.

En las embocaduras del pórtico se disponen cuatro muros de hormigón armado de alturas y longitudes variables.

2. BASES DE CÁLCULO

2. BASES DE CÁLCULO

2.1. CARACTERÍSTICAS DE LOS MATERIALES

- **Hormigones**

  En Pórticos, marcos y muros HA 25

- **Acero de armar**

  En todos los elementos B-500 S

2.2. ACCIONES A CONSIDERAR

Los pesos y acciones considerados son los siguientes:

- **Peso Propio**

  . Peso específico del hormigón armado 2,500 t/m^3

- **Cargas Muertas por via**

  . Imposta + acera + barandilla: 0,676 t/m
  . Conducto cableado: 0,300 t/m
  . Traviesa por via: 0,520 t/m
  . Carríl por via: 0,120 t/m
  . Hormigón de forma: 1,225 t/m

  . Balasto: (0,24685 + 0,2292) x 0,50 x 0,8830 = 0,210 m^2
  0.8830 x 0,50 x 0,4415 = 0,195 m^2
  (0,6707 + 0,6606) x 0,50 x 0,5045 = 0,336 m^2
  (0,4406 + 0,3881) x 0,50 x 2,6250 = 1,088 m^2
  (0,5881 + 0,58735) x 0,50 x 1,0375 = 0,610 m^2

  Σ = 2,438 m^2

  Peso: 1,60 t/m^3 x 2,438 = 3,901 t/m

  Valores característicos superior e inferior:

  q_s = 1,30 x 3,901 = 5,071 t/m
  q_i = 0,70 x 3,901 = 2,731 t/m

  . Guardabalasto: 0,50 x 0,20 x 2,50 = 0,25 t/m

  . Balasto + guardabalasto = 5,071 + 0,25 = 5,321 t/m

2.3. ANÁLISIS COMPARATIVO DE SOBRECARGAS

- **Impacto**

a) Para velocidades inferiores o iguales a 200 km/h, se tienen en cuenta las prescripciones del Ministerio de Fomento "Instrucción relativa a las acciones a considerar en el proyecto de puentes de ferrocarril" (IPF-75):

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

v = 200 km/h = 55,56 m/s

masa:

p.p. losa = 1,00 x 2,50 x 14,00 = 35,00 t/m

c. permanentes = 2 x (0,675 + 0,30 + 0,52 + 0,12 + 1,225 + 0,725 + 5,071 + + 0,25) = 17,772 t/m

Tren = 12,00 t/m

$$m = \frac{35{,}00 + 17{,}772 + 2 \times 12{,}00}{14{,}00} = 5{,}48$$

L = 9,00 m

E = 10 x 19000 x $\sqrt{250}$ = 3 x 10^6 t/m^2

Inercia:

$$I = \frac{1}{12}\,14{,}00 \times 1{,}00^3 = 1{,}166666\ m^4$$

$$f = 1{,}57\sqrt{\frac{E \times I}{m \times L^4}} = 1{,}57\sqrt{\frac{3 \times 10^6 \times 1{,}16666}{5{,}48 \times 9{,}00^4}} = 15{,}49$$

$T = 0{,}064$

$$\mu = \frac{v\ T}{2L}$$

$$\mu = \frac{55{,}56 \times 0{,}064}{2 \times 9{,}00} = 0{,}20$$

$$I = 65\frac{0{,}20}{1 - 0{,}20 + 0{,}20^2} = 15{,}48$$

el coeficiente de impacto será 1,15.

b) Para velocidades mayores de 200 km/h se considerará la situación de vía de alta velocidad y se tendrá en cuenta las especificaciones de la U.I.C.-776.1.

Para esfuerzos cortantes:

$$\Phi_1 = \frac{0{,}96}{\sqrt{L_\Phi} - 0{,}2} + 0{,}88$$

Para momentos flectores:

$$\Phi_2 = \frac{1{,}44}{\sqrt{L_\Phi} - 0{,}2} + 0{,}82$$

Para estructuras porticadas de vano único se considera una viga continua de tres vanos con las longitudes horizontales y verticales de los elementos del pórtico, siendo:

$L_\Phi = k \,.\, L_m$

$$L_m = \frac{1}{n}(L_1 + L_2 + \ldots\ldots + L_n) = \frac{1}{3}(9{,}00 + 9{,}00 + 9{,}00) = 9{,}00 \text{ m}$$

para $n = 3$; $k = 1{,}30$

$L_\Phi = 1{,}30 \times 9{,}00 = 11{,}70$ m

Coeficiente de impacto para esfuerzos cortantes:

$$\Phi_1 = \frac{0{,}96}{\sqrt{11{,}70} - 0{,}2} + 0{,}88 = 1{,}18$$

Coeficiente de impacto para momentos flectores:

$$\Phi_2 = \frac{1{,}44}{\sqrt{11{,}70} - 0{,}2} + 0{,}82 = 1{,}27$$

Sobrecarga a adoptar

a) Tren de la Instrucción IPF-75

Se considera más desfavorable el tren tipo A formado por tres ejes de 30 t separados entre sí 1,50 m.

$q = 1{,}15 \times 30 = 34{,}50$ t

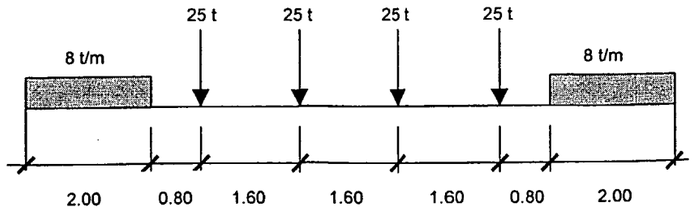
$M_{apoyo} = 107{,}81$ mt

$M_{centro} = 73{,}31$ mt

$V_{apoyo} = 92{,}00$ mt

b) Tren del Eurocódigo EC1.3

Se considera el tren de cargas modelo 71 cuyo esquema es el siguiente:



M_{apoyo} = 156,42 x 1,27 = 198,65 mt

M_{centro} = 84,17 x 1,27 = 106,90 mt

V_{apoyo} = 94,77 x 1,18 = 111,83 mt

A la vista de los resultados obtenidos se considera para el cálculo el tren tipo del Eurocódigo EC1.3 al ser más desfavorable.

Sismo

La obra se encuentra situada en una zona donde la aceleración sísmica básica es igual a 0,04g, por lo que no es necesaria la consideración de las acciones sísmicas.

3. PÓRTICO

3. PÓRTICO

3.1. GENERALIDADES

El cálculo del pórtico, se resuelve mediante el programa de cálculo electrónico "STAAD".

3.2. BASES E HIPÓTESIS DE CÁLCULO

Las características de los materiales utilizados, así como los coeficientes de mayoración de esfuerzos y de minoración de resistencias han sido definidos anteriormente.

Así mismo, también al inicio se definen las características del terreno circundante.

La determinación de los valores de las cargas actuantes se realiza como sigue:

- Las cargas verticales debidas a pesos propios y cargas muertas, se determinan en función del espesor y densidad de los elementos, rellenos, etc.., considerados.

- Los valores de los empujes horizontales se determinan a partir del coeficiente de empuje al reposo.

  $E_h = \gamma \cdot K_r \cdot H$, siendo:

  E_h = empuje a la altura H (t/m)
  γ = densidad (t/m^3)
  K_r = coef. empuje al reposo = 1 - sen ϕ
  ϕ = ángulo rozamiento interno tierras
  H = altura considerada (m)

- Los valores verticales de sobrecargas son los correspondientes al tren del Eurocódigo EC1.3 indicados anteriormente.

El estudio de esfuerzos se realiza para una franja de anchura 1,00 m.

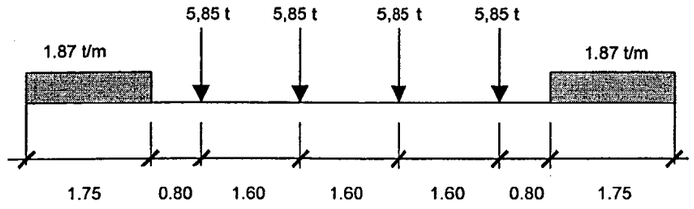
Reparto de cargas

El reparto de carga se realiza a 45º sobre el eje del dintel.

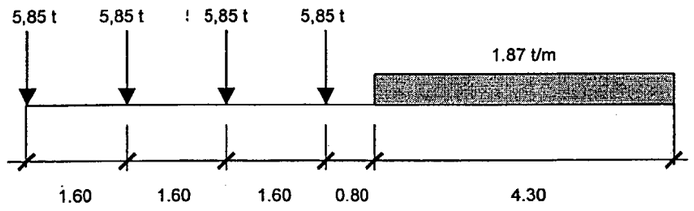
Posición del tren para obtención de momentos flectores:

$$P = \frac{25,00}{4,273} = 5,85 \text{ t}$$

$$P = \frac{8,00}{4,273} = 1,87 \text{ t}$$



Posición del tren para obtención de esfuerzos cortantes:



Las hipótesis consideradas para el cálculo son las que a continuación se relacionan:

H-1) Peso de la estructura + Cargas permanentes

H-2) Empuje de tierras (sin sobrecarga)

H-3) Empuje de tierras (en servicio)

H-4 Empuje lateral para s_c = 3 t/m^2 (lado izq.)

H-5) Empuje lateral para $s_c = 3$ t/m^2 (lado dcho.)

H-6) Empuje lateral para un desnivel de relleno entre hastiales de 2,0 m y una sobrecarga por compactación de 2 t/m^2.

H-7) Sobrecarga de tren posición A

H-8) Sobrecarga de tren posición B

H-9 a H-17). Distintas combinaciones posibles de las siete hipótesis simples.

A partir de los resultados obtenidos para las distintas combinaciones citadas, se determina la armadura necesaria en cada elemento, para los esfuerzos pésimos.

El armado de las distintas secciones se realiza de acuerdo con la EHE.

3.3. RESULTADOS

Los resultados facilitados son los que a continuación se indican:

a) Obtención de esfuerzos y listado de los mismos, en todas las secciones características de la estructura.

b) Cálculo y listado de los desplazamientos de todos los nudos.

c) Reacciones.

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*                                               *
*           S T A A D - III                     *
*           Revision 17.0a                      *
*           Proprietary Program of              *
*           RESEARCH ENGINEERS, Inc.            *
*           Date=    OCT  4, 1999               *
*           Time=    10:17: 7                   *
*                                               *
*************************************************
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 1. STAAD PLANE PASO INFERIOR D.O. 301+080
 2. * 9.00 X 10.00
 3. * HT = 0.00 M
 4. UNIT MET MTO
 5. JOINT COORDINATES
 6.  1  0.000  0.00 ; 2  0.000  1.250 ; 3  0.000  2.500 ; 4  0.000   3.75
 7.  5  0.000  5.00 ; 6  0.000  6.250 ; 7  0.000  7.500 ; 8  0.000   8.75
 8.  9  0.000 10.00 ;10  1.2375 10.00 ;11  2.475 10.000 ;12  3.7125 10.00
 9. 13  4.950 10.00 ;14  6.1875 10.00 ;15  7.425 10.000 ;16  8.6625 10.00
10. 17  9.900 10.00 ;18  9.900  0.000 ;19  9.900  1.250 ;20  9.900   2.50
11. 21  9.900  3.75 ;22  9.900  5.000 ;23  9.900  6.250 ;24  9.900   7.50
12. 25  9.900  8.75
13. MEMBER INCIDENCES
14.  1  1  2  16
15. 17 18 19  23
16. 24 25 17
17. MEMBER PROPERTIES
18.  1 TO  8 17 TO 24 PRISMATIC  AX 0.900  IZ 0.06075
19.  9 TO 16          PRISMATIC  AX 1.000  IZ 0.08333
20. CONSTANTS
21. E 3000000.0  ALL
22. SUPPORTS
23. 1 18          FIXED
24. LOADING 1   PESO PROPIO + CARGAS PERMANENTES
25. MEMBER LOAD
26. 1 TO  8 17 TO 24  UNI GY -2.25
27. 9 TO 16           UNI GY -2.50
28. 9 TO 16           UNI GY -1.47
29. LOADING 2   EMPUJE DE TIERRAS (SIN SOBRECARGA)
30. MEMBER LOAD
31.  1          TRAP GX   8.98   7.89
32.  2          TRAP GX   7.89   6.82
33.  3          TRAP GX   6.82   5.76
34.  4          TRAP GX   5.76   4.69
35.  5          TRAP GX   4.69   3.62
36.  6          TRAP GX   3.62   2.56
37.  7          TRAP GX   2.56   1.49
38.  8          TRAP GX   1.49   0.43
39. 17          TRAP GX  -8.98  -7.89
40. 18          TRAP GX  -7.89  -6.82
41. 19          TRAP GX  -6.82  -5.76
42. 20          TRAP GX  -5.76  -4.69
43. 21          TRAP GX  -4.69  -3.62
44. 22          TRAP GX  -3.62  -2.56
45. 23          TRAP GX  -2.56  -1.49
46. 24          TRAP GX  -1.49  -0.43
47. LOADING 3   EMPUJE DE TIERRAS (EN SERVICIO)
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* 9.00 X 10.00
48. MEMBER LOAD
49.  1          TRAP GX   4.48   3.94
50.  2          TRAP GX   3.94   3.41
51.  3          TRAP GX   3.41   2.88
52.  4          TRAP GX   2.88   2.35
53.  5          TRAP GX   2.35   1.81
54.  6          TRAP GX   1.81   1.28
55.  7          TRAP GX   1.28   0.75
56.  8          TRAP GX   0.75   0.21
57. 17          TRAP GX  -4.48  -3.94
58. 18          TRAP GX  -3.94  -3.41
59. 19          TRAP GX  -3.41  -2.88
60. 20          TRAP GX  -2.88  -2.35
61. 21          TRAP GX  -2.35  -1.81
62. 22          TRAP GX  -1.81  -1.28
63. 23          TRAP GX  -1.28  -0.75
64. 24          TRAP GX  -0.75  -0.21
65. LOADING 4   EMPUJE DE SOBRECARGA DE 3.00 T/M2 (IZQDA)
66. MEMBER LOAD
67.  1          TRAP GX   1.28   1.28
68.  2          TRAP GX   1.28   1.28
69.  3          TRAP GX   1.28   1.28
70.  4          TRAP GX   1.28   1.28
71.  5          TRAP GX   1.28   1.28
72.  6          TRAP GX   1.28   1.28
73.  7          TRAP GX   1.28   1.28
74.  8          TRAP GX   1.28   1.28
75. LOADING 5   EMPUJE DE SOBRECARGA DE 3.00 T/M2 (DRCHA)
76. MEMBER LOAD
77. 17          TRAP GX  -1.28  -1.28
78. 18          TRAP GX  -1.28  -1.28
79. 19          TRAP GX  -1.28  -1.28
80. 20          TRAP GX  -1.28  -1.28
81. 21          TRAP GX  -1.28  -1.28
82. 22          TRAP GX  -1.28  -1.28
83. 23          TRAP GX  -1.28  -1.28
84. 24          TRAP GX  -1.28  -1.28
85. LOADING 6   COMPACTADOR DE 2.00 T/M2
86. MEMBER LOAD
87.  1          TRAP GX   6.40   5.33
88.  2          TRAP GX   5.33   4.26
89.  3          TRAP GX   4.26   3.20
90.  4          TRAP GX   3.20   2.13
91.  5          TRAP GX   2.13   1.07
92.  6          TRAP GX   1.07   0.00
93. 17          TRAP GX  -9.38  -8.31
94. 18          TRAP GX  -8.31  -7.25
95. 19          TRAP GX  -7.25  -6.18
96. 20          TRAP GX  -6.18  -5.12
97. 21          TRAP GX  -5.12  -4.05
98. 22          TRAP GX  -4.05  -2.98
99. 23          TRAP GX  -2.98  -1.92
100. 24         TRAP GX  -1.92  -0.85
101. LOADING 7  SOBRECARGA TREN POSICION A
102. MEMBER LOAD
103. 9          UNI GY -1.90
104. 10         UNI GY -1.90  0.0000  0.5125
105. 11         CON GY -5.85  0.0750
106. 12         CON GY -5.85  0.4375
107. 13         CON GY -5.85  0.8000
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 * 9.00 X 10.00
108. 14          CON GY -5.85  1.1625
109. 15          UNI GY -1.90  0.6950  1.2375
110. 16          UNI GY -1.90
111. LOADING 8  SOBRECARGA TREN POSICION B
112. MEMBER LOAD
113. 9           CON GY -5.85  0.0100
114. 10          CON GY -5.85  0.3625
115. 11          CON GY -5.85  0.7250
116. 12          CON GY -5.85  1.0875
117. 13          UNI GY -1.90  0.6500  1.2375
118. 14 TO 16    UNI GY -1.90
119. * DIMENSIONAMIENTO
120. LOAD COMB  9  P.P. + C.P. + COMPACTADOR
121. 1 1.00  6 1.50
122. LOAD COMB 10  P.P. + C.P. + EMP.TIERRAS + EMP.S.C. (IZQDA)
123. 1 1.00  2 1.50  4 1.50
124. LOAD COMB 11  P.P. + C.P. + EMP.TIERRAS + EMP. S.C. (TOTAL)
125. 1 1.00  2 1.50  4 1.50  5 1.50
126. LOAD COMB 12  P.P. + C.P. + EMP.TIERRAS + SC.TREN A
127. 1 1.35  3 1.00  7 1.50
128. LOAD COMB 13  P.P. + C.P. + EMP.TIERRAS + SC.TREN B
129. 1 1.35  3 1.00  8 1.50
130. LOAD COMB 14  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(IZQDA) + SC.TREN A
131. 1 1.35  2 1.50  4 1.50  7 1.50
132. LOAD COMB 15  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(IZQDA) + SC.TREN B
133. 1 1.35  2 1.50  4 1.50  8 1.50
134. LOAD COMB 16  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(TOTAL) + SC.TREN A
135. 1 1.35  2 1.50  4 1.50  5 1.50  7 1.50
136. LOAD COMB 17  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(TOTAL) + SC.TREN B
137. 1 1.35  2 1.50  4 1.50  5 1.50  8 1.50
138. * COMPROBACION DE TENSIONES
139. LOAD COMB 18  P.P. + C.P. + COMPACTADOR
140. 1 1.00  6 1.00
141. LOAD COMB 19  P.P. + C.P. + EMP.TIERRAS + EMP.S.C. (IZQDA)
142. 1 1.00  2 1.00  4 1.00
143. LOAD COMB 20  P.P. + C.P. + EMP.TIERRAS + EMP. S.C. (TOTAL)
144. 1 1.00  2 1.00  4 1.00  5 1.00
145. LOAD COMB 21  P.P. + C.P. + EMP.TIERRAS + SC.TREN A
146. 1 1.00  3 1.00  7 1.00
147. LOAD COMB 22  P.P. + C.P. + EMP.TIERRAS + SC.TREN B
148. 1 1.00  3 1.00  8 1.00
149. LOAD COMB 23  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(IZQDA) + SC.TREN A
150. 1 1.00  2 1.00  4 1.00  7 1.00
151. LOAD COMB 24  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(IZQDA) + SC.TREN B
152. 1 1.00  2 1.00  4 1.00  8 1.00
153. LOAD COMB 25  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(TOTAL) + SC.TREN A
154. 1 1.00  2 1.00  4 1.00  5 1.00  7 1.00
155. LOAD COMB 26  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(TOTAL) + SC.TREN B
156. 1 1.00  2 1.00  4 1.00  5 1.00  8 1.00
157. * FISURACION
158. LOAD COMB 27  P.P. + C.P. + COMPACTADOR
159. 1 1.00  6 1.00
160. LOAD COMB 28  P.P. + C.P. + EMP.TIERRAS
161. 1 1.00  2 1.00
162. PERFORM ANALYSIS
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 * 9.00 X 10.00

      P R O B L E M   S T A T I S T I C S
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   NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS =    25/   24/    2
   ORIGINAL/FINAL BAND-WIDTH =     8/    1
   TOTAL PRIMARY LOAD CASES  =     8, TOTAL DEGREES OF FREEDOM =    69
   SIZE OF STIFFNESS MATRIX =     414 DOUBLE PREC. WORDS
   TOTAL REQUIRED DISK SPACE =   12.06 MEGA-BYTES


++ PROCESSING ELEMENT STIFFNESS MATRIX.              10:17:13
++ PROCESSING GLOBAL STIFFNESS MATRIX.               10:17:13
++ PROCESSING TRIANGULAR FACTORIZATION.              10:17:13
++ CALCULATING JOINT DISPLACEMENTS.                  10:17:13
++ CALCULATING MEMBER  FORCES.                       10:17:13

 163. LOAD LIST 9 TO 17
 164. PRINT SUP REAC ALL
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SUPPORT REACTIONS -UNIT MTO MET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	9	-19.99	47.34	0.00	0.00	0.00	-10.49
	10	-64.53	39.27	0.00	0.00	0.00	118.32
	11	-60.45	42.15	0.00	0.00	0.00	94.98
	12	-9.86	79.46	0.00	0.00	0.00	2.76
	13	-10.40	86.21	0.00	0.00	0.00	4.84
	14	-59.84	76.58	0.00	0.00	0.00	102.72
	15	-60.38	83.33	0.00	0.00	0.00	104.80
	16	-55.76	79.46	0.00	0.00	0.00	79.38
	17	-56.29	86.21	0.00	0.00	0.00	81.47
18	9	60.75	36.96	0.00	0.00	0.00	-125.23
	10	45.33	45.03	0.00	0.00	0.00	-50.82
	11	60.45	42.15	0.00	0.00	0.00	-94.98
	12	9.86	79.51	0.00	0.00	0.00	-2.76
	13	10.40	74.95	0.00	0.00	0.00	-4.23
	14	40.64	82.39	0.00	0.00	0.00	-35.22
	15	41.18	77.83	0.00	0.00	0.00	-36.68
	16	55.76	79.51	0.00	0.00	0.00	-79.39
	17	56.29	74.95	0.00	0.00	0.00	-80.85

********** END OF LATEST ANALYSIS RESULT **********

165. PRINT JOINT DISP ALL

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
1	9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	13	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	17	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	9	-0.00755	-0.00213	0.00000	0.00000	0.00000	0.00014
	10	0.04004	-0.00175	0.00000	0.00000	0.00000	-0.00056
	11	0.03076	-0.00189	0.00000	0.00000	0.00000	-0.00042
	12	-0.00034	-0.00359	0.00000	0.00000	0.00000	0.00002
	13	0.00046	-0.00390	0.00000	0.00000	0.00000	0.00000
	14	0.03418	-0.00346	0.00000	0.00000	0.00000	-0.00047
	15	0.03498	-0.00377	0.00000	0.00000	0.00000	-0.00049
	16	0.02491	-0.00359	0.00000	0.00000	0.00000	-0.00033
	17	0.02571	-0.00390	0.00000	0.00000	0.00000	-0.00034
3	9	-0.03855	-0.00412	0.00000	0.00000	0.00000	0.00036
	10	0.12384	-0.00338	0.00000	0.00000	0.00000	-0.00072
	11	0.08965	-0.00364	0.00000	0.00000	0.00000	-0.00047
	12	-0.00556	-0.00701	0.00000	0.00000	0.00000	0.00007
	13	-0.00274	-0.00763	0.00000	0.00000	0.00000	0.00005
	14	0.10378	-0.00674	0.00000	0.00000	0.00000	-0.00059
	15	0.10659	-0.00736	0.00000	0.00000	0.00000	-0.00061
	16	0.06959	-0.00701	0.00000	0.00000	0.00000	-0.00034
	17	0.07241	-0.00763	0.00000	0.00000	0.00000	-0.00036
4	9	-0.09782	-0.00599	0.00000	0.00000	0.00000	0.00058
	10	0.21044	-0.00487	0.00000	0.00000	0.00000	-0.00063
	11	0.14009	-0.00527	0.00000	0.00000	0.00000	-0.00031
	12	-0.01814	-0.01024	0.00000	0.00000	0.00000	0.00013
	13	-0.01266	-0.01118	0.00000	0.00000	0.00000	0.00010
	14	0.17285	-0.00984	0.00000	0.00000	0.00000	-0.00049
	15	0.17832	-0.01078	0.00000	0.00000	0.00000	-0.00051
	16	0.10250	-0.01024	0.00000	0.00000	0.00000	-0.00017
	17	0.10798	-0.01118	0.00000	0.00000	0.00000	-0.00019
5	9	-0.18163	-0.00773	0.00000	0.00000	0.00000	0.00074
	10	0.27517	-0.00623	0.00000	0.00000	0.00000	-0.00039
	11	0.16178	-0.00676	0.00000	0.00000	0.00000	-0.00003
	12	-0.03598	-0.01331	0.00000	0.00000	0.00000	0.00015
	13	-0.02776	-0.01456	0.00000	0.00000	0.00000	0.00013
	14	0.22174	-0.01277	0.00000	0.00000	0.00000	-0.00029
	15	0.22995	-0.01403	0.00000	0.00000	0.00000	-0.00031
	16	0.10834	-0.01331	0.00000	0.00000	0.00000	0.00007
	17	0.11656	-0.01456	0.00000	0.00000	0.00000	0.00005
6	9	-0.27980	-0.00933	0.00000	0.00000	0.00000	0.00081
	10	0.30750	-0.00746	0.00000	0.00000	0.00000	-0.00013
	11	0.14855	-0.00813	0.00000	0.00000	0.00000	0.00024

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
	12	-0.05311	-0.01620	0.00000	0.00000	0.00000	0.00011
	13	-0.04266	-0.01776	0.00000	0.00000	0.00000	0.00010
	14	0.24494	-0.01553	0.00000	0.00000	0.00000	-0.00009
	15	0.25539	-0.01709	0.00000	0.00000	0.00000	-0.00011
	16	0.08599	-0.01620	0.00000	0.00000	0.00000	0.00027
	17	0.09644	-0.01776	0.00000	0.00000	0.00000	0.00026
7	9	-0.37789	-0.01081	0.00000	0.00000	0.00000	0.00074
	10	0.30887	-0.00857	0.00000	0.00000	0.00000	0.00009
	11	0.10623	-0.00936	0.00000	0.00000	0.00000	0.00042
	12	-0.06045	-0.01891	0.00000	0.00000	0.00000	-0.00001
	13	-0.04883	-0.02078	0.00000	0.00000	0.00000	-0.00001
	14	0.24894	-0.01811	0.00000	0.00000	0.00000	0.00001
	15	0.26056	-0.01998	0.00000	0.00000	0.00000	0.00000
	16	0.04630	-0.01891	0.00000	0.00000	0.00000	0.00034
	17	0.05792	-0.02078	0.00000	0.00000	0.00000	0.00033
8	9	-0.45927	-0.01215	0.00000	0.00000	0.00000	0.00054
	10	0.29060	-0.00954	0.00000	0.00000	0.00000	0.00018
	11	0.05052	-0.01047	0.00000	0.00000	0.00000	0.00044
	12	-0.04644	-0.02144	0.00000	0.00000	0.00000	-0.00023
	13	-0.03530	-0.02363	0.00000	0.00000	0.00000	-0.00022
	14	0.25007	-0.02051	0.00000	0.00000	0.00000	-0.00006
	15	0.26121	-0.02270	0.00000	0.00000	0.00000	-0.00005
	16	0.00999	-0.02144	0.00000	0.00000	0.00000	0.00021
	17	0.02113	-0.02363	0.00000	0.00000	0.00000	0.00022
9	9	-0.50683	-0.01337	0.00000	0.00000	0.00000	0.00020
	10	0.27170	-0.01038	0.00000	0.00000	0.00000	0.00009
	11	0.00481	-0.01144	0.00000	0.00000	0.00000	0.00025
	12	0.00213	-0.02380	0.00000	0.00000	0.00000	-0.00056
	13	0.01058	-0.02630	0.00000	0.00000	0.00000	-0.00053
	14	0.27237	-0.02274	0.00000	0.00000	0.00000	-0.00034
	15	0.28082	-0.02524	0.00000	0.00000	0.00000	-0.00031
	16	0.00547	-0.02380	0.00000	0.00000	0.00000	-0.00018
	17	0.01392	-0.02630	0.00000	0.00000	0.00000	-0.00015
10	9	-0.50749	-0.00390	0.00000	0.00000	0.00000	-0.00002
	10	0.27067	-0.00563	0.00000	0.00000	0.00000	0.00000
	11	0.00360	0.00816	0.00000	0.00000	0.00000	0.00008
	12	0.00157	-0.10522	0.00000	0.00000	0.00000	-0.00071
	13	0.01005	-0.10290	0.00000	0.00000	0.00000	-0.00066
	14	0.27114	-0.07725	0.00000	0.00000	0.00000	-0.00050
	15	0.27962	-0.07492	0.00000	0.00000	0.00000	-0.00045
	16	0.00408	-0.06346	0.00000	0.00000	0.00000	-0.00042
	17	0.01255	-0.06113	0.00000	0.00000	0.00000	-0.00037
11	9	-0.50815	-0.01418	0.00000	0.00000	0.00000	-0.00012
	10	0.26964	-0.00726	0.00000	0.00000	0.00000	-0.00002
	11	0.00240	0.01286	0.00000	0.00000	0.00000	0.00001
	12	0.00101	-0.18878	0.00000	0.00000	0.00000	-0.00061
	13	0.00951	-0.17996	0.00000	0.00000	0.00000	-0.00055
	14	0.26992	-0.13730	0.00000	0.00000	0.00000	-0.00044

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
	15	0.27841	-0.12848	0.00000	0.00000	0.00000	-0.00038
	16	0.00268	-0.11718	0.00000	0.00000	0.00000	-0.00042
	17	0.01118	-0.10836	0.00000	0.00000	0.00000	-0.00036
12	9	-0.50881	-0.03097	0.00000	0.00000	0.00000	-0.00013
	10	0.26861	-0.00814	0.00000	0.00000	0.00000	0.00001
	11	0.00120	0.01195	0.00000	0.00000	0.00000	-0.00001
	12	0.00045	-0.24908	0.00000	0.00000	0.00000	-0.00035
	13	0.00897	-0.23379	0.00000	0.00000	0.00000	-0.00030
	14	0.26869	-0.17967	0.00000	0.00000	0.00000	-0.00023
	15	0.27721	-0.16438	0.00000	0.00000	0.00000	-0.00018
	16	0.00129	-0.15958	0.00000	0.00000	0.00000	-0.00025
	17	0.00980	-0.14429	0.00000	0.00000	0.00000	-0.00020
13	9	-0.50947	-0.04473	0.00000	0.00000	0.00000	-0.00008
	10	0.26757	-0.00487	0.00000	0.00000	0.00000	0.00004
	11	0.00000	0.01103	0.00000	0.00000	0.00000	0.00000
	12	-0.00011	-0.27089	0.00000	0.00000	0.00000	0.00000
	13	0.00843	-0.25079	0.00000	0.00000	0.00000	0.00003
	14	0.26746	-0.19132	0.00000	0.00000	0.00000	0.00004
	15	0.27600	-0.17122	0.00000	0.00000	0.00000	0.00007
	16	-0.00011	-0.17543	0.00000	0.00000	0.00000	0.00000
	17	0.00843	-0.15532	0.00000	0.00000	0.00000	0.00003
14	9	-0.51013	-0.04968	0.00000	0.00000	0.00000	0.00000
	10	0.26654	0.00224	0.00000	0.00000	0.00000	0.00006
	11	-0.00120	0.01195	0.00000	0.00000	0.00000	0.00001
	12	-0.00067	-0.24914	0.00000	0.00000	0.00000	0.00035
	13	0.00789	-0.22754	0.00000	0.00000	0.00000	0.00034
	14	0.26624	-0.16935	0.00000	0.00000	0.00000	0.00030
	15	0.27480	-0.14776	0.00000	0.00000	0.00000	0.00029
	16	-0.00150	-0.15963	0.00000	0.00000	0.00000	0.00025
	17	0.00706	-0.13804	0.00000	0.00000	0.00000	0.00024
15	9	-0.51079	-0.04374	0.00000	0.00000	0.00000	0.00009
	10	0.26551	0.00913	0.00000	0.00000	0.00000	0.00004
	11	-0.00240	0.01286	0.00000	0.00000	0.00000	-0.00001
	12	-0.00123	-0.18886	0.00000	0.00000	0.00000	0.00061
	13	0.00735	-0.17070	0.00000	0.00000	0.00000	0.00056
	14	0.26501	-0.12099	0.00000	0.00000	0.00000	0.00046
	15	0.27359	-0.10283	0.00000	0.00000	0.00000	0.00041
	16	-0.00290	-0.11726	0.00000	0.00000	0.00000	0.00042
	17	0.00568	-0.09910	0.00000	0.00000	0.00000	0.00037
16	9	-0.51145	-0.02856	0.00000	0.00000	0.00000	0.00015
	10	0.26447	0.00805	0.00000	0.00000	0.00000	-0.00007
	11	-0.00360	0.00816	0.00000	0.00000	0.00000	-0.00008
	12	-0.00179	-0.10529	0.00000	0.00000	0.00000	0.00071
	13	0.00681	-0.09482	0.00000	0.00000	0.00000	0.00064
	14	0.26378	-0.06364	0.00000	0.00000	0.00000	0.00043
	15	0.27239	-0.05317	0.00000	0.00000	0.00000	0.00036
	16	-0.00429	-0.06352	0.00000	0.00000	0.00000	0.00042
	17	0.00431	-0.05305	0.00000	0.00000	0.00000	0.00035

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
17	9	-0.51210	-0.00952	0.00000	0.00000	0.00000	0.00015
	10	0.26344	-0.01251	0.00000	0.00000	0.00000	-0.00028
	11	-0.00481	-0.01144	0.00000	0.00000	0.00000	-0.00025
	12	-0.00235	-0.02382	0.00000	0.00000	0.00000	0.00056
	13	0.00627	-0.02214	0.00000	0.00000	0.00000	0.00050
	14	0.26256	-0.02489	0.00000	0.00000	0.00000	0.00015
	15	0.27118	-0.02320	0.00000	0.00000	0.00000	0.00008
	16	-0.00569	-0.02382	0.00000	0.00000	0.00000	0.00018
	17	0.00294	-0.02214	0.00000	0.00000	0.00000	0.00011
18	9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	13	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	17	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
19	9	-0.04360	-0.00165	0.00000	0.00000	0.00000	0.00062
	10	-0.01442	-0.00202	0.00000	0.00000	0.00000	0.00018
	11	-0.03076	-0.00189	0.00000	0.00000	0.00000	0.00042
	12	0.00033	-0.00359	0.00000	0.00000	0.00000	-0.00002
	13	-0.00020	-0.00338	0.00000	0.00000	0.00000	-0.00001
	14	-0.00857	-0.00373	0.00000	0.00000	0.00000	0.00009
	15	-0.00910	-0.00352	0.00000	0.00000	0.00000	0.00010
	16	-0.02491	-0.00359	0.00000	0.00000	0.00000	0.00033
	17	-0.02544	-0.00338	0.00000	0.00000	0.00000	0.00034
20	9	-0.13993	-0.00316	0.00000	0.00000	0.00000	0.00087
	10	-0.03381	-0.00391	0.00000	0.00000	0.00000	0.00010
	11	-0.08965	-0.00364	0.00000	0.00000	0.00000	0.00047
	12	0.00555	-0.00701	0.00000	0.00000	0.00000	-0.00007
	13	0.00380	-0.00659	0.00000	0.00000	0.00000	-0.00006
	14	-0.01376	-0.00728	0.00000	0.00000	0.00000	-0.00003
	15	-0.01551	-0.00686	0.00000	0.00000	0.00000	-0.00002
	16	-0.06961	-0.00701	0.00000	0.00000	0.00000	0.00034
	17	-0.07136	-0.00659	0.00000	0.00000	0.00000	0.00035
21	9	-0.24947	-0.00455	0.00000	0.00000	0.00000	0.00085
	10	-0.03391	-0.00567	0.00000	0.00000	0.00000	-0.00011
	11	-0.14009	-0.00527	0.00000	0.00000	0.00000	0.00031
	12	0.01811	-0.01025	0.00000	0.00000	0.00000	-0.00013
	13	0.01503	-0.00962	0.00000	0.00000	0.00000	-0.00012
	14	0.00365	-0.01065	0.00000	0.00000	0.00000	-0.00025
	15	0.00057	-0.01002	0.00000	0.00000	0.00000	-0.00024
	16	-0.10253	-0.01025	0.00000	0.00000	0.00000	0.00017
	17	-0.10560	-0.00962	0.00000	0.00000	0.00000	0.00018
22	9	-0.34728	-0.00580	0.00000	0.00000	0.00000	0.00069
	10	-0.00421	-0.00730	0.00000	0.00000	0.00000	-0.00036
	11	-0.16178	-0.00676	0.00000	0.00000	0.00000	0.00003

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
	12	0.03592	-0.01332	0.00000	0.00000	0.00000	-0.00015
	13	0.03198	-0.01247	0.00000	0.00000	0.00000	-0.00015
	14	0.04917	-0.01385	0.00000	0.00000	0.00000	-0.00047
	15	0.04522	-0.01301	0.00000	0.00000	0.00000	-0.00046
	16	-0.10840	-0.01332	0.00000	0.00000	0.00000	-0.00007
	17	-0.11234	-0.01247	0.00000	0.00000	0.00000	-0.00007
23	9	-0.42083	-0.00693	0.00000	0.00000	0.00000	0.00048
	10	0.05426	-0.00880	0.00000	0.00000	0.00000	-0.00056
	11	-0.14855	-0.00813	0.00000	0.00000	0.00000	-0.00024
	12	0.05303	-0.01621	0.00000	0.00000	0.00000	-0.00011
	13	0.04925	-0.01515	0.00000	0.00000	0.00000	-0.00012
	14	0.11673	-0.01687	0.00000	0.00000	0.00000	-0.00059
	15	0.11295	-0.01582	0.00000	0.00000	0.00000	-0.00060
	16	-0.08607	-0.01621	0.00000	0.00000	0.00000	-0.00027
	17	-0.08986	-0.01515	0.00000	0.00000	0.00000	-0.00028
24	9	-0.46789	-0.00792	0.00000	0.00000	0.00000	0.00028
	10	0.13104	-0.01016	0.00000	0.00000	0.00000	-0.00064
	11	-0.10623	-0.00936	0.00000	0.00000	0.00000	-0.00042
	12	0.06032	-0.01892	0.00000	0.00000	0.00000	0.00001
	13	0.05831	-0.01766	0.00000	0.00000	0.00000	-0.00001
	14	0.19085	-0.01972	0.00000	0.00000	0.00000	-0.00056
	15	0.18883	-0.01846	0.00000	0.00000	0.00000	-0.00058
	16	-0.04642	-0.01892	0.00000	0.00000	0.00000	-0.00034
	17	-0.04844	-0.01766	0.00000	0.00000	0.00000	-0.00036
25	9	-0.49435	-0.00879	0.00000	0.00000	0.00000	0.00016
	10	0.20839	-0.01140	0.00000	0.00000	0.00000	-0.00056
	11	-0.05052	-0.01047	0.00000	0.00000	0.00000	-0.00044
	12	0.04628	-0.02146	0.00000	0.00000	0.00000	0.00023
	13	0.04821	-0.01998	0.00000	0.00000	0.00000	0.00019
	14	0.24876	-0.02239	0.00000	0.00000	0.00000	-0.00033
	15	0.25069	-0.02092	0.00000	0.00000	0.00000	-0.00037
	16	-0.01015	-0.02146	0.00000	0.00000	0.00000	-0.00021
	17	-0.00822	-0.01998	0.00000	0.00000	0.00000	-0.00025

********** END OF LATEST ANALYSIS RESULT **********

166. PRINT MEMBER FORCES ALL

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	9	1	47.34	19.99	0.00	0.00	0.00	-10.49
		2	-44.53	-9.00	0.00	0.00	0.00	28.39
	10	1	39.27	64.53	0.00	0.00	0.00	118.32
		2	-36.46	-46.32	0.00	0.00	0.00	-49.26
	11	1	42.15	60.45	0.00	0.00	0.00	94.98
		2	-39.34	-42.23	0.00	0.00	0.00	-31.02
	12	1	79.46	9.86	0.00	0.00	0.00	2.76
		2	-75.66	-4.60	0.00	0.00	0.00	6.21
	13	1	86.21	10.40	0.00	0.00	0.00	4.84
		2	-82.41	-5.13	0.00	0.00	0.00	4.79
	14	1	76.58	59.84	0.00	0.00	0.00	102.72
		2	-72.78	-41.63	0.00	0.00	0.00	-39.51
	15	1	83.33	60.38	0.00	0.00	0.00	104.80
		2	-79.54	-42.16	0.00	0.00	0.00	-40.93
	16	1	79.46	55.76	0.00	0.00	0.00	79.38
		2	-75.66	-37.54	0.00	0.00	0.00	-21.28
	17	1	86.21	56.29	0.00	0.00	0.00	81.47
		2	-82.41	-38.08	0.00	0.00	0.00	-22.70
2	9	2	44.53	9.00	0.00	0.00	0.00	-28.39
		3	-41.72	0.00	0.00	0.00	0.00	33.81
	10	2	36.46	46.32	0.00	0.00	0.00	49.26
		3	-33.65	-30.12	0.00	0.00	0.00	-1.69
	11	2	39.34	42.23	0.00	0.00	0.00	31.02
		3	-36.53	-26.04	0.00	0.00	0.00	11.44
	12	2	75.66	4.60	0.00	0.00	0.00	-6.21
		3	-71.86	-0.01	0.00	0.00	0.00	9.02
	13	2	82.41	5.13	0.00	0.00	0.00	-4.79
		3	-78.62	-0.54	0.00	0.00	0.00	8.27
	14	2	72.78	41.63	0.00	0.00	0.00	39.51
		3	-68.98	-25.44	0.00	0.00	0.00	2.19
	15	2	79.53	42.16	0.00	0.00	0.00	40.93
		3	-75.74	-25.97	0.00	0.00	0.00	1.44
	16	2	75.66	37.54	0.00	0.00	0.00	21.28
		3	-71.86	-21.35	0.00	0.00	0.00	15.32
	17	2	82.41	38.08	0.00	0.00	0.00	22.70
		3	-78.62	-21.89	0.00	0.00	0.00	14.57
3	9	3	41.72	0.00	0.00	0.00	0.00	-33.81
		4	-38.91	6.99	0.00	0.00	0.00	29.24
	10	3	33.65	30.12	0.00	0.00	0.00	1.69
		4	-30.84	-15.93	0.00	0.00	0.00	26.89
	11	3	36.53	26.04	0.00	0.00	0.00	-11.44
		4	-33.71	-11.85	0.00	0.00	0.00	34.91
	12	3	71.86	0.01	0.00	0.00	0.00	-9.02
		4	-68.07	3.92	0.00	0.00	0.00	6.51
	13	3	78.62	0.54	0.00	0.00	0.00	-8.27
		4	-74.82	3.39	0.00	0.00	0.00	6.42

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	14	3	68.98	25.44	0.00	0.00	0.00	-2.19
		4	-65.19	-11.24	0.00	0.00	0.00	24.91
	15	3	75.74	25.97	0.00	0.00	0.00	-1.44
		4	-71.94	-11.78	0.00	0.00	0.00	24.82
	16	3	71.86	21.35	0.00	0.00	0.00	-15.32
		4	-68.07	-7.16	0.00	0.00	0.00	32.94
	17	3	78.62	21.89	0.00	0.00	0.00	-14.57
		4	-74.82	-7.69	0.00	0.00	0.00	32.85
4	9	4	38.91	-6.99	0.00	0.00	0.00	-29.24
		5	-36.09	11.99	0.00	0.00	0.00	17.17
	10	4	30.84	15.93	0.00	0.00	0.00	-26.89
		5	-28.02	-3.73	0.00	0.00	0.00	38.97
	11	4	33.71	11.85	0.00	0.00	0.00	-34.91
		5	-30.90	0.35	0.00	0.00	0.00	41.89
	12	4	68.07	-3.92	0.00	0.00	0.00	-6.51
		5	-64.27	7.19	0.00	0.00	0.00	-0.51
	13	4	74.82	-3.39	0.00	0.00	0.00	-6.42
		5	-71.02	6.66	0.00	0.00	0.00	0.07
	14	4	65.19	11.24	0.00	0.00	0.00	-24.91
		5	-61.39	0.95	0.00	0.00	0.00	31.13
	15	4	71.94	11.78	0.00	0.00	0.00	-24.82
		5	-68.14	0.42	0.00	0.00	0.00	31.71
	16	4	68.07	7.16	0.00	0.00	0.00	-32.94
		5	-64.27	5.04	0.00	0.00	0.00	34.05
	17	4	74.82	7.69	0.00	0.00	0.00	-32.85
		5	-71.02	4.50	0.00	0.00	0.00	34.63
5	9	5	36.09	-11.99	0.00	0.00	0.00	-17.17
		6	-33.28	14.99	0.00	0.00	0.00	0.11
	10	5	28.02	3.73	0.00	0.00	0.00	-38.97
		6	-25.21	6.46	0.00	0.00	0.00	37.06
	11	5	30.90	-0.35	0.00	0.00	0.00	-41.89
		6	-28.09	10.54	0.00	0.00	0.00	34.88
	12	5	64.27	-7.19	0.00	0.00	0.00	0.51
		6	-60.47	9.79	0.00	0.00	0.00	-11.20
	13	5	71.02	-6.66	0.00	0.00	0.00	-0.07
		6	-67.23	9.26	0.00	0.00	0.00	-9.95
	14	5	61.39	-0.95	0.00	0.00	0.00	-31.13
		6	-57.59	11.15	0.00	0.00	0.00	23.36
	15	5	68.14	-0.42	0.00	0.00	0.00	-31.71
		6	-64.35	10.61	0.00	0.00	0.00	24.61
	16	5	64.27	-5.04	0.00	0.00	0.00	-34.05
		6	-60.47	15.23	0.00	0.00	0.00	21.18
	17	5	71.02	-4.50	0.00	0.00	0.00	-34.63
		6	-67.23	14.69	0.00	0.00	0.00	22.43
6	9	6	33.28	-14.99	0.00	0.00	0.00	-0.11
		7	-30.47	15.99	0.00	0.00	0.00	-19.46
	10	6	25.21	-6.46	0.00	0.00	0.00	-37.06
		7	-22.40	14.65	0.00	0.00	0.00	23.66

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	11	6	28.09	-10.54	0.00	0.00	0.00	-34.88
		7	-25.28	18.73	0.00	0.00	0.00	16.38
	12	6	60.47	-9.79	0.00	0.00	0.00	11.20
		7	-56.68	11.72	0.00	0.00	0.00	-24.72
	13	6	67.23	-9.26	0.00	0.00	0.00	9.95
		7	-63.43	11.19	0.00	0.00	0.00	-22.80
	14	6	57.59	-11.15	0.00	0.00	0.00	-23.36
		7	-53.80	19.34	0.00	0.00	0.00	4.10
	15	6	64.35	-10.61	0.00	0.00	0.00	-24.61
		7	-60.55	18.81	0.00	0.00	0.00	6.01
	16	6	60.47	-15.23	0.00	0.00	0.00	-21.18
		7	-56.68	23.42	0.00	0.00	0.00	-3.19
	17	6	67.23	-14.69	0.00	0.00	0.00	-22.43
		7	-63.43	22.89	0.00	0.00	0.00	-1.27
7	9	7	30.47	-15.99	0.00	0.00	0.00	19.46
		8	-27.66	15.99	0.00	0.00	0.00	-39.45
	10	7	22.40	-14.65	0.00	0.00	0.00	-23.66
		8	-19.59	20.85	0.00	0.00	0.00	1.26
	11	7	25.28	-18.73	0.00	0.00	0.00	-16.38
		8	-22.46	24.93	0.00	0.00	0.00	-11.12
	12	7	56.68	-11.72	0.00	0.00	0.00	24.72
		8	-52.88	12.99	0.00	0.00	0.00	-40.23
	13	7	63.43	-11.19	0.00	0.00	0.00	22.80
		8	-59.63	12.46	0.00	0.00	0.00	-37.65
	14	7	53.80	-19.34	0.00	0.00	0.00	-4.10
		8	-50.00	25.54	0.00	0.00	0.00	-24.16
	15	7	60.55	-18.81	0.00	0.00	0.00	-6.01
		8	-56.75	25.00	0.00	0.00	0.00	-21.58
	16	7	56.68	-23.42	0.00	0.00	0.00	3.19
		8	-52.88	29.62	0.00	0.00	0.00	-36.55
	17	7	63.43	-22.89	0.00	0.00	0.00	1.27
		8	-59.63	29.09	0.00	0.00	0.00	-33.96
8	9	8	27.66	-15.99	0.00	0.00	0.00	39.45
		9	-24.84	15.99	0.00	0.00	0.00	-59.44
	10	8	19.59	-20.85	0.00	0.00	0.00	-1.26
		9	-16.77	25.05	0.00	0.00	0.00	-27.63
	11	8	22.46	-24.93	0.00	0.00	0.00	11.12
		9	-19.65	29.13	0.00	0.00	0.00	-45.12
	12	8	52.88	-12.99	0.00	0.00	0.00	40.23
		9	-49.08	13.59	0.00	0.00	0.00	-56.92
	13	8	59.63	-12.46	0.00	0.00	0.00	37.65
		9	-55.84	13.06	0.00	0.00	0.00	-53.67
	14	8	50.00	-25.54	0.00	0.00	0.00	24.16
		9	-46.20	29.74	0.00	0.00	0.00	-58.91
	15	8	56.75	-25.00	0.00	0.00	0.00	21.58
		9	-52.96	29.20	0.00	0.00	0.00	-55.66
	16	8	52.88	-29.62	0.00	0.00	0.00	36.55
		9	-49.08	33.82	0.00	0.00	0.00	-76.40

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	17	8	59.63	-29.09	0.00	0.00	0.00	33.96
		9	-55.84	33.29	0.00	0.00	0.00	-73.15
9	9	9	15.99	24.84	0.00	0.00	0.00	59.44
		10	-15.99	-19.93	0.00	0.00	0.00	-31.73
	10	9	25.05	16.77	0.00	0.00	0.00	27.63
		10	-25.05	-11.86	0.00	0.00	0.00	-9.91
	11	9	29.13	19.65	0.00	0.00	0.00	45.12
		10	-29.13	-14.74	0.00	0.00	0.00	-23.84
	12	9	13.59	49.08	0.00	0.00	0.00	56.92
		10	-13.59	-38.92	0.00	0.00	0.00	-2.47
	13	9	13.06	55.84	0.00	0.00	0.00	53.67
		10	-13.06	-40.43	0.00	0.00	0.00	0.55
	14	9	29.74	46.20	0.00	0.00	0.00	58.91
		10	-29.74	-36.04	0.00	0.00	0.00	-8.02
	15	9	29.20	52.96	0.00	0.00	0.00	55.66
		10	-29.20	-37.55	0.00	0.00	0.00	-5.00
	16	9	33.82	49.08	0.00	0.00	0.00	76.40
		10	-33.82	-38.92	0.00	0.00	0.00	-21.95
	17	9	33.28	55.84	0.00	0.00	0.00	73.15
		10	-33.28	-40.43	0.00	0.00	0.00	-18.93
10	9	10	15.99	19.93	0.00	0.00	0.00	31.73
		11	-15.99	-15.02	0.00	0.00	0.00	-10.11
	10	10	25.05	11.86	0.00	0.00	0.00	9.91
		11	-25.05	-6.95	0.00	0.00	0.00	1.73
	11	10	29.13	14.74	0.00	0.00	0.00	23.84
		11	-29.13	-9.83	0.00	0.00	0.00	-8.64
	12	10	13.59	38.92	0.00	0.00	0.00	2.47
		11	-13.59	-30.83	0.00	0.00	0.00	40.16
	13	10	13.06	40.43	0.00	0.00	0.00	-0.55
		11	-13.06	-25.02	0.00	0.00	0.00	38.80
	14	10	29.74	36.04	0.00	0.00	0.00	8.02
		11	-29.74	-27.95	0.00	0.00	0.00	31.05
	15	10	29.20	37.55	0.00	0.00	0.00	5.00
		11	-29.20	-22.14	0.00	0.00	0.00	29.68
	16	10	33.82	38.92	0.00	0.00	0.00	21.95
		11	-33.82	-30.83	0.00	0.00	0.00	20.68
	17	10	33.29	40.43	0.00	0.00	0.00	18.93
		11	-33.29	-25.02	0.00	0.00	0.00	19.32
11	9	11	15.99	15.02	0.00	0.00	0.00	10.11
		12	-15.99	-10.10	0.00	0.00	0.00	5.43
	10	11	25.05	6.95	0.00	0.00	0.00	-1.73
		12	-25.05	-2.03	0.00	0.00	0.00	7.29
	11	11	29.13	9.83	0.00	0.00	0.00	8.64
		12	-29.13	-4.91	0.00	0.00	0.00	0.48
	12	11	13.59	30.83	0.00	0.00	0.00	-40.16
		12	-13.59	-15.42	0.00	0.00	0.00	64.01
	13	11	13.06	25.02	0.00	0.00	0.00	-38.80
		12	-13.06	-9.61	0.00	0.00	0.00	61.16

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	14	11	-29.74	27.95	0.00	0.00	0.00	-31.05
		12	-29.74	-12.54	0.00	0.00	0.00	51.33
	15	11	29.20	22.14	0.00	0.00	0.00	-29.68
		12	-29.20	-6.73	0.00	0.00	0.00	48.48
	16	11	33.82	30.83	0.00	0.00	0.00	-20.68
		12	-33.82	-15.42	0.00	0.00	0.00	44.53
	17	11	33.29	25.02	0.00	0.00	0.00	-19.32
		12	-33.29	-9.61	0.00	0.00	0.00	41.68
12	9	12	15.99	10.10	0.00	0.00	0.00	-5.43
		13	-15.99	-5.19	0.00	0.00	0.00	14.90
	10	12	25.05	2.03	0.00	0.00	0.00	-7.29
		13	-25.05	2.88	0.00	0.00	0.00	6.76
	11	12	29.13	4.91	0.00	0.00	0.00	-0.48
		13	-29.13	0.00	0.00	0.00	0.00	3.52
	12	12	13.59	15.42	0.00	0.00	0.00	-64.01
		13	-13.59	-0.01	0.00	0.00	0.00	71.97
	13	12	13.06	9.61	0.00	0.00	0.00	-61.16
		13	-13.06	5.79	0.00	0.00	0.00	67.63
	14	12	29.74	12.54	0.00	0.00	0.00	-51.33
		13	-29.74	2.86	0.00	0.00	0.00	55.73
	15	12	29.20	6.74	0.00	0.00	0.00	-48.48
		13	-29.20	8.67	0.00	0.00	0.00	51.40
	16	12	33.82	15.42	0.00	0.00	0.00	-44.53
		13	-33.82	-0.01	0.00	0.00	0.00	52.49
	17	12	33.29	9.61	0.00	0.00	0.00	-41.68
		13	-33.29	5.79	0.00	0.00	0.00	48.15
13	9	13	15.99	5.19	0.00	0.00	0.00	-14.90
		14	-15.99	-0.28	0.00	0.00	0.00	18.28
	10	13	25.05	-2.88	0.00	0.00	0.00	-6.76
		14	-25.05	7.79	0.00	0.00	0.00	0.16
	11	13	29.13	0.00	0.00	0.00	0.00	-3.52
		14	-29.13	4.91	0.00	0.00	0.00	0.48
	12	13	13.59	0.01	0.00	0.00	0.00	-71.97
		14	-13.59	15.39	0.00	0.00	0.00	64.04
	13	13	13.06	-5.79	0.00	0.00	0.00	-67.63
		14	-13.06	14.10	0.00	0.00	0.00	55.87
	14	13	29.74	-2.86	0.00	0.00	0.00	-55.73
		14	-29.74	18.27	0.00	0.00	0.00	44.24
	15	13	29.20	-8.67	0.00	0.00	0.00	-51.40
		14	-29.20	16.98	0.00	0.00	0.00	36.07
	16	13	33.82	0.01	0.00	0.00	0.00	-52.49
		14	-33.82	15.39	0.00	0.00	0.00	44.56
	17	13	33.29	-5.79	0.00	0.00	0.00	-48.15
		14	-33.29	14.10	0.00	0.00	0.00	36.39
14	9	14	15.99	0.28	0.00	0.00	0.00	-18.28
		15	-15.99	4.63	0.00	0.00	0.00	15.59
	10	14	25.05	-7.79	0.00	0.00	0.00	-0.16
		15	-25.05	12.70	0.00	0.00	0.00	-12.52

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	11	14	29.13	-4.91	0.00	0.00	0.00	-0.48
		15	-29.13	9.83	0.00	0.00	0.00	-8.64
	12	14	13.59	-15.39	0.00	0.00	0.00	-64.04
		15	-13.59	30.80	0.00	0.00	0.00	40.23
	13	14	13.06	-14.10	0.00	0.00	0.00	-55.87
		15	-13.06	24.26	0.00	0.00	0.00	32.13
	14	14	29.74	-18.27	0.00	0.00	0.00	-44.24
		15	-29.74	33.68	0.00	0.00	0.00	16.87
	15	14	29.20	-16.98	0.00	0.00	0.00	-36.07
		15	-29.20	27.14	0.00	0.00	0.00	8.77
	16	14	33.82	-15.39	0.00	0.00	0.00	-44.56
		15	-33.82	30.80	0.00	0.00	0.00	20.75
	17	14	33.28	-14.10	0.00	0.00	0.00	-36.39
		15	-33.28	24.26	0.00	0.00	0.00	12.65
15	9	15	15.99	-4.63	0.00	0.00	0.00	-15.59
		16	-15.99	9.55	0.00	0.00	0.00	6.81
	10	15	25.05	-12.70	0.00	0.00	0.00	12.52
		16	-25.05	17.62	0.00	0.00	0.00	-31.28
	11	15	29.13	-9.83	0.00	0.00	0.00	8.64
		16	-29.13	14.74	0.00	0.00	0.00	-23.84
	12	15	13.59	-30.80	0.00	0.00	0.00	-40.23
		16	-13.59	38.98	0.00	0.00	0.00	-2.41
	13	15	13.06	-24.26	0.00	0.00	0.00	-32.13
		16	-13.06	34.42	0.00	0.00	0.00	-4.18
	14	15	29.74	-33.68	0.00	0.00	0.00	-16.87
		16	-29.74	41.86	0.00	0.00	0.00	-29.33
	15	15	29.20	-27.14	0.00	0.00	0.00	-8.77
		16	-29.20	37.30	0.00	0.00	0.00	-31.10
	16	15	33.82	-30.80	0.00	0.00	0.00	-20.75
		16	-33.82	38.98	0.00	0.00	0.00	-21.89
	17	15	33.29	-24.26	0.00	0.00	0.00	-12.65
		16	-33.29	34.42	0.00	0.00	0.00	-23.66
16	9	16	15.99	-9.55	0.00	0.00	0.00	-6.81
		17	-15.99	14.46	0.00	0.00	0.00	-8.04
	10	16	25.05	-17.62	0.00	0.00	0.00	31.28
		17	-25.05	22.53	0.00	0.00	0.00	-56.12
	11	16	29.13	-14.74	0.00	0.00	0.00	23.84
		17	-29.13	19.65	0.00	0.00	0.00	-45.12
	12	16	13.59	-38.98	0.00	0.00	0.00	2.41
		17	-13.59	49.14	0.00	0.00	0.00	-56.93
	13	16	13.06	-34.42	0.00	0.00	0.00	4.18
		17	-13.06	44.58	0.00	0.00	0.00	-53.06
	14	16	29.74	-41.86	0.00	0.00	0.00	29.33
		17	-29.74	52.02	0.00	0.00	0.00	-87.41
	15	16	29.20	-37.30	0.00	0.00	0.00	31.10
		17	-29.20	47.46	0.00	0.00	0.00	-83.54
	16	16	33.82	-38.98	0.00	0.00	0.00	21.89
		17	-33.82	49.14	0.00	0.00	0.00	-76.41

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	17	16	33.29	-34.42	0.00	0.00	0.00	23.66
		17	-33.29	44.58	0.00	0.00	0.00	-72.54
17	9	18	36.96	-60.75	0.00	0.00	0.00	-125.23
		19	-34.15	44.16	0.00	0.00	0.00	59.88
	10	18	45.03	-45.33	0.00	0.00	0.00	-50.82
		19	-42.22	29.52	0.00	0.00	0.00	4.25
	11	18	42.15	-60.45	0.00	0.00	0.00	-94.98
		19	-39.34	42.23	0.00	0.00	0.00	31.02
	12	18	79.51	-9.86	0.00	0.00	0.00	-2.76
		19	-75.72	4.60	0.00	0.00	0.00	-6.21
	13	18	74.95	-10.40	0.00	0.00	0.00	-4.23
		19	-71.16	5.13	0.00	0.00	0.00	-5.41
	14	18	82.39	-40.64	0.00	0.00	0.00	-35.22
		19	-78.59	24.83	0.00	0.00	0.00	-5.49
	15	18	77.83	-41.18	0.00	0.00	0.00	-36.68
		19	-74.04	25.36	0.00	0.00	0.00	-4.69
	16	18	79.51	-55.76	0.00	0.00	0.00	-79.39
		19	-75.72	37.54	0.00	0.00	0.00	21.29
	17	18	74.95	-56.29	0.00	0.00	0.00	-80.85
		19	-71.16	38.08	0.00	0.00	0.00	22.08
18	9	19	34.15	-44.16	0.00	0.00	0.00	-59.88
		20	-31.34	29.57	0.00	0.00	0.00	14.00
	10	19	42.22	-29.52	0.00	0.00	0.00	-4.25
		20	-39.40	15.72	0.00	0.00	0.00	-23.82
	11	19	39.34	-42.23	0.00	0.00	0.00	-31.02
		20	-36.53	26.04	0.00	0.00	0.00	-11.44
	12	19	75.72	-4.60	0.00	0.00	0.00	6.21
		20	-71.92	0.01	0.00	0.00	0.00	-9.02
	13	19	71.16	-5.13	0.00	0.00	0.00	5.41
		20	-67.36	0.54	0.00	0.00	0.00	-8.89
	14	19	78.59	-24.83	0.00	0.00	0.00	5.49
		20	-74.80	11.04	0.00	0.00	0.00	-27.69
	15	19	74.04	-25.36	0.00	0.00	0.00	4.69
		20	-70.24	11.57	0.00	0.00	0.00	-27.56
	16	19	75.72	-37.54	0.00	0.00	0.00	-21.29
		20	-71.92	21.35	0.00	0.00	0.00	-15.32
	17	19	71.16	-38.08	0.00	0.00	0.00	-22.08
		20	-67.36	21.89	0.00	0.00	0.00	-15.19
19	9	20	31.34	-29.57	0.00	0.00	0.00	-14.00
		21	-28.52	16.98	0.00	0.00	0.00	-14.89
	10	20	39.40	-15.72	0.00	0.00	0.00	23.82
		21	-36.59	3.93	0.00	0.00	0.00	-35.89
	11	20	36.53	-26.04	0.00	0.00	0.00	11.44
		21	-33.71	11.85	0.00	0.00	0.00	-34.91
	12	20	71.92	-0.01	0.00	0.00	0.00	9.02
		21	-68.12	-3.92	0.00	0.00	0.00	-6.50
	13	20	67.36	-0.54	0.00	0.00	0.00	8.89
		21	-63.56	-3.39	0.00	0.00	0.00	-7.03

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	14	20	74.80	-11.04	0.00	0.00	0.00	27.69
		21	-71.00	-0.76	0.00	0.00	0.00	-33.91
	15	20	70.24	-11.57	0.00	0.00	0.00	27.56
		21	-66.44	-0.22	0.00	0.00	0.00	-34.44
	16	20	71.92	-21.35	0.00	0.00	0.00	15.32
		21	-68.12	7.16	0.00	0.00	0.00	-32.93
	17	20	67.36	-21.89	0.00	0.00	0.00	15.19
		21	-63.56	7.69	0.00	0.00	0.00	-33.47
20	9	21	28.52	-16.98	0.00	0.00	0.00	14.89
		22	-25.71	6.39	0.00	0.00	0.00	-29.29
	10	21	36.59	-3.93	0.00	0.00	0.00	35.89
		22	-33.78	-5.87	0.00	0.00	0.00	-34.47
	11	21	33.71	-11.85	0.00	0.00	0.00	34.91
		22	-30.90	-0.35	0.00	0.00	0.00	-41.89
	12	21	68.12	3.92	0.00	0.00	0.00	6.50
		22	-64.33	-7.19	0.00	0.00	0.00	0.52
	13	21	63.56	3.39	0.00	0.00	0.00	7.03
		22	-59.77	-6.66	0.00	0.00	0.00	-0.68
	14	21	71.00	0.76	0.00	0.00	0.00	33.91
		22	-67.20	-10.55	0.00	0.00	0.00	-26.63
	15	21	66.44	0.22	0.00	0.00	0.00	34.44
		22	-62.64	-10.02	0.00	0.00	0.00	-27.83
	16	21	68.12	-7.16	0.00	0.00	0.00	32.93
		22	-64.33	-5.04	0.00	0.00	0.00	-34.04
	17	21	63.56	-7.69	0.00	0.00	0.00	33.47
		22	-59.77	-4.50	0.00	0.00	0.00	-35.25
21	9	22	25.71	-6.39	0.00	0.00	0.00	29.29
		23	-22.90	-2.21	0.00	0.00	0.00	-31.69
	10	22	33.78	5.87	0.00	0.00	0.00	34.47
		23	-30.97	-13.66	0.00	0.00	0.00	-22.06
	11	22	30.90	0.35	0.00	0.00	0.00	41.89
		23	-28.09	-10.54	0.00	0.00	0.00	-34.88
	12	22	64.33	7.19	0.00	0.00	0.00	-0.52
		23	-60.53	-9.79	0.00	0.00	0.00	11.21
	13	22	59.77	6.66	0.00	0.00	0.00	0.68
		23	-55.97	-9.26	0.00	0.00	0.00	9.34
	14	22	67.20	10.56	0.00	0.00	0.00	26.63
		23	-63.41	-18.35	0.00	0.00	0.00	-8.36
	15	22	62.64	10.02	0.00	0.00	0.00	27.83
		23	-58.85	-17.81	0.00	0.00	0.00	-10.23
	16	22	64.33	5.04	0.00	0.00	0.00	34.04
		23	-60.53	-15.23	0.00	0.00	0.00	-21.17
	17	22	59.77	4.50	0.00	0.00	0.00	35.25
		23	-55.97	-14.69	0.00	0.00	0.00	-23.04
22	9	23	22.90	2.21	0.00	0.00	0.00	31.69
		24	-20.09	-8.80	0.00	0.00	0.00	-24.61
	10	23	30.97	13.66	0.00	0.00	0.00	22.06
		24	-28.15	-19.45	0.00	0.00	0.00	-1.17

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	11	23	28.09	10.54	0.00	0.00	0.00	34.88
		24	-25.28	-18.73	0.00	0.00	0.00	-16.38
	12	23	60.53	9.79	0.00	0.00	0.00	-11.21
		24	-56.73	-11.72	0.00	0.00	0.00	24.72
	13	23	55.97	9.26	0.00	0.00	0.00	-9.34
		24	-52.17	-11.19	0.00	0.00	0.00	22.19
	14	23	63.41	18.35	0.00	0.00	0.00	8.36
		24	-59.61	-24.14	0.00	0.00	0.00	18.40
	15	23	58.85	17.81	0.00	0.00	0.00	10.23
		24	-55.05	-23.61	0.00	0.00	0.00	15.87
	16	23	60.53	15.23	0.00	0.00	0.00	21.17
		24	-56.73	-23.42	0.00	0.00	0.00	3.19
	17	23	55.97	14.69	0.00	0.00	0.00	23.04
		24	-52.17	-22.89	0.00	0.00	0.00	0.66
23	9	24	20.09	8.80	0.00	0.00	0.00	24.61
		25	-17.27	-13.39	0.00	0.00	0.00	-10.53
	10	24	28.15	19.45	0.00	0.00	0.00	1.17
		25	-25.34	-23.25	0.00	0.00	0.00	25.73
	11	24	25.28	18.73	0.00	0.00	0.00	16.38
		25	-22.46	-24.93	0.00	0.00	0.00	11.12
	12	24	56.73	11.72	0.00	0.00	0.00	-24.72
		25	-52.93	-12.99	0.00	0.00	0.00	40.24
	13	24	52.17	11.19	0.00	0.00	0.00	-22.19
		25	-48.38	-12.46	0.00	0.00	0.00	37.04
	14	24	59.61	24.14	0.00	0.00	0.00	-18.40
		25	-55.81	-27.94	0.00	0.00	0.00	51.16
	15	24	55.05	23.61	0.00	0.00	0.00	-15.87
		25	-51.25	-27.40	0.00	0.00	0.00	47.96
	16	24	56.73	23.42	0.00	0.00	0.00	-3.19
		25	-52.93	-29.62	0.00	0.00	0.00	36.55
	17	24	52.17	22.89	0.00	0.00	0.00	-0.66
		25	-48.38	-29.09	0.00	0.00	0.00	33.35
24	9	25	17.27	13.39	0.00	0.00	0.00	10.53
		17	-14.46	-15.99	0.00	0.00	0.00	8.04
	10	25	25.34	23.25	0.00	0.00	0.00	-25.73
		17	-22.53	-25.05	0.00	0.00	0.00	56.12
	11	25	22.46	24.93	0.00	0.00	0.00	-11.12
		17	-19.65	-29.13	0.00	0.00	0.00	45.12
	12	25	52.93	12.99	0.00	0.00	0.00	-40.24
		17	-49.14	-13.59	0.00	0.00	0.00	56.93
	13	25	48.38	12.46	0.00	0.00	0.00	-37.04
		17	-44.58	-13.06	0.00	0.00	0.00	53.06
	14	25	55.81	27.94	0.00	0.00	0.00	-51.16
		17	-52.02	-29.74	0.00	0.00	0.00	87.41
	15	25	51.25	27.40	0.00	0.00	0.00	-47.96
		17	-47.46	-29.20	0.00	0.00	0.00	83.54
	16	25	52.93	29.62	0.00	0.00	0.00	-36.55
		17	-49.14	-33.82	0.00	0.00	0.00	76.41

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	17	25	48.38	29.08	0.00	0.00	0.00	-33.35
		17	-44.58	-33.28	0.00	0.00	0.00	72.54

********** END OF LATEST ANALYSIS RESULT **********

167. PRINT FORCE ENV ALL FR NS 0.5

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTO MET

MEMB	DISTANCE		FY	LD	MZ	LD	FZ	LD	MY	LD
1	0.00	MAX.	64.53	10	118.32	10	0.00	17	0.00	17
		MIN.	9.86	12	-10.49	9	0.00	17	0.00	17
	0.63	MAX.	55.17	10	80.94	10	0.00	17	0.00	17
		MIN.	7.15	12	-21.16	9	0.00	17	0.00	17
	1.25	MAX.	46.32	10	49.26	10	0.00	17	0.00	17
		MIN.	4.60	12	-28.39	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER	FY/FZ	DIST	LD	1,AMONGST ALL SECT LOCATIONS MZ/MY	DIST	LD	FX	DIST	LD
MAX.	64.53	0.00	10	118.32	0.00	10			
	0.00	0.00	9	0.00	0.00	9	86.21 C	0.00	13
MIN.	4.60	1.25	12	-28.39	1.25	9			
	0.00	1.25	17	0.00	1.25	17	36.46 C	1.25	10

2	0.00	MAX.	46.32	10	49.26	10	0.00	17	0.00	17
		MIN.	4.60	12	-28.39	9	0.00	17	0.00	17
	0.63	MAX.	37.97	10	22.94	10	0.00	17	0.00	17
		MIN.	2.22	12	-32.51	9	0.00	17	0.00	17
	1.25	MAX.	30.12	10	1.69	10	0.00	17	0.00	17
		MIN.	0.00	9	-33.81	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER	FY/FZ	DIST	LD	2,AMONGST ALL SECT LOCATIONS MZ/MY	DIST	LD	FX	DIST	LD
MAX.	46.32	0.00	10	49.26	0.00	10			
	0.00	0.00	9	0.00	0.00	9	82.41 C	0.00	13
MIN.	0.00	1.25	9	-33.81	1.25	9			
	0.00	1.25	17	0.00	1.25	17	33.65 C	1.25	10

3	0.00	MAX.	30.12	10	1.69	10	0.00	17	0.00	17
		MIN.	0.00	9	-33.81	9	0.00	17	0.00	17
	0.63	MAX.	22.78	10	-7.96	13	0.00	17	0.00	17
		MIN.	-3.74	9	-32.62	9	0.00	17	0.00	17
	1.25	MAX.	15.93	10	-6.42	13	0.00	17	0.00	17
		MIN.	-6.99	9	-34.91	11	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER	FY/FZ	DIST	LD	3,AMONGST ALL SECT LOCATIONS MZ/MY	DIST	LD	FX	DIST	LD
MAX.	30.12	0.00	10	1.69	0.00	10			
	0.00	0.00	9	0.00	0.00	9	78.62 C	0.00	13
MIN.	-6.99	1.25	9	-34.91	1.25	11			
	0.00	1.25	17	0.00	1.25	17	30.84 C	1.25	10

4	0.00	MAX.	15.93	10	-6.42	13	0.00	17	0.00	17
		MIN.	-6.99	9	-34.91	11	0.00	17	0.00	17
	0.62	MAX.	9.58	10	-3.51	12	0.00	17	0.00	17
		MIN.	-9.74	9	-40.31	11	0.00	17	0.00	17
	1.25	MAX.	3.73	10	0.51	12	0.00	17	0.00	17
		MIN.	-11.99	9	-41.89	11	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER	FY/FZ	DIST	LD	4,AMONGST ALL SECT LOCATIONS MZ/MY	DIST	LD	FX	DIST	LD
MAX.	15.93	0.00	10	0.51	1.25	12			
	0.00	0.00	9	0.00	0.00	9	74.82 C	0.00	13
MIN.	-11.99	1.25	9	-41.89	1.25	11			
	0.00	1.25	17	0.00	1.25	17	28.02 C	1.25	10

5	0.00	MAX.	3.73	10	0.51	12	0.00	17	0.00	17
		MIN.	-11.99	9	-41.89	11	0.00	17	0.00	17
	0.63	MAX.	-1.61	10	5.45	12	0.00	17	0.00	17
		MIN.	-13.73	9	-39.98	11	0.00	17	0.00	17
	1.25	MAX.	-6.46	10	11.20	12	0.00	17	0.00	17
		MIN.	-15.23	16	-37.06	10	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER	FY/FZ	DIST	LD	5,AMONGST ALL SECT LOCATIONS MZ/MY	DIST	LD	FX	DIST	LD
MAX.	3.73	0.00	10	11.20	1.25	12			
	0.00	0.00	9	0.00	0.00	9	71.02 C	0.00	13
MIN.	-15.23	1.25	16	-41.89	0.00	11			
	0.00	1.25	17	0.00	1.25	17	25.21 C	1.25	10

6	0.00	MAX.	-6.46	10	11.20	12	0.00	17	0.00	17
		MIN.	-15.23	16	-37.06	10	0.00	17	0.00	17
	0.62	MAX.	-10.31	13	17.66	12	0.00	17	0.00	17
		MIN.	-19.57	16	-31.64	10	0.00	17	0.00	17
	1.25	MAX.	-11.19	13	24.72	12	0.00	17	0.00	17

* 9.00 X 10.00

		MIN.	-23.42	16	-23.66	10	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 6,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-6.46	0.00	10	24.72	1.25	12			
	0.00	0.00	9	0.00	0.00	9	67.23 C	0.00	13
MIN.	-23.42	1.25	16	-37.06	0.00	10			
	0.00	1.25	17	0.00	1.25	17	22.40 C	1.25	10

7	0.00	MAX.	-11.19	13	24.72	12	0.00	17	0.00 17
		MIN.	-23.42	16	-23.66	10	0.00	17	0.00 17
	0.62	MAX.	-11.91	13	32.28	12	0.00	17	0.00 17
		MIN.	-26.77	16	-13.43	10	0.00	17	0.00 17
	1.25	MAX.	-12.46	13	40.23	12	0.00	17	0.00 17
		MIN.	-29.62	16	-1.26	10	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 7,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-11.19	0.00	13	40.23	1.25	12			
	0.00	0.00	9	0.00	0.00	9	63.43 C	0.00	13
MIN.	-29.62	1.25	16	-23.66	0.00	10			
	0.00	1.25	17	0.00	1.25	17	19.59 C	1.25	10

8	0.00	MAX.	-12.46	13	40.23	12	0.00	17	0.00 17
		MIN.	-29.62	16	-1.26	10	0.00	17	0.00 17
	0.62	MAX.	-12.84	13	55.82	16	0.00	17	0.00 17
		MIN.	-31.97	16	12.52	10	0.00	17	0.00 17
	1.25	MAX.	-13.06	13	76.40	16	0.00	17	0.00 17
		MIN.	-33.82	16	27.63	10	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 8,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-12.46	0.00	13	76.40	1.25	16			
	0.00	0.00	9	0.00	0.00	9	59.63 C	0.00	13
MIN.	-33.82	1.25	16	-1.26	0.00	10			
	0.00	1.25	17	0.00	1.25	17	16.77 C	1.25	10

9	0.00	MAX.	55.84	13	76.40	16	0.00	17	0.00 17
		MIN.	16.77	10	27.63	10	0.00	17	0.00 17
	0.62	MAX.	44.00	12	47.60	16	0.00	17	0.00 17
		MIN.	14.32	10	18.01	10	0.00	17	0.00 17

* 9.00 X 10.00

1.24		MAX.	40.43	13	31.73	9	0.00	17	0.00 17
		MIN.	11.86	10	-0.55	13	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 9,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	55.84	0.00	13	76.40	0.00	16			
	0.00	0.00	9	0.00	0.00	9	33.82 C	0.00	16
MIN.	11.86	1.24	10	-0.55	1.24	13			
	0.00	1.24	17	0.00	1.24	17	13.06 C	1.24	13

10	0.00	MAX.	40.43	17	31.73	9	0.00	17	0.00 17
		MIN.	11.86	10	-0.55	13	0.00	17	0.00 17
	0.62	MAX.	34.15	16	20.16	9	0.00	17	0.00 17
		MIN.	9.40	10	-22.29	13	0.00	17	0.00 17
	1.24	MAX.	30.83	16	10.11	9	0.00	17	0.00 17
		MIN.	6.95	10	-40.16	12	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 10,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	40.43	0.00	17	31.73	0.00	9			
	0.00	0.00	9	0.00	0.00	9	33.82 C	0.00	16
MIN.	6.95	1.24	10	-40.16	1.24	12			
	0.00	1.24	17	0.00	1.24	17	13.06 C	1.24	13

11	0.00	MAX.	30.83	16	10.11	9	0.00	17	0.00 17
		MIN.	6.95	10	-40.16	12	0.00	17	0.00 17
	0.62	MAX.	21.70	17	3.32	11	0.00	17	0.00 17
		MIN.	4.49	10	-53.44	12	0.00	17	0.00 17
	1.24	MAX.	15.42	16	-0.48	11	0.00	17	0.00 17
		MIN.	2.03	10	-64.01	12	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 11,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	30.83	0.00	16	10.11	0.00	9			
	0.00	0.00	9	0.00	0.00	9	33.82 C	0.00	16
MIN.	2.03	1.24	10	-64.01	1.24	12			
	0.00	1.24	17	0.00	1.24	17	13.06 C	1.24	13

12	0.00	MAX.	15.42	16	-0.48	11	0.00	17	0.00 17
		MIN.	2.03	10	-64.01	12	0.00	17	0.00 17
	0.62	MAX.	7.65	9	-2.76	11	0.00	17	0.00 17

* 9.00 X 10.00

		MIN.	-0.42	10	-70.93	12	0.00	17	0.00	17
	1.24	MAX.	5.19	9	-3.52	11	0.00	17	0.00	17
		MIN.	-8.67	15	-71.97	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 12,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	15.42	0.00	16	-0.48	0.00	11			
	0.00	0.00	9	0.00	0.00	9	33.82 C	0.00	16
MIN.	-8.67	1.24	15	-71.97	1.24	12			
	0.00	1.24	17	0.00	1.24	17	13.06 C	1.24	13

13	0.00	MAX.	5.19	9	-3.52	11	0.00	17	0.00	17
		MIN.	-8.67	15	-71.97	12	0.00	17	0.00	17
	0.62	MAX.	2.73	9	-2.76	11	0.00	17	0.00	17
		MIN.	-11.99	15	-70.95	12	0.00	17	0.00	17
	1.24	MAX.	0.28	9	-0.16	10	0.00	17	0.00	17
		MIN.	-18.27	14	-64.04	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 13,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	5.19	0.00	9	-0.16	1.24	10			
	0.00	0.00	9	0.00	0.00	9	33.82 C	0.00	16
MIN.	-18.27	1.24	14	-71.97	0.00	12			
	0.00	1.24	17	0.00	1.24	17	13.06 C	1.24	13

14	0.00	MAX.	0.28	9	-0.16	10	0.00	17	0.00	17
		MIN.	-18.27	14	-64.04	12	0.00	17	0.00	17
	0.62	MAX.	-2.18	9	5.42	10	0.00	17	0.00	17
		MIN.	-22.06	15	-53.49	12	0.00	17	0.00	17
	1.24	MAX.	-4.63	9	12.52	10	0.00	17	0.00	17
		MIN.	-33.68	14	-40.23	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 14,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	0.28	0.00	9	12.52	1.24	10			
	0.00	0.00	9	0.00	0.00	9	33.82 C	0.00	16
MIN.	-33.68	1.24	14	-64.04	0.00	12			
	0.00	1.24	17	0.00	1.24	17	13.06 C	1.24	13

15	0.00	MAX.	-4.63	9	12.52	10	0.00	17	0.00	17
		MIN.	-33.68	14	-40.23	12	0.00	17	0.00	17

* 9.00 X 10.00

	0.62	MAX.	-7.09	9	21.14	10	0.00	17	0.00	17
		MIN.	-36.99	14	-20.15	12	0.00	17	0.00	17
	1.24	MAX.	-9.55	9	31.28	10	0.00	17	0.00	17
		MIN.	-41.86	14	-6.81	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 15,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-4.63	0.00	9	31.28	1.24	10			
	0.00	0.00	9	0.00	0.00	9	33.82 C	0.00	16
MIN.	-41.86	1.24	14	-40.23	0.00	12			
	0.00	1.24	17	0.00	1.24	17	13.06 C	1.24	13

16	0.00	MAX.	-9.55	9	31.28	10	0.00	17	0.00	17
		MIN.	-41.86	14	-6.81	9	0.00	17	0.00	17
	0.62	MAX.	-12.00	9	56.80	14	0.00	17	0.00	17
		MIN.	-46.94	14	-0.15	9	0.00	17	0.00	17
	1.24	MAX.	-14.46	9	87.41	14	0.00	17	0.00	17
		MIN.	-52.02	14	8.04	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 16,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-9.55	0.00	9	87.41	1.24	14			
	0.00	0.00	9	0.00	0.00	9	33.82 C	0.00	16
MIN.	-52.02	1.24	14	-6.81	0.00	9			
	0.00	1.24	17	0.00	1.24	17	13.06 C	1.24	13

17	0.00	MAX.	-9.86	12	-2.76	12	0.00	17	0.00	17
		MIN.	-60.75	9	-125.23	9	0.00	17	0.00	17
	0.63	MAX.	-7.15	12	2.54	12	0.00	17	0.00	17
		MIN.	-52.20	9	-89.96	9	0.00	17	0.00	17
	1.25	MAX.	-4.60	12	6.21	12	0.00	17	0.00	17
		MIN.	-44.16	9	-59.88	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 17,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-4.60	1.25	12	6.21	1.25	12			
	0.00	0.00	9	0.00	0.00	9	82.39 C	0.00	14
MIN.	-60.75	0.00	9	-125.23	0.00	9			
	0.00	1.25	17	0.00	1.25	17	34.15 C	1.25	9

18	0.00	MAX.	-4.60	12	6.21	12	0.00	17	0.00	17

* 9.00 X 10.00

		MIN.	-44.16	9	-59.88	9	0.00	17	0.00	17
	0.63	MAX.	-2.22	12	18.74	14	0.00	17	0.00	17
		MIN.	-36.62	9	-34.66	9	0.00	17	0.00	17
	1.25	MAX.	-0.01	12	27.69	14	0.00	17	0.00	17
		MIN.	-29.57	9	-14.00	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 18,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-0.01	1.25	12	27.69	1.25	14			
	0.00	0.00	9	0.00	0.00	9	78.59 C	0.00	14
MIN.	-44.16	0.00	9	-59.88	0.00	9			
	0.00	1.25	17	0.00	1.25	17	31.34 C	1.25	9

19	0.00	MAX.	-0.01	12	27.69	14	0.00	17	0.00	17
		MIN.	-29.57	9	-14.00	9	0.00	17	0.00	17
	0.63	MAX.	2.04	12	32.84	15	0.00	17	0.00	17
		MIN.	-23.03	9	2.41	9	0.00	17	0.00	17
	1.25	MAX.	3.92	12	35.89	10	0.00	17	0.00	17
		MIN.	-16.98	9	6.50	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 19,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	3.92	1.25	12	35.89	1.25	10			
	0.00	0.00	9	0.00	0.00	9	74.80 C	0.00	14
MIN.	-29.57	0.00	9	-14.00	0.00	9			
	0.00	1.25	17	0.00	1.25	17	28.52 C	1.25	9

20	0.00	MAX.	3.92	12	35.89	10	0.00	17	0.00	17
		MIN.	-16.98	9	6.50	12	0.00	17	0.00	17
	0.62	MAX.	5.91	14	40.31	11	0.00	17	0.00	17
		MIN.	-11.44	9	3.50	12	0.00	17	0.00	17
	1.25	MAX.	10.55	14	41.89	11	0.00	17	0.00	17
		MIN.	-6.39	9	-0.52	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 20,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	10.55	1.25	14	41.89	1.25	11			
	0.00	0.00	9	0.00	0.00	9	71.00 C	0.00	14
MIN.	-16.98	0.00	9	-0.52	1.25	12			
	0.00	1.25	17	0.00	1.25	17	25.71 C	1.25	9

* 9.00 X 10.00

21	0.00	MAX.	10.56	14	41.89	11	0.00	17	0.00	17
		MIN.	-6.39	9	-0.52	12	0.00	17	0.00	17
	0.63	MAX.	14.70	14	39.98	11	0.00	17	0.00	17
		MIN.	-1.84	9	-5.46	12	0.00	17	0.00	17
	1.25	MAX.	18.35	14	34.88	11	0.00	17	0.00	17
		MIN.	2.21	9	-11.21	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 21,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	18.35	1.25	14	41.89	0.00	11			
	0.00	0.00	9	0.00	0.00	9	67.20 C	0.00	14
MIN.	-6.39	0.00	9	-11.21	1.25	12			
	0.00	1.25	17	0.00	1.25	17	22.90 C	1.25	9

22	0.00	MAX.	18.35	14	34.88	11	0.00	17	0.00	17
		MIN.	2.21	9	-11.21	12	0.00	17	0.00	17
	0.62	MAX.	21.49	14	29.18	9	0.00	17	0.00	17
		MIN.	5.75	9	-17.66	12	0.00	17	0.00	17
	1.25	MAX.	24.14	14	24.61	9	0.00	17	0.00	17
		MIN.	8.80	9	-24.72	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 22,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	24.14	1.25	14	34.88	0.00	11			
	0.00	0.00	9	0.00	0.00	9	63.41 C	0.00	14
MIN.	2.21	0.00	9	-24.72	1.25	12			
	0.00	1.25	17	0.00	1.25	17	20.09 C	1.25	9

23	0.00	MAX.	24.14	14	24.61	9	0.00	17	0.00	17
		MIN.	8.80	9	-24.72	12	0.00	17	0.00	17
	0.62	MAX.	26.77	16	18.29	9	0.00	17	0.00	17
		MIN.	11.34	9	-34.19	14	0.00	17	0.00	17
	1.25	MAX.	29.62	16	10.53	9	0.00	17	0.00	17
		MIN.	12.46	13	-51.16	14	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 23,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD

* 9.00 X 10.00

MAX.	29.62	1.25	16	24.61	0.00	9				
	0.00	0.00	9	0.00	0.00	9	59.61 C	0.00	14
MIN.	8.80	0.00	9	-51.16	1.25	14				
	0.00	1.25	17	0.00	1.25	17	17.27 C	1.25	9

24	0.00	MAX.	29.62	16	10.53	9	0.00	17	0.00	17
		MIN.	12.46	13	-51.16	14	0.00	17	0.00	17
	0.62	MAX.	31.97	16	1.65	9	0.00	17	0.00	17
		MIN.	12.84	13	-69.01	14	0.00	17	0.00	17
	1.25	MAX.	33.82	16	-8.04	9	0.00	17	0.00	17
		MIN.	13.06	13	-87.41	14	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 24,AMONGST ALL SECT LOCATIONS

	FY/ FZ	DIST	LD	MZ/ MY	DIST	LD	FX	DIST	LD
MAX.	33.82	1.25	16	10.53	0.00	9			
	0.00	0.00	9	0.00	0.00	9	55.81 C	0.00	14
MIN.	12.46	0.00	13	-87.41	1.25	14			
	0.00	1.25	17	0.00	1.25	17	14.46 C	1.25	9

********** END OF FORCE ENVELOPE FROM INTERNAL STORAGE **********

168. LOAD LIST 18 TO 26
169. PRINT SUP REAC DIS ALL

* 9.00 X 10.00

SUPPORT REACTIONS -UNIT MTO MET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	18	-12.37	45.61	0.00	0.00	0.00	-10.17
	19	-42.06	40.23	0.00	0.00	0.00	75.70
	20	-39.34	42.15	0.00	0.00	0.00	60.14
	21	-12.09	57.19	0.00	0.00	0.00	10.18
	22	-12.45	61.69	0.00	0.00	0.00	11.58
	23	-39.61	55.27	0.00	0.00	0.00	67.52
	24	-39.96	59.77	0.00	0.00	0.00	68.92
	25	-36.89	57.19	0.00	0.00	0.00	51.96
	26	-37.24	61.69	0.00	0.00	0.00	53.36
18	18	39.54	38.69	0.00	0.00	0.00	-80.31
	19	29.26	44.07	0.00	0.00	0.00	-30.70
	20	39.34	42.15	0.00	0.00	0.00	-60.14
	21	12.09	57.22	0.00	0.00	0.00	-10.19
	22	12.45	54.18	0.00	0.00	0.00	-11.17
	23	26.81	59.14	0.00	0.00	0.00	-22.52
	24	27.16	56.10	0.00	0.00	0.00	-23.50
	25	36.89	57.22	0.00	0.00	0.00	-51.97
	26	37.24	54.18	0.00	0.00	0.00	-52.95

********** END OF LATEST ANALYSIS RESULT **********

170. PRINT MEMBER FORCES LIST 1 17

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	18	1	45.61	12.37	0.00	0.00	0.00	-10.17
		2	-42.80	-5.04	0.00	0.00	0.00	20.92
	19	1	40.23	42.06	0.00	0.00	0.00	75.70
		2	-37.42	-29.92	0.00	0.00	0.00	-30.85
	20	1	42.15	39.34	0.00	0.00	0.00	60.14
		2	-39.34	-27.20	0.00	0.00	0.00	-18.70
	21	1	57.19	12.09	0.00	0.00	0.00	10.18
		2	-54.37	-6.83	0.00	0.00	0.00	1.58
	22	1	61.69	12.45	0.00	0.00	0.00	11.58
		2	-58.88	-7.19	0.00	0.00	0.00	0.63
	23	1	55.27	39.61	0.00	0.00	0.00	67.52
		2	-52.45	-27.46	0.00	0.00	0.00	-25.75
	24	1	59.77	39.96	0.00	0.00	0.00	68.92
		2	-56.96	-27.82	0.00	0.00	0.00	-26.69
	25	1	57.19	36.89	0.00	0.00	0.00	51.96
		2	-54.37	-24.74	0.00	0.00	0.00	-13.59
	26	1	61.69	37.24	0.00	0.00	0.00	53.36
		2	-58.88	-25.10	0.00	0.00	0.00	-14.54
17	18	18	38.69	-39.54	0.00	0.00	0.00	-80.31
		19	-35.88	28.48	0.00	0.00	0.00	37.93
	19	18	44.07	-29.26	0.00	0.00	0.00	-30.70
		19	-41.26	18.72	0.00	0.00	0.00	0.85
	20	18	42.15	-39.34	0.00	0.00	0.00	-60.14
		19	-39.34	27.20	0.00	0.00	0.00	18.70
	21	18	57.22	-12.09	0.00	0.00	0.00	-10.19
		19	-54.41	6.83	0.00	0.00	0.00	-1.57
	22	18	54.18	-12.45	0.00	0.00	0.00	-11.17
		19	-51.37	7.19	0.00	0.00	0.00	-1.04
	23	18	59.14	-26.81	0.00	0.00	0.00	-22.52
		19	-56.33	16.26	0.00	0.00	0.00	-4.25
	24	18	56.10	-27.16	0.00	0.00	0.00	-23.50
		19	-53.29	16.62	0.00	0.00	0.00	-3.72
	25	18	57.22	-36.89	0.00	0.00	0.00	-51.97
		19	-54.41	24.74	0.00	0.00	0.00	13.59
	26	18	54.18	-37.24	0.00	0.00	0.00	-52.95
		19	-51.37	25.10	0.00	0.00	0.00	14.13

********** END OF LATEST ANALYSIS RESULT **********

171. LOAD LIST 27 28
172. PRINT MEMBER FORCES ALL

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	27	1	45.61	12.37	0.00	0.00	0.00	-10.17
		2	-42.80	-5.04	0.00	0.00	0.00	20.92
	28	1	42.15	31.99	0.00	0.00	0.00	46.26
		2	-39.34	-21.44	0.00	0.00	0.00	-13.00
2	27	2	42.80	5.04	0.00	0.00	0.00	-20.92
		3	-39.99	0.95	0.00	0.00	0.00	23.33
	28	2	39.34	21.44	0.00	0.00	0.00	13.00
		3	-36.53	-12.25	0.00	0.00	0.00	7.91
3	27	3	39.99	-0.95	0.00	0.00	0.00	-23.33
		4	-37.17	5.62	0.00	0.00	0.00	19.09
	28	3	36.53	12.25	0.00	0.00	0.00	-7.91
		4	-33.71	-4.39	0.00	0.00	0.00	18.17
4	27	4	37.17	-5.62	0.00	0.00	0.00	-19.09
		5	-34.36	8.95	0.00	0.00	0.00	9.85
	28	4	33.71	4.39	0.00	0.00	0.00	-18.17
		5	-30.90	2.14	0.00	0.00	0.00	19.44
5	27	5	34.36	-8.95	0.00	0.00	0.00	-9.85
		6	-31.55	10.95	0.00	0.00	0.00	-2.72
	28	5	30.90	-2.14	0.00	0.00	0.00	-19.44
		6	-28.09	7.34	0.00	0.00	0.00	13.37
6	27	6	31.55	-10.95	0.00	0.00	0.00	2.72
		7	-28.74	11.62	0.00	0.00	0.00	-16.96
	28	6	28.09	-7.34	0.00	0.00	0.00	-13.37
		7	-25.28	11.20	0.00	0.00	0.00	1.64
7	27	7	28.74	-11.62	0.00	0.00	0.00	16.96
		8	-25.92	11.62	0.00	0.00	0.00	-31.48
	28	7	25.28	-11.20	0.00	0.00	0.00	-1.64
		8	-22.46	13.73	0.00	0.00	0.00	-14.08
8	27	8	25.92	-11.62	0.00	0.00	0.00	31.48
		9	-23.11	11.62	0.00	0.00	0.00	-46.00
	28	8	22.46	-13.73	0.00	0.00	0.00	14.08
		9	-19.65	14.93	0.00	0.00	0.00	-32.13
9	27	9	11.61	23.11	0.00	0.00	0.00	46.00
		10	-11.61	-18.20	0.00	0.00	0.00	-20.44
	28	9	14.93	19.65	0.00	0.00	0.00	32.13
		10	-14.93	-14.74	0.00	0.00	0.00	-10.85
10	27	10	11.62	18.20	0.00	0.00	0.00	20.44
		11	-11.62	-13.29	0.00	0.00	0.00	-0.96

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	28	10	14.93	14.74	0.00	0.00	0.00	10.85
		11	-14.93	-9.83	0.00	0.00	0.00	4.35
11	27	11	11.62	13.29	0.00	0.00	0.00	0.96
		12	-11.62	-8.37	0.00	0.00	0.00	12.44
	28	11	14.93	9.83	0.00	0.00	0.00	-4.35
		12	-14.93	-4.91	0.00	0.00	0.00	13.47
12	27	12	11.62	8.37	0.00	0.00	0.00	-12.44
		13	-11.62	-3.46	0.00	0.00	0.00	19.77
	28	12	14.93	4.91	0.00	0.00	0.00	-13.47
		13	-14.93	0.00	0.00	0.00	0.00	16.51
13	27	13	11.61	3.46	0.00	0.00	0.00	-19.77
		14	-11.61	1.45	0.00	0.00	0.00	21.01
	28	13	14.93	0.00	0.00	0.00	0.00	-16.51
		14	-14.93	4.91	0.00	0.00	0.00	13.47
14	27	14	11.62	-1.45	0.00	0.00	0.00	-21.01
		15	-11.62	6.36	0.00	0.00	0.00	16.17
	28	14	14.93	-4.91	0.00	0.00	0.00	-13.47
		15	-14.93	9.83	0.00	0.00	0.00	4.35
15	27	15	11.61	-6.36	0.00	0.00	0.00	-16.17
		16	-11.61	11.28	0.00	0.00	0.00	5.26
	28	15	14.93	-9.83	0.00	0.00	0.00	-4.35
		16	-14.93	14.74	0.00	0.00	0.00	-10.85
16	27	16	11.62	-11.28	0.00	0.00	0.00	-5.26
		17	-11.62	16.19	0.00	0.00	0.00	-11.74
	28	16	14.93	-14.74	0.00	0.00	0.00	10.85
		17	-14.93	19.65	0.00	0.00	0.00	-32.13
17	27	18	38.69	-39.54	0.00	0.00	0.00	-80.31
		19	-35.88	28.48	0.00	0.00	0.00	37.93
	28	18	42.15	-31.99	0.00	0.00	0.00	-46.26
		19	-39.34	21.44	0.00	0.00	0.00	13.00
18	27	19	35.88	-28.48	0.00	0.00	0.00	-37.93
		20	-33.07	18.76	0.00	0.00	0.00	8.54
	28	19	39.34	-21.44	0.00	0.00	0.00	-13.00
		20	-36.53	12.25	0.00	0.00	0.00	-7.91
19	27	20	33.07	-18.76	0.00	0.00	0.00	-8.54
		21	-30.25	10.37	0.00	0.00	0.00	-9.52
	28	20	36.53	-12.25	0.00	0.00	0.00	7.91
		21	-33.71	4.39	0.00	0.00	0.00	-18.17
20	27	21	30.25	-10.37	0.00	0.00	0.00	9.52
		22	-27.44	3.30	0.00	0.00	0.00	-17.93

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	28	21	33.71	-4.39	0.00	0.00	0.00	18.17
		22	-30.90	-2.14	0.00	0.00	0.00	-19.44
21	27	22	27.44	-3.30	0.00	0.00	0.00	17.93
		23	-24.63	-2.43	0.00	0.00	0.00	-18.34
	28	22	30.90	2.14	0.00	0.00	0.00	19.44
		23	-28.09	-7.34	0.00	0.00	0.00	-13.37
22	27	23	24.63	2.43	0.00	0.00	0.00	18.34
		24	-21.82	-6.82	0.00	0.00	0.00	-12.42
	28	23	28.09	7.34	0.00	0.00	0.00	13.37
		24	-25.28	-11.20	0.00	0.00	0.00	-1.64
23	27	24	21.82	6.82	0.00	0.00	0.00	12.42
		25	-19.00	-9.88	0.00	0.00	0.00	-1.84
	28	24	25.28	11.20	0.00	0.00	0.00	1.64
		25	-22.46	-13.73	0.00	0.00	0.00	14.08
24	27	25	19.00	9.88	0.00	0.00	0.00	1.84
		17	-16.19	-11.62	0.00	0.00	0.00	11.74
	28	25	22.46	13.73	0.00	0.00	0.00	-14.08
		17	-19.65	-14.93	0.00	0.00	0.00	32.13

********** END OF LATEST ANALYSIS RESULT **********

173. PLOT DIS FILE
174. PLOT BEN FILE
175. FINISH

********** END OF STAAD-III **********

**** DATE= OCT 4,1999 TIME= 10:17:24 ****

****
* FOR QUESTIONS REGARDING THIS VERSION OF PROGRAM *
* TEL:(0454) 281-080, FAX:(0454)-415-866 THORNBURY UK *
* 10, St.MARY ST, St.MARY CENTRE,THORNBURY,BRISTOL,UK *
****

D.O. 301+080

MOMENTOS FLECTORES

DINTEL	b_0	h	r	U_o	Coef. Impacto	M_d	$M_{tot.}$	U_{s1}	$0.04*A_c*f_{cd}$	$A_{s,nec.}$	$A_{s,disp.}$
Exterior	1.00	1.00	0.04	1360.00	1.30	87.41	113.63	124.02	64.00	27.97	34.60
interior	1.00	1.00	0.04	1360.00	1.30	71.97	93.561	101.23	64.00	22.83	32.72

HASTIALES	b_0	h	r	U_0	Coef. Impacto	M_d	$M_{tot.}$	N_d	e=M/N	Mtot	U_{s1}	$0.04*A_c*f_{cd}$	$A_{s,nec.}$	A_{min}	$A_{s,disp.}$
Hastial exterior	1.00	0.90	0.04	1218.33	1.00	76.40	76.40	49.08	1.557	96.52	68.86	57.33	15.53	8.10	---------
Superior Izda.	1.00	0.90	0.04	1218.33	1.00	53.67	53.67	55.84	0.961	76.56	36.70	57.33	9.77	8.10	---------
Hastial exterior	1.00	0.90	0.04	1218.33	1.00	87.41	87.41	52.02	1.680	108.74	81.77	57.33	18.44	8.10	---------
Superior dcha.	1.00	0.90	0.04	1218.33	1.00	83.54	83.54	47.46	1.760	103.00	78.85	57.33	17.78	8.10	20.10
Hastial exterior	1.00	0.90	0.04	1218.33	1.00	118.32	118.32	39.27	3.013	134.42	128.60	57.33	29.00	8.10	---------
Inferior Izda.	1.00	0.90	0.04	1218.33	1.00	81.47	81.47	86.21	0.945	116.82	58.18	57.33	13.12	8.10	---------
Hastial exterior	1.00	0.90	0.04	1218.33	1.00	125.23	125.23	36.96	3.388	140.38	138.98	57.33	31.34	8.10	34.60
Inferior dcha.	1.00	0.90	0.04	1218.33	1.00	79.39	79.39	79.51	0.998	111.99	58.53	57.33	13.20	8.10	---------
Hastial interior	1.00	0.90	0.04	1218.33	1.00	41.89	41.89	30.90	1.356	54.56	34.28	57.33	9.28	8.10	10.05
	1.00	0.90	0.04	1218.33	1.00	38.97	38.97	28.02	1.391	50.46	32.14	57.33	8.84	8.10	---------
	1.00	0.90	0.04	1218.33	1.00	36.71	36.71	35.19	1.043	51.14	25.80	57.33	7.42	8.10	---------

D.O. 301+080

ESFUERZOS CORTANTES

	ξ	ρ_1	V_{cu}	V_d	$V_{d\ canto\ util}$	Coef. Impacto	V_{tot}	A_{st}	$A_{st,min}$
Dintel	1.51	0.0036	29.38	55.84	38.28	1.20	45.94	4.70	8.17

	ξ	ρ_1	V_{cu}	V_d	$V_{d\ canto\ util}$	Coef. Impacto	V_{tot}	A_{st}	$A_{st,min}$
Hastial superior	1.54	0.0023	23.22	33.82	29.07	1.00	29.07	1.85	8.17
Hastial inferior	1.54	0.0040	27.83	64.53	44.89	1.00	44.89	5.40	8.17

Comprobación de fisuración

Dintel

Recubrimiento = 0.04 m
Es = 21000000 T/m^2
canto = 1.00 m
β = 1.7
fck = 250 kg/cm^2

Sección	Mk (mT)	Armadura dispuesta Básica ϕ (mm)	Básica sep (cm)	Refuerzo ϕ (mm)	Refuerzo sep (cm)	s (m)	K_1	K_2	$\phi_{equiv.}$ (mm)	$A_{c,eficaz}$ (m^2)	A_s (cm^2)	M_{fis} (mT)	σ_s (T/m^2)	s_m (mm)	ε_{sm}	w_k (mm)	$w_{máx}$ (mm)
1	46.00	16	20	25	20	0.20	0.125	0.50	25	0.25	34.60	44.98	17313	210.33	0.0004	**0.15**	**0.30**
2	21.01	25	20			0.20	0.125	0.50	25	0.25	24.54	44.98	11146	247.32	0.0002	**0.09**	**0.30**
3	32.13	16	20	25	20	0.20	0.125	0.50	25	0.25	34.60	44.98	12092	210.33	0.0002	**0.08**	**0.30**

Hastiales

Recubrimiento = 0.04 m
Es = 21000000 T/m^2
canto = 0.90 m
β = 1.7
fck 250 kg/cm^2

Sección (m)	Mk (mT)	Nk (T)	Armadura dispuesta Básica ϕ (mm)	Básica sep (cm)	Refuerzo ϕ (mm)	Refuerzo sep (cm)	s (m)	K_1	K_2	$\phi_{equiv.}$ (mm)	$A_{c,eficaz}$ (m^2)	A_s (cm^2)	M_{fis} (mT)	σ_s (T/m^2)	s_m (mm)	ε_{sm}	w_k (mm)	$w_{máx}$ (mm)
1	46.00	23.11	16	20	25	20	0.20	0.125	0.50	25	0.23	34.60	36.43	16627	201.29	0.0005	**0.19**	**0.30**
2	23.33	39.99	16	20			0.20	0.125	0.50	16	0.23	10.05	36.43	17657	299.05	0.0003	**0.17**	**0.30**
3	46.26	42.15	16	20	25	20	0.20	0.125	0.50	25	0.23	34.60	36.43	14512	201.29	0.0005	**0.16**	**0.30**

DIMENSIONAMIENTO DE ZAPATAS

	Espesor Hastial	Longitud zapata	Canto zapata	Vuelo interior	Vuelo exterior	S. Ref. Mom. Int.	S. Ref. Mom. Ext.	S. Ref. Cort. Int.	S. Ref. Cort. Ext.
DIMENSIONES	0.900	3.000	1.000	1.050	1.050	1:185	1:185	0.090	0.090

ESFUERZOS	**H-1**	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
Momento	-75.70	-80.31	-53.36	-51.97	-10.18	-10.19
Axil	40.23	38.69	61.69	57.22	57.19	57.22
F. Horizontal	42.06	39.54	37.24	36.89	12.09	12.09
H tierras ext.	10.00	10.00	10.00	10.00	10.00	10.00
H tierras int.	2.40	2.40	2.40	2.40	2.40	2.40
AXILES	**H-1**	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
Ordenador	40.23	38.69	61.69	57.22	57.19	57.22
Peso zapata	7.50	7.50	7.50	7.50	7.50	7.50
Peso tierras ext.	21.00	21.00	21.00	21.00	21.00	21.00
Peso tierras int.	5.04	5.04	5.04	5.04	5.04	5.04
Axil total	**73.77**	**72.23**	**95.23**	**90.76**	**90.73**	**90.76**
MOMENTOS	**H-1**	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
Ordenador	-75.70	-80.31	-53.36	-51.97	-10.18	-10.19
F. Horizontal	42.06	39.54	37.24	36.89	12.09	12.09
Peso tierras ext.	20.48	20.48	20.48	20.48	20.48	20.48
Peso tierras int.	-4.91	-4.91	-4.91	-4.91	-4.91	-4.91
M total	**-18.08**	**-25.21**	**-0.56**	**0.48**	**17.47**	**17.46**

TENSIONES EN EL TERRENO

	H-1	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
σ_1(interior)	36.64	40.88	32.12	29.93	18.60	18.61
σ_2(exterior)	12.54	7.27	31.37	30.57	41.89	41.89
σ_{12}(media)	24.59	24.08	31.74	30.25	30.24	30.25

TENSIONES PARA ARMAR

	H-1	H-2	H-3	H-4	H-5	H-6
σ_1(interior)	34.14	38.38	29.62	27.43	16.10	16.11
σ_A	24.62	25.11	29.32	27.69	25.30	25.31
σ_B	19.56	18.05	29.17	27.82	30.19	30.20
σ_C (cort. int)	33.42	37.37	29.59	27.45	16.79	16.81
σ_D (cort. ext)	10.76	5.78	28.89	28.05	38.69	38.70
σ_2(exterior)	10.04	4.77	28.87	28.07	39.39	39.39

ESFUERZOS	H-1	H-2	H-3	H-4	H-5	H-6
Mom. Superior	-16.62	-18.72	-15.60	-14.19	-8.33	-8.34
	6.52	9.34	-4.54	-3.85	-9.71	-9.71
Mom. Inferior	16.62	18.72	15.60	14.19	8.33	8.34
	-6.52	-9.34	4.54	3.85	9.71	9.71
Cortante Int.	2.38	2.75	2.01	1.81	0.82	0.82
Cortante ext.	1.09	1.55	-0.57	-0.50	-1.49	-1.49

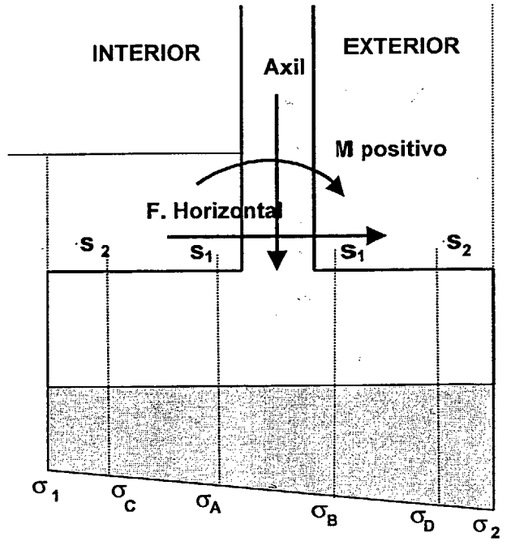
DIMENSIONAMIENTO

h	r	$0.04*A_c*f_{cd}$	U_c
1.00	0.04	64.00	1360.00

	Coef. Mayor.	M	M_d	U_{s1}	$A_{s,nec.}$	$A_{s,disp.}$
Armadura sup.	1.50	9.34	14.01	14.67	4.58	5.65
Armadura Inf.	1.50	18.72	28.07	29.57	8.46	10.05

	ξ	ρ_1	V_{cu}	V	Coef. Mayor.	V_d	A_{st}	$A_{st,min}$
Cortante	1.51	0.0010	19.46	2.75	1.50	4.13	no	-------

ESQUEMA



COMPROBACIÓN A FISURACIÓN

Dintel

Recubrimiento = 0.04 m
Es = 21000000 T/m^2
canto = 1.00 m
β = 1.7
fck = 250 kg/cm^2

Sección	Mk (mT)	Armadura dispuesta Básica ϕ (mm)	Básica sep (cm)	Refuerzo ϕ (mm)	Refuerzo sep (cm)	s (m)	K_1	K_2	$\phi_{equiv.}$ (mm)	$A_{c,eficaz}$ (m^2)	A_s (cm^2)	M_{fis} (mT)	σ_s (T/m^2)	s_m (mm)	ε_{sm}	w_k (mm)	$w_{máx}$ (mm)
1	46.00	16	20	25	20	0.20	0.125	0.50	25	0.25	34.60	44.98	17313	210.33	0.0004	**0.15**	**0.30**
2	21.01	25	20			0.20	0.125	0.50	25	0.25	24.54	44.98	11146	247.32	0.0002	**0.09**	**0.30**
3	32.13	16	20	25	20	0.20	0.125	0.50	25	0.25	34.60	44.98	12092	210.33	0.0002	**0.08**	**0.30**

Hastiales

Recubrimiento = 0.04 m
Es = 21000000 T/m^2
canto = 0.90 m
β = 1.7
fck = 250 kg/cm^2

Sección (m)	Mk (mT)	Nk (T)	Armadura dispuesta Básica ϕ (mm)	Básica sep (cm)	Refuerzo ϕ (mm)	Refuerzo sep (cm)	s (m)	K_1	K_2	$\phi_{equiv.}$ (mm)	$A_{c,eficaz}$ (m^2)	A_s (cm^2)	M_{fis} (mT)	σ_s (T/m^2)	s_m (mm)	ε_{sm}	w_k (mm)	$w_{máx}$ (mm)
1	46.00	23.11	16	20	25	20	0.20	0.125	0.50	25	0.23	34.60	36.43	16627	201.29	0.0005	**0.19**	**0.30**
2	23.33	39.99	16	20			0.20	0.125	0.50	16	0.23	10.05	36.43	17657	299.05	0.0003	**0.17**	**0.30**
3	46.26	42.15	16	20	25	20	0.20	0.125	0.50	25	0.23	34.60	36.43	14512	201.29	0.0005	**0.16**	**0.30**

Zapata

Recubrimiento = 0.04 m
Es = 21000000 T/m^2
canto = 1.00 m
β = 1.7
fck = 250 kg/cm^2

Sección	Mk (mT)	Armadura dispuesta Básica ϕ (mm)	Básica sep (cm)	Refuerzo ϕ (mm)	Refuerzo sep (cm)	s (m)	K_1	K_2	$\phi_{equiv.}$ (mm)	$A_{c,eficaz}$ (m^2)	A_s (cm^2)	M_{fis} (mT)	σ_s (T/m^2)	s_m (mm)	ε_{sm}	w_k (mm)	$w_{máx}$ (mm)
1	18.72	16	20			0.20	0.125	0.50	16	0.25	10.05	44.98	24246	318.94	0.0005	**0.25**	**0.30**

4. MUROS

4. MUROS

Se calculan los muros de la estructura que nos ocupa, mediante programa desarrollado en base a los criterios normalmente utilizados en el cálculo de los citados elementos estructurales.

Partiendo de los datos de cada situación en estudio: características del relleno, posibilidad de sobrecarga o terraplén en el trasdós, muro de paramento vertical o inclinado y de unos datos previos de la geometría el programa efectúa los cálculos siguientes:

- Determinación de la puntera y el talón del muro, en función de cumplir las condiciones de estabilidad y tensiones admisibles en el terreno impuestas y que son las que siguen:

  . Coeficiente de seguridad al deslizamiento: 1,50
  . Coeficiente de seguridad al vuelco: 2,00

Los resultados que el programa facilita son:

a) Geometría completa del muro, alzado y cimentación.

b) Armaduras completas del mismo, armaduras principales y de reparto.

c) Tensiones en el terreno, en la situación más desfavorable.

d) Coeficientes de seguridad al vuelco y deslizamiento.

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CALCULO DE MUROS. VERSION 09-01-1996

PROGRAMA PROPIEDAD DE INTECSA


      CARACTERISTICAS DEL RELLENO
      ===========================

PESO ESPECIFICO  (TN/M3)                  =  2.00
ANGULO DE ROZAMIENTO FI                   = 35.00
ANGULO ROZAMIENTO TERRENO-MURO            =   .00
ANGULO DE TALUD DEL TERRENO               = 26.56
SOBRECARGA  (TN/M2)                       =   .00
PENDIENTE DE INCLINACION DEL TRASDOS      =   .0900

COEFICIENTE DE EMPUJE ACTIVO              =   .448
COEFICIENTE DE EMPUJE ACTIVO VERTICAL     =   .040
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      CARACTERISTICAS DE LOS MATERIALES
      =================================

RESISTENCIA CARACTERISTICA DEL HORMIGON   =   250. KG/CM2
LIMITE ELASTICO DEL ACERO                 =  5100. KG/CM2
RECUBRIMIENTO DE LAS ARMADURAS            =   .040 M
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GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	1.03
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	9.20
ALTURA DE TIERRAS	H	=	8.90

ZAPATA

VUELO DELANTERO	A1	=	.94
VUELO TRASERO	A4	=	3.70
LONGITUD TOTAL	L	=	5.67
CANTO	C	=	1.10
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.=	35.1 CM2/M	(FI 25 A	.125 M)
		AH.=	8.8 CM2/M	(FI 16 A	.225 M)
	4.9 M. SUPERIORES	AV.=	17.6 CM2/M	(FI 25 A	.250 M)
		AH.=	6.4 CM2/M	(FI 12 A	.175 M)
INTRADOS		AV.=	3.3 CM2/M	(FI 12 A	.250 M)
		AH.=	7.8 CM2/M	(FI 16 A	.250 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL	=	6.3 CM2/M	(FI 12 A	.175 M)
	A. DE REPARTO	=	1.9 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL	=	31.7 CM2/M	(FI 25 A	.150 M)
	A. DE REPARTO	=	9.5 CM2/M	(FI 16 A	.200 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 28.63)

S1 = 35.78 SA = 30.03 SB = 23.74 S2 = 1.09

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO	=	1.50
COEFICIENTE DE SEGURIDAD AL VUELCO	=	2.51

VOLUMEN DE HORMIGON = 11.88 M3. PESO DE ACERO = 693.8 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.79
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	6.60
ALTURA DE TIERRAS	H	=	6.30

ZAPATA

VUELO DELANTERO	A1	=	.66
VUELO TRASERO	A4	=	2.60
LONGITUD TOTAL	L	=	4.05
CANTO	C	=	.80
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.=	15.8 CM2/M	(FI 20 A	.175 M)
		AH.=	6.4 CM2/M	(FI 12 A	.175 M)
	3.0 M. SUPERIORES	AV.=	7.9 CM2/M	(FI 20 A	.350 M)
		AH.=	4.9 CM2/M	(FI 12 A	.225 M)
INTRADOS		AV.=	2.6 CM2/M	(FI 12 A	.250 M)
		AH.=	6.4 CM2/M	(FI 12 A	.175 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL	=	3.2 CM2/M	(FI 12 A	.250 M)
	A. DE REPARTO	=	.9 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL	=	15.2 CM2/M	(FI 20 A	.200 M)
	A. DE REPARTO	=	4.6 CM2/M	(FI 12 A	.225 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 20.39)

S1 = 25.48 SA = 21.48 SB = 16.67 S2 = .92

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO	=	1.52
COEFICIENTE DE SEGURIDAD AL VUELCO	=	2.56

VOLUMEN DE HORMIGON = 6.52 M3. PESO DE ACERO = 290.7 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	1.00
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	8.90
ALTURA DE TIERRAS	H	=	8.60

ZAPATA

VUELO DELANTERO	A1	=	.89
VUELO TRASERO	A4	=	3.56
LONGITUD TOTAL	L	=	5.45
CANTO	C	=	1.00
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 32.4 CM2/M	(FI 25 A	.150 M)
		AH.= 8.1 CM2/M	(FI 16 A	.225 M)
	4.6 M. SUPERIORES	AV.= 16.2 CM2/M	(FI 25 A	.300 M)
		AH.= 6.2 CM2/M	(FI 12 A	.175 M)
INTRADOS		AV.= 3.2 CM2/M	(FI 12 A	.250 M)
		AH.= 8.0 CM2/M	(FI 16 A	.250 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	6.0 CM2/M	(FI 12 A	.175 M)
	A. DE REPARTO =	1.8 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	31.1 CM2/M	(FI 25 A	.150 M)
	A. DE REPARTO =	9.3 CM2/M	(FI 16 A	.200 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 27.48)

S1 = 34.34 SA = 28.91 SB = 22.80 S2 = 1.08

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO	=	1.50	
COEFICIENTE DE SEGURIDAD AL VUELCO	=	2.52	

VOLUMEN DE HORMIGON = 10.80 M3. PESO DE ACERO = 626.2 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.69
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	5.40
ALTURA DE TIERRAS	H	=	5.10

ZAPATA

VUELO DELANTERO	A1	=	.54
VUELO TRASERO	A4	=	2.06
LONGITUD TOTAL	L	=	3.29
CANTO	C	=	.70
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 9.7 CM2/M	(FI 16 A	.200 M)
		AH.= 5.5 CM2/M	(FI 12 A	.200 M)
	4.6 M. SUPERIORES	AV.= 16.2 CM2/M	(FI 16 A	.300 M)
		AH.= .1 CM2/M	(FI 12 A	.175 M)
INTRADOS		AV.= 2.2 CM2/M	(FI 8 A	.200 M)
		AH.= 5.5 CM2/M	(FI 12 A	.200 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	2.0 CM2/M	(FI 12 A	.250 M)
	A. DE REPARTO =	.6 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	9.8 CM2/M	(FI 16 A	.200 M)
	A. DE REPARTO =	2.9 CM2/M	(FI 12 A	.250 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 16.96)

S1 = 21.21 SA = 17.80 SB = 13.47 S2 = .46

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO	=	1.52	
COEFICIENTE DE SEGURIDAD AL VUELCO	=	2.52	

VOLUMEN DE HORMIGON = 4.69 M3. PESO DE ACERO = 185.1 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	1.05
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	9.40
ALTURA DE TIERRAS	H	=	9.10

ZAPATA

VUELO DELANTERO	A1	=	.98
VUELO TRASERO	A4	=	3.80
LONGITUD TOTAL	L	=	5.83
CANTO	C	=	1.10
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 36.9 CM2/M	(FI 25 A	.125 M)
		AH.= 9.2 CM2/M	(FI 16 A	.200 M)
	5.1 M. SUPERIORES	AV.= 18.5 CM2/M	(FI 25 A	.250 M)
		AH.= 6.5 CM2/M	(FI 12 A	.150 M)
INTRADOS		AV.= 3.4 CM2/M	(FI 12 A	.250 M)
		AH.= 7.6 CM2/M	(FI 16 A	.250 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	6.8 CM2/M	(FI 12 A	.150 M)
	A. DE REPARTO =	2.0 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	33.6 CM2/M	(FI 25 A	.125 M)
	A. DE REPARTO =	10.1 CM2/M	(FI 16 A	.175 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 28.73)

S1 = 35.92 SA = 30.14 SB = 23.97 S2 = 1.58

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO = 1.50
COEFICIENTE DE SEGURIDAD AL VUELCO = 2.55

VOLUMEN DE HORMIGON = 12.26 M3. PESO DE ACERO = 767.7 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.84
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	7.10
ALTURA DE TIERRAS	H	=	6.80

ZAPATA

VUELO DELANTERO	A1	=	.71
VUELO TRASERO	A4	=	2.84
LONGITUD TOTAL	L	=	4.39
CANTO	C	=	.90
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 18.9 CM2/M	(FI 20 A	.150 M)
		AH.= 6.7 CM2/M	(FI 12 A	.150 M)
	3.4 M. SUPERIORES	AV.= 9.4 CM2/M	(FI 20 A	.300 M)
		AH.= 5.2 CM2/M	(FI 12 A	.200 M)
INTRADOS		AV.= 2.7 CM2/M	(FI 12 A	.250 M)
		AH.= 6.7 CM2/M	(FI 12 A	.150 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	3.5 CM2/M	(FI 12 A	.250 M)
	A. DE REPARTO =	1.1 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	17.4 CM2/M	(FI 20 A	.175 M)
	A. DE REPARTO =	5.2 CM2/M	(FI 12 A	.200 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 22.19)

S1 = 27.73 SA = 23.40 SB = 18.28 S2 = .96

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO = 1.52
COEFICIENTE DE SEGURIDAD AL VUELCO = 2.55

VOLUMEN DE HORMIGON = 7.64 M3. PESO DE ACERO = 354.1 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	1.03
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	9.20
ALTURA DE TIERRAS	H	=	8.90

ZAPATA

VUELO DELANTERO	A1	=	.94
VUELO TRASERO	A4	=	3.70
LONGITUD TOTAL	L	=	5.67
CANTO	C	=	1.10
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.=	35.1 CM2/M	(FI 25 A	.125 M)
		AH.=	8.8 CM2/M	(FI 16 A	.225 M)
	4.9 M. SUPERIORES	AV.=	17.6 CM2/M	(FI 25 A	.250 M)
		AH.=	6.4 CM2/M	(FI 12 A	.175 M)
INTRADOS		AV.=	3.3 CM2/M	(FI 12 A	.250 M)
		AH.=	7.8 CM2/M	(FI 16 A	.250 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL	=	6.3 CM2/M	(FI 12 A	.175 M)
	A. DE REPARTO	=	1.9 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL	=	31.7 CM2/M	(FI 25 A	.150 M)
	A. DE REPARTO	=	9.5 CM2/M	(FI 16 A	.200 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 28.63)

S1 = 35.78 SA = 30.03 SB = 23.74 S2 = 1.09

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO = 1.50
COEFICIENTE DE SEGURIDAD AL VUELCO = 2.51

VOLUMEN DE HORMIGON = 11.88 M3. PESO DE ACERO = 693.8 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.76
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	6.20
ALTURA DE TIERRAS	H	=	5.90

ZAPATA

VUELO DELANTERO	A1	=	.62
VUELO TRASERO	A4	=	2.40
LONGITUD TOTAL	L	=	3.78
CANTO	C	=	.80
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.=	13.5 CM2/M	(FI 20 A	.225 M)
		AH.=	6.1 CM2/M	(FI 12 A	.175 M)
	4.9 M. SUPERIORES	AV.=	17.6 CM2/M	(FI 20 A	.250 M)
		AH.=	.1 CM2/M	(FI 12 A	.175 M)
INTRADOS		AV.=	2.4 CM2/M	(FI 8 A	.200 M)
		AH.=	6.1 CM2/M	(FI 12 A	.175 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL	=	2.7 CM2/M	(FI 12 A	.250 M)
	A. DE REPARTO	=	.8 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL	=	12.6 CM2/M	(FI 20 A	.225 M)
	A. DE REPARTO	=	3.8 CM2/M	(FI 12 A	.250 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 19.64)

S1 = 24.54 SA = 20.58 SB = 15.74 S2 = .42

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO = 1.50
COEFICIENTE DE SEGURIDAD AL VUELCO = 2.50

VOLUMEN DE HORMIGON = 5.99 M3. PESO DE ACERO = 257.4 KG

Estructura E-10 (PK 302+060)

ESTRUCTURA E - 10

PASO INFERIOR D.O. 302+060

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1. INTRODUCCIÓN

2. BASES DE CÁLCULO

3. PÓRTICO

4. MUROS

1. INTRODUCCIÓN

1. INTRODUCCIÓN

Corresponde el presente anejo al cálculo de un pórtico en la D.O. 302+060 de la Línea de Alta Velocidad, MADRID-BARCELONA-FRONTERA FRANCESA, TRAMO LLEIDA-MARTORELL. SUBTRAMO III.

Se trata de un pórtico con una longitud de 20.55 m. y unas dimensiones libres de 9.00 x 8.30 m. Consta de dintel de 1.00 m de espesor y hastiales de 0.90 m. La cimentación se resuelve mediante zapatas de hormigón armado de 3.00 m de ancho y 1.00 m de canto.

En las embocaduras del pórtico se disponen cuatro muros de hormigón armado de alturas y longitudes variables.

2. BASES DE CÁLCULO

2. BASES DE CÁLCULO

2.1. CARACTERÍSTICAS DE LOS MATERIALES

- **Hormigones**

  En Pórticos, marcos y muros HA 25

- **Acero de armar**

  En todos los elementos B-500 S

2.2. ACCIONES A CONSIDERAR

Los pesos y acciones considerados son los siguientes:

- **Peso Propio**

  . Peso específico del hormigón armado 2,500 t/m^3

- **Cargas Muertas por via**

  . Imposta + acera + barandilla: 0,676 t/m
  . Conducto cableado: 0,300 t/m
  . Traviesa por via: 0,520 t/m
  . Carríl por via: 0,120 t/m
  . Hormigón de forma: 1,225 t/m

  . Balasto: (0,24685 + 0,2292) x 0,50 x 0,8830 = 0,210 m^2
  0.8830 x 0,50 x 0,4415 = 0,195 m^2
  (0,6707 + 0,6606) x 0,50 x 0,5045 = 0,336 m^2
  (0,4406 + 0,3881) x 0,50 x 2,6250 = 1,088 m^2
  (0,5881 + 0,58735) x 0,50 x 1,0375 = 0,610 m^2

  Σ = 2,438 m^2

  Peso: 1,60 t/m^3 x 2,438 = 3,901 t/m

  Valores característicos superior e inferior:

  q_s = 1,30 x 3,901 = 5,071 t/m
  q_i = 0,70 x 3,901 = 2,731 t/m

  . Guardabalasto: 0,50 x 0,20 x 2,50 = 0,25 t/m

  . Balasto + guardabalasto = 5,071 + 0,25 = 5,321 t/m

2.3. ANÁLISIS COMPARATIVO DE SOBRECARGAS

- **Impacto**

a) Para velocidades inferiores o iguales a 200 km/h, se tienen en cuenta las prescripciones del Ministerio de Fomento "Instrucción relativa a las acciones a considerar en el proyecto de puentes de ferrocarril" (IPF-75):

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

v = 200 km/h = 55,56 m/s

masa:

p.p. losa = 1,00 x 2,50 x 20,55 = 51,38 t/m

c. permanentes = 2 x (0,675 + 0,30 + 0,52 + 0,12 + 1,225 + 0,725 + 5,071 + + 0,25) = 17,772 t/m

Tren = 12,00 t/m

$$m = \frac{51{,}38 + 17{,}772 + 2 \times 12{,}00}{20{,}55} = 4{,}53$$

L = 9,00 m

E = 10 x 19000 x $\sqrt{250}$ = 3 x 10^6 t/m^2

Inercia:

$$I = \frac{1}{12} 20{,}55 \times 1{,}00^3 = 1{,}7125 \text{ m}^4$$

$$f = 1{,}57\sqrt{\frac{E \times I}{m \times L^4}} = 1{,}57\sqrt{\frac{3 \times 10^6 \times 1{,}7125}{4{,}53 \times 9{,}00^4}} = 20{,}64$$

$$T = 0{,}048$$

$$\mu = \frac{v\ T}{2L}$$

$$\mu = \frac{55{,}56 \times 0{,}048}{2 \times 9{,}00} = 0{,}15$$

$$I = 65\frac{0{,}15}{1 - 0{,}15 + 0{,}15^2} = 11{,}17$$

el coeficiente de impacto será 1,12.

b) Para velocidades mayores de 200 km/h se considerará la situación de vía de alta velocidad y se tendrá en cuenta las especificaciones de la U.I.C.-776.1.

Para esfuerzos cortantes:

$$\Phi_1 = \frac{0{,}96}{\sqrt{L_\Phi} - 0{,}2} + 0{,}88$$

Para momentos flectores:

$$\Phi_2 = \frac{1{,}44}{\sqrt{L_\Phi} - 0{,}2} + 0{,}82$$

Para estructuras porticadas de vano único se considera una viga continua de tres vanos con las longitudes horizontales y verticales de los elementos del pórtico, siendo:

$$L_\Phi = k \,.\, L_m$$

$$L_m = \frac{1}{n}(L_1 + L_2 + \ldots\ldots + L_n) = \frac{1}{3}(8{,}30 + 9{,}00 + 8{,}30) = 8{,}533 \text{ m}$$

para $n = 3$; $k = 1{,}30$

$$L_\Phi = 1{,}30 \times 8{,}533 = 11{,}09 \text{ m}$$

Coeficiente de impacto para esfuerzos cortantes:

$$\Phi_1 = \frac{0{,}96}{\sqrt{11{,}09} - 0{,}2} + 0{,}88 = 1{,}19$$

Coeficiente de impacto para momentos flectores:

$$\Phi_2 = \frac{1{,}44}{\sqrt{11{,}09} - 0{,}2} + 0{,}82 = 1{,}28$$

Sobrecarga a adoptar

a) Tren de la Instrucción IPF-75

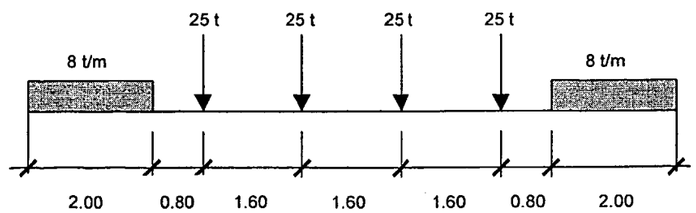
Se considera más desfavorable el tren tipo A formado por tres ejes de 30 t separados entre sí 1,50 m.

$$q = 1{,}12 \times 30 = 35{,}40 \text{ t}$$

M_{apoyo} = 105,00 mt
M_{centro} = 71,40 mt
V_{apoyo} = 89,60 mt

b) Tren del Eurocódigo EC1.3

Se considera el tren de cargas modelo 71 cuyo esquema es el siguiente:



M_{apoyo} = 143,09 x 1,28 = 183,15 mt

M_{centro} = 76,15 x 1,28 = 97,47 mt

V_{apoyo} = 91,65 x 1,19 = 109,06 mt

A la vista de los resultados obtenidos se considera para el cálculo el tren tipo del Eurocódigo EC1.3 al ser más desfavorable.

Sismo

La obra se encuentra situada en una zona donde la aceleración sísmica básica es igual a 0,04g, por lo que no es necesaria la consideración de las acciones sísmicas.

3. PÓRTICO

3. PÓRTICO

3.1. GENERALIDADES

El cálculo del pórtico, se resuelve mediante el programa de cálculo electrónico "STAAD".

3.2. BASES E HIPÓTESIS DE CÁLCULO

Las características de los materiales utilizados, así como los coeficientes de mayoración de esfuerzos y de minoración de resistencias han sido definidos anteriormente.

Así mismo, también al inicio se definen las características del terreno circundante.

La determinación de los valores de las cargas actuantes se realiza como sigue:

- Las cargas verticales debidas a pesos propios y cargas muertas, se determinan en función del espesor y densidad de los elementos, rellenos, etc.., considerados.

- Los valores de los empujes horizontales se determinan a partir del coeficiente de empuje al reposo.

  $E_h = \gamma \cdot K_r \cdot H$, siendo:

  E_h = empuje a la altura H (t/m)
  γ = densidad (t/m^3)
  K_r = coef. empuje al reposo = 1 - sen ϕ
  ϕ = ángulo rozamiento interno tierras
  H = altura considerada (m)

- Los valores verticales de sobrecargas son los correspondientes al tren del Eurocódigo EC1.3 indicados anteriormente.

El estudio de esfuerzos se realiza para una franja de anchura 1,00 m.

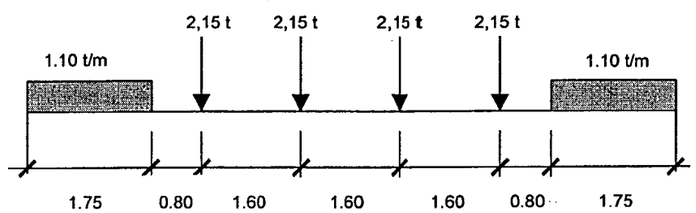
Reparto de cargas

Altura de tierras sobre el dintel = 1,50 m.

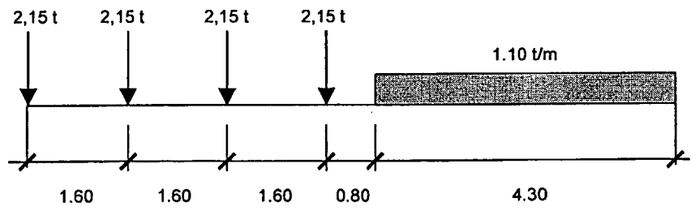
Posición del tren para obtención de momentos flectores:

$$P = \frac{4 \times 25{,}00}{7{,}267 \times 6{,}40} = 2{,}15 \text{ t}$$

$$q = \frac{8{,}00}{7{,}267} = 1{,}10 \text{ t}$$



Posición del tren para obtención de esfuerzos cortantes:



Las hipótesis consideradas para el cálculo son las que a continuación se relacionan:

H-1) Peso de la estructura + Cargas permanentes

H-2) Empuje de tierras (sin sobrecarga)

H-3) Empuje de tierras (en servicio)

H-4 Empuje lateral para s_c = 3 t/m^2 (lado izq.)

H-5) Empuje lateral para s_c = 3 t/m^2 (lado dcho.)

H-6) Empuje lateral para un desnivel de relleno entre hastiales de 2,0 m y una sobrecarga por compactación de 2 t/m^2.

H-7) Sobrecarga de tren posición A

H-8) Sobrecarga de tren posición B

H-9 a H-17). Distintas combinaciones posibles de las siete hipótesis simples.

A partir de los resultados obtenidos para las distintas combinaciones citadas, se determina la armadura necesaria en cada elemento, para los esfuerzos pésimos.

El armado de las distintas secciones se realiza de acuerdo con la EHE.

3.3. RESULTADOS

Los resultados facilitados son los que a continuación se indican:

a) Obtención de esfuerzos y listado de los mismos, en todas las secciones características de la estructura.

b) Cálculo y listado de los desplazamientos de todos los nudos.

c) Reacciones.

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 *************************************************
 *                                               *
 *           S T A A D - III                     *
 *           Revision 17.0a                      *
 *           Proprietary Program of              *
 *           RESEARCH ENGINEERS, Inc.            *
 *           Date=    SEP 29, 1999               *
 *           Time=    17:56:21                   *
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 1. STAAD PLANE PASO INFERIOR D.O. 302+060
 2. * 9.00 X 9.80
 3. * HT = 1.50 M
 4. UNIT MET MTO
 5. JOINT COORDINATES
 6.  1  0.000  0.00 ; 2  0.000  1.1625 ; 3  0.000  2.3250 ; 4  0.000  3.4875
 7.  5  0.000  4.65 ; 6  0.000  5.8125 ; 7  0.000  6.975 ; 8  0.000  8.1375
 8.  9  0.000  9.30 ;10  1.2375  9.30 ;11  2.475  9.300 ;12  3.7125  9.30
 9. 13  4.950  9.30 ;14  6.1875  9.30 ;15  7.425  9.300 ;16  8.6625  9.30
10. 17  9.900  9.30 ;18  9.900  0.000 ;19  9.900  1.1625 ;20  9.900  2.325
11. 21  9.900  3.4875 ;22  9.900  4.650 ;23  9.900  5.8125 ;24  9.900  6.975
12. 25  9.900  8.1375
13. MEMBER INCIDENCES
14.  1  1  2  16
15. 17 18 19  23
16. 24 25 17
17. MEMBER PROPERTIES
18.  1 TO  8 17 TO 24 PRISMATIC  AX 0.900  IZ 0.06075
19.  9 TO 16          PRISMATIC  AX 1.000  IZ 0.08333
20. CONSTANTS
21. E 3000000.0  ALL
22. SUPPORTS
23. 1 18          FIXED
24. LOADING 1   PESO PROPIO + CARGAS PERMANENTES
25. MEMBER LOAD
26. 1 TO  8 17 TO 24  UNI GY -2.25
27. 9 TO 16           UNI GY -2.50
28. 9 TO 16           UNI GY -1.47
29. 9 TO 16           UNI GY -3.00
30. LOADING 2   EMPUJE DE TIERRAS (SIN SOBRECARGA)
31. MEMBER LOAD
32.  1          TRAP GX   9.64   8.65
33.  2          TRAP GX   8.65   7.65
34.  3          TRAP GX   7.65   6.66
35.  4          TRAP GX   6.66   5.67
36.  5          TRAP GX   5.67   4.68
37.  6          TRAP GX   4.68   3.69
38.  7          TRAP GX   3.69   2.70
39.  8          TRAP GX   2.70   1.71
40. 17          TRAP GX  -9.64  -8.65
41. 18          TRAP GX  -8.65  -7.65
42. 19          TRAP GX  -7.65  -6.66
43. 20          TRAP GX  -6.66  -5.67
44. 21          TRAP GX  -5.67  -4.68
45. 22          TRAP GX  -4.68  -3.69
46. 23          TRAP GX  -3.69  -2.70
47. 24          TRAP GX  -2.70  -1.71
```



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* 9.00 X 9.80
48. LOADING 3   EMPUJE DE TIERRAS (EN SERVICIO)
49. MEMBER LOAD
50.  1          TRAP GX   4.82   4.32
51.  2          TRAP GX   4.32   3.83
52.  3          TRAP GX   3.83   3.33
53.  4          TRAP GX   3.33   2.84
54.  5          TRAP GX   2.84   2.34
55.  6          TRAP GX   2.34   1.84
56.  7          TRAP GX   1.84   1.35
57.  8          TRAP GX   1.35   0.85
58. 17          TRAP GX  -4.82  -4.32
59. 18          TRAP GX  -4.32  -3.83
60. 19          TRAP GX  -3.83  -3.33
61. 20          TRAP GX  -3.33  -2.84
62. 21          TRAP GX  -2.84  -2.34
63. 22          TRAP GX  -2.34  -1.84
64. 23          TRAP GX  -1.84  -1.35
65. 24          TRAP GX  -1.35  -0.85
66. LOADING 4   EMPUJE DE SOBRECARGA DE 3.00 T/M2 (IZQDA)
67. MEMBER LOAD
68.  1          TRAP GX   1.28   1.28
69.  2          TRAP GX   1.28   1.28
70.  3          TRAP GX   1.28   1.28
71.  4          TRAP GX   1.28   1.28
72.  5          TRAP GX   1.28   1.28
73.  6          TRAP GX   1.28   1.28
74.  7          TRAP GX   1.28   1.28
75.  8          TRAP GX   1.28   1.28
76. LOADING 5   EMPUJE DE SOBRECARGA DE 3.00 T/M2 (DRCHA)
77. MEMBER LOAD
78. 17          TRAP GX  -1.28  -1.28
79. 18          TRAP GX  -1.28  -1.28
80. 19          TRAP GX  -1.28  -1.28
81. 20          TRAP GX  -1.28  -1.28
82. 21          TRAP GX  -1.28  -1.28
83. 22          TRAP GX  -1.28  -1.28
84. 23          TRAP GX  -1.28  -1.28
85. 24          TRAP GX  -1.28  -1.28
86. LOADING 6   COMPACTADOR DE 2.00 T/M2
87. MEMBER LOAD
88.  1          TRAP GX   5.95   4.96
89.  2          TRAP GX   4.96   3.97
90.  3          TRAP GX   3.97   2.97
91.  4          TRAP GX   2.97   1.98
92.  5          TRAP GX   1.98   0.99
93.  6          TRAP GX   0.99   0.00
94. 17          TRAP GX  -8.78  -7.79
95. 18          TRAP GX  -7.79  -6.80
96. 19          TRAP GX  -6.80  -5.81
97. 20          TRAP GX  -5.81  -4.82
98. 21          TRAP GX  -4.82  -3.83
99. 22          TRAP GX  -3.83  -2.84
100. 23         TRAP GX  -2.84  -1.84
101. 24         TRAP GX  -1.84  -0.85
102. LOADING 7  SOBRECARGA TREN POSICION A
103. MEMBER LOAD
104. 9 10       UNI GY -1.10
105. 11         UNI GY -1.10  0.0000  0.0750
106. 11         UNI GY -2.15  0.0750  1.2375
107. 12 TO 14   UNI GY -2.15
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108. 15          UNI GY -2.15  0.0000  0.6950
109. 15          UNI GY -2.15  0.6950  1.2375
110. 16          UNI GY -1.10
111. LOADING 8  SOBRECARGA TREN POSICION B
112. MEMBER LOAD
113. 9 TO 12     UNI GY -2.15
114. 13          UNI GY -2.15  0.0000  0.6500
115. 13          UNI GY -1.10  0.6500  1.2375
116. 14 TO 16    UNI GY -1.10
117. * DIMENSIONAMIENTO
118. LOAD COMB  9  P.P. + C.P. + COMPACTADOR
119. 1 1.00  6 1.50
120. LOAD COMB 10  P.P. + C.P. + EMP.TIERRAS + EMP.S.C. (IZQDA)
121. 1 1.00  2 1.50  4 1.50
122. LOAD COMB 11  P.P. + C.P. + EMP.TIERRAS + EMP. S.C. (TOTAL)
123. 1 1.00  2 1.50  4 1.50  5 1.50
124. LOAD COMB 12  P.P. + C.P. + EMP.TIERRAS + SC.TREN A
125. 1 1.35  3 1.00  7 1.50
126. LOAD COMB 13  P.P. + C.P. + EMP.TIERRAS + SC.TREN B
127. 1 1.35  3 1.00  8 1.50
128. LOAD COMB 14  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(IZQDA) + SC.TREN A
129. 1 1.35  2 1.50  4 1.50  7 1.50
130. LOAD COMB 15  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(IZQDA) + SC.TREN B
131. 1 1.35  2 1.50  4 1.50  8 1.50
132. LOAD COMB 16  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(TOTAL) + SC.TREN A
133. 1 1.35  2 1.50  4 1.50  5 1.50  7 1.50
134. LOAD COMB 17  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(TOTAL) + SC.TREN B
135. 1 1.35  2 1.50  4 1.50  5 1.50  8 1.50
136. * COMPROBACION TENSIONES
137. LOAD COMB 18  P.P. + C.P. + COMPACTADOR
138. 1 1.00  6 1.00
139. LOAD COMB 19  P.P. + C.P. + EMP.TIERRAS + EMP.S.C. (IZQDA)
140. 1 1.00  2 1.00  4 1.00
141. LOAD COMB 20  P.P. + C.P. + EMP.TIERRAS + EMP. S.C. (TOTAL)
142. 1 1.00  2 1.00  4 1.00  5 1.00
143. LOAD COMB 21  P.P. + C.P. + EMP.TIERRAS + SC.TREN A
144. 1 1.00  3 1.00  7 1.00
145. LOAD COMB 22  P.P. + C.P. + EMP.TIERRAS + SC.TREN B
146. 1 1.00  3 1.00  8 1.00
147. LOAD COMB 23  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(IZQDA) + SC.TREN A
148. 1 1.00  2 1.00  4 1.00  7 1.00
149. LOAD COMB 24  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(IZQDA) + SC.TREN B
150. 1 1.00  2 1.00  4 1.00  8 1.00
151. LOAD COMB 25  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(TOTAL) + SC.TREN A
152. 1 1.00  2 1.00  4 1.00  5 1.00  7 1.00
153. LOAD COMB 26  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(TOTAL) + SC.TREN B
154. 1 1.00  2 1.00  4 1.00  5 1.00  8 1.00
155. * FISURACION
156. LOAD COMB 27  P.P. + C.P. + COMPACTADOR
157. 1 1.00  6 1.00
158. LOAD COMB 28  P.P. + C.P. + EMP.TIERRAS
159. 1 1.00  2 1.00
160. PERFORM ANALYSIS
```


P R O B L E M S T A T I S T I C S

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NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS =    25/   24/    2
ORIGINAL/FINAL BAND-WIDTH =    8/    1
TOTAL PRIMARY LOAD CASES  =    8, TOTAL DEGREES OF FREEDOM =    69
SIZE OF STIFFNESS MATRIX =     414 DOUBLE PREC. WORDS
TOTAL REQUIRED DISK SPACE =   12.06 MEGA-BYTES


++ PROCESSING ELEMENT STIFFNESS MATRIX.              17:56:28
++ PROCESSING GLOBAL STIFFNESS MATRIX.               17:56:28
++ PROCESSING TRIANGULAR FACTORIZATION.              17:56:28
++ CALCULATING JOINT DISPLACEMENTS.                  17:56:28
++ CALCULATING MEMBER  FORCES.                       17:56:28

161. LOAD LIST 9 TO 17
162. PRINT SUP REAC ALL
```

SUPPORT REACTIONS -UNIT MTO MET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	9	-14.11	59.69	0.00	0.00	0.00	-18.86
	10	-64.36	52.96	0.00	0.00	0.00	107.40
	11	-60.59	55.43	0.00	0.00	0.00	87.18
	12	-8.78	87.15	0.00	0.00	0.00	-1.77
	13	-9.03	89.37	0.00	0.00	0.00	-0.67
	14	-60.10	84.68	0.00	0.00	0.00	94.10
	15	-60.34	86.90	0.00	0.00	0.00	95.20
	16	-56.32	87.15	0.00	0.00	0.00	73.89
	17	-56.56	89.37	0.00	0.00	0.00	74.99
18	9	50.20	51.17	0.00	0.00	0.00	-93.47
	10	46.51	57.90	0.00	0.00	0.00	-48.81
	11	60.59	55.43	0.00	0.00	0.00	-87.18
	12	8.78	88.47	0.00	0.00	0.00	1.56
	13	9.03	85.44	0.00	0.00	0.00	1.15
	14	42.24	90.93	0.00	0.00	0.00	-35.72
	15	42.48	87.91	0.00	0.00	0.00	-36.13
	16	56.32	88.47	0.00	0.00	0.00	-74.09
	17	56.56	85.44	0.00	0.00	0.00	-74.50

********** END OF LATEST ANALYSIS RESULT **********

163. PRINT JOINT DISP ALL

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
1	9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	13	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	17	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	9	-0.00866	-0.00251	0.00000	0.00000	0.00000	0.00016
	10	0.03124	-0.00222	0.00000	0.00000	0.00000	-0.00047
	11	0.02429	-0.00233	0.00000	0.00000	0.00000	-0.00035
	12	-0.00172	-0.00368	0.00000	0.00000	0.00000	0.00004
	13	-0.00135	-0.00377	0.00000	0.00000	0.00000	0.00003
	14	0.02693	-0.00357	0.00000	0.00000	0.00000	-0.00040
	15	0.02730	-0.00367	0.00000	0.00000	0.00000	-0.00041
	16	0.01997	-0.00368	0.00000	0.00000	0.00000	-0.00029
	17	0.02035	-0.00377	0.00000	0.00000	0.00000	-0.00029
3	9	-0.03862	-0.00491	0.00000	0.00000	0.00000	0.00036
	10	0.09584	-0.00433	0.00000	0.00000	0.00000	-0.00060
	11	0.07020	-0.00455	0.00000	0.00000	0.00000	-0.00039
	12	-0.00963	-0.00720	0.00000	0.00000	0.00000	0.00010
	13	-0.00828	-0.00739	0.00000	0.00000	0.00000	0.00009
	14	0.08103	-0.00699	0.00000	0.00000	0.00000	-0.00049
	15	0.08238	-0.00718	0.00000	0.00000	0.00000	-0.00050
	16	0.05539	-0.00720	0.00000	0.00000	0.00000	-0.00029
	17	0.05674	-0.00739	0.00000	0.00000	0.00000	-0.00030
4	9	-0.09048	-0.00720	0.00000	0.00000	0.00000	0.00053
	10	0.16108	-0.00633	0.00000	0.00000	0.00000	-0.00050
	11	0.10828	-0.00665	0.00000	0.00000	0.00000	-0.00024
	12	-0.02467	-0.01057	0.00000	0.00000	0.00000	0.00015
	13	-0.02195	-0.01086	0.00000	0.00000	0.00000	0.00014
	14	0.13326	-0.01025	0.00000	0.00000	0.00000	-0.00039
	15	0.13598	-0.01054	0.00000	0.00000	0.00000	-0.00040
	16	0.08046	-0.01057	0.00000	0.00000	0.00000	-0.00013
	17	0.08318	-0.01086	0.00000	0.00000	0.00000	-0.00014
5	9	-0.15889	-0.00938	0.00000	0.00000	0.00000	0.00063
	10	0.20765	-0.00822	0.00000	0.00000	0.00000	-0.00029
	11	0.12246	-0.00864	0.00000	0.00000	0.00000	0.00000
	12	-0.04397	-0.01379	0.00000	0.00000	0.00000	0.00017
	13	-0.03969	-0.01417	0.00000	0.00000	0.00000	0.00016
	14	0.16801	-0.01337	0.00000	0.00000	0.00000	-0.00021
	15	0.17229	-0.01375	0.00000	0.00000	0.00000	-0.00022
	16	0.08282	-0.01379	0.00000	0.00000	0.00000	0.00009
	17	0.08710	-0.01417	0.00000	0.00000	0.00000	0.00007
6	9	-0.23401	-0.01144	0.00000	0.00000	0.00000	0.00064
	10	0.22820	-0.00999	0.00000	0.00000	0.00000	-0.00007
	11	0.10866	-0.01052	0.00000	0.00000	0.00000	0.00023

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
	12	-0.06129	-0.01686	0.00000	0.00000	0.00000	0.00012
	13	-0.05548	-0.01734	0.00000	0.00000	0.00000	0.00010
	14	0.18158	-0.01633	0.00000	0.00000	0.00000	-0.00004
	15	0.18739	-0.01681	0.00000	0.00000	0.00000	-0.00005
	16	0.06204	-0.01686	0.00000	0.00000	0.00000	0.00026
	17	0.06784	-0.01734	0.00000	0.00000	0.00000	0.00024
7	9	-0.30306	-0.01339	0.00000	0.00000	0.00000	0.00053
	10	0.22581	-0.01165	0.00000	0.00000	0.00000	0.00009
	11	0.07320	-0.01229	0.00000	0.00000	0.00000	0.00036
	12	-0.06757	-0.01978	0.00000	0.00000	0.00000	-0.00002
	13	-0.06047	-0.02035	0.00000	0.00000	0.00000	-0.00003
	14	0.18074	-0.01914	0.00000	0.00000	0.00000	0.00003
	15	0.18784	-0.01971	0.00000	0.00000	0.00000	0.00002
	16	0.02813	-0.01978	0.00000	0.00000	0.00000	0.00030
	17	0.03522	-0.02035	0.00000	0.00000	0.00000	0.00029
8	9	-0.35172	-0.01523	0.00000	0.00000	0.00000	0.00029
	10	0.21254	-0.01320	0.00000	0.00000	0.00000	0.00011
	11	0.03139	-0.01395	0.00000	0.00000	0.00000	0.00033
	12	-0.05139	-0.02254	0.00000	0.00000	0.00000	-0.00027
	13	-0.04345	-0.02321	0.00000	0.00000	0.00000	-0.00028
	14	0.18121	-0.02180	0.00000	0.00000	0.00000	-0.00007
	15	0.18915	-0.02247	0.00000	0.00000	0.00000	-0.00008
	16	0.00007	-0.02254	0.00000	0.00000	0.00000	0.00015
	17	0.00801	-0.02321	0.00000	0.00000	0.00000	0.00014
9	9	-0.36534	-0.01696	0.00000	0.00000	0.00000	-0.00008
	10	0.20788	-0.01464	0.00000	0.00000	0.00000	-0.00007
	11	0.00600	-0.01549	0.00000	0.00000	0.00000	0.00007
	12	0.00051	-0.02515	0.00000	0.00000	0.00000	-0.00064
	13	0.00863	-0.02592	0.00000	0.00000	0.00000	-0.00064
	14	0.20619	-0.02430	0.00000	0.00000	0.00000	-0.00040
	15	0.21431	-0.02507	0.00000	0.00000	0.00000	-0.00040
	16	0.00432	-0.02515	0.00000	0.00000	0.00000	-0.00026
	17	0.01244	-0.02592	0.00000	0.00000	0.00000	-0.00026
10	9	-0.36605	-0.04221	0.00000	0.00000	0.00000	-0.00030
	10	0.20653	-0.03303	0.00000	0.00000	0.00000	-0.00020
	11	0.00450	-0.02137	0.00000	0.00000	0.00000	-0.00013
	12	-0.00022	-0.11825	0.00000	0.00000	0.00000	-0.00081
	13	0.00791	-0.11820	0.00000	0.00000	0.00000	-0.00080
	14	0.20467	-0.08915	0.00000	0.00000	0.00000	-0.00060
	15	0.21280	-0.08910	0.00000	0.00000	0.00000	-0.00058
	16	0.00264	-0.07749	0.00000	0.00000	0.00000	-0.00053
	17	0.01077	-0.07744	0.00000	0.00000	0.00000	-0.00052
11	9	-0.36675	-0.08295	0.00000	0.00000	0.00000	-0.00033
	10	0.20519	-0.05883	0.00000	0.00000	0.00000	-0.00020
	11	0.00300	-0.04191	0.00000	0.00000	0.00000	-0.00018
	12	-0.00094	-0.21427	0.00000	0.00000	0.00000	-0.00070
	13	0.00720	-0.21187	0.00000	0.00000	0.00000	-0.00068
	14	0.20315	-0.16131	0.00000	0.00000	0.00000	-0.00053

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
	15	0.21129	-0.15891	0.00000	0.00000	0.00000	-0.00051
	16	0.00096	-0.14439	0.00000	0.00000	0.00000	-0.00051
	17	0.00910	-0.14200	0.00000	0.00000	0.00000	-0.00049
12	9	-0.36745	-0.11960	0.00000	0.00000	0.00000	-0.00024
	10	0.20384	-0.07756	0.00000	0.00000	0.00000	-0.00010
	11	0.00150	-0.06078	0.00000	0.00000	0.00000	-0.00011
	12	-0.00167	-0.28416	0.00000	0.00000	0.00000	-0.00040
	13	0.00648	-0.27836	0.00000	0.00000	0.00000	-0.00037
	14	0.20163	-0.21360	0.00000	0.00000	0.00000	-0.00029
	15	0.20978	-0.20780	0.00000	0.00000	0.00000	-0.00026
	16	-0.00071	-0.19682	0.00000	0.00000	0.00000	-0.00031
	17	0.00743	-0.19102	0.00000	0.00000	0.00000	-0.00028
13	9	-0.36815	-0.13912	0.00000	0.00000	0.00000	-0.00007
	10	0.20250	-0.08129	0.00000	0.00000	0.00000	0.00004
	11	0.00000	-0.06816	0.00000	0.00000	0.00000	0.00000
	12	-0.00239	-0.30996	0.00000	0.00000	0.00000	-0.00001
	13	0.00577	-0.30098	0.00000	0.00000	0.00000	0.00002
	14	0.20010	-0.22993	0.00000	0.00000	0.00000	0.00003
	15	0.20826	-0.22095	0.00000	0.00000	0.00000	0.00005
	16	-0.00239	-0.21679	0.00000	0.00000	0.00000	-0.00001
	17	0.00577	-0.20782	0.00000	0.00000	0.00000	0.00002
14	9	-0.36885	-0.13501	0.00000	0.00000	0.00000	0.00013
	10	0.20115	-0.06863	0.00000	0.00000	0.00000	0.00016
	11	-0.00150	-0.06078	0.00000	0.00000	0.00000	0.00011
	12	-0.00312	-0.28544	0.00000	0.00000	0.00000	0.00039
	13	0.00505	-0.27488	0.00000	0.00000	0.00000	0.00040
	14	0.19858	-0.20594	0.00000	0.00000	0.00000	0.00034
	15	0.20675	-0.19538	0.00000	0.00000	0.00000	0.00035
	16	-0.00407	-0.19810	0.00000	0.00000	0.00000	0.00030
	17	0.00410	-0.18753	0.00000	0.00000	0.00000	0.00030
15	9	-0.36955	-0.10732	0.00000	0.00000	0.00000	0.00031
	10	0.19981	-0.04470	0.00000	0.00000	0.00000	0.00021
	11	-0.00300	-0.04191	0.00000	0.00000	0.00000	0.00018
	12	-0.00384	-0.21624	0.00000	0.00000	0.00000	0.00070
	13	0.00434	-0.20677	0.00000	0.00000	0.00000	0.00068
	14	0.19706	-0.14916	0.00000	0.00000	0.00000	0.00055
	15	0.20524	-0.13968	0.00000	0.00000	0.00000	0.00053
	16	-0.00575	-0.14637	0.00000	0.00000	0.00000	0.00051
	17	0.00243	-0.13689	0.00000	0.00000	0.00000	0.00049
16	9	-0.37025	-0.06262	0.00000	0.00000	0.00000	0.00040
	10	0.19846	-0.02120	0.00000	0.00000	0.00000	0.00014
	11	-0.00450	-0.02137	0.00000	0.00000	0.00000	0.00013
	12	-0.00457	-0.11987	0.00000	0.00000	0.00000	0.00082
	13	0.00362	-0.11407	0.00000	0.00000	0.00000	0.00078
	14	0.19554	-0.07894	0.00000	0.00000	0.00000	0.00055
	15	0.20373	-0.07314	0.00000	0.00000	0.00000	0.00051
	16	-0.00742	-0.07911	0.00000	0.00000	0.00000	0.00054
	17	0.00077	-0.07331	0.00000	0.00000	0.00000	0.00050

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
17	9	-0.37096	-0.01402	0.00000	0.00000	0.00000	0.00036
	10	0.19711	-0.01634	0.00000	0.00000	0.00000	-0.00010
	11	-0.00600	-0.01549	0.00000	0.00000	0.00000	-0.00007
	12	-0.00529	-0.02561	0.00000	0.00000	0.00000	0.00065
	13	0.00291	-0.02456	0.00000	0.00000	0.00000	0.00061
	14	0.19402	-0.02646	0.00000	0.00000	0.00000	0.00025
	15	0.20222	-0.02541	0.00000	0.00000	0.00000	0.00021
	16	-0.00910	-0.02561	0.00000	0.00000	0.00000	0.00028
	17	-0.00090	-0.02456	0.00000	0.00000	0.00000	0.00024
18	9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	13	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	17	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
19	9	-0.02798	-0.00215	0.00000	0.00000	0.00000	0.00043
	10	-0.01201	-0.00244	0.00000	0.00000	0.00000	0.00016
	11	-0.02429	-0.00233	0.00000	0.00000	0.00000	0.00035
	12	0.00164	-0.00373	0.00000	0.00000	0.00000	-0.00004
	13	0.00153	-0.00360	0.00000	0.00000	0.00000	-0.00003
	14	-0.00777	-0.00384	0.00000	0.00000	0.00000	0.00009
	15	-0.00788	-0.00371	0.00000	0.00000	0.00000	0.00009
	16	-0.02005	-0.00373	0.00000	0.00000	0.00000	0.00029
	17	-0.02017	-0.00360	0.00000	0.00000	0.00000	0.00029
20	9	-0.08931	-0.00418	0.00000	0.00000	0.00000	0.00059
	10	-0.02820	-0.00476	0.00000	0.00000	0.00000	0.00009
	11	-0.07020	-0.00455	0.00000	0.00000	0.00000	0.00039
	12	0.00933	-0.00731	0.00000	0.00000	0.00000	-0.00010
	13	0.00900	-0.00705	0.00000	0.00000	0.00000	-0.00010
	14	-0.01369	-0.00753	0.00000	0.00000	0.00000	-0.00001
	15	-0.01402	-0.00727	0.00000	0.00000	0.00000	-0.00001
	16	-0.05569	-0.00731	0.00000	0.00000	0.00000	0.00029
	17	-0.05602	-0.00705	0.00000	0.00000	0.00000	0.00029
21	9	-0.15866	-0.00610	0.00000	0.00000	0.00000	0.00058
	10	-0.02837	-0.00697	0.00000	0.00000	0.00000	-0.00010
	11	-0.10828	-0.00665	0.00000	0.00000	0.00000	0.00024
	12	0.02400	-0.01074	0.00000	0.00000	0.00000	-0.00015
	13	0.02357	-0.01035	0.00000	0.00000	0.00000	-0.00015
	14	-0.00123	-0.01106	0.00000	0.00000	0.00000	-0.00021
	15	-0.00165	-0.01067	0.00000	0.00000	0.00000	-0.00021
	16	-0.08113	-0.01074	0.00000	0.00000	0.00000	0.00013
	17	-0.08156	-0.01035	0.00000	0.00000	0.00000	0.00013
22	9	-0.22091	-0.00791	0.00000	0.00000	0.00000	0.00048
	10	-0.00379	-0.00907	0.00000	0.00000	0.00000	-0.00032
	11	-0.12246	-0.00864	0.00000	0.00000	0.00000	0.00000

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
	12	0.04277	-0.01402	0.00000	0.00000	0.00000	-0.00016
	13	0.04257	-0.01350	0.00000	0.00000	0.00000	-0.00017
	14	0.03466	-0.01444	0.00000	0.00000	0.00000	-0.00040
	15	0.03446	-0.01392	0.00000	0.00000	0.00000	-0.00041
	16	-0.08402	-0.01402	0.00000	0.00000	0.00000	-0.00008
	17	-0.08421	-0.01350	0.00000	0.00000	0.00000	-0.00009
23	9	-0.26968	-0.00961	0.00000	0.00000	0.00000	0.00036
	10	0.04424	-0.01106	0.00000	0.00000	0.00000	-0.00049
	11	-0.10866	-0.01052	0.00000	0.00000	0.00000	-0.00023
	12	0.05942	-0.01714	0.00000	0.00000	0.00000	-0.00011
	13	0.05999	-0.01649	0.00000	0.00000	0.00000	-0.00012
	14	0.08899	-0.01768	0.00000	0.00000	0.00000	-0.00051
	15	0.08956	-0.01702	0.00000	0.00000	0.00000	-0.00052
	16	-0.06390	-0.01714	0.00000	0.00000	0.00000	-0.00025
	17	-0.06334	-0.01649	0.00000	0.00000	0.00000	-0.00026
24	9	-0.30582	-0.01119	0.00000	0.00000	0.00000	0.00027
	10	0.10589	-0.01293	0.00000	0.00000	0.00000	-0.00055
	11	-0.07320	-0.01229	0.00000	0.00000	0.00000	-0.00036
	12	0.06487	-0.02012	0.00000	0.00000	0.00000	0.00003
	13	0.06696	-0.01934	0.00000	0.00000	0.00000	0.00002
	14	0.14827	-0.02075	0.00000	0.00000	0.00000	-0.00048
	15	0.15035	-0.01997	0.00000	0.00000	0.00000	-0.00049
	16	-0.03082	-0.02012	0.00000	0.00000	0.00000	-0.00029
	17	-0.02874	-0.01934	0.00000	0.00000	0.00000	-0.00031
25	9	-0.33595	-0.01266	0.00000	0.00000	0.00000	0.00026
	10	0.16432	-0.01469	0.00000	0.00000	0.00000	-0.00043
	11	-0.03139	-0.01395	0.00000	0.00000	0.00000	-0.00033
	12	0.04772	-0.02294	0.00000	0.00000	0.00000	0.00028
	13	0.05228	-0.02203	0.00000	0.00000	0.00000	0.00026
	14	0.19197	-0.02368	0.00000	0.00000	0.00000	-0.00024
	15	0.19653	-0.02277	0.00000	0.00000	0.00000	-0.00026
	16	-0.00374	-0.02294	0.00000	0.00000	0.00000	-0.00014
	17	0.00082	-0.02203	0.00000	0.00000	0.00000	-0.00016

********** END OF LATEST ANALYSIS RESULT **********

164. PRINT MEMBER FORCES ALL

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	9	1	59.69	14.11	0.00	0.00	0.00	-18.86
		2	-57.07	-4.60	0.00	0.00	0.00	29.56
	10	1	52.96	64.36	0.00	0.00	0.00	107.40
		2	-50.34	-46.18	0.00	0.00	0.00	-43.31
	11	1	55.43	60.59	0.00	0.00	0.00	87.18
		2	-52.81	-42.41	0.00	0.00	0.00	-27.49
	12	1	87.15	8.78	0.00	0.00	0.00	-1.77
		2	-83.62	-3.47	0.00	0.00	0.00	8.83
	13	1	89.37	9.03	0.00	0.00	0.00	-0.67
		2	-85.84	-3.71	0.00	0.00	0.00	8.02
	14	1	84.68	60.10	0.00	0.00	0.00	94.10
		2	-81.15	-41.92	0.00	0.00	0.00	-34.97
	15	1	86.90	60.34	0.00	0.00	0.00	95.20
		2	-83.37	-42.16	0.00	0.00	0.00	-35.79
	16	1	87.15	56.32	0.00	0.00	0.00	73.89
		2	-83.62	-38.14	0.00	0.00	0.00	-19.15
	17	1	89.37	56.56	0.00	0.00	0.00	74.99
		2	-85.84	-38.39	0.00	0.00	0.00	-19.97
2	9	2	57.07	4.60	0.00	0.00	0.00	-29.56
		3	-54.46	3.19	0.00	0.00	0.00	30.21
	10	2	50.34	46.18	0.00	0.00	0.00	43.31
		3	-47.73	-29.74	0.00	0.00	0.00	0.65
	11	2	52.81	42.41	0.00	0.00	0.00	27.49
		3	-50.20	-25.96	0.00	0.00	0.00	12.09
	12	2	83.62	3.47	0.00	0.00	0.00	-8.83
		3	-80.09	1.27	0.00	0.00	0.00	10.06
	13	2	85.84	3.71	0.00	0.00	0.00	-8.02
		3	-82.31	1.02	0.00	0.00	0.00	9.52
	14	2	81.15	41.92	0.00	0.00	0.00	34.97
		3	-77.62	-25.47	0.00	0.00	0.00	4.03
	15	2	83.37	42.16	0.00	0.00	0.00	35.79
		3	-79.84	-25.72	0.00	0.00	0.00	3.50
	16	2	83.62	38.14	0.00	0.00	0.00	19.15
		3	-80.09	-21.70	0.00	0.00	0.00	15.46
	17	2	85.84	38.39	0.00	0.00	0.00	19.97
		3	-82.31	-21.94	0.00	0.00	0.00	14.93
3	9	3	54.46	-3.19	0.00	0.00	0.00	-30.21
		4	-51.84	9.24	0.00	0.00	0.00	22.82
	10	3	47.73	29.74	0.00	0.00	0.00	-0.65
		4	-45.11	-15.03	0.00	0.00	0.00	26.51
	11	3	50.20	25.96	0.00	0.00	0.00	-12.09
		4	-47.58	-11.25	0.00	0.00	0.00	33.55
	12	3	80.09	-1.27	0.00	0.00	0.00	-10.06
		4	-76.56	5.43	0.00	0.00	0.00	6.11
	13	3	82.31	-1.02	0.00	0.00	0.00	-9.52
		4	-78.77	5.18	0.00	0.00	0.00	5.86

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	14	3	77.62	25.47	0.00	0.00	0.00	-4.03
		4	-74.09	-10.77	0.00	0.00	0.00	24.93
	15	3	79.84	25.72	0.00	0.00	0.00	-3.50
		4	-76.31	-11.01	0.00	0.00	0.00	24.68
	16	3	80.09	21.70	0.00	0.00	0.00	-15.46
		4	-76.56	-6.99	0.00	0.00	0.00	31.97
	17	3	82.31	21.94	0.00	0.00	0.00	-14.93
		4	-78.77	-7.23	0.00	0.00	0.00	31.72
4	9	4	51.84	-9.24	0.00	0.00	0.00	-22.82
		5	-49.22	13.56	0.00	0.00	0.00	9.40
	10	4	45.11	15.03	0.00	0.00	0.00	-26.51
		5	-42.49	-2.05	0.00	0.00	0.00	36.27
	11	4	47.58	11.25	0.00	0.00	0.00	-33.55
		5	-44.96	1.73	0.00	0.00	0.00	38.92
	12	4	76.56	-5.43	0.00	0.00	0.00	-6.11
		5	-73.02	9.02	0.00	0.00	0.00	-2.34
	13	4	78.77	-5.18	0.00	0.00	0.00	-5.86
		5	-75.24	8.77	0.00	0.00	0.00	-2.31
	14	4	74.09	10.77	0.00	0.00	0.00	-24.93
		5	-70.55	2.22	0.00	0.00	0.00	29.73
	15	4	76.31	11.01	0.00	0.00	0.00	-24.68
		5	-72.77	1.97	0.00	0.00	0.00	29.76
	16	4	76.56	6.99	0.00	0.00	0.00	-31.97
		5	-73.02	5.99	0.00	0.00	0.00	32.38
	17	4	78.77	7.23	0.00	0.00	0.00	-31.72
		5	-75.24	5.75	0.00	0.00	0.00	32.42
5	9	5	49.22	-13.56	0.00	0.00	0.00	-9.40
		6	-46.61	16.15	0.00	0.00	0.00	-8.04
	10	5	42.49	2.05	0.00	0.00	0.00	-36.27
		6	-39.88	9.21	0.00	0.00	0.00	31.94
	11	5	44.96	-1.73	0.00	0.00	0.00	-38.92
		6	-42.35	12.98	0.00	0.00	0.00	30.20
	12	5	73.02	-9.02	0.00	0.00	0.00	2.34
		6	-69.49	12.03	0.00	0.00	0.00	-14.63
	13	5	75.24	-8.77	0.00	0.00	0.00	2.31
		6	-71.71	11.78	0.00	0.00	0.00	-14.31
	14	5	70.55	-2.22	0.00	0.00	0.00	-29.73
		6	-67.02	13.47	0.00	0.00	0.00	20.44
	15	5	72.77	-1.97	0.00	0.00	0.00	-29.76
		6	-69.24	13.23	0.00	0.00	0.00	20.76
	16	5	73.02	-5.99	0.00	0.00	0.00	-32.38
		6	-69.49	17.25	0.00	0.00	0.00	18.70
	17	5	75.24	-5.75	0.00	0.00	0.00	-32.42
		6	-71.71	17.00	0.00	0.00	0.00	19.03
6	9	6	46.61	-16.15	0.00	0.00	0.00	8.04
		7	-43.99	17.01	0.00	0.00	0.00	-27.48
	10	6	39.88	-9.21	0.00	0.00	0.00	-31.94
		7	-37.26	18.74	0.00	0.00	0.00	15.53

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	11	6	42.35	-12.98	0.00	0.00	0.00	-30.20
		7	-39.73	22.51	0.00	0.00	0.00	9.40
	12	6	69.49	-12.03	0.00	0.00	0.00	14.63
		7	-65.96	14.46	0.00	0.00	0.00	-30.08
	13	6	71.71	-11.78	0.00	0.00	0.00	14.31
		7	-68.18	14.21	0.00	0.00	0.00	-29.47
	14	6	67.02	-13.47	0.00	0.00	0.00	-20.44
		7	-63.49	23.00	0.00	0.00	0.00	-0.93
	15	6	69.24	-13.23	0.00	0.00	0.00	-20.76
		7	-65.71	22.76	0.00	0.00	0.00	-0.32
	16	6	69.49	-17.25	0.00	0.00	0.00	-18.70
		7	-65.96	26.78	0.00	0.00	0.00	-7.05
	17	6	71.71	-17.00	0.00	0.00	0.00	-19.03
		7	-68.18	26.53	0.00	0.00	0.00	-6.45
7	9	7	43.99	-17.01	0.00	0.00	0.00	27.48
		8	-41.38	17.01	0.00	0.00	0.00	-47.25
	10	7	37.26	-18.74	0.00	0.00	0.00	-15.53
		8	-34.65	26.54	0.00	0.00	0.00	-10.96
	11	7	39.73	-22.51	0.00	0.00	0.00	-9.40
		8	-37.12	30.32	0.00	0.00	0.00	-21.47
	12	7	65.96	-14.46	0.00	0.00	0.00	30.08
		8	-62.43	16.31	0.00	0.00	0.00	-48.02
	13	7	68.18	-14.21	0.00	0.00	0.00	29.47
		8	-64.65	16.07	0.00	0.00	0.00	-47.13
	14	7	63.49	-23.00	0.00	0.00	0.00	0.93
		8	-59.96	30.81	0.00	0.00	0.00	-32.37
	15	7	65.71	-22.76	0.00	0.00	0.00	0.32
		8	-62.18	30.56	0.00	0.00	0.00	-31.48
	16	7	65.96	-26.78	0.00	0.00	0.00	7.05
		8	-62.43	34.58	0.00	0.00	0.00	-42.89
	17	7	68.18	-26.53	0.00	0.00	0.00	6.45
		8	-64.65	34.34	0.00	0.00	0.00	-42.00
8	9	8	41.38	-17.01	0.00	0.00	0.00	47.25
		9	-38.76	17.01	0.00	0.00	0.00	-67.02
	10	8	34.65	-26.54	0.00	0.00	0.00	10.96
		9	-32.03	32.62	0.00	0.00	0.00	-45.51
	11	8	37.12	-30.32	0.00	0.00	0.00	21.47
		9	-34.50	36.39	0.00	0.00	0.00	-60.41
	12	8	62.43	-16.31	0.00	0.00	0.00	48.02
		9	-58.90	17.59	0.00	0.00	0.00	-67.78
	13	8	64.65	-16.07	0.00	0.00	0.00	47.13
		9	-61.12	17.34	0.00	0.00	0.00	-66.60
	14	8	59.96	-30.81	0.00	0.00	0.00	32.37
		9	-56.43	36.88	0.00	0.00	0.00	-71.88
	15	8	62.18	-30.56	0.00	0.00	0.00	31.48
		9	-58.65	36.64	0.00	0.00	0.00	-70.71
	16	8	62.43	-34.58	0.00	0.00	0.00	42.89
		9	-58.90	40.66	0.00	0.00	0.00	-86.79

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	17	8	64.65	-34.34	0.00	0.00	0.00	42.00
		9	-61.12	40.41	0.00	0.00	0.00	-85.61
9	9	9	17.01	38.76	0.00	0.00	0.00	67.02
		10	-17.01	-30.14	0.00	0.00	0.00	-24.39
	10	9	32.62	32.03	0.00	0.00	0.00	45.51
		10	-32.62	-23.41	0.00	0.00	0.00	-11.21
	11	9	36.39	34.50	0.00	0.00	0.00	60.41
		10	-36.39	-25.88	0.00	0.00	0.00	-23.05
	12	9	17.59	58.90	0.00	0.00	0.00	67.78
		10	-17.59	-45.21	0.00	0.00	0.00	-3.36
	13	9	17.34	61.12	0.00	0.00	0.00	66.60
		10	-17.34	-45.48	0.00	0.00	0.00	-0.64
	14	9	36.88	56.43	0.00	0.00	0.00	71.88
		10	-36.88	-42.74	0.00	0.00	0.00	-10.52
	15	9	36.64	58.65	0.00	0.00	0.00	70.71
		10	-36.64	-43.01	0.00	0.00	0.00	-7.80
	16	9	40.66	58.90	0.00	0.00	0.00	86.79
		10	-40.66	-45.21	0.00	0.00	0.00	-22.37
	17	9	40.41	61.12	0.00	0.00	0.00	85.61
		10	-40.41	-45.48	0.00	0.00	0.00	-19.65
10	9	10	17.01	30.14	0.00	0.00	0.00	24.39
		11	-17.01	-21.51	0.00	0.00	0.00	7.57
	10	10	32.62	23.41	0.00	0.00	0.00	11.20
		11	-32.62	-14.78	0.00	0.00	0.00	12.42
	11	10	36.39	25.88	0.00	0.00	0.00	23.05
		11	-36.39	-17.25	0.00	0.00	0.00	3.63
	12	10	17.59	45.21	0.00	0.00	0.00	3.36
		11	-17.59	-31.53	0.00	0.00	0.00	44.13
	13	10	17.34	45.48	0.00	0.00	0.00	0.64
		11	-17.34	-29.85	0.00	0.00	0.00	45.97
	14	10	36.88	42.74	0.00	0.00	0.00	10.52
		11	-36.88	-29.06	0.00	0.00	0.00	33.91
	15	10	36.64	43.01	0.00	0.00	0.00	7.80
		11	-36.64	-27.38	0.00	0.00	0.00	35.75
	16	10	40.66	45.21	0.00	0.00	0.00	22.37
		11	-40.66	-31.53	0.00	0.00	0.00	25.12
	17	10	40.41	45.48	0.00	0.00	0.00	19.65
		11	-40.41	-29.85	0.00	0.00	0.00	26.96
11	9	11	17.01	21.51	0.00	0.00	0.00	-7.57
		12	-17.01	-12.89	0.00	0.00	0.00	28.85
	10	11	32.62	14.78	0.00	0.00	0.00	-12.42
		12	-32.62	-6.16	0.00	0.00	0.00	25.38
	11	11	36.39	17.25	0.00	0.00	0.00	-3.63
		12	-36.39	-8.63	0.00	0.00	0.00	19.64
	12	11	17.59	31.53	0.00	0.00	0.00	-44.13
		12	-17.59	-16.01	0.00	0.00	0.00	73.61
	13	11	17.34	29.85	0.00	0.00	0.00	-45.97
		12	-17.34	-14.21	0.00	0.00	0.00	73.23

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	14	11	36.88	29.06	0.00	0.00	0.00	-33.91
		12	-36.88	-13.54	0.00	0.00	0.00	60.33
	15	11	36.64	27.38	0.00	0.00	0.00	-35.75
		12	-36.64	-11.74	0.00	0.00	0.00	59.96
	16	11	40.66	31.53	0.00	0.00	0.00	-25.12
		12	-40.66	-16.01	0.00	0.00	0.00	54.60
	17	11	40.41	29.85	0.00	0.00	0.00	-26.96
		12	-40.41	-14.21	0.00	0.00	0.00	54.22
12	9	12	17.01	12.89	0.00	0.00	0.00	-28.85
		13	-17.01	-4.26	0.00	0.00	0.00	39.46
	10	12	32.62	6.16	0.00	0.00	0.00	-25.38
		13	-32.62	2.47	0.00	0.00	0.00	27.66
	11	12	36.39	8.63	0.00	0.00	0.00	-19.64
		13	-36.39	0.00	0.00	0.00	0.00	24.98
	12	12	17.59	16.01	0.00	0.00	0.00	-73.61
		13	-17.59	-0.38	0.00	0.00	0.00	83.75
	13	12	17.34	14.21	0.00	0.00	0.00	-73.23
		13	-17.34	1.42	0.00	0.00	0.00	81.15
	14	12	36.88	13.54	0.00	0.00	0.00	-60.34
		13	-36.88	2.09	0.00	0.00	0.00	67.42
	15	12	36.64	11.74	0.00	0.00	0.00	-59.96
		13	-36.64	3.89	0.00	0.00	0.00	64.82
	16	12	40.66	16.01	0.00	0.00	0.00	-54.60
		13	-40.66	-0.37	0.00	0.00	0.00	64.74
	17	12	40.41	14.21	0.00	0.00	0.00	-54.22
		13	-40.41	1.42	0.00	0.00	0.00	62.14
13	9	13	17.01	4.26	0.00	0.00	0.00	-39.46
		14	-17.01	4.36	0.00	0.00	0.00	39.40
	10	13	32.62	-2.47	0.00	0.00	0.00	-27.66
		14	-32.62	11.09	0.00	0.00	0.00	19.27
	11	13	36.39	0.00	0.00	0.00	0.00	-24.98
		14	-36.39	8.63	0.00	0.00	0.00	19.64
	12	13	17.59	0.38	0.00	0.00	0.00	-83.75
		14	-17.59	15.26	0.00	0.00	0.00	74.54
	13	13	17.34	-1.42	0.00	0.00	0.00	-81.15
		14	-17.34	16.13	0.00	0.00	0.00	69.99
	14	13	36.88	-2.09	0.00	0.00	0.00	-67.42
		14	-36.88	17.73	0.00	0.00	0.00	55.15
	15	13	36.64	-3.89	0.00	0.00	0.00	-64.82
		14	-36.64	18.60	0.00	0.00	0.00	50.60
	16	13	40.66	0.38	0.00	0.00	0.00	-64.74
		14	-40.66	15.26	0.00	0.00	0.00	55.53
	17	13	40.41	-1.42	0.00	0.00	0.00	-62.14
		14	-40.41	16.13	0.00	0.00	0.00	50.98
14	9	14	17.01	-4.36	0.00	0.00	0.00	-39.39
		15	-17.01	12.99	0.00	0.00	0.00	28.66
	10	14	32.62	-11.09	0.00	0.00	0.00	-19.27
		15	-32.62	19.72	0.00	0.00	0.00	0.20

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	11	14	36.39	-8.63	0.00	0.00	0.00	-19.64
		15	-36.39	17.25	0.00	0.00	0.00	3.63
	12	14	17.59	-15.26	0.00	0.00	0.00	-74.54
		15	-17.59	30.90	0.00	0.00	0.00	45.98
	13	14	17.34	-16.13	0.00	0.00	0.00	-69.99
		15	-17.34	29.82	0.00	0.00	0.00	41.56
	14	14	36.88	-17.73	0.00	0.00	0.00	-55.15
		15	-36.88	33.36	0.00	0.00	0.00	23.54
	15	14	36.64	-18.60	0.00	0.00	0.00	-50.60
		15	-36.64	32.29	0.00	0.00	0.00	19.11
	16	14	40.66	-15.26	0.00	0.00	0.00	-55.53
		15	-40.66	30.90	0.00	0.00	0.00	26.97
	17	14	40.41	-16.13	0.00	0.00	0.00	-50.98
		15	-40.41	29.82	0.00	0.00	0.00	22.55
15	9	15	17.01	-12.99	0.00	0.00	0.00	-28.66
		16	-17.01	21.62	0.00	0.00	0.00	7.25
	10	15	32.62	-19.72	0.00	0.00	0.00	-0.20
		16	-32.62	28.35	0.00	0.00	0.00	-29.54
	11	15	36.39	-17.25	0.00	0.00	0.00	-3.63
		16	-36.39	25.88	0.00	0.00	0.00	-23.05
	12	15	17.59	-30.90	0.00	0.00	0.00	-45.98
		16	-17.59	46.53	0.00	0.00	0.00	-1.93
	13	15	17.34	-29.82	0.00	0.00	0.00	-41.56
		16	-17.34	43.50	0.00	0.00	0.00	-3.81
	14	15	36.88	-33.36	0.00	0.00	0.00	-23.54
		16	-36.88	49.00	0.00	0.00	0.00	-27.43
	15	15	36.64	-32.29	0.00	0.00	0.00	-19.11
		16	-36.64	45.97	0.00	0.00	0.00	-29.31
	16	15	40.66	-30.90	0.00	0.00	0.00	-26.97
		16	-40.66	46.53	0.00	0.00	0.00	-20.94
	17	15	40.41	-29.82	0.00	0.00	0.00	-22.54
		16	-40.41	43.50	0.00	0.00	0.00	-22.82
16	9	16	17.01	-21.62	0.00	0.00	0.00	-7.25
		17	-17.01	30.24	0.00	0.00	0.00	-24.84
	10	16	32.62	-28.35	0.00	0.00	0.00	29.54
		17	-32.62	36.97	0.00	0.00	0.00	-69.96
	11	16	36.39	-25.88	0.00	0.00	0.00	23.05
		17	-36.39	34.50	0.00	0.00	0.00	-60.41
	12	16	17.59	-46.53	0.00	0.00	0.00	1.93
		17	-17.59	60.22	0.00	0.00	0.00	-67.98
	13	16	17.34	-43.50	0.00	0.00	0.00	3.81
		17	-17.34	57.19	0.00	0.00	0.00	-66.12
	14	16	36.88	-49.00	0.00	0.00	0.00	27.43
		17	-36.88	62.69	0.00	0.00	0.00	-96.53
	15	16	36.64	-45.97	0.00	0.00	0.00	29.31
		17	-36.64	59.66	0.00	0.00	0.00	-94.67
	16	16	40.66	-46.53	0.00	0.00	0.00	20.94
		17	-40.66	60.22	0.00	0.00	0.00	-86.99

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	17	16	40.41	-43.50	0.00	0.00	0.00	22.82
		17	-40.41	57.19	0.00	0.00	0.00	-85.13
17	9	18	51.17	-50.20	0.00	0.00	0.00	-93.47
		19	-48.55	35.76	0.00	0.00	0.00	43.67
	10	18	57.90	-46.51	0.00	0.00	0.00	-48.81
		19	-55.28	30.56	0.00	0.00	0.00	4.19
	11	18	55.43	-60.59	0.00	0.00	0.00	-87.18
		19	-52.81	42.41	0.00	0.00	0.00	27.49
	12	18	88.47	-8.78	0.00	0.00	0.00	1.56
		19	-84.93	3.47	0.00	0.00	0.00	-8.63
	13	18	85.44	-9.03	0.00	0.00	0.00	1.15
		19	-81.91	3.71	0.00	0.00	0.00	-8.50
	14	18	90.93	-42.24	0.00	0.00	0.00	-35.72
		19	-87.40	26.29	0.00	0.00	0.00	-3.95
	15	18	87.91	-42.48	0.00	0.00	0.00	-36.13
		19	-84.38	26.54	0.00	0.00	0.00	-3.82
	16	18	88.47	-56.32	0.00	0.00	0.00	-74.09
		19	-84.93	38.14	0.00	0.00	0.00	19.35
	17	18	85.44	-56.56	0.00	0.00	0.00	-74.50
		19	-81.91	38.39	0.00	0.00	0.00	19.48
18	9	19	48.55	-35.76	0.00	0.00	0.00	-43.67
		20	-45.93	23.04	0.00	0.00	0.00	9.66
	10	19	55.28	-30.56	0.00	0.00	0.00	-4.19
		20	-52.66	16.35	0.00	0.00	0.00	-22.91
	11	19	52.81	-42.41	0.00	0.00	0.00	-27.49
		20	-50.20	25.96	0.00	0.00	0.00	-12.09
	12	19	84.93	-3.47	0.00	0.00	0.00	8.63
		20	-81.40	-1.27	0.00	0.00	0.00	-9.85
	13	19	81.91	-3.71	0.00	0.00	0.00	8.50
		20	-78.38	-1.02	0.00	0.00	0.00	-10.01
	14	19	87.40	-26.29	0.00	0.00	0.00	3.95
		20	-83.87	12.08	0.00	0.00	0.00	-26.08
	15	19	84.38	-26.54	0.00	0.00	0.00	3.82
		20	-80.85	12.33	0.00	0.00	0.00	-26.24
	16	19	84.93	-38.14	0.00	0.00	0.00	-19.35
		20	-81.40	21.70	0.00	0.00	0.00	-15.26
	17	19	81.91	-38.39	0.00	0.00	0.00	-19.48
		20	-78.38	21.94	0.00	0.00	0.00	-15.42
19	9	20	45.93	-23.04	0.00	0.00	0.00	-9.66
		21	-43.32	12.04	0.00	0.00	0.00	-10.56
	10	20	52.66	-16.35	0.00	0.00	0.00	22.91
		21	-50.05	3.87	0.00	0.00	0.00	-34.49
	11	20	50.20	-25.96	0.00	0.00	0.00	12.09
		21	-47.58	11.25	0.00	0.00	0.00	-33.55
	12	20	81.40	1.27	0.00	0.00	0.00	9.85
		21	-77.87	-5.43	0.00	0.00	0.00	-5.91
	13	20	78.38	1.02	0.00	0.00	0.00	10.01
		21	-74.85	-5.18	0.00	0.00	0.00	-6.35

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	14	20	83.87	-12.08	0.00	0.00	0.00	26.08
		21	-80.34	-0.39	0.00	0.00	0.00	-32.71
	15	20	80.85	-12.33	0.00	0.00	0.00	26.24
		21	-77.31	-0.15	0.00	0.00	0.00	-33.15
	16	20	81.40	-21.70	0.00	0.00	0.00	15.26
		21	-77.87	6.99	0.00	0.00	0.00	-31.77
	17	20	78.38	-21.94	0.00	0.00	0.00	15.42
		21	-74.85	7.23	0.00	0.00	0.00	-32.21
20	9	21	43.32	-12.04	0.00	0.00	0.00	10.56
		22	-40.70	2.77	0.00	0.00	0.00	-19.00
	10	21	50.05	-3.87	0.00	0.00	0.00	34.49
		22	-47.43	-6.88	0.00	0.00	0.00	-32.58
	11	21	47.58	-11.26	0.00	0.00	0.00	33.55
		22	-44.96	-1.73	0.00	0.00	0.00	-38.92
	12	21	77.87	5.43	0.00	0.00	0.00	5.91
		22	-74.34	-9.02	0.00	0.00	0.00	2.54
	13	21	74.85	5.18	0.00	0.00	0.00	6.35
		22	-71.31	-8.77	0.00	0.00	0.00	1.82
	14	21	80.34	0.39	0.00	0.00	0.00	32.71
		22	-76.81	-11.14	0.00	0.00	0.00	-25.84
	15	21	77.31	0.15	0.00	0.00	0.00	33.15
		22	-73.78	-10.90	0.00	0.00	0.00	-26.56
	16	21	77.87	-6.99	0.00	0.00	0.00	31.77
		22	-74.34	-5.99	0.00	0.00	0.00	-32.18
	17	21	74.85	-7.23	0.00	0.00	0.00	32.21
		22	-71.31	-5.75	0.00	0.00	0.00	-32.90
21	9	22	40.70	-2.77	0.00	0.00	0.00	19.00
		23	-38.09	-4.77	0.00	0.00	0.00	-17.67
	10	22	47.43	6.88	0.00	0.00	0.00	32.58
		23	-44.82	-15.90	0.00	0.00	0.00	-19.17
	11	22	44.96	1.73	0.00	0.00	0.00	38.92
		23	-42.35	-12.98	0.00	0.00	0.00	-30.20
	12	22	74.34	9.02	0.00	0.00	0.00	-2.54
		23	-70.81	-12.03	0.00	0.00	0.00	14.83
	13	22	71.31	8.77	0.00	0.00	0.00	-1.82
		23	-67.78	-11.78	0.00	0.00	0.00	13.82
	14	22	76.81	11.14	0.00	0.00	0.00	25.84
		23	-73.28	-20.17	0.00	0.00	0.00	-7.47
	15	22	73.78	10.90	0.00	0.00	0.00	26.56
		23	-70.25	-19.92	0.00	0.00	0.00	-8.48
	16	22	74.34	5.99	0.00	0.00	0.00	32.18
		23	-70.81	-17.25	0.00	0.00	0.00	-18.50
	17	22	71.31	5.75	0.00	0.00	0.00	32.90
		23	-67.78	-17.00	0.00	0.00	0.00	-19.51
22	9	23	38.09	4.77	0.00	0.00	0.00	17.67
		24	-35.47	-10.58	0.00	0.00	0.00	-8.58
	10	23	44.82	15.90	0.00	0.00	0.00	19.17
		24	-42.20	-23.20	0.00	0.00	0.00	3.73

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	11	23	42.35	12.98	0.00	0.00	0.00	30.20
		24	-39.73	-22.51	0.00	0.00	0.00	-9.40
	12	23	70.81	12.03	0.00	0.00	0.00	-14.83
		24	-67.28	-14.46	0.00	0.00	0.00	30.28
	13	23	67.78	11.78	0.00	0.00	0.00	-13.82
		24	-64.25	-14.21	0.00	0.00	0.00	28.99
	14	23	73.28	20.17	0.00	0.00	0.00	7.47
		24	-69.75	-27.47	0.00	0.00	0.00	20.39
	15	23	70.25	19.92	0.00	0.00	0.00	8.48
		24	-66.72	-27.22	0.00	0.00	0.00	19.10
	16	23	70.81	17.25	0.00	0.00	0.00	18.50
		24	-67.28	-26.78	0.00	0.00	0.00	7.25
	17	23	67.78	17.00	0.00	0.00	0.00	19.51
		24	-64.25	-26.53	0.00	0.00	0.00	5.96
23	9	24	35.47	10.58	0.00	0.00	0.00	8.58
		25	-32.86	-14.66	0.00	0.00	0.00	6.26
	10	24	42.20	23.20	0.00	0.00	0.00	-3.73
		25	-39.59	-28.77	0.00	0.00	0.00	34.11
	11	24	39.73	22.51	0.00	0.00	0.00	9.40
		25	-37.12	-30.32	0.00	0.00	0.00	21.47
	12	24	67.28	14.46	0.00	0.00	0.00	-30.28
		25	-63.75	-16.31	0.00	0.00	0.00	48.22
	13	24	64.25	14.21	0.00	0.00	0.00	-28.99
		25	-60.72	-16.07	0.00	0.00	0.00	46.64
	14	24	69.75	27.47	0.00	0.00	0.00	-20.39
		25	-66.22	-33.04	0.00	0.00	0.00	55.72
	15	24	66.72	27.22	0.00	0.00	0.00	-19.10
		25	-63.19	-32.79	0.00	0.00	0.00	54.15
	16	24	67.28	26.78	0.00	0.00	0.00	-7.25
		25	-63.75	-34.58	0.00	0.00	0.00	43.09
	17	24	64.25	26.53	0.00	0.00	0.00	-5.96
		25	-60.72	-34.34	0.00	0.00	0.00	41.51
24	9	25	32.86	14.66	0.00	0.00	0.00	-6.26
		17	-30.24	-17.01	0.00	0.00	0.00	24.84
	10	25	39.59	28.77	0.00	0.00	0.00	-34.11
		17	-36.97	-32.62	0.00	0.00	0.00	69.96
	11	25	37.12	30.32	0.00	0.00	0.00	-21.47
		17	-34.50	-36.39	0.00	0.00	0.00	60.41
	12	25	63.75	16.31	0.00	0.00	0.00	-48.22
		17	-60.22	-17.59	0.00	0.00	0.00	67.98
	13	25	60.72	16.07	0.00	0.00	0.00	-46.64
		17	-57.19	-17.34	0.00	0.00	0.00	66.12
	14	25	66.22	33.04	0.00	0.00	0.00	-55.72
		17	-62.69	-36.88	0.00	0.00	0.00	96.53
	15	25	63.19	32.79	0.00	0.00	0.00	-54.15
		17	-59.66	-36.64	0.00	0.00	0.00	94.67
	16	25	63.75	34.58	0.00	0.00	0.00	-43.09
		17	-60.22	-40.66	0.00	0.00	0.00	86.99

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	17	25	60.72	34.34	0.00	0.00	0.00	-41.51
		17	-57.19	-40.41	0.00	0.00	0.00	85.13

********** END OF LATEST ANALYSIS RESULT **********

165. PRINT FORCE ENV ALL FR NS 0.5

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTO MET

MEMB	DISTANCE		FY	LD	MZ	LD	FZ	LD	MY	LD
1	0.00	MAX.	64.36	10	107.40	10	0.00	17	0.00	17
		MIN.	8.78	12	-18.86	9	0.00	17	0.00	17
	0.58	MAX.	55.06	10	72.71	10	0.00	17	0.00	17
		MIN.	6.05	12	-25.59	9	0.00	17	0.00	17
	1.16	MAX.	46.18	10	43.31	10	0.00	17	0.00	17
		MIN.	3.47	12	-29.56	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER	FY/FZ	DIST	LD	MZ/MY	DIST	LD	1,AMONGST ALL SECT LOCATIONS FX	DIST	LD
MAX.	64.36	0.00	10	107.40	0.00	10			
	0.00	0.00	9	0.00	0.00	9	89.37 C	0.00	17
MIN.	3.47	1.16	12	-29.56	1.16	9			
	0.00	1.16	17	0.00	1.16	17	50.34 C	1.16	10

2	0.00	MAX.	46.18	10	43.31	10	0.00	17	0.00	17
		MIN.	3.47	12	-29.56	9	0.00	17	0.00	17
	0.58	MAX.	37.74	10	18.94	10	0.00	17	0.00	17
		MIN.	0.49	9	-31.02	9	0.00	17	0.00	17
	1.16	MAX.	29.74	10	-0.65	10	0.00	17	0.00	17
		MIN.	-3.19	9	-30.21	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER	FY/FZ	DIST	LD	MZ/MY	DIST	LD	2,AMONGST ALL SECT LOCATIONS FX	DIST	LD
MAX.	46.18	0.00	10	43.31	0.00	10			
	0.00	0.00	9	0.00	0.00	9	85.84 C	0.00	17
MIN.	-3.19	1.16	9	-31.02	0.58	9			
	0.00	1.16	17	0.00	1.16	17	47.73 C	1.16	10

3	0.00	MAX.	29.74	10	-0.65	10	0.00	17	0.00	17
		MIN.	-3.19	9	-30.21	9	0.00	17	0.00	17
	0.58	MAX.	22.17	10	-8.30	13	0.00	17	0.00	17
		MIN.	-6.43	9	-27.39	9	0.00	17	0.00	17
	1.16	MAX.	15.03	10	-5.86	13	0.00	17	0.00	17
		MIN.	-9.24	9	-33.55	11	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER	FY/FZ	DIST	LD	MZ/MY	DIST	LD	3,AMONGST ALL SECT LOCATIONS FX	DIST	LD
MAX.	29.74	0.00	10	-0.65	0.00	10			
	0.00	0.00	9	0.00	0.00	9	82.31 C	0.00	17
MIN.	-9.24	1.16	9	-33.55	1.16	11			
	0.00	1.16	17	0.00	1.16	17	45.11 C	1.16	10

4	0.00	MAX.	15.03	10	-5.86	13	0.00	17	0.00	17
		MIN.	-9.24	9	-33.55	11	0.00	17	0.00	17
	0.58	MAX.	8.32	10	-2.30	13	0.00	17	0.00	17
		MIN.	-11.62	9	-38.12	11	0.00	17	0.00	17
	1.16	MAX.	2.05	10	2.34	12	0.00	17	0.00	17
		MIN.	-13.56	9	-38.92	11	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER	FY/FZ	DIST	LD	MZ/MY	DIST	LD	4,AMONGST ALL SECT LOCATIONS FX	DIST	LD
MAX.	15.03	0.00	10	2.34	1.16	12			
	0.00	0.00	9	0.00	0.00	9	78.77 C	0.00	17
MIN.	-13.56	1.16	9	-38.92	1.16	11			
	0.00	1.16	17	0.00	1.16	17	42.49 C	1.16	10

5	0.00	MAX.	2.05	10	2.34	12	0.00	17	0.00	17
		MIN.	-13.56	9	-38.92	11	0.00	17	0.00	17
	0.58	MAX.	-3.80	10	8.05	12	0.00	17	0.00	17
		MIN.	-15.07	9	-36.20	11	0.00	17	0.00	17
	1.16	MAX.	-9.21	10	14.63	12	0.00	17	0.00	17
		MIN.	-17.25	16	-31.94	10	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER	FY/FZ	DIST	LD	MZ/MY	DIST	LD	5,AMONGST ALL SECT LOCATIONS FX	DIST	LD
MAX.	2.05	0.00	10	14.63	1.16	12			
	0.00	0.00	9	0.00	0.00	9	75.24 C	0.00	17
MIN.	-17.25	1.16	16	-38.92	0.00	11			
	0.00	1.16	17	0.00	1.16	17	39.88 C	1.16	10

6	0.00	MAX.	-9.21	10	14.63	12	0.00	17	0.00	17
		MIN.	-17.25	16	-31.94	10	0.00	17	0.00	17
	0.58	MAX.	-13.07	13	22.00	12	0.00	17	0.00	17
		MIN.	-22.23	16	-25.12	10	0.00	17	0.00	17
	1.16	MAX.	-14.21	13	30.08	12	0.00	17	0.00	17

* 9.00 X 9.80

		MIN.	-26.78	16	-15.53	10	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 6,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-9.21	0.00	10	30.08	1.16	12			
	0.00	0.00	9	0.00	0.00	9	71.71 C	0.00	17
MIN.	-26.78	1.16	16	-31.94	0.00	10			
	0.00	1.16	17	0.00	1.16	17	37.26 C	1.16	10

7	0.00	MAX.	-14.21	13	30.08	12	0.00	17	0.00	17
		MIN.	-26.78	16	-15.53	10	0.00	17	0.00	17
	0.58	MAX.	-15.21	13	38.78	12	0.00	17	0.00	17
		MIN.	-30.90	16	-3.42	10	0.00	17	0.00	17
	1.16	MAX.	-16.07	13	48.02	12	0.00	17	0.00	17
		MIN.	-34.58	16	10.96	10	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 7,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-14.21	0.00	13	48.02	1.16	12			
	0.00	0.00	9	0.00	0.00	9	68.18 C	0.00	17
MIN.	-34.58	1.16	16	-15.53	0.00	10			
	0.00	1.16	17	0.00	1.16	17	34.65 C	1.16	10

8	0.00	MAX.	-16.07	13	48.02	12	0.00	17	0.00	17
		MIN.	-34.58	16	10.96	10	0.00	17	0.00	17
	0.58	MAX.	-16.78	13	63.95	16	0.00	17	0.00	17
		MIN.	-37.84	16	27.35	10	0.00	17	0.00	17
	1.16	MAX.	-17.01	9	86.79	16	0.00	17	0.00	17
		MIN.	-40.66	16	45.51	10	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 8,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-16.07	0.00	13	86.79	1.16	16			
	0.00	0.00	9	0.00	0.00	9	64.65 C	0.00	17
MIN.	-40.66	1.16	16	10.96	0.00	10			
	0.00	1.16	17	0.00	1.16	17	32.03 C	1.16	10

9	0.00	MAX.	61.12	17	86.79	16	0.00	17	0.00	17
		MIN.	32.03	10	45.51	10	0.00	17	0.00	17
	0.62	MAX.	53.30	17	52.46	16	0.00	17	0.00	17
		MIN.	27.72	10	27.02	10	0.00	17	0.00	17

* 9.00 X 9.80

	1.24	MAX.	45.48	17	24.39	9	0.00	17	0.00	17
		MIN.	23.41	10	0.64	13	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 9,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	61.12	0.00	17	86.79	0.00	16			
	0.00	0.00	9	0.00	0.00	9	40.66 C	0.00	16
MIN.	23.41	1.24	10	0.64	1.24	13			
	0.00	1.24	17	0.00	1.24	17	17.01 C	1.24	9

10	0.00	MAX.	45.48	13	24.39	9	0.00	17	0.00	17
		MIN.	23.41	10	0.64	13	0.00	17	0.00	17
	0.62	MAX.	38.37	12	8.38	11	0.00	17	0.00	17
		MIN.	19.09	10	-25.08	13	0.00	17	0.00	17
	1.24	MAX.	31.53	12	-3.63	11	0.00	17	0.00	17
		MIN.	14.78	10	-45.97	13	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 10,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	45.48	0.00	13	24.39	0.00	9			
	0.00	0.00	9	0.00	0.00	9	40.66 C	0.00	16
MIN.	14.78	1.24	10	-45.97	1.24	13			
	0.00	1.24	17	0.00	1.24	17	17.01 C	1.24	9

11	0.00	MAX.	31.53	16	-3.63	11	0.00	17	0.00	17
		MIN.	14.78	10	-45.97	13	0.00	17	0.00	17
	0.62	MAX.	23.83	16	-12.97	11	0.00	17	0.00	17
		MIN.	10.47	10	-62.02	13	0.00	17	0.00	17
	1.24	MAX.	16.01	16	-19.64	11	0.00	17	0.00	17
		MIN.	6.16	10	-73.61	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 11,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	31.53	0.00	16	-3.63	0.00	11			
	0.00	0.00	9	0.00	0.00	9	40.66 C	0.00	16
MIN.	6.16	1.24	10	-73.61	1.24	12			
	0.00	1.24	17	0.00	1.24	17	17.01 C	1.24	9

12	0.00	MAX.	16.01	12	-19.64	11	0.00	17	0.00	17
		MIN.	6.16	10	-73.61	12	0.00	17	0.00	17
	0.62	MAX.	8.57	9	-23.65	11	0.00	17	0.00	17

* 9.00 X 9.80

		MIN.	1.84	10	-81.10	12	0.00	17	0.00	17
	1.24	MAX.	4.26	9	-24.98	11	0.00	17	0.00	17
		MIN.	-3.89	15	-83.75	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 12,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	16.01	0.00	12	-19.64	0.00	11			
	0.00	0.00	9	0.00	0.00	9	40.66 C	0.00	16
MIN.	-3.89	1.24	15	-83.75	1.24	12			
	0.00	1.24	17	0.00	1.24	17	17.01 C	1.24	9

13	0.00	MAX.	4.26	9	-24.98	11	0.00	17	0.00	17
		MIN.	-3.89	15	-83.75	12	0.00	17	0.00	17
	0.62	MAX.	-0.05	9	-23.65	11	0.00	17	0.00	17
		MIN.	-11.71	15	-81.56	12	0.00	17	0.00	17
	1.24	MAX.	-4.36	9	-19.27	10	0.00	17	0.00	17
		MIN.	-18.60	15	-74.54	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 13,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	4.26	0.00	9	-19.27	1.24	10			
	0.00	0.00	9	0.00	0.00	9	40.66 C	0.00	16
MIN.	-18.60	1.24	15	-83.75	0.00	12			
	0.00	1.24	17	0.00	1.24	17	17.01 C	1.24	9

14	0.00	MAX.	-4.36	9	-19.27	10	0.00	17	0.00	17
		MIN.	-18.60	15	-74.54	12	0.00	17	0.00	17
	0.62	MAX.	-8.68	9	-11.07	10	0.00	17	0.00	17
		MIN.	-25.55	14	-62.68	12	0.00	17	0.00	17
	1.24	MAX.	-12.99	9	-0.20	10	0.00	17	0.00	17
		MIN.	-33.36	14	-45.98	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 14,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-4.36	0.00	9	-0.20	1.24	10			
	0.00	0.00	9	0.00	0.00	9	40.66 C	0.00	16
MIN.	-33.36	1.24	14	-74.54	0.00	12			
	0.00	1.24	17	0.00	1.24	17	17.01 C	1.24	9

15	0.00	MAX.	-12.99	9	-0.20	10	0.00	17	0.00	17
		MIN.	-33.36	14	-45.98	12	0.00	17	0.00	17

* 9.00 X 9.80

	0.62	MAX.	-17.30	9	13.34	10	0.00	17	0.00	17
		MIN.	-41.18	14	-24.44	12	0.00	17	0.00	17
	1.24	MAX.	-21.62	9	29.54	10	0.00	17	0.00	17
		MIN.	-49.00	14	-7.25	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 15,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-12.99	0.00	9	29.54	1.24	10			
	0.00	0.00	9	0.00	0.00	9	40.66 C	0.00	16
MIN.	-49.00	1.24	14	-45.98	0.00	12			
	0.00	1.24	17	0.00	1.24	17	17.01 C	1.24	9

16	0.00	MAX.	-21.62	9	29.54	10	0.00	17	0.00	17
		MIN.	-49.00	14	-7.25	9	0.00	17	0.00	17
	0.62	MAX.	-25.93	9	59.87	15	0.00	17	0.00	17
		MIN.	-55.84	14	7.46	9	0.00	17	0.00	17
	1.24	MAX.	-30.24	9	96.53	14	0.00	17	0.00	17
		MIN.	-62.69	14	24.84	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 16,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-21.62	0.00	9	96.53	1.24	14			
	0.00	0.00	9	0.00	0.00	9	40.66 C	0.00	16
MIN.	-62.69	1.24	14	-7.25	0.00	9			
	0.00	1.24	17	0.00	1.24	17	17.01 C	1.24	9

17	0.00	MAX.	-8.78	12	1.56	12	0.00	17	0.00	17
		MIN.	-60.59	11	-93.47	9	0.00	17	0.00	17
	0.58	MAX.	-6.05	12	5.87	12	0.00	17	0.00	17
		MIN.	-51.28	11	-66.47	9	0.00	17	0.00	17
	1.16	MAX.	-3.47	12	8.63	12	0.00	17	0.00	17
		MIN.	-42.41	11	-43.67	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 17,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-3.47	1.16	12	8.63	1.16	12			
	0.00	0.00	9	0.00	0.00	9	90.93 C	0.00	14
MIN.	-60.59	0.00	11	-93.47	0.00	9			
	0.00	1.16	17	0.00	1.16	17	48.55 C	1.16	9

18	0.00	MAX.	-3.47	12	8.63	12	0.00	17	0.00	17

* 9.00 X 9.80

		MIN.	-42.41	11	-43.67	9	0.00	17	0.00	17
	0.58	MAX.	-1.03	12	17.10	15	0.00	17	0.00	17
		MIN.	-33.97	11	-24.82	9	0.00	17	0.00	17
	1.16	MAX.	1.27	12	26.24	15	0.00	17	0.00	17
		MIN.	-25.96	11	-9.66	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 18,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	1.27	1.16	12	26.24	1.16	15			
	0.00	0.00	9	0.00	0.00	9	87.40 C	0.00	14
MIN.	-42.41	0.00	11	-43.67	0.00	9			
	0.00	1.16	17	0.00	1.16	17	45.93 C	1.16	9

19	0.00	MAX.	1.27	12	26.24	15	0.00	17	0.00	17
		MIN.	-25.96	11	-9.66	9	0.00	17	0.00	17
	0.58	MAX.	3.42	12	31.51	15	0.00	17	0.00	17
		MIN.	-18.39	11	2.04	9	0.00	17	0.00	17
	1.16	MAX.	5.43	12	34.49	10	0.00	17	0.00	17
		MIN.	-12.04	9	5.91	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 19,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	5.43	1.16	12	34.49	1.16	10			
	0.00	0.00	9	0.00	0.00	9	83.87 C	0.00	14
MIN.	-25.96	0.00	11	-9.66	0.00	9			
	0.00	1.16	17	0.00	1.16	17	43.32 C	1.16	9

20	0.00	MAX.	5.43	12	34.49	10	0.00	17	0.00	17
		MIN.	-12.04	9	5.91	12	0.00	17	0.00	17
	0.58	MAX.	7.29	12	38.12	11	0.00	17	0.00	17
		MIN.	-7.19	9	2.20	12	0.00	17	0.00	17
	1.16	MAX.	11.14	14	38.92	11	0.00	17	0.00	17
		MIN.	-2.77	9	-2.54	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 20,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	11.14	1.16	14	38.92	1.16	11			
	0.00	0.00	9	0.00	0.00	9	80.34 C	0.00	14
MIN.	-12.04	0.00	9	-2.54	1.16	12			
	0.00	1.16	17	0.00	1.16	17	40.70 C	1.16	9

* 9.00 X 9.80

21	0.00	MAX.	11.14	14	38.92	11	0.00	17	0.00	17
		MIN.	-2.77	9	-2.54	12	0.00	17	0.00	17
	0.58	MAX.	15.87	14	36.20	11	0.00	17	0.00	17
		MIN.	1.21	9	-8.25	12	0.00	17	0.00	17
	1.16	MAX.	20.17	14	30.20	11	0.00	17	0.00	17
		MIN.	4.77	9	-14.83	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 21,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	20.17	1.16	14	38.92	0.00	11			
	0.00	0.00	9	0.00	0.00	9	76.81 C	0.00	14
MIN.	-2.77	0.00	9	-14.83	1.16	12			
	0.00	1.16	17	0.00	1.16	17	38.09 C	1.16	9

22	0.00	MAX.	20.17	14	30.20	11	0.00	17	0.00	17
		MIN.	4.77	9	-14.83	12	0.00	17	0.00	17
	0.58	MAX.	24.03	14	21.19	11	0.00	17	0.00	17
		MIN.	7.89	9	-22.20	12	0.00	17	0.00	17
	1.16	MAX.	27.47	14	9.40	11	0.00	17	0.00	17
		MIN.	10.58	9	-30.28	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 22,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	27.47	1.16	14	30.20	0.00	11			
	0.00	0.00	9	0.00	0.00	9	73.28 C	0.00	14
MIN.	4.77	0.00	9	-30.28	1.16	12			
	0.00	1.16	17	0.00	1.16	17	35.47 C	1.16	9

23	0.00	MAX.	27.47	14	9.40	11	0.00	17	0.00	17
		MIN.	10.58	9	-30.28	12	0.00	17	0.00	17
	0.58	MAX.	30.90	16	1.75	9	0.00	17	0.00	17
		MIN.	12.84	9	-38.98	12	0.00	17	0.00	17
	1.16	MAX.	34.58	16	-6.26	9	0.00	17	0.00	17
		MIN.	14.66	9	-55.72	14	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 23,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD

* 9.00 X 9.80

MAX.		34.58	1.16	16	9.40	0.00	11			
		0.00	0.00	9	0.00	0.00	9	69.75 C	0.00	14
MIN.		10.58	0.00	9	-55.72	1.16	14			
		0.00	1.16	17	0.00	1.16	17	32.86 C	1.16	9
24	0.00	MAX.	34.58	16	-6.26	9	0.00	17	0.00	17
		MIN.	14.66	9	-55.72	14	0.00	17	0.00	17
	0.58	MAX.	37.84	16	-15.21	9	0.00	17	0.00	17
		MIN.	16.05	9	-75.57	14	0.00	17	0.00	17
	1.16	MAX.	40.66	16	-24.84	9	0.00	17	0.00	17
		MIN.	17.01	9	-96.53	14	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 24,AMONGST ALL SECT LOCATIONS

	FY/ FZ	DIST	LD	MZ/ MY	DIST	LD	FX	DIST	LD
MAX.	40.66	1.16	16	-6.26	0.00	9			
	0.00	0.00	9	0.00	0.00	9	66.22 C	0.00	14
MIN.	14.66	0.00	9	-96.53	1.16	14			
	0.00	1.16	17	0.00	1.16	17	30.24 C	1.16	9

********** END OF FORCE ENVELOPE FROM INTERNAL STORAGE **********

166. LOAD LIST 18 TO 26
167. PRINT SUP REAC DIS ALL

* 9.00 X 9.80

SUPPORT REACTIONS -UNIT MTO MET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	18	-7.55	58.27	0.00	0.00	0.00	-18.31
	19	-41.05	53.78	0.00	0.00	0.00	65.85
	20	-38.53	55.43	0.00	0.00	0.00	52.38
	21	-11.50	63.64	0.00	0.00	0.00	6.69
	22	-11.67	65.12	0.00	0.00	0.00	7.42
	23	-39.51	62.00	0.00	0.00	0.00	61.01
	24	-39.67	63.47	0.00	0.00	0.00	61.74
	25	-36.99	63.64	0.00	0.00	0.00	47.54
	26	-37.15	65.12	0.00	0.00	0.00	48.27
18	18	31.61	52.59	0.00	0.00	0.00	-56.57
	19	29.15	57.07	0.00	0.00	0.00	-26.80
	20	38.53	55.43	0.00	0.00	0.00	-52.38
	21	11.50	64.52	0.00	0.00	0.00	-6.82
	22	11.67	62.50	0.00	0.00	0.00	-7.10
	23	27.60	66.17	0.00	0.00	0.00	-22.09
	24	27.77	64.15	0.00	0.00	0.00	-22.37
	25	36.99	64.52	0.00	0.00	0.00	-47.67
	26	37.15	62.50	0.00	0.00	0.00	-47.95

********** END OF LATEST ANALYSIS RESULT **********

168. PRINT MEMBER FORCES LIST 1 17

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	18	1	58.27	7.55	0.00	0.00	0.00	-18.31
		2	-55.65	-1.21	0.00	0.00	0.00	23.29
	19	1	53.78	41.05	0.00	0.00	0.00	65.85
		2	-51.16	-28.93	0.00	0.00	0.00	-25.29
	20	1	55.43	38.53	0.00	0.00	0.00	52.38
		2	-52.81	-26.41	0.00	0.00	0.00	-14.74
	21	1	63.64	11.50	0.00	0.00	0.00	6.69
		2	-61.03	-6.19	0.00	0.00	0.00	3.54
	22	1	65.12	11.67	0.00	0.00	0.00	7.42
		2	-62.51	-6.35	0.00	0.00	0.00	3.00
	23	1	62.00	39.51	0.00	0.00	0.00	61.01
		2	-59.38	-27.39	0.00	0.00	0.00	-22.24
	24	1	63.47	39.67	0.00	0.00	0.00	61.74
		2	-60.86	-27.55	0.00	0.00	0.00	-22.78
	25	1	63.64	36.99	0.00	0.00	0.00	47.54
		2	-61.03	-24.87	0.00	0.00	0.00	-11.69
	26	1	65.12	37.15	0.00	0.00	0.00	48.27
		2	-62.51	-25.03	0.00	0.00	0.00	-12.24
17	18	18	52.59	-31.61	0.00	0.00	0.00	-56.57
		19	-49.97	21.98	0.00	0.00	0.00	25.53
	19	18	57.07	-29.15	0.00	0.00	0.00	-26.80
		19	-54.46	18.52	0.00	0.00	0.00	-0.79
	20	18	55.43	-38.53	0.00	0.00	0.00	-52.38
		19	-52.81	26.41	0.00	0.00	0.00	14.74
	21	18	64.52	-11.50	0.00	0.00	0.00	-6.82
		19	-61.90	6.19	0.00	0.00	0.00	-3.41
	22	18	62.50	-11.67	0.00	0.00	0.00	-7.10
		19	-59.89	6.35	0.00	0.00	0.00	-3.32
	23	18	66.17	-27.60	0.00	0.00	0.00	-22.09
		19	-63.55	16.97	0.00	0.00	0.00	-3.71
	24	18	64.15	-27.77	0.00	0.00	0.00	-22.37
		19	-61.53	17.13	0.00	0.00	0.00	-3.62
	25	18	64.52	-36.99	0.00	0.00	0.00	-47.67
		19	-61.90	24.87	0.00	0.00	0.00	11.83
	26	18	62.50	-37.15	0.00	0.00	0.00	-47.95
		19	-59.89	25.03	0.00	0.00	0.00	11.91

********** END OF LATEST ANALYSIS RESULT **********

169. LOAD LIST 27 28
170. PRINT MEMBER FORCES ALL

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	27	1	58.27	7.55	0.00	0.00	0.00	-18.31
		2	-55.65	-1.21	0.00	0.00	0.00	23.29
	28	1	55.43	31.66	0.00	0.00	0.00	40.27
		2	-52.81	-21.03	0.00	0.00	0.00	-9.76
2	27	2	55.65	1.21	0.00	0.00	0.00	-23.29
		3	-53.04	3.98	0.00	0.00	0.00	21.57
	28	2	52.81	21.03	0.00	0.00	0.00	9.76
		3	-50.20	-11.56	0.00	0.00	0.00	9.08
3	27	3	53.04	-3.98	0.00	0.00	0.00	-21.57
		4	-50.42	8.02	0.00	0.00	0.00	14.48
	28	3	50.20	11.56	0.00	0.00	0.00	-9.08
		4	-47.58	-3.24	0.00	0.00	0.00	17.57
4	27	4	50.42	-8.02	0.00	0.00	0.00	-14.48
		5	-47.80	10.89	0.00	0.00	0.00	3.37
	28	4	47.58	3.24	0.00	0.00	0.00	-17.57
		5	-44.96	3.93	0.00	0.00	0.00	17.06
5	27	5	47.80	-10.89	0.00	0.00	0.00	-3.37
		6	-45.19	12.62	0.00	0.00	0.00	-10.41
	28	5	44.96	-3.93	0.00	0.00	0.00	-17.06
		6	-42.35	9.94	0.00	0.00	0.00	8.89
6	27	6	45.19	-12.62	0.00	0.00	0.00	10.41
		7	-42.57	13.20	0.00	0.00	0.00	-25.53
	28	6	42.35	-9.94	0.00	0.00	0.00	-8.89
		7	-39.73	14.81	0.00	0.00	0.00	-5.61
7	27	7	42.57	-13.20	0.00	0.00	0.00	25.53
		8	-39.96	13.20	0.00	0.00	0.00	-40.87
	28	7	39.73	-14.81	0.00	0.00	0.00	5.61
		8	-37.12	18.52	0.00	0.00	0.00	-25.09
8	27	8	39.96	-13.20	0.00	0.00	0.00	40.87
		9	-37.34	13.20	0.00	0.00	0.00	-56.21
	28	8	37.12	-18.52	0.00	0.00	0.00	25.09
		9	-34.50	21.08	0.00	0.00	0.00	-48.23
9	27	9	13.20	37.34	0.00	0.00	0.00	56.21
		10	-13.20	-28.72	0.00	0.00	0.00	-15.33
	28	9	21.08	34.50	0.00	0.00	0.00	48.23
		10	-21.08	-25.88	0.00	0.00	0.00	-10.87
10	27	10	13.20	28.72	0.00	0.00	0.00	15.33
		11	-13.20	-20.09	0.00	0.00	0.00	14.87

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	28	10	21.08	25.88	0.00	0.00	0.00	10.87
		11	-21.08	-17.25	0.00	0.00	0.00	15.82
11	27	11	13.20	20.09	0.00	0.00	0.00	-14.87
		12	-13.20	-11.47	0.00	0.00	0.00	34.39
	28	11	21.08	17.25	0.00	0.00	0.00	-15.82
		12	-21.08	-8.63	0.00	0.00	0.00	31.83
12	27	12	13.20	11.47	0.00	0.00	0.00	-34.39
		13	-13.20	-2.84	0.00	0.00	0.00	43.24
	28	12	21.08	8.63	0.00	0.00	0.00	-31.83
		13	-21.08	0.00	0.00	0.00	0.00	37.16
13	27	13	13.20	2.84	0.00	0.00	0.00	-43.24
		14	-13.20	5.78	0.00	0.00	0.00	41.42
	28	13	21.08	0.00	0.00	0.00	0.00	-37.17
		14	-21.08	8.63	0.00	0.00	0.00	31.83
14	27	14	13.20	-5.78	0.00	0.00	0.00	-41.42
		15	-13.20	14.41	0.00	0.00	0.00	28.93
	28	14	21.08	-8.63	0.00	0.00	0.00	-31.83
		15	-21.08	17.25	0.00	0.00	0.00	15.82
15	27	15	13.20	-14.41	0.00	0.00	0.00	-28.93
		16	-13.20	23.04	0.00	0.00	0.00	5.76
	28	15	21.08	-17.25	0.00	0.00	0.00	-15.82
		16	-21.08	25.88	0.00	0.00	0.00	-10.87
16	27	16	13.20	-23.04	0.00	0.00	0.00	-5.76
		17	-13.20	31.66	0.00	0.00	0.00	-28.09
	28	16	21.08	-25.88	0.00	0.00	0.00	10.87
		17	-21.08	34.50	0.00	0.00	0.00	-48.23
17	27	18	52.59	-31.61	0.00	0.00	0.00	-56.57
		19	-49.97	21.98	0.00	0.00	0.00	25.53
	28	18	55.43	-31.66	0.00	0.00	0.00	-40.27
		19	-52.81	21.03	0.00	0.00	0.00	9.76
18	27	19	49.97	-21.98	0.00	0.00	0.00	-25.53
		20	-47.35	13.50	0.00	0.00	0.00	5.02
	28	19	52.81	-21.03	0.00	0.00	0.00	-9.76
		20	-50.20	11.56	0.00	0.00	0.00	-9.08
19	27	20	47.35	-13.50	0.00	0.00	0.00	-5.02
		21	-44.74	6.17	0.00	0.00	0.00	-6.31
	28	20	50.20	-11.56	0.00	0.00	0.00	9.08
		21	-47.58	3.24	0.00	0.00	0.00	-17.57
20	27	21	44.74	-6.17	0.00	0.00	0.00	6.31
		22	-42.12	-0.01	0.00	0.00	0.00	-9.78

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	28	21	47.58	-3.24	-0.00	0.00	0.00	17.57
		22	-44.96	-3.93	0.00	0.00	0.00	-17.06
21	27	22	42.12	0.01	0.00	0.00	0.00	9.78
		23	-39.51	-5.04	0.00	0.00	0.00	-6.73
	28	22	44.96	3.93	0.00	0.00	0.00	17.06
		23	-42.35	-9.94	0.00	0.00	0.00	-8.89
22	27	23	39.51	5.04	0.00	0.00	0.00	6.73
		24	-36.89	-8.91	0.00	0.00	0.00	1.49
	28	23	42.35	9.94	0.00	0.00	0.00	8.89
		24	-39.73	-14.81	0.00	0.00	0.00	5.61
23	27	24	36.89	8.91	0.00	0.00	0.00	-1.49
		25	-34.28	-11.63	0.00	0.00	0.00	13.54
	28	24	39.73	14.81	0.00	0.00	0.00	-5.61
		25	-37.12	-18.52	0.00	0.00	0.00	25.09
24	27	25	34.28	11.63	0.00	0.00	0.00	-13.54
		17	-31.66	-13.20	0.00	0.00	0.00	28.09
	28	25	37.12	18.52	0.00	0.00	0.00	-25.09
		17	-34.50	-21.08	0.00	0.00	0.00	48.23

********** END OF LATEST ANALYSIS RESULT **********

171. PLOT DIS FILE
172. PLOT BEN FILE
173. FINISH

********** END OF STAAD-III **********

**** DATE= SEP 29,1999 TIME= 17:56:39 ****

****
* FOR QUESTIONS REGARDING THIS VERSION OF PROGRAM *
* TEL:(0454) 281-080, FAX:(0454)-415-866 THORNBURY UK *
* 10, St.MARY ST, St.MARY CENTRE,THORNBURY,BRISTOL,UK *
****

D.O. 302+060

MOMENTOS FLECTORES

DINTEL	b_0	h	r	U_o	Coef. Impacto	M_d	$M_{tot.}$	U_{s1}	$0.04*A_c*f_{cd}$	$A_{s,nec.}$	$A_{s,disp.}$
Exterior	1.00	1.00	0.04	1360.00	1.30	96.53	125.49	137.69	64.00	31.05	34.60
interior	1.00	1.00	0.04	1360.00	1.30	83.75	108.88	118.58	64.00	26.74	32.72

HASTIALES	b_0	h	r	U_o	Coef. Impacto	M_d	$M_{tot.}$	N_d	e=M/N	Mtot	U_{s1}	$0.04*A_c*f_{cd}$	$A_{s,nec.}$	A_{min}	$A_{s,disp.}$
Hastial exterior	1.00	0.90	0.04	1218.33	1.00	86.79	86.79	58.90	1.474	110.94	77.76	57.33	17.53	8.10	---------
Superior Izda.	1.00	0.90	0.04	1218.33	1.00	85.61	85.61	40.41	2.119	102.18	84.84	57.33	19.13	8.10	---------
Hastial exterior	1.00	0.90	0.04	1218.33	1.00	96.53	96.53	62.69	1.540	122.23	88.87	57.33	20.04	8.10	20.10
Superior dcha.	1.00	0.90	0.04	1218.33	1.00	85.13	85.13	57.19	1.489	108.58	76.39	57.33	17.22	8.10	---------
Hastial exterior	1.00	0.90	0.04	1218.33	1.00	107.40	107.40	52.96	2.028	129.11	107.77	57.33	24.30	8.10	25.76
Inferior Izda.	1.00	0.90	0.04	1218.33	1.00	95.20	95.20	86.90	1.096	130.83	76.14	57.33	17.17	8.10	---------
Hastial exterior	1.00	0.90	0.04	1218.33	1.00	93.47	93.47	51.17	1.827	114.45	90.10	57.33	20.32	8.10	---------
Inferior dcha.	1.00	0.90	0.04	1218.33	1.00	87.18	87.18	55.43	1.573	109.91	79.88	57.33	18.01	8.10	---------
Hastial interior	1.00	0.90	0.04	1218.33	1.00	38.92	38.92	44.96	0.866	57.35	23.66	57.33	6.90	8.10	10.05
	1.00	0.90	0.04	1218.33	1.00	36.27	36.27	42.49	0.854	53.69	21.63	57.33	6.40	8.10	---------
	1.00	0.90	0.04	1218.33	1.00	35.10	35.10	48.74	0.720	55.08	17.09	57.33	5.21	8.10	---------

D.O. 302+060

ESFUERZOS CORTANTES

	ξ	ρ_1	V_{cu}	V_d	$V_{d\ canto\ util}$	Coef. Impacto	V_{tot}	A_{st}	$A_{st,min}$
Dintel	1.51	0.0036	29.38	62.69	46.82	1.20	56.18	7.60	8.17

	ξ	ρ_1	V_{cu}	V_d	$V_{d\ canto\ util}$	Coef. Impacto	V_{tot}	A_{st}	$A_{st,min}$
Hastial superior	1.54	0.0023	23.22	40.66	33.25	1.00	33.25	3.18	8.17
Hastial inferior	1.54	0.0030	25.22	64.36	43.39	1.00	43.39	5.75	8.17

DIMENSIONAMIENTO DE ZAPATAS

	Espesor Hastial	Longitud zapata	Canto zapata	Vuelo interior	Vuelo exterior	S. Ref. Mom. Int.	S. Ref. Mom. Ext.	S. Ref. Cort. Int.	S. Ref. Cort. Ext.
DIMENSIONES	0.900	3.000	1.000	1.050	1.050	1.185	1.185	0.090	0.090

ESFUERZOS	**H-1**	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
Momento	-65.85	-56.57	-48.27	-52.38	-22.09	-6.69
Axil	53.78	52.59	65.12	55.43	66.17	63.64
F. Horizontal	41.05	31.61	37.15	38.53	27.60	11.50
H tierras ext.	10.80	10.80	10.80	10.80	10.80	10.80
H tierras int.	1.50	1.50	1.50	1.50	1.50	1.50

AXILES	**H-1**	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
Ordenador	53.78	52.59	65.12	55.43	66.17	63.64
Peso zapata	7.50	7.50	7.50	7.50	7.50	7.50
Peso tierras ext.	22.68	22.68	22.68	22.68	22.68	22.68
Peso tierras int.	3.15	3.15	3.15	3.15	3.15	3.15
Axil total	**87.11**	**85.92**	**98.45**	**88.76**	**99.50**	**96.97**

MOMENTOS	**H-1**	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
Ordenador	-65.85	-56.57	-48.27	-52.38	-22.09	-6.69
F. Horizontal	41.05	31.61	37.15	38.53	27.60	11.50
Peso tierras ext.	22.11	22.11	22.11	22.11	22.11	22.11
Peso tierras int.	-3.07	-3.07	-3.07	-3.07	-3.07	-3.07
M total	**-5.76**	**-5.92**	**7.92**	**5.19**	**24.55**	**23.85**

TENSIONES EN EL TERRENO

	H-1	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
σ_1**(interior)**	32.88	32.59	27.54	26.13	16.80	16.42
σ_2**(exterior)**	25.20	24.69	38.10	33.05	49.53	48.22
σ_2**(media)**	29.04	28.64	32.82	29.59	33.17	32.32

TENSIONES PARA ARMAR

	H-1	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
σ_1**(interior)**	30.38	30.09	25.04	23.63	14.30	13.92
σ_A	27.34	26.97	29.21	26.36	27.23	26.48
σ_B	25.73	25.31	31.43	27.81	34.10	33.16
σ_C **(cort. int)**	30.15	29.85	25.35	23.83	15.28	14.88
σ_D **(cort. ext)**	22.93	22.43	35.28	30.34	46.05	44.77
σ_2**(exterior)**	22.70	22.19	35.60	30.55	47.03	45.72

ESFUERZOS	**H-1**	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
Mom. Superior	-16.76	-16.53	-14.69	-13.37	-9.20	-8.85
	0.27	0.61	-7.10	-3.89	-13.08	-12.24
Mom. Inferior	16.76	16.53	14.69	13.37	9.20	8.85
	-0.27	-0.61	7.10	3.89	13.08	12.24
Cortante Int.	2.23	2.20	1.77	1.64	0.84	0.80
Cortante ext.	0.12	0.16	-1.02	-0.57	-2.02	-1.90

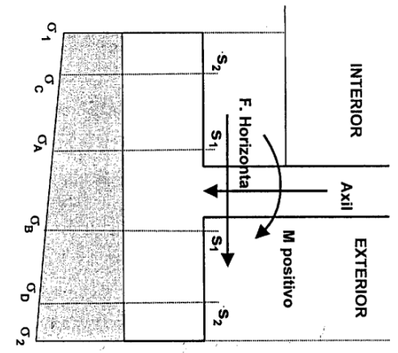
DIMENSIONAMIENTO

h	**r**	**0.04*A_c*f_{cd}**	**U_c**
1.00	0.04	64.00	1360.00

	Coef. Mayor.	**M**	**M_d**	**U_{s1}**	**$A_{s,nec.}$**	**$A_{s,disp.}$**
Armadura sup.	1.50	0.61	0.91	0.95	0.32	5.65
Armadura Inf.	1.50	16.76	25.13	26.44	7.71	10.05

	ξ	**ρ_1**	**V_{cu}**	**V**	**Coef. Mayor.**	**V_d**	**A_{st}**	**$A_{st,min}$**
Cortante	1.51	0.0010	19.46	2.23	1.50	3.34	no	-------

ESQUEMA



COMPROBACIÓN A FISURACIÓN

Dintel

Recubrimiento = 0.04 m
Es = 21000000 T/m²
canto = 1.00 m
β = 1.7
fck = 250 kg/cm²

Sección	Mk (mT)	Armadura dispuesta Básica ϕ (mm)	Básica sep (cm)	Refuerzo ϕ (mm)	Refuerzo sep (cm)	s (m)	K_1	K_2	$\phi_{equiv.}$ (mm)	$A_{c,eficaz}$ (m^2)	A_s (cm^2)	M_{fis} (mT)	σ_s (T/m^2)	s_m (mm)	ε_{sm}	w_k (mm)	$w_{máx}$ (mm)
1	56.21	16	20	25	20	0.20	0.125	0.50	25	0.25	34.60	44.98	21155	210.33	0.0007	**0.24**	**0.30**
2	43.67	25	20			0.20	0.125	0.50	25	0.25	24.54	44.98	23168	247.32	0.0005	**0.22**	**0.30**
3	48.23	16	20	25	20	0.20	0.125	0.50	25	0.25	34.60	44.98	18152	210.33	0.0005	**0.17**	**0.30**

Hastiales

Recubrimiento = 0.04 m
Es = 21000000 T/m²
canto = 0.90 m
β = 1.7
fck = 250 kg/cm²

Sección (m)	Mk (mT)	Nk (T)	Armadura dispuesta Básica ϕ (mm)	Básica sep (cm)	Refuerzo ϕ (mm)	Refuerzo sep (cm)	s (m)	K_1	K_2	$\phi_{equiv.}$ (mm)	$A_{c,eficaz}$ (m^2)	A_s (cm^2)	M_{fis} (mT)	σ_s (T/m^2)	s_m (mm)	ε_{sm}	w_k (mm)	$w_{máx}$ (mm)
1	56.21	37.34	16	20	25	20	0.20	0.125	0.50	25	0.23	34.60	36.43	19254	201.29	0.0007	**0.25**	**0.30**
2	23.29	55.65	16	20			0.20	0.125	0.50	16	0.23	10.05	36.43	11305	299.05	0.0002	**0.11**	**0.30**
3	56.57	52.59	16	20	25	20	0.20	0.125	0.50	25	0.23	34.60	36.43	17624	201.29	0.0007	**0.23**	**0.30**

Zapata

Recubrimiento = 0.04 m
Es = 21000000 T/m^2
canto = 1.00 m
β = 1.7
fck = 250 kg/cm^2

Sección	Mk (mT)	Armadura dispuesta: Básica ϕ (mm)	Básica sep (cm)	Refuerzo ϕ (mm)	Refuerzo sep (cm)	s (m)	K_1	K_2	$\phi_{equiv.}$ (mm)	$A_{c,eficaz}$ (m^2)	A_s (cm^2)	M_{fis} (mT)	σ_s (T/m^2)	s_m (mm)	ε_{sm}	w_k (mm)	$w_{máx}$ (mm)
1	16.76	16	20			0.20	0.125	0.50	16	0.25	10.05	44.98	21708	318.94	0.0004	**0.22**	**0.30**

4. MUROS

4. MUROS

Se calculan los muros de la estructura que nos ocupa, mediante programa desarrollado en base a los criterios normalmente utilizados en el cálculo de los citados elementos estructurales.

Partiendo de los datos de cada situación en estudio: características del relleno, posibilidad de sobrecarga o terraplén en el trasdós, muro de paramento vertical o inclinado y de unos datos previos de la geometría el programa efectúa los cálculos siguientes:

- Determinación de la puntera y el talón del muro, en función de cumplir las condiciones de estabilidad y tensiones admisibles en el terreno impuestas y que son las que siguen:

  . Coeficiente de seguridad al deslizamiento: 1,50
  . Coeficiente de seguridad al vuelco: 2,00

Los resultados que el programa facilita son:

a) Geometría completa del muro, alzado y cimentación.

b) Armaduras completas del mismo, armaduras principales y de reparto.

c) Tensiones en el terreno, en la situación más desfavorable.

d) Coeficientes de seguridad al vuelco y deslizamiento.

```
CALCULO DE MUROS. VERSION 09-01-1996
PROGRAMA PROPIEDAD DE INTECSA

        CARACTERISTICAS DEL RELLENO
        ===========================

PESO ESPECIFICO  (TN/M3)                  =  2.00
ANGULO DE ROZAMIENTO FI                   = 35.00
ANGULO ROZAMIENTO TERRENO-MURO            =   .00
ANGULO DE TALUD DEL TERRENO               = 26.56
SOBRECARGA  (TN/M2)                       =   .00
PENDIENTE DE INCLINACION DEL TRASDOS      =   .0900

COEFICIENTE DE EMPUJE ACTIVO              =   .448
COEFICIENTE DE EMPUJE ACTIVO VERTICAL     =   .040

        CARACTERISTICAS DE LOS MATERIALES
        =================================

RESISTENCIA CARACTERISTICA DEL HORMIGON   =   250. KG/CM2
LIMITE ELASTICO DEL ACERO                 =  5100. KG/CM2
RECUBRIMIENTO DE LAS ARMADURAS            =   .040 M
```

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	1.02
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	9.10
ALTURA DE TIERRAS	H	=	8.80

ZAPATA

VUELO DELANTERO	A1	=	.92
VUELO TRASERO	A4	=	3.65
LONGITUD TOTAL	L	=	5.59
CANTO	C	=	1.10
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 34.2 CM2/M	(FI 25 A	.125 M)
		AH.= 8.6 CM2/M	(FI 16 A	.225 M)
	4.8 M. SUPERIORES	AV.= 17.1 CM2/M	(FI 25 A	.250 M)
		AH.= 6.3 CM2/M	(FI 12 A	.175 M)
INTRADOS		AV.= 3.3 CM2/M	(FI 12 A	.250 M)
		AH.= 7.8 CM2/M	(FI 16 A	.250 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	6.0 CM2/M	(FI 12 A	.175 M)
	A. DE REPARTO =	1.8 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	30.8 CM2/M	(FI 25 A	.150 M)
	A. DE REPARTO =	9.2 CM2/M	(FI 16 A	.200 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 28.58)

S1 = 35.72 SA = 29.98 SB = 23.62 S2 = .85

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO = 1.50
COEFICIENTE DE SEGURIDAD AL VUELCO = 2.50

VOLUMEN DE HORMIGON = 11.69 M3. PESO DE ACERO = 687.6 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.73
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	5.90
ALTURA DE TIERRAS	H	=	5.60

ZAPATA

VUELO DELANTERO	A1	=	.59
VUELO TRASERO	A4	=	2.26
LONGITUD TOTAL	L	=	3.58
CANTO	C	=	.70
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 12.0 CM2/M	(FI 20 A	.250 M)
		AH.= 5.9 CM2/M	(FI 12 A	.175 M)
	4.8 M. SUPERIORES	AV.= 17.1 CM2/M	(FI 20 A	.250 M)
		AH.= .1 CM2/M	(FI 12 A	.175 M)
INTRADOS		AV.= 2.4 CM2/M	(FI 8 A	.200 M)
		AH.= 5.9 CM2/M	(FI 12 A	.175 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	2.6 CM2/M	(FI 12 A	.250 M)
	A. DE REPARTO =	.8 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	11.9 CM2/M	(FI 20 A	.250 M)
	A. DE REPARTO =	3.6 CM2/M	(FI 12 A	.250 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 18.21)

S1 = 22.76 SA = 19.12 SB = 14.60 S2 = .64

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO = 1.51
COEFICIENTE DE SEGURIDAD AL VUELCO = 2.53

VOLUMEN DE HORMIGON = 5.25 M3. PESO DE ACERO = 228.5 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.99
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	8.80
ALTURA DE TIERRAS	H	=	8.50

ZAPATA

VUELO DELANTERO	A1	=	.88
VUELO TRASERO	A4	=	3.52
LONGITUD TOTAL	L	=	5.39
CANTO	C	=	1.00
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 31.6 CM2/M	(FI 25 A	.150 M)
		AH.= 8.0 CM2/M	(FI 16 A	.250 M)
	4.5 M. SUPERIORES	AV.= 15.8 CM2/M	(FI 25 A	.300 M)
		AH.= 6.1 CM2/M	(FI 12 A	.175 M)
INTRADOS		AV.= 3.2 CM2/M	(FI 12 A	.250 M)
		AH.= 8.0 CM2/M	(FI 16 A	.250 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	5.8 CM2/M	(FI 12 A	.175 M)
	A. DE REPARTO =	1.7 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	30.1 CM2/M	(FI 25 A	.150 M)
	A. DE REPARTO =	9.0 CM2/M	(FI 16 A	.200 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 27.23)

S1 = 34.03 SA = 28.65 SB = 22.58 S2 = 1.04

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO	=	1.50
COEFICIENTE DE SEGURIDAD AL VUELCO	=	2.52

VOLUMEN DE HORMIGON = 10.64 M3. PESO DE ACERO = 618.6 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.91
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	7.90
ALTURA DE TIERRAS	H	=	7.60

ZAPATA

VUELO DELANTERO	A1	=	.79
VUELO TRASERO	A4	=	3.16
LONGITUD TOTAL	L	=	4.86
CANTO	C	=	.90
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 24.4 CM2/M	(FI 20 A	.125 M)
		AH.= 7.3 CM2/M	(FI 12 A	.150 M)
	3.7 M. SUPERIORES	AV.= 12.2 CM2/M	(FI 20 A	.250 M)
		AH.= 5.4 CM2/M	(FI 12 A	.200 M)
INTRADOS		AV.= 2.9 CM2/M	(FI 12 A	.250 M)
		AH.= 7.3 CM2/M	(FI 12 A	.150 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	4.7 CM2/M	(FI 12 A	.225 M)
	A. DE REPARTO =	1.4 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	23.8 CM2/M	(FI 20 A	.125 M)
	A. DE REPARTO =	7.1 CM2/M	(FI 12 A	.150 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 24.18)

S1 = 30.23 SA = 25.52 SB = 20.08 S2 = 1.23

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO	=	1.52
COEFICIENTE DE SEGURIDAD AL VUELCO	=	2.56

VOLUMEN DE HORMIGON = 8.76 M3. PESO DE ACERO = 456.4 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.58
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	4.20
ALTURA DE TIERRAS	H	=	3.90

ZAPATA

VUELO DELANTERO	A1	=	.42
VUELO TRASERO	A4	=	1.50
LONGITUD TOTAL	L	=	2.50
CANTO	C	=	.60
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 6.1 CM2/M	(FI 12 A	.175 M)
		AH.= 4.6 CM2/M	(FI 12 A	.225 M)
	3.7 M. SUPERIORES	AV.= 12.2 CM2/M	(FI 12 A	.250 M)
		AH.= .1 CM2/M	(FI 12 A	.200 M)
INTRADOS		AV.= 1.9 CM2/M	(FI 8 A	.200 M)
		AH.= 4.6 CM2/M	(FI 12 A	.225 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	1.2 CM2/M	(FI 12 A	.250 M)
	A. DE REPARTO =	.4 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	5.9 CM2/M	(FI 12 A	.175 M)
	A. DE REPARTO =	1.8 CM2/M	(FI 12 A	.250 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 13.69)

S1 = 17.11 SA = 14.20 SB = 10.20 S2 = -.19

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO = 1.50
COEFICIENTE DE SEGURIDAD AL VUELCO = 2.50

VOLUMEN DE HORMIGON = 3.13 M3. PESO DE ACERO = 116.0 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.95
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	8.30
ALTURA DE TIERRAS	H	=	8.00

ZAPATA

VUELO DELANTERO	A1	=	.83
VUELO TRASERO	A4	=	3.32
LONGITUD TOTAL	L	=	5.10
CANTO	C	=	1.00
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 27.5 CM2/M	(FI 25 A	.175 M)
		AH.= 7.6 CM2/M	(FI 16 A	.250 M)
	4.1 M. SUPERIORES	AV.= 13.7 CM2/M	(FI 25 A	.350 M)
		AH.= 5.7 CM2/M	(FI 12 A	.175 M)
INTRADOS		AV.= 3.0 CM2/M	(FI 12 A	.250 M)
		AH.= 7.6 CM2/M	(FI 16 A	.250 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	5.0 CM2/M	(FI 12 A	.225 M)
	A. DE REPARTO =	1.5 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	25.3 CM2/M	(FI 25 A	.175 M)
	A. DE REPARTO =	7.6 CM2/M	(FI 16 A	.250 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 25.98)

S1 = 32.47 SA = 27.33 SB = 21.46 S2 = .87

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO = 1.50
COEFICIENTE DE SEGURIDAD AL VUELCO = 2.51

VOLUMEN DE HORMIGON = 9.86 M3. PESO DE ACERO = 523.3 KG

Estructura E-11 (PK 305+529)

ESTRUCTURA E - 11

PASO INFERIOR D.O. 305+529

ÍNDICE

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2. BASES DE CÁLCULO

3. PÓRTICO

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1. INTRODUCCIÓN

1. INTRODUCCIÓN

Corresponde el presente anejo al cálculo de un pórtico en la D.O. 305+529 de la Línea de Alta Velocidad, MADRID-BARCELONA-FRONTERA FRANCESA, TRAMO LLEIDA-MARTORELL. SUBTRAMO III.

Se trata de un pórtico con una longitud de 28.40 m. y unas dimensiones libres de 9.00 x 9.50 m. Consta de dintel de 1.10 m de espesor y hastiales de 1.00 m. La cimentación se resuelve mediante zapatas de hormigón armado de 3.40 m de ancho y 1.00 m de canto.

En las embocaduras del pórtico se disponen cuatro muros de hormigón armado de alturas y longitudes variables.

2. BASES DE CÁLCULO

2. BASES DE CÁLCULO

2.1. CARACTERÍSTICAS DE LOS MATERIALES

- **Hormigones**

  En Pórticos, marcos y muros HA 25

- **Acero de armar**

  En todos los elementos B-500 S

2.2. ACCIONES A CONSIDERAR

Los pesos y acciones considerados son los siguientes:

- **Peso Propio**

  . Peso específico del hormigón armado 2,500 t/m^3

- **Cargas Muertas por via**

  . Imposta + acera + barandilla: 0,676 t/m
  . Conducto cableado: 0,300 t/m
  . Traviesa por via: 0,520 t/m
  . Carríl por via: 0,120 t/m
  . Hormigón de forma: 1,225 t/m

  . Balasto: (0,24685 + 0,2292) x 0,50 x 0,8830 = 0,210 m^2
  0.8830 x 0,50 x 0,4415 = 0,195 m^2
  (0,6707 + 0,6606) x 0,50 x 0,5045 = 0,336 m^2
  (0,4406 + 0,3881) x 0,50 x 2,6250 = 1,088 m^2
  (0,5881 + 0,58735) x 0,50 x 1,0375 = 0,610 m^2

  Σ = 2,438 m^2

  Peso: 1,60 t/m^3 x 2,438 = 3,901 t/m

  Valores característicos superior e inferior:

  q_s = 1,30 x 3,901 = 5,071 t/m
  q_i = 0,70 x 3,901 = 2,731 t/m

  . Guardabalasto: 0,50 x 0,20 x 2,50 = 0,25 t/m

  . Balasto + guardabalasto = 5,071 + 0,25 = 5,321 t/m

2.3. ANÁLISIS COMPARATIVO DE SOBRECARGAS

- **Impacto**

a) Para velocidades inferiores o iguales a 200 km/h, se tienen en cuenta las prescripciones del Ministerio de Fomento "Instrucción relativa a las acciones a considerar en el proyecto de puentes de ferrocarril" (IPF-75):

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

v = 200 km/h = 55,56 m/s

masa:

p.p. losa = 1,10 x 2,50 x 28,40 = 78,10 t/m

c. permanentes = 2 x (0,675 + 0,30 + 0,52 + 0,12 + 1,225 + 0,725 + 5,071 + + 0,25) = 17,772 t/m

Tren = 12,00 t/m

$$m = \frac{78{,}10 + 17{,}772 + 2 \times 12{,}00}{28{,}40} = 4{,}22$$

L = 9,00 m

E = 10 x 19000 x $\sqrt{250}$ = 3 x 10^6 t/m^2

Inercia:

$$I = \frac{1}{12} 28{,}40 \times 1{,}10^3 = 3{,}150033 \text{ m}^4$$

$$f = 1{,}57\sqrt{\frac{E \times I}{m \times L^4}} = 1{,}57\sqrt{\frac{3 \times 10^6 \times 3{,}150033}{4{,}22 \times 9{,}00^4}} = 29{,}00$$

$T = 0{,}034$

$$\mu = \frac{v\ T}{2L}$$

$$\mu = \frac{55{,}56 \times 0{,}034}{2 \times 9{,}00} = 0{,}106$$

$$I = 65\frac{0{,}106}{1 - 0{,}106 + 0{,}106^2} = 7{,}61$$

el coeficiente de impacto será 1,08.

b) Para velocidades mayores de 200 km/h se considerará la situación de vía de alta velocidad y se tendrá en cuenta las especificaciones de la U.I.C.-776.1.

Para esfuerzos cortantes:

$$\Phi_1 = \frac{0{,}96}{\sqrt{L_\Phi} - 0{,}2} + 0{,}88$$

Para momentos flectores:

$$\Phi_2 = \frac{1{,}44}{\sqrt{L_\Phi} - 0{,}2} + 0{,}82$$

Para estructuras porticadas de vano único se considera una viga continua de tres vanos con las longitudes horizontales y verticales de los elementos del pórtico, siendo:

$L_\Phi = k \,.\, L_m$

$$L_m = \frac{1}{n}(L_1 + L_2 + \ldots\ldots + L_n) = \frac{1}{3}(9{,}50 + 9{,}00 + 9{,}50) = 9{,}33 \text{ m}$$

para $n = 3$; $k = 1{,}30$

$L_\Phi = 1{,}30 \times 9{,}33 = 12{,}13$ m

Coeficiente de impacto para esfuerzos cortantes:

$$\Phi_1 = \frac{0{,}96}{\sqrt{12{,}13} - 0{,}2} + 0{,}88 = 1{,}17$$

Coeficiente de impacto para momentos flectores:

$$\Phi_2 = \frac{1{,}44}{\sqrt{12{,}13} - 0{,}2} + 0{,}82 = 1{,}26$$

Sobrecarga a adoptar

a) Tren de la Instrucción IPF-75

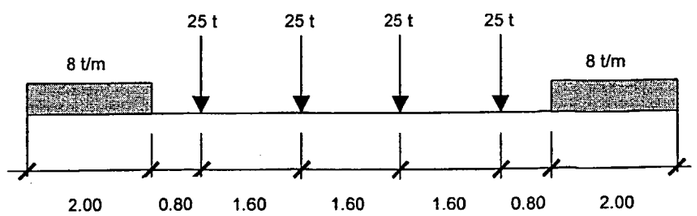
Se considera más desfavorable el tren tipo A formado por tres ejes de 30 t separados entre sí 1,50 m.

$q = 1{,}08 \times 30 = 32{,}40$ t

$M_{apoyo} = 101{,}25$ mt
$M_{centro} = 68{,}85$ mt
$V_{apoyo} = 86{,}40$ mt

b) Tren del Eurocódigo EC1.3

Se considera el tren de cargas modelo 71 cuyo esquema es el siguiente:



M_{apoyo} = 166,10 x 1,26 = 209,29 mt

M_{centro} = 89,99 x 1,26 = 113,39 mt

V_{apoyo} = 96,96 x 1,17 = 113,443 mt

A la vista de los resultados obtenidos se considera para el cálculo el tren tipo del Eurocódigo EC1.3 al ser más desfavorable.

Sismo

La obra se encuentra situada en una zona donde la aceleración sísmica básica es igual a 0,04g, por lo que no es necesaria la consideración de las acciones sísmicas.

3. PÓRTICO

3. PÓRTICO

3.1. GENERALIDADES

El cálculo del pórtico, se resuelve mediante el programa de cálculo electrónico "STAAD".

3.2. BASES E HIPÓTESIS DE CÁLCULO

Las características de los materiales utilizados, así como los coeficientes de mayoración de esfuerzos y de minoración de resistencias han sido definidos anteriormente.

Así mismo, también al inicio se definen las características del terreno circundante.

La determinación de los valores de las cargas actuantes se realiza como sigue:

- Las cargas verticales debidas a pesos propios y cargas muertas, se determinan en función del espesor y densidad de los elementos, rellenos, etc.., considerados.

- Los valores de los empujes horizontales se determinan a partir del coeficiente de empuje al reposo.

  $E_h = \gamma \cdot K_r \cdot H$, siendo:

  E_h = empuje a la altura H (t/m)
  γ = densidad (t/m^3)
  K_r = coef. empuje al reposo = 1 - sen ϕ
  ϕ = ángulo rozamiento interno tierras
  H = altura considerada (m)

- Los valores verticales de sobrecargas son los correspondientes al tren del Eurocódigo EC1.3 indicados anteriormente.

El estudio de esfuerzos se realiza para una franja de anchura 1,00 m.

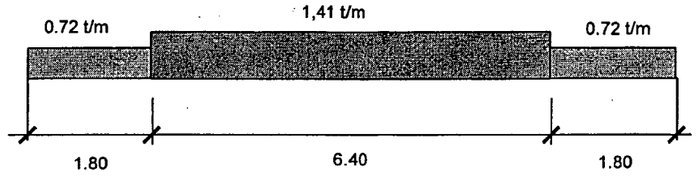
Reparto de cargas

Altura de tierras sobre el dintel = 3,50 m.

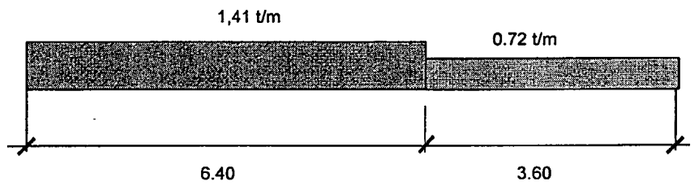
Posición del tren para obtención de momentos flectores:

$$P = \frac{4 \times 25{,}00}{11{,}081 \times 6{,}40} = 1{,}41 \text{ t}$$

$$q = \frac{8{,}00}{11{,}081} = 0{,}72 \text{ t}$$



Posición del tren para obtención de esfuerzos cortantes:



Las hipótesis consideradas para el cálculo son las que a continuación se relacionan:

H-1) Peso de la estructura + Cargas permanentes

H-2) Empuje de tierras (sin sobrecarga)

H-3) Empuje de tierras (en servicio)

H-4 Empuje lateral para s_c = 3 t/m^2 (lado izq.)

H-5) Empuje lateral para $s_c = 3$ t/m^2 (lado dcho.)

H-6) Empuje lateral para un desnivel de relleno entre hastiales de 2,0 m y una sobrecarga por compactación de 2 t/m^2.

H-7) Sobrecarga de tren posición A

H-8) Sobrecarga de tren posición B

H-9 a H-17). Distintas combinaciones posibles de las siete hipótesis simples.

A partir de los resultados obtenidos para las distintas combinaciones citadas, se determina la armadura necesaria en cada elemento, para los esfuerzos pésimos.

El armado de las distintas secciones se realiza de acuerdo con la EHE.

3.3. RESULTADOS

Los resultados facilitados son los que a continuación se indican:

a) Obtención de esfuerzos y listado de los mismos, en todas las secciones características de la estructura.

b) Cálculo y listado de los desplazamientos de todos los nudos.

c) Reacciones.

```
 *************************************************
 *                                               *
 *           S T A A D - III                     *
 *           Revision 17.0a                      *
 *           Proprietary Program of              *
 *           RESEARCH ENGINEERS, Inc.            *
 *           Date=    OCT  4, 1999               *
 *           Time=    10:40: 7                   *
 *                                               *
 *************************************************

 1. STAAD PLANE PASO INFERIOR D.O. 305+529
 2. * 9.00 X 10.60
 3. * HT = 3.50 M
 4. UNIT MET MTO
 5. JOINT COORDINATES
 6.  1  0.000  0.00 ; 2  0.000  1.325 ; 3  0.000  2.650 ; 4  0.000   3.975
 7.  5  0.000  5.30 ; 6  0.000  6.625 ; 7  0.000  7.950 ; 8  0.000   9.275
 8.  9  0.000 10.60 ;10  1.250 10.60 ;11  2.500 10.600 ;12  3.750 10.60
 9. 13  5.000 10.60 ;14  6.250 10.60 ;15  7.500 10.600 ;16  8.750 10.60
10. 17 10.000 10.60 ;18 10.000  0.000 ;19 10.000  1.325 ;20 10.000   2.65
11. 21 10.000  3.975 ;22 10.000  5.300 ;23 10.000  6.625 ;24 10.000   7.95
12. 25 10.000  9.275
13. MEMBER INCIDENCES
14.  1  1  2  16
15. 17 18 19  23
16. 24 25 17
17. MEMBER PROPERTIES
18.  1 TO  8 17 TO 24 PRISMATIC  AX 1.000  IZ 0.08333
19.  9 TO 16          PRISMATIC  AX 1.100  IZ 0.110917
20. CONSTANTS
21. E 3000000.0  ALL
22. SUPPORTS
23. 1 18         FIXED
24. LOADING 1   PESO PROPIO + CARGAS PERMANENTES
25. MEMBER LOAD
26. 1 TO  8 17 TO 24  UNI GY -2.50
27. 9 TO 16           UNI GY -2.75
28. 9 TO 16           UNI GY -1.47
29. 9 TO 16           UNI GY -7.00
30. LOADING 2   EMPUJE DE TIERRAS (SIN SOBRECARGA)
31. MEMBER LOAD
32.  1          TRAP GX  12.49  11.36
33.  2          TRAP GX  11.36  10.23
34.  3          TRAP GX  10.23   9.10
35.  4          TRAP GX   9.10   7.97
36.  5          TRAP GX   7.97   6.84
37.  6          TRAP GX   6.84   5.71
38.  7          TRAP GX   5.71   4.58
39.  8          TRAP GX   4.58   3.45
40. 17          TRAP GX -12.49 -11.36
41. 18          TRAP GX -11.36 -10.23
42. 19          TRAP GX -10.23  -9.10
43. 20          TRAP GX  -9.10  -7.97
44. 21          TRAP GX  -7.97  -6.84
45. 22          TRAP GX  -6.84  -5.71
46. 23          TRAP GX  -5.71  -4.58
47. 24          TRAP GX  -4.58  -3.45
```



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* 9.00 X 10.60
48. LOADING 3   EMPUJE DE TIERRAS (EN SERVICIO)
49. MEMBER LOAD
50.  1          TRAP GX   6.25   5.68
51.  2          TRAP GX   5.68   5.12
52.  3          TRAP GX   5.12   4.55
53.  4          TRAP GX   4.55   3.99
54.  5          TRAP GX   3.99   3.42
55.  6          TRAP GX   3.42   2.86
56.  7          TRAP GX   2.86   2.29
57.  8          TRAP GX   2.29   1.73
58. 17          TRAP GX  -6.25  -5.68
59. 18          TRAP GX  -5.68  -5.12
60. 19          TRAP GX  -5.12  -4.55
61. 20          TRAP GX  -4.55  -3.99
62. 21          TRAP GX  -3.99  -3.42
63. 22          TRAP GX  -3.42  -2.86
64. 23          TRAP GX  -2.86  -2.29
65. 24          TRAP GX  -2.29  -1.73
66. LOADING 4   EMPUJE DE SOBRECARGA DE 3.00 T/M2 (IZQDA)
67. MEMBER LOAD
68.  1          TRAP GX   1.28   1.28
69.  2          TRAP GX   1.28   1.28
70.  3          TRAP GX   1.28   1.28
71.  4          TRAP GX   1.28   1.28
72.  5          TRAP GX   1.28   1.28
73.  6          TRAP GX   1.28   1.28
74.  7          TRAP GX   1.28   1.28
75.  8          TRAP GX   1.28   1.28
76. LOADING 5   EMPUJE DE SOBRECARGA DE 3.00 T/M2 (DRCHA)
77. MEMBER LOAD
78. 17          TRAP GX  -1.28  -1.28
79. 18          TRAP GX  -1.28  -1.28
80. 19          TRAP GX  -1.28  -1.28
81. 20          TRAP GX  -1.28  -1.28
82. 21          TRAP GX  -1.28  -1.28
83. 22          TRAP GX  -1.28  -1.28
84. 23          TRAP GX  -1.28  -1.28
85. 24          TRAP GX  -1.28  -1.28
86. LOADING 6   COMPACTADOR DE 2.00 T/M2
87. MEMBER LOAD
88.  1          TRAP GX   6.78   5.65
89.  2          TRAP GX   5.65   4.52
90.  3          TRAP GX   4.52   3.39
91.  4          TRAP GX   3.39   2.26
92.  5          TRAP GX   2.26   1.13
93.  6          TRAP GX   1.13   0.00
94. 17          TRAP GX  -9.89  -8.76
95. 18          TRAP GX  -8.76  -7.63
96. 19          TRAP GX  -7.63  -6.50
97. 20          TRAP GX  -6.50  -5.37
98. 21          TRAP GX  -5.37  -4.24
99. 22          TRAP GX  -4.24  -3.11
100. 23         TRAP GX  -3.11  -1.98
101. 24         TRAP GX  -1.98  -0.85
102. LOADING 7  SOBRECARGA TREN POSICION A
103. MEMBER LOAD
104. 9          UNI GY -0.72
105. 10         UNI GY -0.72  0.0000  0.5500
106. 10         UNI GY -1.41  0.5500  1.2500
107. 11 TO 14   UNI GY -1.41
```

```
 * 9.00 X 10.60
UNI GY -1.41  0.0000  0.7000
UNI GY -0.72  0.7000  1.2500
UNI GY -0.72
LOADING 8  SOBRECARGA TREN POSICION B
MEMBER LOAD
9 TO 13      UNI GY -1.41
14           UNI GY -1.41  0.0000  0.1500
14           UNI GY -0.72  0.1500  1.2500
15 16        UNI GY -0.72
* DIMENSIONAMIENTO
LOAD COMB  9  P.P. + C.P. + COMPACTADOR
1 1.00  6 1.50
LOAD COMB 10  P.P. + C.P. + EMP.TIERRAS + EMP.S.C. (IZQDA)
1 1.00  2 1.50  4 1.50
LOAD COMB 11  P.P. + C.P. + EMP.TIERRAS + EMP. S.C. (TOTAL)
1 1.00  2 1.50  4 1.50  5 1.50
LOAD COMB 12  P.P. + C.P. + EMP.TIERRAS + SC.TREN A
1 1.35  3 1.00  7 1.50
LOAD COMB 13  P.P. + C.P. + EMP.TIERRAS + SC.TREN B
1 1.35  3 1.00  8 1.50
LOAD COMB 14  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(IZQDA) + SC.TREN A
1 1.35  2 1.50  4 1.50  7 1.50
LOAD COMB 15  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(IZQDA) + SC.TREN B
1 1.35  2 1.50  4 1.50  8 1.50
LOAD COMB 16  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(TOTAL) + SC.TREN A
1 1.35  2 1.50  4 1.50  5 1.50  7 1.50
LOAD COMB 17  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(TOTAL) + SC.TREN B
1 1.35  2 1.50  4 1.50  5 1.50  8 1.50
* COMPROBACION DE TENSIONES
LOAD COMB 18  P.P. + C.P. + COMPACTADOR
1 1.00  6 1.00
LOAD COMB 19  P.P. + C.P. + EMP.TIERRAS + EMP.S.C. (IZQDA)
1 1.00  2 1.00  4 1.00
LOAD COMB 20  P.P. + C.P. + EMP.TIERRAS + EMP. S.C. (TOTAL)
1 1.00  2 1.00  4 1.00  5 1.00
LOAD COMB 21  P.P. + C.P. + EMP.TIERRAS + SC.TREN A
1 1.00  3 1.00  7 1.00
LOAD COMB 22  P.P. + C.P. + EMP.TIERRAS + SC.TREN B
1 1.00  3 1.00  8 1.00
LOAD COMB 23  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(IZQDA) + SC.TREN A
1 1.00  2 1.00  4 1.00  7 1.00
LOAD COMB 24  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(IZQDA) + SC.TREN B
1 1.00  2 1.00  4 1.00  8 1.00
LOAD COMB 25  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(TOTAL) + SC.TREN A
1 1.00  2 1.00  4 1.00  5 1.00  7 1.00
LOAD COMB 26  P.P. + C.P. + EMP.TIERRAS + EMP.S.C.(TOTAL) + SC.TREN B
1 1.00  2 1.00  4 1.00  5 1.00  8 1.00
* FISURACION
LOAD COMB 27  P.P. + C.P. + COMPACTADOR
1 1.00  6 1.00
LOAD COMB 28  P.P. + C.P. + EMP.TIERRAS
1 1.00  2 1.00
PERFORM ANALYSIS
```



```
 * 9.00 X 10.60
```

P R O B L E M S T A T I S T I C S

NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS = 25/ 24/ 2
ORIGINAL/FINAL BAND-WIDTH = 8/ 1
TOTAL PRIMARY LOAD CASES = 8, TOTAL DEGREES OF FREEDOM = 69
SIZE OF STIFFNESS MATRIX = 414 DOUBLE PREC. WORDS
TOTAL REQUIRED DISK SPACE = 12.06 MEGA-BYTES

```
++ PROCESSING ELEMENT STIFFNESS MATRIX.              10:40:15
++ PROCESSING GLOBAL STIFFNESS MATRIX.               10:40:15
++ PROCESSING TRIANGULAR FACTORIZATION.              10:40:15
++ CALCULATING JOINT DISPLACEMENTS.                  10:40:15
++ CALCULATING MEMBER  FORCES.                       10:40:15

LOAD LIST 9 TO 17
PRINT SUP REAC ALL
```

SUPPORT REACTIONS -UNIT MTO MET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	9	-18.10	88.60	0.00	0.00	0.00	-27.39
	10	-94.33	79.39	0.00	0.00	0.00	176.60
	11	-90.00	82.60	0.00	0.00	0.00	150.38
	12	-16.91	120.22	0.00	0.00	0.00	9.90
	13	-17.00	121.44	0.00	0.00	0.00	10.34
	14	-90.29	117.02	0.00	0.00	0.00	162.33
	15	-90.38	118.23	0.00	0.00	0.00	162.77
	16	-85.95	120.22	0.00	0.00	0.00	136.11
	17	-86.04	121.44	0.00	0.00	0.00	136.55
18	9	63.05	76.60	0.00	0.00	0.00	-131.06
	10	73.98	85.81	0.00	0.00	0.00	-100.80
	11	90.00	82.60	0.00	0.00	0.00	-150.38
	12	16.91	120.22	0.00	0.00	0.00	-9.90
	13	17.00	119.00	0.00	0.00	0.00	-10.08
	14	69.94	123.43	0.00	0.00	0.00	-86.53
	15	70.02	122.21	0.00	0.00	0.00	-86.71
	16	85.95	120.22	0.00	0.00	0.00	-136.11
	17	86.04	119.00	0.00	0.00	0.00	-136.30

********** END OF LATEST ANALYSIS RESULT **********

163. PRINT JOINT DISP ALL

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
1	9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	13	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	17	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	9	-0.01192	-0.00384	0.00000	0.00000	0.00000	0.00019
	10	0.04842	-0.00343	0.00000	0.00000	0.00000	-0.00064
	11	0.03989	-0.00358	0.00000	0.00000	0.00000	-0.00051
	12	0.00117	-0.00521	0.00000	0.00000	0.00000	0.00000
	13	0.00131	-0.00526	0.00000	0.00000	0.00000	0.00000
	14	0.04404	-0.00507	0.00000	0.00000	0.00000	-0.00057
	15	0.04418	-0.00512	0.00000	0.00000	0.00000	-0.00058
	16	0.03551	-0.00521	0.00000	0.00000	0.00000	-0.00045
	17	0.03565	-0.00526	0.00000	0.00000	0.00000	-0.00045
3	9	-0.05313	-0.00753	0.00000	0.00000	0.00000	0.00043
	10	0.14742	-0.00672	0.00000	0.00000	0.00000	-0.00079
	11	0.11598	-0.00700	0.00000	0.00000	0.00000	-0.00058
	12	-0.00214	-0.01022	0.00000	0.00000	0.00000	0.00006
	13	-0.00163	-0.01033	0.00000	0.00000	0.00000	0.00006
	14	0.13240	-0.00994	0.00000	0.00000	0.00000	-0.00070
	15	0.13291	-0.01005	0.00000	0.00000	0.00000	-0.00070
	16	0.10095	-0.01022	0.00000	0.00000	0.00000	-0.00048
	17	0.10146	-0.01033	0.00000	0.00000	0.00000	-0.00048
4	9	-0.12426	-0.01108	0.00000	0.00000	0.00000	0.00063
	10	0.24481	-0.00986	0.00000	0.00000	0.00000	-0.00064
	11	0.18010	-0.01029	0.00000	0.00000	0.00000	-0.00036
	12	-0.01496	-0.01504	0.00000	0.00000	0.00000	0.00013
	13	-0.01394	-0.01520	0.00000	0.00000	0.00000	0.00013
	14	0.21665	-0.01462	0.00000	0.00000	0.00000	-0.00054
	15	0.21767	-0.01478	0.00000	0.00000	0.00000	-0.00054
	16	0.15194	-0.01504	0.00000	0.00000	0.00000	-0.00026
	17	0.15296	-0.01520	0.00000	0.00000	0.00000	-0.00026
5	9	-0.21760	-0.01448	0.00000	0.00000	0.00000	0.00076
	10	0.30966	-0.01286	0.00000	0.00000	0.00000	-0.00033
	11	0.20538	-0.01342	0.00000	0.00000	0.00000	-0.00001
	12	-0.03605	-0.01966	0.00000	0.00000	0.00000	0.00018
	13	-0.03446	-0.01987	0.00000	0.00000	0.00000	0.00017
	14	0.26965	-0.01909	0.00000	0.00000	0.00000	-0.00025
	15	0.27124	-0.01931	0.00000	0.00000	0.00000	-0.00026
	16	0.16537	-0.01966	0.00000	0.00000	0.00000	0.00006
	17	0.16696	-0.01987	0.00000	0.00000	0.00000	0.00006
6	9	-0.31917	-0.01774	0.00000	0.00000	0.00000	0.00075
	10	0.33029	-0.01570	0.00000	0.00000	0.00000	0.00001
	11	0.18415	-0.01641	0.00000	0.00000	0.00000	0.00032

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
	12	-0.05854	-0.02408	0.00000	0.00000	0.00000	0.00015
	13	-0.05640	-0.02435	0.00000	0.00000	0.00000	0.00014
	14	0.28346	-0.02337	0.00000	0.00000	0.00000	0.00003
	15	0.28560	-0.02364	0.00000	0.00000	0.00000	0.00003
	16	0.13732	-0.02408	0.00000	0.00000	0.00000	0.00034
	17	0.13946	-0.02435	0.00000	0.00000	0.00000	0.00034
7	9	-0.41079	-0.02085	0.00000	0.00000	0.00000	0.00060
	10	0.31208	-0.01841	0.00000	0.00000	0.00000	0.00024
	11	0.12583	-0.01926	0.00000	0.00000	0.00000	0.00053
	12	-0.07065	-0.02830	0.00000	0.00000	0.00000	0.00001
	13	-0.06806	-0.02863	0.00000	0.00000	0.00000	0.00001
	14	0.26724	-0.02745	0.00000	0.00000	0.00000	0.00018
	15	0.26983	-0.02778	0.00000	0.00000	0.00000	0.00018
	16	0.08099	-0.02830	0.00000	0.00000	0.00000	0.00047
	17	0.08358	-0.02863	0.00000	0.00000	0.00000	0.00047
8	9	-0.47220	-0.02381	0.00000	0.00000	0.00000	0.00030
	10	0.27546	-0.02096	0.00000	0.00000	0.00000	0.00027
	11	0.05487	-0.02195	0.00000	0.00000	0.00000	0.00050
	12	-0.05636	-0.03233	0.00000	0.00000	0.00000	-0.00025
	13	-0.05351	-0.03271	0.00000	0.00000	0.00000	-0.00026
	14	0.24517	-0.03134	0.00000	0.00000	0.00000	0.00010
	15	0.24802	-0.03171	0.00000	0.00000	0.00000	0.00010
	16	0.02459	-0.03233	0.00000	0.00000	0.00000	0.00033
	17	0.02744	-0.03271	0.00000	0.00000	0.00000	0.00033
9	9	-0.48264	-0.02662	0.00000	0.00000	0.00000	-0.00017
	10	0.25375	-0.02337	0.00000	0.00000	0.00000	0.00000
	11	0.00865	-0.02450	0.00000	0.00000	0.00000	0.00014
	12	0.00384	-0.03616	0.00000	0.00000	0.00000	-0.00068
	13	0.00668	-0.03659	0.00000	0.00000	0.00000	-0.00068
	14	0.25436	-0.03503	0.00000	0.00000	0.00000	-0.00030
	15	0.25720	-0.03546	0.00000	0.00000	0.00000	-0.00030
	16	0.00926	-0.03616	0.00000	0.00000	0.00000	-0.00016
	17	0.01210	-0.03659	0.00000	0.00000	0.00000	-0.00016
10	9	-0.48348	-0.06562	0.00000	0.00000	0.00000	-0.00041
	10	0.25175	-0.03776	0.00000	0.00000	0.00000	-0.00020
	11	0.00649	-0.02597	0.00000	0.00000	0.00000	-0.00013
	12	0.00288	-0.13645	0.00000	0.00000	0.00000	-0.00086
	13	0.00572	-0.13652	0.00000	0.00000	0.00000	-0.00086
	14	0.25221	-0.09155	0.00000	0.00000	0.00000	-0.00055
	15	0.25506	-0.09161	0.00000	0.00000	0.00000	-0.00054
	16	0.00695	-0.07976	0.00000	0.00000	0.00000	-0.00048
	17	0.00979	-0.07982	0.00000	0.00000	0.00000	-0.00047
11	9	-0.48433	-0.12094	0.00000	0.00000	0.00000	-0.00044
	10	0.24976	-0.06493	0.00000	0.00000	0.00000	-0.00021
	11	0.00432	-0.04760	0.00000	0.00000	0.00000	-0.00019
	12	0.00192	-0.23966	0.00000	0.00000	0.00000	-0.00074
	13	0.00477	-0.23885	0.00000	0.00000	0.00000	-0.00074
	14	0.25006	-0.15981	0.00000	0.00000	0.00000	-0.00051

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
	15	0.25291	-0.15899	0.00000	0.00000	0.00000	-0.00050
	16	0.00463	-0.14247	0.00000	0.00000	0.00000	-0.00049
	17	0.00748	-0.14166	0.00000	0.00000	0.00000	-0.00048
12	9	-0.48517	-0.16849	0.00000	0.00000	0.00000	-0.00030
	10	0.24776	-0.08619	0.00000	0.00000	0.00000	-0.00011
	11	0.00216	-0.06881	0.00000	0.00000	0.00000	-0.00013
	12	0.00096	-0.31425	0.00000	0.00000	0.00000	-0.00042
	13	0.00381	-0.31229	0.00000	0.00000	0.00000	-0.00041
	14	0.24791	-0.21015	0.00000	0.00000	0.00000	-0.00028
	15	0.25076	-0.20820	0.00000	0.00000	0.00000	-0.00027
	16	0.00232	-0.19277	0.00000	0.00000	0.00000	-0.00029
	17	0.00516	-0.19081	0.00000	0.00000	0.00000	-0.00028
13	9	-0.48602	-0.19240	0.00000	0.00000	0.00000	-0.00007
	10	0.24576	-0.09108	0.00000	0.00000	0.00000	0.00004
	11	0.00000	-0.07725	0.00000	0.00000	0.00000	0.00000
	12	0.00000	-0.34122	0.00000	0.00000	0.00000	0.00000
	13	0.00285	-0.33824	0.00000	0.00000	0.00000	0.00001
	14	0.24576	-0.22547	0.00000	0.00000	0.00000	0.00004
	15	0.24861	-0.22249	0.00000	0.00000	0.00000	0.00004
	16	0.00000	-0.21164	0.00000	0.00000	0.00000	0.00000
	17	0.00285	-0.20866	0.00000	0.00000	0.00000	0.00001
14	9	-0.48686	-0.18504	0.00000	0.00000	0.00000	0.00019
	10	0.24376	-0.07735	0.00000	0.00000	0.00000	0.00017
	11	-0.00216	-0.06881	0.00000	0.00000	0.00000	0.00013
	12	-0.00096	-0.31425	0.00000	0.00000	0.00000	0.00042
	13	0.00190	-0.31073	0.00000	0.00000	0.00000	0.00042
	14	0.24361	-0.20131	0.00000	0.00000	0.00000	0.00034
	15	0.24647	-0.19779	0.00000	0.00000	0.00000	0.00034
	16	-0.00232	-0.19277	0.00000	0.00000	0.00000	0.00029
	17	0.00054	-0.18924	0.00000	0.00000	0.00000	0.00029
15	9	-0.48771	-0.14699	0.00000	0.00000	0.00000	0.00041
	10	0.24176	-0.05101	0.00000	0.00000	0.00000	0.00023
	11	-0.00432	-0.04760	0.00000	0.00000	0.00000	0.00019
	12	-0.00192	-0.23966	0.00000	0.00000	0.00000	0.00074
	13	0.00094	-0.23646	0.00000	0.00000	0.00000	0.00074
	14	0.24146	-0.14589	0.00000	0.00000	0.00000	0.00052
	15	0.24432	-0.14268	0.00000	0.00000	0.00000	0.00051
	16	-0.00463	-0.14247	0.00000	0.00000	0.00000	0.00049
	17	-0.00177	-0.13927	0.00000	0.00000	0.00000	0.00048
16	9	-0.48856	-0.08708	0.00000	0.00000	0.00000	0.00053
	10	0.23977	-0.02628	0.00000	0.00000	0.00000	0.00014
	11	-0.00649	-0.02597	0.00000	0.00000	0.00000	0.00013
	12	-0.00288	-0.13645	0.00000	0.00000	0.00000	0.00086
	13	-0.00002	-0.13446	0.00000	0.00000	0.00000	0.00085
	14	0.23931	-0.08008	0.00000	0.00000	0.00000	0.00049
	15	0.24217	-0.07808	0.00000	0.00000	0.00000	0.00048
	16	-0.00695	-0.07976	0.00000	0.00000	0.00000	0.00048
	17	-0.00408	-0.07776	0.00000	0.00000	0.00000	0.00046

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
17	9	-0.48940	-0.02238	0.00000	0.00000	0.00000	0.00047
	10	0.23777	-0.02564	0.00000	0.00000	0.00000	-0.00017
	11	-0.00865	-0.02450	0.00000	0.00000	0.00000	-0.00014
	12	-0.00384	-0.03616	0.00000	0.00000	0.00000	0.00068
	13	-0.00098	-0.03573	0.00000	0.00000	0.00000	0.00067
	14	0.23716	-0.03729	0.00000	0.00000	0.00000	0.00014
	15	0.24002	-0.03686	0.00000	0.00000	0.00000	0.00012
	16	-0.00926	-0.03616	0.00000	0.00000	0.00000	0.00016
	17	-0.00639	-0.03573	0.00000	0.00000	0.00000	0.00015
18	9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	13	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	17	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
19	9	-0.03698	-0.00331	0.00000	0.00000	0.00000	0.00050
	10	-0.02486	-0.00372	0.00000	0.00000	0.00000	0.00030
	11	-0.03989	-0.00358	0.00000	0.00000	0.00000	0.00051
	12	-0.00117	-0.00521	0.00000	0.00000	0.00000	0.00000
	13	-0.00122	-0.00516	0.00000	0.00000	0.00000	0.00000
	14	-0.02048	-0.00535	0.00000	0.00000	0.00000	0.00024
	15	-0.02053	-0.00530	0.00000	0.00000	0.00000	0.00024
	16	-0.03551	-0.00521	0.00000	0.00000	0.00000	0.00045
	17	-0.03556	-0.00516	0.00000	0.00000	0.00000	0.00045
20	9	-0.11748	-0.00647	0.00000	0.00000	0.00000	0.00068
	10	-0.06462	-0.00729	0.00000	0.00000	0.00000	0.00025
	11	-0.11598	-0.00700	0.00000	0.00000	0.00000	0.00058
	12	0.00214	-0.01022	0.00000	0.00000	0.00000	-0.00006
	13	0.00198	-0.01012	0.00000	0.00000	0.00000	-0.00006
	14	-0.04960	-0.01051	0.00000	0.00000	0.00000	0.00016
	15	-0.04975	-0.01040	0.00000	0.00000	0.00000	0.00016
	16	-0.10095	-0.01022	0.00000	0.00000	0.00000	0.00048
	17	-0.10111	-0.01012	0.00000	0.00000	0.00000	0.00048
21	9	-0.20764	-0.00949	0.00000	0.00000	0.00000	0.00066
	10	-0.08248	-0.01071	0.00000	0.00000	0.00000	0.00000
	11	-0.18010	-0.01029	0.00000	0.00000	0.00000	0.00036
	12	0.01496	-0.01504	0.00000	0.00000	0.00000	-0.00013
	13	0.01474	-0.01488	0.00000	0.00000	0.00000	-0.00013
	14	-0.05432	-0.01547	0.00000	0.00000	0.00000	-0.00010
	15	-0.05454	-0.01530	0.00000	0.00000	0.00000	-0.00010
	16	-0.15194	-0.01504	0.00000	0.00000	0.00000	0.00026
	17	-0.15216	-0.01488	0.00000	0.00000	0.00000	0.00026
22	9	-0.28772	-0.01236	0.00000	0.00000	0.00000	0.00054
	10	-0.06053	-0.01399	0.00000	0.00000	0.00000	-0.00033
	11	-0.20538	-0.01342	0.00000	0.00000	0.00000	0.00001

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
	12	0.03605	-0.01966	0.00000	0.00000	0.00000	-0.00018
	13	0.03589	-0.01944	0.00000	0.00000	0.00000	-0.00018
	14	-0.02052	-0.02023	0.00000	0.00000	0.00000	-0.00040
	15	-0.02069	-0.02001	0.00000	0.00000	0.00000	-0.00040
	16	-0.16537	-0.01966	0.00000	0.00000	0.00000	-0.00006
	17	-0.16554	-0.01944	0.00000	0.00000	0.00000	-0.00006
23	9	-0.35001	-0.01509	0.00000	0.00000	0.00000	0.00040
	10	0.00226	-0.01712	0.00000	0.00000	0.00000	-0.00060
	11	-0.18415	-0.01641	0.00000	0.00000	0.00000	-0.00032
	12	0.05854	-0.02408	0.00000	0.00000	0.00000	-0.00015
	13	0.05863	-0.02381	0.00000	0.00000	0.00000	-0.00015
	14	0.04909	-0.02479	0.00000	0.00000	0.00000	-0.00063
	15	0.04918	-0.02452	0.00000	0.00000	0.00000	-0.00063
	16	-0.13732	-0.02408	0.00000	0.00000	0.00000	-0.00034
	17	-0.13723	-0.02381	0.00000	0.00000	0.00000	-0.00035
24	9	-0.39673	-0.01767	0.00000	0.00000	0.00000	0.00031
	10	0.09223	-0.02011	0.00000	0.00000	0.00000	-0.00072
	11	-0.12583	-0.01926	0.00000	0.00000	0.00000	-0.00053
	12	0.07065	-0.02830	0.00000	0.00000	0.00000	-0.00001
	13	0.07127	-0.02798	0.00000	0.00000	0.00000	-0.00002
	14	0.13707	-0.02915	0.00000	0.00000	0.00000	-0.00066
	15	0.13769	-0.02883	0.00000	0.00000	0.00000	-0.00067
	16	-0.08099	-0.02830	0.00000	0.00000	0.00000	-0.00047
	17	-0.08037	-0.02798	0.00000	0.00000	0.00000	-0.00047
25	9	-0.43792	-0.02010	0.00000	0.00000	0.00000	0.00033
	10	0.18303	-0.02294	0.00000	0.00000	0.00000	-0.00060
	11	-0.05487	-0.02195	0.00000	0.00000	0.00000	-0.00050
	12	0.05636	-0.03233	0.00000	0.00000	0.00000	0.00025
	13	0.05788	-0.03195	0.00000	0.00000	0.00000	0.00025
	14	0.21331	-0.03332	0.00000	0.00000	0.00000	-0.00043
	15	0.21483	-0.03294	0.00000	0.00000	0.00000	-0.00044
	16	-0.02459	-0.03233	0.00000	0.00000	0.00000	-0.00033
	17	-0.02307	-0.03195	0.00000	0.00000	0.00000	-0.00034

********** END OF LATEST ANALYSIS RESULT **********

164. PRINT MEMBER FORCES ALL

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	9	1	88.60	18.10	0.00	0.00	0.00	-27.39
		2	-85.29	-5.74	0.00	0.00	0.00	42.94
	10	1	79.39	94.33	0.00	0.00	0.00	176.60
		2	-76.08	-68.09	0.00	0.00	0.00	-69.24
	11	1	82.60	90.00	0.00	0.00	0.00	150.38
		2	-79.29	-63.76	0.00	0.00	0.00	-48.77
	12	1	120.22	16.91	0.00	0.00	0.00	9.90
		2	-115.75	-9.01	0.00	0.00	0.00	7.19
	13	1	121.44	17.00	0.00	0.00	0.00	10.34
		2	-116.97	-9.10	0.00	0.00	0.00	6.87
	14	1	117.02	90.29	0.00	0.00	0.00	162.33
		2	-112.54	-64.04	0.00	0.00	0.00	-60.33
	15	1	118.23	90.38	0.00	0.00	0.00	162.77
		2	-113.76	-64.13	0.00	0.00	0.00	-60.66
	16	1	120.22	85.95	0.00	0.00	0.00	136.11
		2	-115.75	-59.71	0.00	0.00	0.00	-39.86
	17	1	121.44	86.04	0.00	0.00	0.00	136.55
		2	-116.97	-59.80	0.00	0.00	0.00	-40.18
2	9	2	85.29	5.74	0.00	0.00	0.00	-42.94
		3	-81.97	4.36	0.00	0.00	0.00	43.61
	10	2	76.08	68.09	0.00	0.00	0.00	69.24
		3	-72.77	-44.09	0.00	0.00	0.00	4.83
	11	2	79.29	63.76	0.00	0.00	0.00	48.77
		3	-75.97	-39.76	0.00	0.00	0.00	19.56
	12	2	115.75	9.01	0.00	0.00	0.00	-7.19
		3	-111.28	-1.85	0.00	0.00	0.00	14.31
	13	2	116.97	9.10	0.00	0.00	0.00	-6.87
		3	-112.50	-1.94	0.00	0.00	0.00	14.10
	14	2	112.54	64.04	0.00	0.00	0.00	60.33
		3	-108.07	-40.04	0.00	0.00	0.00	8.38
	15	2	113.76	64.13	0.00	0.00	0.00	60.66
		3	-109.29	-40.13	0.00	0.00	0.00	8.17
	16	2	115.75	59.71	0.00	0.00	0.00	39.86
		3	-111.28	-35.71	0.00	0.00	0.00	23.11
	17	2	116.97	59.80	0.00	0.00	0.00	40.18
		3	-112.50	-35.80	0.00	0.00	0.00	22.90
3	9	3	81.97	-4.36	0.00	0.00	0.00	-43.61
		4	-78.66	12.22	0.00	0.00	0.00	32.37
	10	3	72.77	44.09	0.00	0.00	0.00	-4.83
		4	-69.46	-22.34	0.00	0.00	0.00	48.59
	11	3	75.97	39.76	0.00	0.00	0.00	-19.56
		4	-72.66	-18.00	0.00	0.00	0.00	57.58
	12	3	111.28	1.85	0.00	0.00	0.00	-14.31
		4	-106.81	4.55	0.00	0.00	0.00	12.44
	13	3	112.50	1.94	0.00	0.00	0.00	-14.10
		4	-108.02	4.46	0.00	0.00	0.00	12.35

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	14	3	108.07	40.04	0.00	0.00	0.00	-8.38
		4	-103.60	-18.29	0.00	0.00	0.00	46.77
	15	3	109.29	40.13	0.00	0.00	0.00	-8.17
		4	-104.82	-18.38	0.00	0.00	0.00	46.69
	16	3	111.28	35.71	0.00	0.00	0.00	-23.11
		4	-106.81	-13.96	0.00	0.00	0.00	55.77
	17	3	112.50	35.80	0.00	0.00	0.00	-22.90
		4	-108.02	-14.05	0.00	0.00	0.00	55.68
4	9	4	78.66	-12.22	0.00	0.00	0.00	-32.37
		5	-75.35	17.84	0.00	0.00	0.00	12.21
	10	4	69.46	22.34	0.00	0.00	0.00	-48.59
		5	-66.14	-2.83	0.00	0.00	0.00	65.01
	11	4	72.66	18.00	0.00	0.00	0.00	-57.58
		5	-69.35	1.50	0.00	0.00	0.00	68.27
	12	4	106.81	-4.55	0.00	0.00	0.00	-12.44
		5	-102.33	10.21	0.00	0.00	0.00	2.58
	13	4	108.02	-4.46	0.00	0.00	0.00	-12.35
		5	-103.55	10.12	0.00	0.00	0.00	2.61
	14	4	103.60	18.29	0.00	0.00	0.00	-46.77
		5	-99.13	1.22	0.00	0.00	0.00	57.84
	15	4	104.82	18.38	0.00	0.00	0.00	-46.69
		5	-100.35	1.13	0.00	0.00	0.00	57.87
	16	4	106.81	13.96	0.00	0.00	0.00	-55.77
		5	-102.33	5.55	0.00	0.00	0.00	61.09
	17	4	108.02	14.05	0.00	0.00	0.00	-55.68
		5	-103.55	5.46	0.00	0.00	0.00	61.12
5	9	5	75.35	-17.84	0.00	0.00	0.00	-12.21
		6	-72.04	21.21	0.00	0.00	0.00	-13.91
	10	5	66.14	2.83	0.00	0.00	0.00	-65.01
		6	-62.83	14.43	0.00	0.00	0.00	57.08
	11	5	69.35	-1.50	0.00	0.00	0.00	-68.27
		6	-66.04	18.76	0.00	0.00	0.00	54.59
	12	5	102.33	-10.21	0.00	0.00	0.00	-2.58
		6	-97.86	15.12	0.00	0.00	0.00	-14.29
	13	5	103.55	-10.12	0.00	0.00	0.00	-2.61
		6	-99.08	15.03	0.00	0.00	0.00	-14.14
	14	5	99.13	-1.22	0.00	0.00	0.00	-57.84
		6	-94.66	18.48	0.00	0.00	0.00	44.54
	15	5	100.35	-1.13	0.00	0.00	0.00	-57.87
		6	-95.87	18.39	0.00	0.00	0.00	44.69
	16	5	102.33	-5.55	0.00	0.00	0.00	-61.09
		6	-97.86	22.81	0.00	0.00	0.00	42.05
	17	5	103.55	-5.46	0.00	0.00	0.00	-61.12
		6	-99.08	22.72	0.00	0.00	0.00	42.20
6	9	6	72.04	-21.21	0.00	0.00	0.00	13.91
		7	-68.72	22.33	0.00	0.00	0.00	-43.00
	10	6	62.83	-14.43	0.00	0.00	0.00	-57.08
		7	-59.52	29.45	0.00	0.00	0.00	27.76

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	11	6	66.04	-18.76	0.00	0.00	0.00	-54.59
		7	-62.72	33.78	0.00	0.00	0.00	19.53
	12	6	97.86	-15.12	0.00	0.00	0.00	14.29
		7	-93.39	19.28	0.00	0.00	0.00	-37.16
	13	6	99.08	-15.03	0.00	0.00	0.00	14.14
		7	-94.61	19.19	0.00	0.00	0.00	-36.89
	14	6	94.66	-18.48	0.00	0.00	0.00	-44.54
		7	-90.18	33.49	0.00	0.00	0.00	9.86
	15	6	95.87	-18.39	0.00	0.00	0.00	-44.69
		7	-91.40	33.41	0.00	0.00	0.00	10.13
	16	6	97.86	-22.81	0.00	0.00	0.00	-42.05
		7	-93.39	37.83	0.00	0.00	0.00	1.63
	17	6	99.08	-22.72	0.00	0.00	0.00	-42.20
		7	-94.61	37.74	0.00	0.00	0.00	1.90
7	9	7	68.72	-22.33	0.00	0.00	0.00	43.00
		8	-65.41	22.33	0.00	0.00	0.00	-72.59
	10	7	59.52	-29.45	0.00	0.00	0.00	-27.76
		8	-56.21	42.22	0.00	0.00	0.00	-19.96
	11	7	62.72	-33.78	0.00	0.00	0.00	-19.53
		8	-59.41	46.55	0.00	0.00	0.00	-33.94
	12	7	93.39	-19.28	0.00	0.00	0.00	37.16
		8	-88.92	22.69	0.00	0.00	0.00	-65.05
	13	7	94.61	-19.19	0.00	0.00	0.00	36.89
		8	-90.14	22.60	0.00	0.00	0.00	-64.67
	14	7	90.18	-33.49	0.00	0.00	0.00	-9.86
		8	-85.71	46.26	0.00	0.00	0.00	-43.23
	15	7	91.40	-33.41	0.00	0.00	0.00	-10.13
		8	-86.93	46.17	0.00	0.00	0.00	-42.84
	16	7	93.39	-37.83	0.00	0.00	0.00	-1.63
		8	-88.92	50.60	0.00	0.00	0.00	-57.20
	17	7	94.61	-37.74	0.00	0.00	0.00	-1.90
		8	-90.14	50.51	0.00	0.00	0.00	-56.81
8	9	8	65.41	-22.33	0.00	0.00	0.00	72.59
		9	-62.10	22.33	0.00	0.00	0.00	-102.17
	10	8	56.21	-42.22	0.00	0.00	0.00	19.96
		9	-52.89	52.74	0.00	0.00	0.00	-83.12
	11	8	59.41	-46.55	0.00	0.00	0.00	33.94
		9	-56.10	57.07	0.00	0.00	0.00	-102.83
	12	8	88.92	-22.69	0.00	0.00	0.00	65.05
		9	-84.45	25.35	0.00	0.00	0.00	-96.96
	13	8	90.14	-22.60	0.00	0.00	0.00	64.67
		9	-85.66	25.27	0.00	0.00	0.00	-96.46
	14	8	85.71	-46.26	0.00	0.00	0.00	43.23
		9	-81.24	56.79	0.00	0.00	0.00	-111.75
	15	8	86.93	-46.17	0.00	0.00	0.00	42.84
		9	-82.46	56.70	0.00	0.00	0.00	-111.24
	16	8	88.92	-50.60	0.00	0.00	0.00	57.20
		9	-84.45	61.12	0.00	0.00	0.00	-131.46

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	17	8	90.14	-50.51	0.00	0.00	0.00	56.81
		9	-85.66	61.03	0.00	0.00	0.00	-130.96
9	9	9	22.33	62.10	0.00	0.00	0.00	102.17
		10	-22.33	-48.07	0.00	0.00	0.00	-33.32
	10	9	52.74	52.89	0.00	0.00	0.00	83.12
		10	-52.74	-38.87	0.00	0.00	0.00	-25.77
	11	9	57.07	56.10	0.00	0.00	0.00	102.83
		10	-57.07	-42.07	0.00	0.00	0.00	-41.48
	12	9	25.35	84.45	0.00	0.00	0.00	96.96
		10	-25.35	-64.16	0.00	0.00	0.00	-4.08
	13	9	25.27	85.66	0.00	0.00	0.00	96.46
		10	-25.27	-64.09	0.00	0.00	0.00	-2.87
	14	9	56.79	81.24	0.00	0.00	0.00	111.75
		10	-56.79	-60.96	0.00	0.00	0.00	-22.87
	15	9	56.70	82.46	0.00	0.00	0.00	111.24
		10	-56.70	-60.88	0.00	0.00	0.00	-21.66
	16	9	61.12	84.45	0.00	0.00	0.00	131.46
		10	-61.12	-64.16	0.00	0.00	0.00	-38.58
	17	9	61.03	85.66	0.00	0.00	0.00	130.96
		10	-61.03	-64.09	0.00	0.00	0.00	-37.36
10	9	10	22.33	48.07	0.00	0.00	0.00	33.32
		11	-22.33	-34.05	0.00	0.00	0.00	18.01
	10	10	52.74	38.87	0.00	0.00	0.00	25.77
		11	-52.74	-24.84	0.00	0.00	0.00	14.05
	11	10	57.07	42.08	0.00	0.00	0.00	41.48
		11	-57.07	-28.05	0.00	0.00	0.00	2.35
	12	10	25.35	64.16	0.00	0.00	0.00	4.08
		11	-25.35	-43.16	0.00	0.00	0.00	63.19
	13	10	25.27	64.09	0.00	0.00	0.00	2.87
		11	-25.27	-42.51	0.00	0.00	0.00	63.76
	14	10	56.79	60.96	0.00	0.00	0.00	22.87
		11	-56.79	-39.95	0.00	0.00	0.00	40.39
	15	10	56.70	60.88	0.00	0.00	0.00	21.66
		11	-56.70	-39.30	0.00	0.00	0.00	40.96
	16	10	61.12	64.16	0.00	0.00	0.00	38.58
		11	-61.12	-43.16	0.00	0.00	0.00	28.70
	17	10	61.03	64.09	0.00	0.00	0.00	37.36
		11	-61.03	-42.51	0.00	0.00	0.00	29.26
11	9	11	22.33	34.05	0.00	0.00	0.00	-18.01
		12	-22.33	-20.02	0.00	0.00	0.00	51.81
	10	11	52.74	24.84	0.00	0.00	0.00	-14.05
		12	-52.74	-10.82	0.00	0.00	0.00	36.34
	11	11	57.07	28.05	0.00	0.00	0.00	-2.35
		12	-57.07	-14.03	0.00	0.00	0.00	28.65
	12	11	25.35	43.16	0.00	0.00	0.00	-63.19
		12	-25.35	-21.58	0.00	0.00	0.00	103.65
	13	11	25.27	42.51	0.00	0.00	0.00	-63.76
		12	-25.27	-20.93	0.00	0.00	0.00	103.41

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	14	11	56.79	39.95	0.00	0.00	0.00	-40.39
		12	-56.79	-18.37	0.00	0.00	0.00	76.84
	15	11	56.70	39.30	0.00	0.00	0.00	-40.96
		12	-56.70	-17.73	0.00	0.00	0.00	76.60
	16	11	61.12	43.16	0.00	0.00	0.00	-28.70
		12	-61.12	-21.58	0.00	0.00	0.00	69.15
	17	11	61.03	42.51	0.00	0.00	0.00	-29.26
		12	-61.03	-20.93	0.00	0.00	0.00	68.91
12	9	12	22.33	20.02	0.00	0.00	0.00	-51.81
		13	-22.33	-6.00	0.00	0.00	0.00	68.07
	10	12	52.74	10.82	0.00	0.00	0.00	-36.34
		13	-52.74	3.21	0.00	0.00	0.00	41.10
	11	12	57.07	14.02	0.00	0.00	0.00	-28.65
		13	-57.07	0.00	0.00	0.00	0.00	37.42
	12	12	25.35	21.58	0.00	0.00	0.00	-103.65
		13	-25.35	0.00	0.00	0.00	0.00	117.14
	13	12	25.27	20.93	0.00	0.00	0.00	-103.41
		13	-25.27	0.65	0.00	0.00	0.00	116.09
	14	12	56.79	18.37	0.00	0.00	0.00	-76.84
		13	-56.79	3.21	0.00	0.00	0.00	86.32
	15	12	56.70	17.73	0.00	0.00	0.00	-76.60
		13	-56.70	3.85	0.00	0.00	0.00	85.27
	16	12	61.12	21.58	0.00	0.00	0.00	-69.15
		13	-61.12	0.00	0.00	0.00	0.00	82.64
	17	12	61.03	20.93	0.00	0.00	0.00	-68.91
		13	-61.03	0.65	0.00	0.00	0.00	81.59
13	9	13	22.33	6.00	0.00	0.00	0.00	-68.07
		14	-22.33	8.03	0.00	0.00	0.00	66.80
	10	13	52.74	-3.21	0.00	0.00	0.00	-41.10
		14	-52.74	17.23	0.00	0.00	0.00	28.32
	11	13	57.07	0.00	0.00	0.00	0.00	-37.42
		14	-57.07	14.03	0.00	0.00	0.00	28.65
	12	13	25.35	0.00	0.00	0.00	0.00	-117.14
		14	-25.35	21.58	0.00	0.00	0.00	103.65
	13	13	25.27	-0.65	0.00	0.00	0.00	-116.09
		14	-25.27	22.22	0.00	0.00	0.00	101.79
	14	13	56.79	-3.21	0.00	0.00	0.00	-86.32
		14	-56.79	24.78	0.00	0.00	0.00	68.83
	15	13	56.70	-3.85	0.00	0.00	0.00	-85.27
		14	-56.70	25.43	0.00	0.00	0.00	66.97
	16	13	61.12	0.00	0.00	0.00	0.00	-82.64
		14	-61.12	21.58	0.00	0.00	0.00	69.15
	17	13	61.03	-0.65	0.00	0.00	0.00	-81.59
		14	-61.03	22.22	0.00	0.00	0.00	67.30
14	9	14	22.33	-8.03	0.00	0.00	0.00	-66.80
		15	-22.33	22.05	0.00	0.00	0.00	48.00
	10	14	52.74	-17.23	0.00	0.00	0.00	-28.32
		15	-52.74	31.26	0.00	0.00	0.00	-1.98

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	11	14	57.07	-14.02	0.00	0.00	0.00	-28.65
		15	-57.07	28.05	0.00	0.00	0.00	2.35
	12	14	25.35	-21.58	0.00	0.00	0.00	-103.65
		15	-25.35	43.16	0.00	0.00	0.00	63.19
	13	14	25.27	-22.22	0.00	0.00	0.00	-101.79
		15	-25.27	42.66	0.00	0.00	0.00	61.16
	14	14	56.79	-24.78	0.00	0.00	0.00	-68.83
		15	-56.79	46.36	0.00	0.00	0.00	24.36
	15	14	56.70	-25.43	0.00	0.00	0.00	-66.97
		15	-56.70	45.87	0.00	0.00	0.00	22.33
	16	14	61.12	-21.58	0.00	0.00	0.00	-69.15
		15	-61.12	43.15	0.00	0.00	0.00	28.70
	17	14	61.03	-22.22	0.00	0.00	0.00	-67.30
		15	-61.03	42.66	0.00	0.00	0.00	26.66
15	9	15	22.33	-22.05	0.00	0.00	0.00	-48.00
		16	-22.33	36.08	0.00	0.00	0.00	11.67
	10	15	52.74	-31.26	0.00	0.00	0.00	1.98
		16	-52.74	45.28	0.00	0.00	0.00	-49.82
	11	15	57.07	-28.05	0.00	0.00	0.00	-2.35
		16	-57.07	42.08	0.00	0.00	0.00	-41.48
	12	15	25.35	-43.16	0.00	0.00	0.00	-63.19
		16	-25.35	64.16	0.00	0.00	0.00	-4.08
	13	15	25.27	-42.66	0.00	0.00	0.00	-61.16
		16	-25.27	62.95	0.00	0.00	0.00	-4.85
	14	15	56.79	-46.36	0.00	0.00	0.00	-24.36
		16	-56.79	67.37	0.00	0.00	0.00	-46.92
	15	15	56.70	-45.87	0.00	0.00	0.00	-22.33
		16	-56.70	66.15	0.00	0.00	0.00	-47.68
	16	15	61.12	-43.16	0.00	0.00	0.00	-28.70
		16	-61.12	64.16	0.00	0.00	0.00	-38.58
	17	15	61.03	-42.66	0.00	0.00	0.00	-26.66
		16	-61.03	62.95	0.00	0.00	0.00	-39.34
16	9	16	22.33	-36.08	0.00	0.00	0.00	-11.67
		17	-22.33	50.10	0.00	0.00	0.00	-42.19
	10	16	52.74	-45.28	0.00	0.00	0.00	49.82
		17	-52.74	59.31	0.00	0.00	0.00	-115.18
	11	16	57.07	-42.08	0.00	0.00	0.00	41.47
		17	-57.07	56.10	0.00	0.00	0.00	-102.83
	12	16	25.35	-64.16	0.00	0.00	0.00	4.08
		17	-25.35	84.45	0.00	0.00	0.00	-96.96
	13	16	25.27	-62.95	0.00	0.00	0.00	4.85
		17	-25.27	83.23	0.00	0.00	0.00	-96.21
	14	16	56.79	-67.37	0.00	0.00	0.00	46.92
		17	-56.79	87.65	0.00	0.00	0.00	-143.81
	15	16	56.70	-66.15	0.00	0.00	0.00	47.68
		17	-56.70	86.44	0.00	0.00	0.00	-143.05
	16	16	61.12	-64.16	0.00	0.00	0.00	38.58
		17	-61.12	84.45	0.00	0.00	0.00	-131.46

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	17	16	61.03	-62.95	0.00	0.00	0.00	39.34
		17	-61.03	83.23	0.00	0.00	0.00	-130.70
17	9	18	76.60	-63.05	0.00	0.00	0.00	-131.06
		19	-73.29	44.52	0.00	0.00	0.00	60.04
	10	18	85.81	-73.98	0.00	0.00	0.00	-100.80
		19	-82.49	50.28	0.00	0.00	0.00	18.72
	11	18	82.60	-90.00	0.00	0.00	0.00	-150.38
		19	-79.29	63.76	0.00	0.00	0.00	48.77
	12	18	120.22	-16.91	0.00	0.00	0.00	-9.90
		19	-115.75	9.01	0.00	0.00	0.00	-7.19
	13	18	119.00	-17.00	0.00	0.00	0.00	-10.08
		19	-114.53	9.10	0.00	0.00	0.00	-7.13
	14	18	123.43	-69.94	0.00	0.00	0.00	-86.53
		19	-118.96	46.23	0.00	0.00	0.00	9.81
	15	18	122.21	-70.02	0.00	0.00	0.00	-86.71
		19	-117.74	46.32	0.00	0.00	0.00	9.88
	16	18	120.22	-85.95	0.00	0.00	0.00	-136.11
		19	-115.75	59.71	0.00	0.00	0.00	39.86
	17	18	119.00	-86.04	0.00	0.00	0.00	-136.30
		19	-114.53	59.80	0.00	0.00	0.00	39.93
18	9	19	73.29	-44.52	0.00	0.00	0.00	-60.04
		20	-69.98	28.23	0.00	0.00	0.00	12.09
	10	19	82.49	-50.28	0.00	0.00	0.00	-18.72
		20	-79.18	28.83	0.00	0.00	0.00	-33.44
	11	19	79.29	-63.76	0.00	0.00	0.00	-48.77
		20	-75.97	39.76	0.00	0.00	0.00	-19.56
	12	19	115.75	-9.01	0.00	0.00	0.00	7.19
		20	-111.28	1.85	0.00	0.00	0.00	-14.31
	13	19	114.53	-9.10	0.00	0.00	0.00	7.13
		20	-110.06	1.94	0.00	0.00	0.00	-14.36
	14	19	118.96	-46.23	0.00	0.00	0.00	-9.81
		20	-114.48	24.78	0.00	0.00	0.00	-36.99
	15	19	117.74	-46.32	0.00	0.00	0.00	-9.88
		20	-113.27	24.87	0.00	0.00	0.00	-37.04
	16	19	115.75	-59.71	0.00	0.00	0.00	-39.86
		20	-111.28	35.71	0.00	0.00	0.00	-23.11
	17	19	114.53	-59.80	0.00	0.00	0.00	-39.93
		20	-110.06	35.80	0.00	0.00	0.00	-23.16
19	9	20	69.98	-28.23	0.00	0.00	0.00	-12.09
		21	-66.66	14.19	0.00	0.00	0.00	-15.77
	10	20	79.18	-28.83	0.00	0.00	0.00	33.44
		21	-75.87	9.62	0.00	0.00	0.00	-58.66
	11	20	75.98	-39.76	0.00	0.00	0.00	19.56
		21	-72.66	18.00	0.00	0.00	0.00	-57.58
	12	20	111.28	-1.85	0.00	0.00	0.00	14.31
		21	-106.81	-4.55	0.00	0.00	0.00	-12.44
	13	20	110.06	-1.94	0.00	0.00	0.00	14.36
		21	-105.59	-4.46	0.00	0.00	0.00	-12.60

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	14	20	114.48	-24.78	0.00	0.00	0.00	36.99
		21	-110.01	5.57	0.00	0.00	0.00	-56.85
	15	20	113.27	-24.87	0.00	0.00	0.00	37.04
		21	-108.79	5.66	0.00	0.00	0.00	-57.01
	16	20	111.28	-35.71	0.00	0.00	0.00	23.11
		21	-106.81	13.96	0.00	0.00	0.00	-55.77
	17	20	110.06	-35.80	0.00	0.00	0.00	23.16
		21	-105.59	14.05	0.00	0.00	0.00	-55.93
20	9	21	66.66	-14.19	0.00	0.00	0.00	15.77
		22	-63.35	2.39	0.00	0.00	0.00	-26.51
	10	21	75.87	-9.62	0.00	0.00	0.00	58.66
		22	-72.56	-7.35	0.00	0.00	0.00	-59.92
	11	21	72.66	-18.00	0.00	0.00	0.00	57.58
		22	-69.35	-1.50	0.00	0.00	0.00	-68.27
	12	21	106.81	4.55	0.00	0.00	0.00	12.44
		22	-102.33	-10.21	0.00	0.00	0.00	-2.58
	13	21	105.59	4.46	0.00	0.00	0.00	12.60
		22	-101.12	-10.12	0.00	0.00	0.00	-2.86
	14	21	110.01	-5.57	0.00	0.00	0.00	56.85
		22	-105.54	-11.39	0.00	0.00	0.00	-52.74
	15	21	108.79	-5.66	0.00	0.00	0.00	57.01
		22	-104.32	-11.30	0.00	0.00	0.00	-53.03
	16	21	106.81	-13.96	0.00	0.00	0.00	55.77
		22	-102.33	-5.55	0.00	0.00	0.00	-61.09
	17	21	105.59	-14.05	0.00	0.00	0.00	55.93
		22	-101.12	-5.46	0.00	0.00	0.00	-61.37
21	9	22	63.35	-2.40	0.00	0.00	0.00	26.51
		23	-60.04	-7.15	0.00	0.00	0.00	-23.11
	10	22	72.56	7.35	0.00	0.00	0.00	59.92
		23	-69.24	-22.06	0.00	0.00	0.00	-40.19
	11	22	69.35	1.50	0.00	0.00	0.00	68.27
		23	-66.04	-18.76	0.00	0.00	0.00	-54.59
	12	22	102.33	10.21	0.00	0.00	0.00	2.58
		23	-97.86	-15.12	0.00	0.00	0.00	14.29
	13	22	101.12	10.12	0.00	0.00	0.00	2.86
		23	-96.64	-15.03	0.00	0.00	0.00	13.89
	14	22	105.54	11.39	0.00	0.00	0.00	52.74
		23	-101.07	-26.11	0.00	0.00	0.00	-27.65
	15	22	104.32	11.30	0.00	0.00	0.00	53.03
		23	-99.85	-26.02	0.00	0.00	0.00	-28.05
	16	22	102.33	5.55	0.00	0.00	0.00	61.09
		23	-97.86	-22.81	0.00	0.00	0.00	-42.05
	17	22	101.12	5.46	0.00	0.00	0.00	61.37
		23	-96.64	-22.72	0.00	0.00	0.00	-42.45
22	9	23	60.04	7.15	0.00	0.00	0.00	23.11
		24	-56.73	-14.46	0.00	0.00	0.00	-8.54
	10	23	69.24	22.06	0.00	0.00	0.00	40.19
		24	-65.93	-34.53	0.00	0.00	0.00	-2.44

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	11	23	66.04	18.76	0.00	0.00	0.00	54.59
		24	-62.72	-33.78	0.00	0.00	0.00	-19.53
	12	23	97.86	15.12	0.00	0.00	0.00	-14.29
		24	-93.39	-19.28	0.00	0.00	0.00	37.16
	13	23	96.64	15.03	0.00	0.00	0.00	-13.89
		24	-92.17	-19.19	0.00	0.00	0.00	36.64
	14	23	101.07	26.11	0.00	0.00	0.00	27.65
		24	-96.60	-38.58	0.00	0.00	0.00	15.46
	15	23	99.85	26.02	0.00	0.00	0.00	28.05
		24	-95.38	-38.49	0.00	0.00	0.00	14.94
	16	23	97.86	22.81	0.00	0.00	0.00	42.05
		24	-93.39	-37.83	0.00	0.00	0.00	-1.63
	17	23	96.64	22.72	0.00	0.00	0.00	42.45
		24	-92.17	-37.74	0.00	0.00	0.00	-2.15
23	9	24	56.73	14.46	0.00	0.00	0.00	8.54
		25	-53.41	-19.52	0.00	0.00	0.00	14.21
	10	24	65.93	34.54	0.00	0.00	0.00	2.44
		25	-62.62	-44.76	0.00	0.00	0.00	50.34
	11	24	62.73	33.78	0.00	0.00	0.00	19.53
		25	-59.41	-46.55	0.00	0.00	0.00	33.94
	12	24	93.39	19.28	0.00	0.00	0.00	-37.16
		25	-88.92	-22.69	0.00	0.00	0.00	65.05
	13	24	92.17	19.19	0.00	0.00	0.00	-36.64
		25	-87.70	-22.60	0.00	0.00	0.00	64.41
	14	24	96.60	38.58	0.00	0.00	0.00	-15.46
		25	-92.13	-48.81	0.00	0.00	0.00	73.60
	15	24	95.38	38.49	0.00	0.00	0.00	-14.94
		25	-90.91	-48.72	0.00	0.00	0.00	72.96
	16	24	93.39	37.83	0.00	0.00	0.00	1.63
		25	-88.92	-50.60	0.00	0.00	0.00	57.20
	17	24	92.17	37.74	0.00	0.00	0.00	2.15
		25	-87.70	-50.51	0.00	0.00	0.00	56.56
24	9	25	53.41	19.52	0.00	0.00	0.00	-14.21
		17	-50.10	-22.33	0.00	0.00	0.00	42.19
	10	25	62.62	44.76	0.00	0.00	0.00	-50.34
		17	-59.31	-52.74	0.00	0.00	0.00	115.18
	11	25	59.41	46.55	0.00	0.00	0.00	-33.94
		17	-56.10	-57.07	0.00	0.00	0.00	102.83
	12	25	88.92	22.69	0.00	0.00	0.00	-65.05
		17	-84.45	-25.35	0.00	0.00	0.00	96.96
	13	25	87.70	22.60	0.00	0.00	0.00	-64.41
		17	-83.23	-25.27	0.00	0.00	0.00	96.21
	14	25	92.12	48.81	0.00	0.00	0.00	-73.60
		17	-87.65	-56.79	0.00	0.00	0.00	143.81
	15	25	90.91	48.72	0.00	0.00	0.00	-72.96
		17	-86.44	-56.70	0.00	0.00	0.00	143.05
	16	25	88.92	50.60	0.00	0.00	0.00	-57.20
		17	-84.45	-61.12	0.00	0.00	0.00	131.46

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	17	25	87.70	50.51	0.00	0.00	0.00	-56.56
		17	-83.23	-61.03	0.00	0.00	0.00	130.70

********** END OF LATEST ANALYSIS RESULT **********

165. PRINT FORCE ENV ALL FR NS 0.5

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTO MET

MEMB	DISTANCE		FY	LD	MZ	LD	FZ	LD	MY	LD
1	0.00	MAX.	94.33	10	176.60	10	0.00	17	0.00	17
		MIN.	16.91	12	-27.39	9	0.00	17	0.00	17
	0.66	MAX.	80.93	10	118.57	10	0.00	17	0.00	17
		MIN.	11.64	9	-37.21	9	0.00	17	0.00	17
	1.33	MAX.	68.09	10	69.24	10	0.00	17	0.00	17
		MIN.	5.74	9	-42.94	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 1,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	94.33	0.00	10	176.60	0.00	10			
	0.00	0.00	9	0.00	0.00	9	121.44 C	0.00	13
MIN.	5.74	1.33	9	-42.94	1.33	9			
	0.00	1.33	17	0.00	1.33	17	76.08 C	1.33	10

2	0.00	MAX.	68.09	10	69.24	10	0.00	17	0.00	17
		MIN.	5.74	9	-42.94	9	0.00	17	0.00	17
	0.66	MAX.	55.81	10	28.23	10	0.00	17	0.00	17
		MIN.	0.41	9	-44.95	9	0.00	17	0.00	17
	1.33	MAX.	44.09	10	-4.83	10	0.00	17	0.00	17
		MIN.	-4.36	9	-43.61	9	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 2,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	68.09	0.00	10	69.24	0.00	10			
	0.00	0.00	9	0.00	0.00	9	116.97 C	0.00	13
MIN.	-4.36	1.33	9	-44.95	0.66	9			
	0.00	1.33	17	0.00	1.33	17	72.77 C	1.33	10

3	0.00	MAX.	44.09	10	-4.83	10	0.00	17	0.00	17
		MIN.	-4.36	9	-43.61	9	0.00	17	0.00	17
	0.66	MAX.	32.93	10	-14.29	13	0.00	17	0.00	17
		MIN.	-8.57	9	-43.04	16	0.00	17	0.00	17
	1.32	MAX.	22.34	10	-12.35	13	0.00	17	0.00	17
		MIN.	-12.22	9	-57.58	11	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 3,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	44.09	0.00	10	-4.83	0.00	10			
	0.00	0.00	9	0.00	0.00	9	112.50 C	0.00	13
MIN.	-12.22	1.32	9	-57.58	1.32	11			
	0.00	1.32	17	0.00	1.32	17	69.46 C	1.32	10

4	0.00	MAX.	22.34	10	-12.35	13	0.00	17	0.00	17
		MIN.	-12.22	9	-57.58	11	0.00	17	0.00	17
	0.66	MAX.	12.30	10	-8.42	13	0.00	17	0.00	17
		MIN.	-15.31	9	-66.15	11	0.00	17	0.00	17
	1.33	MAX.	2.83	10	-2.58	12	0.00	17	0.00	17
		MIN.	-17.84	9	-68.27	11	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 4,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	22.34	0.00	10	-2.58	1.33	12			
	0.00	0.00	9	0.00	0.00	9	108.02 C	0.00	13
MIN.	-17.84	1.33	9	-68.27	1.33	11			
	0.00	1.33	17	0.00	1.33	17	66.14 C	1.33	10

5	0.00	MAX.	2.83	10	-2.58	12	0.00	17	0.00	17
		MIN.	-17.84	9	-68.27	11	0.00	17	0.00	17
	0.66	MAX.	-6.08	10	5.04	12	0.00	17	0.00	17
		MIN.	-19.80	9	-64.29	11	0.00	17	0.00	17
	1.32	MAX.	-14.43	10	14.29	12	0.00	17	0.00	17
		MIN.	-22.81	16	-57.08	10	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 5,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	2.83	0.00	10	14.29	1.32	12			
	0.00	0.00	9	0.00	0.00	9	103.55 C	0.00	13
MIN.	-22.81	1.32	16	-68.27	0.00	11			
	0.00	1.32	17	0.00	1.32	17	62.83 C	1.32	10

6	0.00	MAX.	-14.43	10	14.29	12	0.00	17	0.00	17
		MIN.	-22.81	16	-57.08	10	0.00	17	0.00	17
	0.66	MAX.	-17.20	13	28.27	9	0.00	17	0.00	17
		MIN.	-30.60	16	-44.91	10	0.00	17	0.00	17
	1.33	MAX.	-19.19	13	43.00	9	0.00	17	0.00	17

* 9.00 X 10.60

		MIN.	-37.83	16	-27.76	10	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 6,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-14.43	0.00	10	43.00	1.33	9			
	0.00	0.00	9	0.00	0.00	9	99.08 C	0.00	13
MIN.	-37.83	1.33	16	-57.08	0.00	10			
	0.00	1.33	17	0.00	1.33	17	59.52 C	1.33	10

7	0.00	MAX.	-19.19	13	43.00	9	0.00	17	0.00	17
		MIN.	-37.83	16	-27.76	10	0.00	17	0.00	17
	0.66	MAX.	-20.99	13	57.79	9	0.00	17	0.00	17
		MIN.	-44.49	16	-6.01	10	0.00	17	0.00	17
	1.33	MAX.	-22.33	9	72.59	9	0.00	17	0.00	17
		MIN.	-50.60	16	19.96	10	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 7,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-19.19	0.00	13	72.59	1.33	9			
	0.00	0.00	9	0.00	0.00	9	94.61 C	0.00	13
MIN.	-50.60	1.33	16	-27.76	0.00	10			
	0.00	1.33	17	0.00	1.33	17	56.21 C	1.33	10

8	0.00	MAX.	-22.33	9	72.59	9	0.00	17	0.00	17
		MIN.	-50.60	16	19.96	10	0.00	17	0.00	17
	0.66	MAX.	-22.33	9	92.58	16	0.00	17	0.00	17
		MIN.	-56.14	16	49.80	10	0.00	17	0.00	17
	1.33	MAX.	-22.33	9	131.46	16	0.00	17	0.00	17
		MIN.	-61.12	16	83.12	10	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 8,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-22.33	0.00	9	131.46	1.33	16			
	0.00	0.00	9	0.00	0.00	9	90.14 C	0.00	13
MIN.	-61.12	1.33	16	19.96	0.00	10			
	0.00	1.33	17	0.00	1.33	17	52.89 C	1.33	10

9	0.00	MAX.	85.66	17	131.46	16	0.00	17	0.00	17
		MIN.	52.89	10	83.12	10	0.00	17	0.00	17
	0.63	MAX.	74.88	17	81.85	16	0.00	17	0.00	17
		MIN.	45.88	10	46.29	13	0.00	17	0.00	17

* 9.00 X 10.60

	1.25	MAX.	64.16	16	41.48	11	0.00	17	0.00	17
		MIN.	38.87	10	2.87	13	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 9,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	85.66	0.00	17	131.46	0.00	16			
	0.00	0.00	9	0.00	0.00	9	61.12 C	0.00	16
MIN.	38.87	1.25	10	2.87	1.25	13			
	0.00	1.25	17	0.00	1.25	17	22.33 C	1.25	9

10	0.00	MAX.	64.16	12	41.48	11	0.00	17	0.00	17
		MIN.	38.87	10	2.87	13	0.00	17	0.00	17
	0.63	MAX.	53.94	12	17.37	11	0.00	17	0.00	17
		MIN.	31.86	10	-33.82	13	0.00	17	0.00	17
	1.25	MAX.	43.16	12	-2.35	11	0.00	17	0.00	17
		MIN.	24.84	10	-63.76	13	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 10,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	64.16	0.00	12	41.48	0.00	11			
	0.00	0.00	9	0.00	0.00	9	61.12 C	0.00	16
MIN.	24.84	1.25	10	-63.76	1.25	13			
	0.00	1.25	17	0.00	1.25	17	22.33 C	1.25	9

11	0.00	MAX.	43.16	16	-2.35	11	0.00	17	0.00	17
		MIN.	24.84	10	-63.76	13	0.00	17	0.00	17
	0.63	MAX.	32.37	16	-17.69	11	0.00	17	0.00	17
		MIN.	17.83	10	-86.95	13	0.00	17	0.00	17
	1.25	MAX.	21.58	16	-28.65	11	0.00	17	0.00	17
		MIN.	10.82	10	-103.65	12	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 11,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	43.16	0.00	16	-2.35	0.00	11			
	0.00	0.00	9	0.00	0.00	9	61.12 C	0.00	16
MIN.	10.82	1.25	10	-103.65	1.25	12			
	0.00	1.25	17	0.00	1.25	17	22.33 C	1.25	9

12	0.00	MAX.	21.58	12	-28.65	11	0.00	17	0.00	17
		MIN.	10.82	10	-103.65	12	0.00	17	0.00	17
	0.62	MAX.	13.01	9	-35.22	11	0.00	17	0.00	17

* 9.00 X 10.60

		MIN.	3.81	10	-113.76	12	0.00	17	0.00 17
	1.25	MAX.	6.00	9	-37.42	11	0.00	17	0.00 17
		MIN.	-3.85	15	-117.14	12	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 12,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	21.58	0.00	12	-28.65	0.00	11			
	0.00	0.00	9	0.00	0.00	9	61.12 C	0.00	16
MIN.	-3.85	1.25	15	-117.14	1.25	12			
	0.00	1.25	17	0.00	1.25	17	22.33 C	1.25	9

13	0.00	MAX.	6.00	9	-37.42	11	0.00	17	0.00 17
		MIN.	-3.85	15	-117.14	12	0.00	17	0.00 17
	0.63	MAX.	-1.01	9	-35.22	11	0.00	17	0.00 17
		MIN.	-14.64	15	-113.76	12	0.00	17	0.00 17
	1.25	MAX.	-8.03	9	-28.32	10	0.00	17	0.00 17
		MIN.	-25.43	15	-103.65	12	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 13,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	6.00	0.00	9	-28.32	1.25	10			
	0.00	0.00	9	0.00	0.00	9	61.12 C	0.00	16
MIN.	-25.43	1.25	15	-117.14	0.00	12			
	0.00	1.25	17	0.00	1.25	17	22.33 C	1.25	9

14	0.00	MAX.	-8.03	9	-28.32	10	0.00	17	0.00 17
		MIN.	-25.43	15	-103.65	12	0.00	17	0.00 17
	0.62	MAX.	-15.04	9	-15.36	10	0.00	17	0.00 17
		MIN.	-35.73	15	-86.79	12	0.00	17	0.00 17
	1.25	MAX.	-22.05	9	1.98	10	0.00	17	0.00 17
		MIN.	-46.36	14	-63.19	12	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 14,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-8.03	0.00	9	1.98	1.25	10			
	0.00	0.00	9	0.00	0.00	9	61.12 C	0.00	16
MIN.	-46.36	1.25	14	-103.65	0.00	12			
	0.00	1.25	17	0.00	1.25	17	22.33 C	1.25	9

15	0.00	MAX.	-22.05	9	1.98	10	0.00	17	0.00 17
		MIN.	-46.36	14	-63.19	12	0.00	17	0.00 17

* 9.00 X 10.60

	0.62	MAX.	-29.06	9	23.71	10	0.00	17	0.00 17
		MIN.	-57.15	14	-32.85	12	0.00	17	0.00 17
	1.25	MAX.	-36.08	9	49.82	10	0.00	17	0.00 17
		MIN.	-67.37	14	-11.67	9	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 15,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-22.05	0.00	9	49.82	1.25	10			
	0.00	0.00	9	0.00	0.00	9	61.12 C	0.00	16
MIN.	-67.37	1.25	14	-63.19	0.00	12			
	0.00	1.25	17	0.00	1.25	17	22.33 C	1.25	9

16	0.00	MAX.	-36.08	9	49.82	10	0.00	17	0.00 17
		MIN.	-67.37	14	-11.67	9	0.00	17	0.00 17
	0.62	MAX.	-43.09	9	92.20	15	0.00	17	0.00 17
		MIN.	-77.51	14	13.06	9	0.00	17	0.00 17
	1.25	MAX.	-50.10	9	143.81	14	0.00	17	0.00 17
		MIN.	-87.65	14	42.19	9	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 16,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-36.08	0.00	9	143.81	1.25	14			
	0.00	0.00	9	0.00	0.00	9	61.12 C	0.00	16
MIN.	-87.65	1.25	14	-11.67	0.00	9			
	0.00	1.25	17	0.00	1.25	17	22.33 C	1.25	9

17	0.00	MAX.	-16.91	12	-9.90	12	0.00	17	0.00 17
		MIN.	-90.00	11	-150.38	11	0.00	17	0.00 17
	0.66	MAX.	-12.87	12	-0.04	12	0.00	17	0.00 17
		MIN.	-76.60	11	-95.23	11	0.00	17	0.00 17
	1.33	MAX.	-9.01	12	7.19	12	0.00	17	0.00 17
		MIN.	-63.76	11	-60.04	9	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 17,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-9.01	1.33	12	7.19	1.33	12			
	0.00	0.00	9	0.00	0.00	9	123.43 C	0.00	14
MIN.	-90.00	0.00	11	-150.38	0.00	11			
	0.00	1.33	17	0.00	1.33	17	73.29 C	1.33	9

18	0.00	MAX.	-9.01	12	7.19	12	0.00	17	0.00 17

* 9.00 X 10.60

		MIN.	-63.76	11	-60.04	9	0.00	17	0.00 17
	0.66	MAX.	-5.34	12	17.14	14	0.00	17	0.00 17
		MIN.	-51.48	11	-33.36	9	0.00	17	0.00 17
	1.33	MAX.	-1.85	12	37.04	15	0.00	17	0.00 17
		MIN.	-39.76	11	-12.09	9	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 18,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	-1.85	1.33	12	37.04	1.33	15			
	0.00	0.00	9	0.00	0.00	9	118.96 C	0.00	14
MIN.	-63.76	0.00	11	-60.04	0.00	9			
	0.00	1.33	17	0.00	1.33	17	69.98 C	1.33	9

19	0.00	MAX.	-1.85	12	37.04	15	0.00	17	0.00 17
		MIN.	-39.76	11	-12.09	9	0.00	17	0.00 17
	0.66	MAX.	1.44	12	50.21	15	0.00	17	0.00 17
		MIN.	-28.60	11	4.17	9	0.00	17	0.00 17
	1.32	MAX.	4.55	12	58.66	10	0.00	17	0.00 17
		MIN.	-18.00	11	12.44	12	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 19,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	4.55	1.32	12	58.66	1.32	10			
	0.00	0.00	9	0.00	0.00	9	114.48 C	0.00	14
MIN.	-39.76	0.00	11	-12.09	0.00	9			
	0.00	1.32	17	0.00	1.32	17	66.66 C	1.32	9

20	0.00	MAX.	4.55	12	58.66	10	0.00	17	0.00 17
		MIN.	-18.00	11	12.44	12	0.00	17	0.00 17
	0.66	MAX.	7.47	12	66.15	11	0.00	17	0.00 17
		MIN.	-8.01	9	8.44	12	0.00	17	0.00 17
	1.33	MAX.	11.39	14	68.27	11	0.00	17	0.00 17
		MIN.	-2.39	9	2.58	12	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 20,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	11.39	1.33	14	68.27	1.33	11			
	0.00	0.00	9	0.00	0.00	9	110.01 C	0.00	14
MIN.	-18.00	0.00	11	2.58	1.33	12			
	0.00	1.33	17	0.00	1.33	17	63.35 C	1.33	9

* 9.00 X 10.60

21	0.00	MAX.	11.39	14	68.27	11	0.00	17	0.00 17
		MIN.	-2.40	9	2.58	12	0.00	17	0.00 17
	0.66	MAX.	19.03	14	64.29	11	0.00	17	0.00 17
		MIN.	2.66	9	-5.04	12	0.00	17	0.00 17
	1.32	MAX.	26.11	14	54.59	11	0.00	17	0.00 17
		MIN.	7.15	9	-14.29	12	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 21,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	26.11	1.32	14	68.27	0.00	11			
	0.00	0.00	9	0.00	0.00	9	105.54 C	0.00	14
MIN.	-2.40	0.00	9	-14.29	1.32	12			
	0.00	1.32	17	0.00	1.32	17	60.04 C	1.32	9

22	0.00	MAX.	26.11	14	54.59	11	0.00	17	0.00 17
		MIN.	7.15	9	-14.29	12	0.00	17	0.00 17
	0.66	MAX.	32.63	14	39.55	11	0.00	17	0.00 17
		MIN.	11.09	9	-25.04	12	0.00	17	0.00 17
	1.33	MAX.	38.58	14	19.53	11	0.00	17	0.00 17
		MIN.	14.46	9	-37.16	12	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 22,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD
MAX.	38.58	1.33	14	54.59	0.00	11			
	0.00	0.00	9	0.00	0.00	9	101.07 C	0.00	14
MIN.	7.15	0.00	9	-37.16	1.33	12			
	0.00	1.33	17	0.00	1.33	17	56.73 C	1.33	9

23	0.00	MAX.	38.58	14	19.53	11	0.00	17	0.00 17
		MIN.	14.46	9	-37.16	12	0.00	17	0.00 17
	0.66	MAX.	44.49	16	-2.00	9	0.00	17	0.00 17
		MIN.	17.27	9	-50.54	12	0.00	17	0.00 17
	1.33	MAX.	50.60	16	-14.21	9	0.00	17	0.00 17
		MIN.	19.52	9	-73.60	14	0.00	17	0.00 17

MAX/MIN FORCES FOR MEMBER 23,AMONGST ALL SECT LOCATIONS

	FY/FZ	DIST	LD	MZ/MY	DIST	LD	FX	DIST	LD

* 9.00 X 10.60

MAX.		50.60	1.33	16	19.53	0.00	11			
		0.00	0.00	9	0.00	0.00	9	96.60 C	0.00	14
MIN.		14.46	0.00	9	-73.60	1.33	14			
		0.00	1.33	17	0.00	1.33	17	53.41 C	1.33	9
24	0.00	MAX.	50.60	16	-14.21	9	0.00	17	0.00	17
		MIN.	19.52	9	-73.60	14	0.00	17	0.00	17
	0.66	MAX.	56.14	16	-27.73	9	0.00	17	0.00	17
		MIN.	21.20	9	-107.38	14	0.00	17	0.00	17
	1.33	MAX.	61.12	16	-42.19	9	0.00	17	0.00	17
		MIN.	22.33	9	-143.81	14	0.00	17	0.00	17

MAX/MIN FORCES FOR MEMBER 24,AMONGST ALL SECT LOCATIONS

	FY/ FZ	DIST	LD	MZ/ MY	DIST	LD	FX	DIST	LD
MAX.	61.12	1.33	16	-14.21	0.00	9			
	0.00	0.00	9	0.00	0.00	9	92.12 C	0.00	14
MIN.	19.52	0.00	9	-143.81	1.33	14			
	0.00	1.33	17	0.00	1.33	17	50.10 C	1.33	9

********** END OF FORCE ENVELOPE FROM INTERNAL STORAGE **********

166. LOAD LIST 18 TO 26
167. PRINT SUP REAC DIS ALL

* 9.00 X 10.60

SUPPORT REACTIONS -UNIT MTO MET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	18	-9.48	86.60	0.00	0.00	0.00	-27.36
	19	-60.31	80.46	0.00	0.00	0.00	108.63
	20	-57.42	82.60	0.00	0.00	0.00	91.16
	21	-20.07	88.41	0.00	0.00	0.00	21.02
	22	-20.13	89.22	0.00	0.00	0.00	21.32
	23	-59.42	86.27	0.00	0.00	0.00	105.49
	24	-59.48	87.08	0.00	0.00	0.00	105.78
	25	-56.53	88.41	0.00	0.00	0.00	88.01
	26	-56.59	89.22	0.00	0.00	0.00	88.31
18	18	39.46	78.60	0.00	0.00	0.00	-78.27
	19	46.74	84.74	0.00	0.00	0.00	-58.10
	20	57.42	82.60	0.00	0.00	0.00	-91.16
	21	20.07	88.41	0.00	0.00	0.00	-21.02
	22	20.13	87.60	0.00	0.00	0.00	-21.15
	23	45.85	90.55	0.00	0.00	0.00	-54.95
	24	45.91	89.73	0.00	0.00	0.00	-55.08
	25	56.53	88.41	0.00	0.00	0.00	-88.01
	26	56.59	87.60	0.00	0.00	0.00	-88.14

********** END OF LATEST ANALYSIS RESULT **********

168. PRINT MEMBER FORCES LIST 1 17

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	18	1	86.60	9.48	0.00	0.00	0.00	-27.36
		2	-83.29	-1.25	0.00	0.00	0.00	34.31
	19	1	80.46	60.31	0.00	0.00	0.00	108.63
		2	-77.15	-42.81	0.00	0.00	0.00	-40.48
	20	1	82.60	57.42	0.00	0.00	0.00	91.16
		2	-79.29	-39.92	0.00	0.00	0.00	-26.83
	21	1	88.41	20.07	0.00	0.00	0.00	21.02
		2	-85.10	-12.16	0.00	0.00	0.00	0.25
	22	1	89.22	20.13	0.00	0.00	0.00	21.32
		2	-85.91	-12.22	0.00	0.00	0.00	0.03
	23	1	86.27	59.42	0.00	0.00	0.00	105.49
		2	-82.96	-41.92	0.00	0.00	0.00	-38.52
	24	1	87.08	59.48	0.00	0.00	0.00	105.78
		2	-83.77	-41.98	0.00	0.00	0.00	-38.73
	25	1	88.41	56.53	0.00	0.00	0.00	88.01
		2	-85.10	-39.03	0.00	0.00	0.00	-24.87
	26	1	89.22	56.59	0.00	0.00	0.00	88.31
		2	-85.91	-39.09	0.00	0.00	0.00	-25.08
17	18	18	78.60	-39.46	0.00	0.00	0.00	-78.27
		19	-75.29	27.10	0.00	0.00	0.00	34.34
	19	18	84.74	-46.74	0.00	0.00	0.00	-58.10
		19	-81.42	30.94	0.00	0.00	0.00	6.80
	20	18	82.60	-57.42	0.00	0.00	0.00	-91.16
		19	-79.29	39.92	0.00	0.00	0.00	26.83
	21	18	88.41	-20.07	0.00	0.00	0.00	-21.02
		19	-85.10	12.16	0.00	0.00	0.00	-0.25
	22	18	87.60	-20.13	0.00	0.00	0.00	-21.15
		19	-84.28	12.22	0.00	0.00	0.00	-0.20
	23	18	90.55	-45.85	0.00	0.00	0.00	-54.95
		19	-87.23	30.05	0.00	0.00	0.00	4.84
	24	18	89.73	-45.91	0.00	0.00	0.00	-55.08
		19	-86.42	30.11	0.00	0.00	0.00	4.88
	25	18	88.41	-56.53	0.00	0.00	0.00	-88.01
		19	-85.10	39.03	0.00	0.00	0.00	24.87
	26	18	87.60	-56.59	0.00	0.00	0.00	-88.14
		19	-84.28	39.09	0.00	0.00	0.00	24.91

********** END OF LATEST ANALYSIS RESULT **********

169. LOAD LIST 27 28
170. PRINT MEMBER FORCES ALL

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	27	1	86.60	9.48	0.00	0.00	0.00	-27.36
		2	-83.29	-1.25	0.00	0.00	0.00	34.31
	28	1	82.60	49.63	0.00	0.00	0.00	75.57
		2	-79.29	-33.83	0.00	0.00	0.00	-20.45
2	27	2	83.29	1.25	0.00	0.00	0.00	-34.31
		3	-79.97	5.49	0.00	0.00	0.00	31.33
	28	2	79.29	33.83	0.00	0.00	0.00	20.45
		3	-75.97	-19.53	0.00	0.00	0.00	14.73
3	27	3	79.97	-5.49	0.00	0.00	0.00	-31.33
		4	-76.66	10.73	0.00	0.00	0.00	20.42
	28	3	75.97	19.53	0.00	0.00	0.00	-14.73
		4	-72.66	-6.72	0.00	0.00	0.00	31.96
4	27	4	76.66	-10.73	0.00	0.00	0.00	-20.42
		5	-73.35	14.47	0.00	0.00	0.00	3.56
	28	4	72.66	6.72	0.00	0.00	0.00	-31.96
		5	-69.35	4.59	0.00	0.00	0.00	33.20
5	27	5	73.35	-14.47	0.00	0.00	0.00	-3.56
		6	-70.04	16.72	0.00	0.00	0.00	-17.27
	28	5	69.35	-4.59	0.00	0.00	0.00	-33.20
		6	-66.04	14.40	0.00	0.00	0.00	20.45
6	27	6	70.04	-16.72	0.00	0.00	0.00	17.27
		7	-66.72	17.47	0.00	0.00	0.00	-40.08
	28	6	66.04	-14.40	0.00	0.00	0.00	-20.46
		7	-62.72	22.72	0.00	0.00	0.00	-4.30
7	27	7	66.72	-17.47	0.00	0.00	0.00	40.08
		8	-63.41	17.47	0.00	0.00	0.00	-63.23
	28	7	62.72	-22.72	0.00	0.00	0.00	4.30
		8	-59.41	29.53	0.00	0.00	0.00	-39.08
8	27	8	63.41	-17.47	0.00	0.00	0.00	63.22
		9	-60.10	17.47	0.00	0.00	0.00	-86.37
	28	8	59.41	-29.53	0.00	0.00	0.00	39.08
		9	-56.10	34.85	0.00	0.00	0.00	-81.90
9	27	9	17.47	60.10	0.00	0.00	0.00	86.37
		10	-17.47	-46.07	0.00	0.00	0.00	-20.01
	28	9	34.85	56.10	0.00	0.00	0.00	81.90
		10	-34.85	-42.07	0.00	0.00	0.00	-20.54
10	27	10	17.47	46.07	0.00	0.00	0.00	20.01
		11	-17.47	-32.05	0.00	0.00	0.00	28.82

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	28	10	34.85	42.08	0.00	0.00	0.00	20.54
		11	-34.85	-28.05	0.00	0.00	0.00	23.29
11	27	11	17.47	32.05	0.00	0.00	0.00	-28.82
		12	-17.47	-18.02	0.00	0.00	0.00	60.11
	28	11	34.85	28.05	0.00	0.00	0.00	-23.29
		12	-34.85	-14.03	0.00	0.00	0.00	49.58
12	27	12	17.47	18.02	0.00	0.00	0.00	-60.11
		13	-17.47	-4.00	0.00	0.00	0.00	73.88
	28	12	34.85	14.02	0.00	0.00	0.00	-49.58
		13	-34.85	0.00	0.00	0.00	0.00	58.35
13	27	13	17.47	4.00	0.00	0.00	0.00	-73.88
		14	-17.47	10.03	0.00	0.00	0.00	70.11
	28	13	34.85	0.00	0.00	0.00	0.00	-58.35
		14	-34.85	14.03	0.00	0.00	0.00	49.58
14	27	14	17.47	-10.03	0.00	0.00	0.00	-70.11
		15	-17.47	24.05	0.00	0.00	0.00	48.81
	28	14	34.85	-14.03	0.00	0.00	0.00	-49.58
		15	-34.85	28.05	0.00	0.00	0.00	23.29
15	27	15	17.47	-24.05	0.00	0.00	0.00	-48.81
		16	-17.47	38.08	0.00	0.00	0.00	9.98
	28	15	34.85	-28.05	0.00	0.00	0.00	-23.29
		16	-34.85	42.08	0.00	0.00	0.00	-20.54
16	27	16	17.47	-38.08	0.00	0.00	0.00	-9.98
		17	-17.47	52.10	0.00	0.00	0.00	-46.38
	28	16	34.85	-42.08	0.00	0.00	0.00	20.54
		17	-34.85	56.10	0.00	0.00	0.00	-81.90
17	27	18	78.60	-39.46	0.00	0.00	0.00	-78.27
		19	-75.29	27.10	0.00	0.00	0.00	34.34
	28	18	82.60	-49.63	0.00	0.00	0.00	-75.57
		19	-79.29	33.83	0.00	0.00	0.00	20.45
18	27	19	75.29	-27.10	0.00	0.00	0.00	-34.34
		20	-71.98	16.24	0.00	0.00	0.00	5.79
	28	19	79.29	-33.83	0.00	0.00	0.00	-20.45
		20	-75.97	19.53	0.00	0.00	0.00	-14.73
19	27	20	71.98	-16.24	0.00	0.00	0.00	-5.79
		21	-68.66	6.88	0.00	0.00	0.00	-9.36
	28	20	75.98	-19.53	0.00	0.00	0.00	14.73
		21	-72.66	6.72	0.00	0.00	0.00	-31.96
20	27	21	68.66	-6.88	0.00	0.00	0.00	9.36
		22	-65.35	-0.98	0.00	0.00	0.00	-13.10

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- MTO MET

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	28	21	72.66	-6.72	0.00	0.00	0.00	31.96
		22	-69.35	-4.59	0.00	0.00	0.00	-33.20
21	27	22	65.35	0.98	0.00	0.00	0.00	13.10
		23	-62.04	-7.35	0.00	0.00	0.00	-7.41
	28	22	69.35	4.59	0.00	0.00	0.00	33.20
		23	-66.04	-14.40	0.00	0.00	0.00	-20.45
22	27	23	62.04	7.35	0.00	0.00	0.00	7.41
		24	-58.73	-12.22	0.00	0.00	0.00	5.72
	28	23	66.04	14.40	0.00	0.00	0.00	20.45
		24	-62.72	-22.72	0.00	0.00	0.00	4.30
23	27	24	58.73	12.22	0.00	0.00	0.00	-5.72
		25	-55.41	-15.59	0.00	0.00	0.00	24.31
	28	24	62.73	22.72	0.00	0.00	0.00	-4.30
		25	-59.41	-29.53	0.00	0.00	0.00	39.08
24	27	25	55.41	15.59	0.00	0.00	0.00	-24.31
		17	-52.10	-17.47	0.00	0.00	0.00	46.38
	28	25	59.41	29.53	0.00	0.00	0.00	-39.08
		17	-56.10	-34.85	0.00	0.00	0.00	81.90

********** END OF LATEST ANALYSIS RESULT **********

171. PLOT DIS FILE
172. PLOT BEN FILE
173. FINISH

********** END OF STAAD-III **********

**** DATE= OCT 4,1999 TIME= 10:40:26 ****

****
* FOR QUESTIONS REGARDING THIS VERSION OF PROGRAM *
* TEL:(0454) 281-080, FAX:(0454)-415-866 THORNBURY UK *
* 10, St.MARY ST, St.MARY CENTRE,THORNBURY,BRISTOL,UK *
****

D.O. 305+529

MOMENTOS FLECTORES

DINTEL	b_0	h	r	U_o	Coef. Impacto	M_d	$M_{tot.}$	U_{s1}	$0.04*A_c*f_{cd}$	$A_{s,nec.}$	$A_{s,disp.}$
Exterior	1.00	1.10	0.04	1501.67	1.30	143.86	187.02	188.23	70.67	42.44	46.13
interior	1.00	1.10	0.04	1501.67	1.30	117.00	152.1	151.09	70.67	34.07	34.34

HASTIALES	b_0	h	r	U_0	Coef. Impacto	M_d	$M_{tot.}$	N_d	e=M/N	Mtot	U_{s1}	$0.04*A_c*f_{cd}$	$A_{s,nec.}$	A_{min}	$A_{s,disp.}$
Hastial exterior	1.00	1.00	0.04	1360.00	1.00	131.35	131.35	83.94	1.565	169.96	106.43	64.00	24.00	9.00	----------
Superior Izda.	1.00	1.00	0.04	1360.00	1.00	102.83	102.83	56.10	1.833	128.64	85.24	64.00	19.22	9.00	----------
Hastial exterior	1.00	1.00	0.04	1360.00	1.00	143.86	143.86	88.96	1.617	184.78	119.50	64.00	26.95	9.00	26.81
Superior dcha.	1.00	1.00	0.04	1360.00	1.00	115.18	115.18	59.31	1.942	142.46	98.21	64.00	22.15	9.00	----------
Hastial exterior	1.00	1.00	0.04	1360.00	1.00	176.60	176.60	73.39	2.406	210.36	166.98	64.00	37.65	9.00	46.13
Inferior Izda.	1.00	1.00	0.04	1360.00	1.00	163.06	163.06	117.92	1.383	217.30	131.27	64.00	29.60	9.00	----------
Hastial exterior	1.00	1.00	0.04	1360.00	1.00	150.38	150.38	82.60	1.821	188.38	130.29	64.00	29.38	9.00	----------
Inferior dcha.	1.00	1.00	0.04	1360.00	1.00	136.56	136.56	118.52	1.152	191.08	97.71	64.00	22.03	9.00	----------
Hastial interior	1.00	1.00	0.04	1360.00	1.00	68.27	68.27	69.35	0.984	100.17	39.34	64.00	10.58	9.00	13.40
	1.00	1.00	0.04	1360.00	1.00	65.01	65.01	66.14	0.983	95.43	37.20	64.00	10.14	9.00	----------
	1.00	1.00	0.04	1360.00	1.00	59.92	59.92	72.56	0.826	93.30	28.37	64.00	8.18	9.00	----------

D.O. 305+529

ESFUERZOS CORTANTES

	ξ	ρ_1	V_{cu}	V_d	$V_{d\ canto\ util}$	Coef. Impacto	V_{tot}	A_{st}	$A_{st,min}$
Dintel	1.49	0.0044	33.99	87.65	62.16	1.20	74.59	10.43	8.17

	ξ	ρ_1	V_{cu}	V_d	$V_{d\ canto\ util}$	Coef. Impacto	V_{tot}	A_{st}	$A_{st,min}$
Hastial superior	1.51	0.0028	26.99	61.12	49.78	1.00	49.78	6.47	8.17
Hastial inferior	1.51	0.0048	32.34	94.33	65.64	1.00	65.64	9.45	8.17

DIMENSIONAMIENTO DE ZAPATAS

	Espesor Hastial	Longitud zapata	Canto zapata	Vuelo interior	Vuelo exterior	S. Ref. Mom. Int.	S. Ref. Mom. Ext.	S. Ref. Cort. Int.	S. Ref. Cort. Ext.
DIMENSIONES	1.000	3.400	1.000	1.200	1.200	1.35	1.35	0.240	0.240

ESFUERZOS	**H-1**	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
Momento	-108.63	-91.16	-20.98	-78.27	-21.09	-55.02
Axil	80.46	82.60	88.07	78.60	89.28	91.42
F. Horizontal	60.31	57.42	20.07	39.46	20.07	45.85
H tierras ext.	14.10	14.10	14.10	14.10	14.10	14.10
H tierras int.	4.30	4.30	4.30	4.30	4.30	4.30

AXILES	**H-1**	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
Ordenador	80.46	82.60	88.07	78.60	89.28	91.42
Peso zapata	8.50	8.50	8.50	8.50	8.50	8.50
Peso tierras ext.	33.84	33.84	33.84	33.84	33.84	33.84
Peso tierras int.	10.32	10.32	10.32	10.32	10.32	10.32
Axil total	**133.12**	**135.26**	**140.73**	**131.26**	**141.94**	**144.08**

MOMENTOS	**H-1**	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
Ordenador	-108.63	-91.16	-20.98	-78.27	-21.09	-55.02
F. Horizontal	60.31	57.42	20.07	39.46	20.07	45.85
Peso tierras ext.	37.22	37.22	37.22	37.22	37.22	37.22
Peso tierras int.	-11.35	-11.35	-11.35	-11.35	-11.35	-11.35
M total	**-22.45**	**-7.87**	**24.96**	**-12.94**	**24.85**	**16.70**

TENSIONES EN EL TERRENO

	H-1	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
σ_1(interior)	50.80	43.87	28.44	45.32	28.85	33.71
σ_2(exterior)	27.50	35.70	54.35	31.89	54.65	51.05
σ_2(media)	39.15	39.78	41.39	38.61	41.75	42.38

TENSIONES PARA ARMAR

	H-1	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
σ_1(interior)	48.30	41.37	25.94	42.82	26.35	31.21
σ_A	39.05	38.12	36.22	37.49	36.59	38.09
σ_B	34.25	36.44	41.56	34.72	41.90	41.66
σ_C (cort. int)	46.66	40.79	27.76	41.87	28.17	32.43
σ_D (cort. ext)	26.65	33.78	50.02	30.34	50.32	47.32
σ_2(exterior)	25.00	33.20	51.85	29.39	52.15	48.55

ESFUERZOS	**H-1**	**H-2**	**H-3**	**H-4**	**H-5**	**H-6**
Mom. Superior	-31.09	-26.59	-16.64	-27.29	-17.01	-20.41
	2.38	-3.26	-16.15	-0.43	-16.43	-14.17
Mom. Inferior	31.09	26.59	16.64	27.29	17.01	20.41
	-2.38	3.26	16.15	0.43	16.43	14.17
Cortante Int.	8.73	7.19	3.78	7.50	3.88	4.97
Cortante ext.	1.17	-0.67	-4.86	0.20	-4.93	-4.14

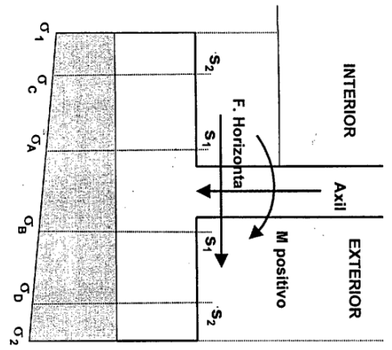
DIMENSIONAMIENTO

h	**r**	**$0.04*A_c*f_{cd}$**	**U_c**
1.00	0.04	64.00	1360.00

	Coef. Mayor.	**M**	**M_d**	**U_{s1}**	**$A_{s,nec.}$**	**$A_{s,disp.}$**
Armadura sup.	1.50	2.38	3.57	3.73	1.24	5.65
Armadura Inf.	1.50	31.09	46.64	49.48	12.42	15.71

	ξ	**ρ_1**	**V_{cu}**	**V**	**Coef. Mayor.**	**V_d**	**A_{st}**	**$A_{st,min}$**
Cortante	1.51	0.0016	22.58	8.73	1.50	13.10	no	———

ESQUEMA



COMPROBACIÓN A FISURACIÓN

Dintel

Recubrimiento = 0.04 m
Es = 21000000 T/m^2
canto = 1.10 m
β = 1.7
fck = 250 kg/cm^2

		Armadura dispuesta																
		Básica		Refuerzo														
Sección	Mk	ϕ	sep	ϕ	sep	s	K_1	K_2	$\phi_{equiv.}$	$A_{c,eficaz}$	A_s	M_{fis}	σ_s	s_m	ε_{sm}	w_k	$w_{máx}$
	(mT)	(mm)	(cm)	(mm)	(cm)	(m)			(mm)	(m^2)	(cm^2)	(mT)	(T/m^2)	(mm)		**(mm)**	**(mm)**
1	86.37	16	15	25	15	0.15	0.125	0.50	25	0.28	46.13	54.42	22080	184.52	0.0008	**0.26**	**0.30**
2	13.88	20	15	16	15	0.15	0.125	0.50	20	0.28	34.35	54.42	4765	190.06	0.0001	**0.03**	**0.30**
3	46.38	16	15	25	15	0.15	0.125	0.50	25	0.28	46.13	54.42	11857	184.52	0.0002	**0.07**	**0.30**

Hastiales

Recubrimiento = 0.04 m
Es = 21000000 T/m^2
canto = 1.00 m
β = 1.7
fck = 250 kg/cm^2

			Armadura dispuesta																
			Básica		Refuerzo														
Sección	Mk	Nk	ϕ	sep	ϕ	sep	s	K_1	K_2	$\phi_{equiv.}$	$A_{c,eficaz}$	A_s	M_{fis}	σ_s	s_m	ε_{sm}	w_k	$w_{máx}$
(m)	(mT)	(T)	(mm)	(cm)	(mm)	(cm)	(m)			(mm)	(m^2)	(cm^2)	(mT)	(T/m^2)	(mm)		**(mm)**	**(mm)**
1	81.90	56.10	16	15	25	15	0.15	0.125	0.50	25	0.25	46.13	44.98	18241	177.74	0.0007	**0.22**	**0.30**
2	34.45	71.00	16	15			0.15	0.125	0.50	16	0.25	13.40	44.98	12222	259.21	0.0002	**0.10**	**0.30**
3	78.27	78.60	16	15	25	15	0.15	0.125	0.50	25	0.25	46.13	44.98	15260	177.74	0.0006	**0.18**	**0.30**

Zapata

Recubrimiento = 0.04 m
Es = 21000000 T/m^2
canto = 1.10 m
β = 1.7
fck = 250 kg/cm^2

Sección	Mk (mT)	Armadura dispuesta: Básica ϕ (mm)	Básica sep (cm)	Refuerzo ϕ (mm)	Refuerzo sep (cm)	s (m)	K_1	K_2	$\phi_{equiv.}$ (mm)	$A_{c,eficaz}$ (m^2)	A_s (cm^2)	M_{fis} (mT)	σ_s (T/m^2)	s_m (mm)	ε_{sm}	w_k (mm)	$w_{máx}$ (mm)
1	31.09	20	20			0.20	0.125	0.50	20	0.28	15.71	54.42	23340	295.07	0.0004	**0.22**	**0.30**

4. MUROS

4. MUROS

Se calculan los muros de la estructura que nos ocupa, mediante programa desarrollado en base a los criterios normalmente utilizados en el cálculo de los citados elementos estructurales.

Partiendo de los datos de cada situación en estudio: características del relleno, posibilidad de sobrecarga o terraplén en el trasdós, muro de paramento vertical o inclinado y de unos datos previos de la geometría el programa efectúa los cálculos siguientes:

- Determinación de la puntera y el talón del muro, en función de cumplir las condiciones de estabilidad y tensiones admisibles en el terreno impuestas y que son las que siguen:

  . Coeficiente de seguridad al deslizamiento: 1,50
  . Coeficiente de seguridad al vuelco: 2,00

Los resultados que el programa facilita son:

a) Geometría completa del muro, alzado y cimentación.

b) Armaduras completas del mismo, armaduras principales y de reparto.

c) Tensiones en el terreno, en la situación más desfavorable.

d) Coeficientes de seguridad al vuelco y deslizamiento.

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CALCULO DE MUROS. VERSION 09-01-1996

PROGRAMA PROPIEDAD DE INTECSA


        CARACTERISTICAS DEL RELLENO
        ===========================

PESO ESPECIFICO  (TN/M3)                    =  2.00
ANGULO DE ROZAMIENTO FI                     = 35.00
ANGULO ROZAMIENTO TERRENO-MURO              =   .00
ANGULO DE TALUD DEL TERRENO                 = 26.56
SOBRECARGA  (TN/M2)                         =   .00
PENDIENTE DE INCLINACION DEL TRASDOS        =   .0900

COEFICIENTE DE EMPUJE ACTIVO                =   .448
COEFICIENTE DE EMPUJE ACTIVO VERTICAL       =   .040


        CARACTERISTICAS DE LOS MATERIALES
        =================================

RESISTENCIA CARACTERISTICA DEL HORMIGON  =   250. KG/CM2
LIMITE ELASTICO DEL ACERO               =  5100. KG/CM2
RECUBRIMIENTO DE LAS ARMADURAS          =   .040 M
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GEOMETRIA DEL MURO
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ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	1.05
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	9.40
ALTURA DE TIERRAS	H	=	9.10

ZAPATA

VUELO DELANTERO	A1	=	.98
VUELO TRASERO	A4	=	3.80
LONGITUD TOTAL	L	=	5.83
CANTO	C	=	1.10
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.=	36.9 CM2/M	(FI 25 A	.125 M)
		AH.=	9.2 CM2/M	(FI 16 A	.200 M)
	5.1 M. SUPERIORES	AV.=	18.5 CM2/M	(FI 25 A	.250 M)
		AH.=	6.5 CM2/M	(FI 12 A	.150 M)
INTRADOS		AV.=	3.4 CM2/M	(FI 12 A	.250 M)
		AH.=	7.6 CM2/M	(FI 16 A	.250 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL	=	6.8 CM2/M	(FI 12 A	.150 M)
	A. DE REPARTO	=	2.0 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL	=	33.6 CM2/M	(FI 25 A	.125 M)
	A. DE REPARTO	=	10.1 CM2/M	(FI 16 A	.175 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 28.73)

S1 = 35.92 SA = 30.14 SB = 23.97 S2 = 1.58

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO	=	1.50
COEFICIENTE DE SEGURIDAD AL VUELCO	=	2.55

VOLUMEN DE HORMIGON = 12.26 M3. PESO DE ACERO = 767.7 KG

GEOMETRIA DEL MURO
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ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.75
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	6.10
ALTURA DE TIERRAS	H	=	5.80

ZAPATA

VUELO DELANTERO	A1	=	.61
VUELO TRASERO	A4	=	2.35
LONGITUD TOTAL	L	=	3.71
CANTO	C	=	.80
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.=	13.0 CM2/M	(FI 20 A	.225 M)
		AH.=	6.0 CM2/M	(FI 12 A	.175 M)
	5.1 M. SUPERIORES	AV.=	18.5 CM2/M	(FI 20 A	.250 M)
		AH.=	.1 CM2/M	(FI 12 A	.150 M)
INTRADOS		AV.=	2.4 CM2/M	(FI 8 A	.200 M)
		AH.=	6.0 CM2/M	(FI 12 A	.175 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL	=	2.6 CM2/M	(FI 12 A	.250 M)
	A. DE REPARTO	=	.8 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL	=	12.0 CM2/M	(FI 20 A	.250 M)
	A. DE REPARTO	=	3.6 CM2/M	(FI 12 A	.250 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 19.45)

S1 = 24.31 SA = 20.36 SB = 15.51 S2 = .29

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO	=	1.50
COEFICIENTE DE SEGURIDAD AL VUELCO	=	2.50

VOLUMEN DE HORMIGON = 5.86 M3. PESO DE ACERO = 247.8 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	1.10
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	10.40
ALTURA DE TIERRAS	H	=	10.10

ZAPATA

VUELO DELANTERO	A1	=	1.10
VUELO TRASERO	A4	=	4.10
LONGITUD TOTAL	L	=	6.30
CANTO	C	=	1.10
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 48.9 CM2/M	(FI 25 A .100 M)
		AH.= 12.2 CM2/M	(FI 20 A .250 M)
	5.6 M. SUPERIORES	AV.= 24.5 CM2/M	(FI 25 A .200 M)
		AH.= 6.7 CM2/M	(FI 12 A .150 M)
INTRADOS		AV.= 3.5 CM2/M	(FI 12 A .250 M)
		AH.= 5.9 CM2/M	(FI 12 A .175 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	9.2 CM2/M	(FI 16 A .200 M)
	A. DE REPARTO =	2.7 CM2/M	(FI 12 A .250 M)
CARA SUPERIOR.	A. PRINCIPAL =	45.1 CM2/M	(FI 25 A .100 M)
	A. DE REPARTO =	13.5 CM2/M	(FI 20 A .225 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 31.88)

S1 = 39.85 SA = 33.05 SB = 26.24 S2 = .88

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO	= 1.50
COEFICIENTE DE SEGURIDAD AL VUELCO	= 2.50

VOLUMEN DE HORMIGON = 13.69 M3. PESO DE ACERO = 987.1 KG

GEOMETRIA DEL MURO
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ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.68
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	5.30
ALTURA DE TIERRAS	H	=	5.00

ZAPATA

VUELO DELANTERO	A1	=	.53
VUELO TRASERO	A4	=	2.02
LONGITUD TOTAL	L	=	3.23
CANTO	C	=	.70
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 9.6 CM2/M	(FI 16 A .200 M)
		AH.= 5.4 CM2/M	(FI 12 A .200 M)
	5.6 M. SUPERIORES	AV.= 24.5 CM2/M	(FI 16 A .200 M)
		AH.= .1 CM2/M	(FI 12 A .150 M)
INTRADOS		AV.= 2.2 CM2/M	(FI 8 A .200 M)
		AH.= 5.4 CM2/M	(FI 12 A .200 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	1.9 CM2/M	(FI 12 A .250 M)
	A. DE REPARTO =	.6 CM2/M	(FI 12 A .250 M)
CARA SUPERIOR.	A. PRINCIPAL =	9.5 CM2/M	(FI 16 A .200 M)
	A. DE REPARTO =	2.8 CM2/M	(FI 12 A .250 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 16.72)

S1 = 20.89 SA = 17.53 SB = 13.24 S2 = .43

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO	= 1.52
COEFICIENTE DE SEGURIDAD AL VUELCO	= 2.52

VOLUMEN DE HORMIGON = 4.58 M3. PESO DE ACERO = 181.7 KG

GEOMETRIA DEL MURO
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ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	1.05
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	9.50
ALTURA DE TIERRAS	H	=	9.20

ZAPATA

VUELO DELANTERO	A1	=	1.00
VUELO TRASERO	A4	=	3.85
LONGITUD TOTAL	L	=	5.90
CANTO	C	=	1.10
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 37.9 CM2/M	(FI 25 A	.125 M)
		AH.= 9.5 CM2/M	(FI 16 A	.200 M)
	5.2 M. SUPERIORES	AV.= 18.9 CM2/M	(FI 25 A	.250 M)
		AH.= 6.6 CM2/M	(FI 12 A	.150 M)
INTRADOS		AV.= 3.4 CM2/M	(FI 12 A	.250 M)
		AH.= 7.5 CM2/M	(FI 12 A	.150 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	7.1 CM2/M	(FI 12 A	.150 M)
	A. DE REPARTO =	2.1 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	34.6 CM2/M	(FI 25 A	.125 M)
	A. DE REPARTO =	10.4 CM2/M	(FI 16 A	.175 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 28.79)

S1 = 35.99 SA = 30.20 SB = 24.09 S2 = 1.81

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO = 1.51
COEFICIENTE DE SEGURIDAD AL VUELCO = 2.57

VOLUMEN DE HORMIGON = 12.46 M3. PESO DE ACERO = 772.8 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.80
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	6.70
ALTURA DE TIERRAS	H	=	6.40

ZAPATA

VUELO DELANTERO	A1	=	.67
VUELO TRASERO	A4	=	2.65
LONGITUD TOTAL	L	=	4.12
CANTO	C	=	.80
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 16.4 CM2/M	(FI 20 A	.175 M)
		AH.= 6.5 CM2/M	(FI 12 A	.175 M)
	3.1 M. SUPERIORES	AV.= 8.2 CM2/M	(FI 20 A	.350 M)
		AH.= 4.9 CM2/M	(FI 12 A	.225 M)
INTRADOS		AV.= 2.6 CM2/M	(FI 12 A	.250 M)
		AH.= 6.5 CM2/M	(FI 12 A	.175 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	3.3 CM2/M	(FI 12 A	.250 M)
	A. DE REPARTO =	1.0 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	15.9 CM2/M	(FI 20 A	.175 M)
	A. DE REPARTO =	4.8 CM2/M	(FI 12 A	.225 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 20.58)

S1 = 25.72 SA = 21.71 SB = 16.90 S2 = 1.04

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO = 1.52
COEFICIENTE DE SEGURIDAD AL VUELCO = 2.57

VOLUMEN DE HORMIGON = 6.66 M3. PESO DE ACERO = 305.2 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	1.08
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	9.80
ALTURA DE TIERRAS	H	=	9.50

ZAPATA

VUELO DELANTERO	A1	=	1.06
VUELO TRASERO	A4	=	4.00
LONGITUD TOTAL	L	=	6.14
CANTO	C	=	1.10
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 40.8 CM2/M	(FI 25 A	.100 M)
		AH.= 10.2 CM2/M	(FI 16 A	.175 M)
	5.0 M. SUPERIORES	AV.= 20.4 CM2/M	(FI 25 A	.200 M)
		AH.= 6.5 CM2/M	(FI 12 A	.150 M)
INTRADOS		AV.= 3.5 CM2/M	(FI 12 A	.250 M)
		AH.= 7.2 CM2/M	(FI 12 A	.150 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	7.9 CM2/M	(FI 16 A	.250 M)
	A. DE REPARTO =	2.4 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	37.7 CM2/M	(FI 25 A	.125 M)
	A. DE REPARTO =	11.3 CM2/M	(FI 16 A	.175 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 28.97)

S1 = 36.21 SA = 30.40 SB = 24.46 S2 = 2.51

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO	=	1.52
COEFICIENTE DE SEGURIDAD AL VUELCO	=	2.62

VOLUMEN DE HORMIGON = 13.04 M3. PESO DE ACERO = 876.1 KG

GEOMETRIA DEL MURO
==========

ALZADO DEL MURO

ANCHO EN CORONACION	A3	=	.20
ANCHO EN LA BASE	A2	=	.91
INCLINACION DEL TRASDOS	CTG(ALFA)	=	.09000
ALTURA TOTAL	H1	=	7.90
ALTURA DE TIERRAS	H	=	7.60

ZAPATA

VUELO DELANTERO	A1	=	.79
VUELO TRASERO	A4	=	3.16
LONGITUD TOTAL	L	=	4.86
CANTO	C	=	.90
RESGUARDO SOBRE ZAPATA		=	0.30
TENSION MEDIA PEDIDA SOBRE TERRENO		=	LIBRE

ARMADURAS DEL ALZADO

TRASDOS.	ZONA INFERIOR	AV.= 24.4 CM2/M	(FI 20 A	.125 M)
		AH.= 7.3 CM2/M	(FI 12 A	.150 M)
	3.7 M. SUPERIORES	AV.= 12.2 CM2/M	(FI 20 A	.250 M)
		AH.= 5.4 CM2/M	(FI 12 A	.200 M)
INTRADOS		AV.= 2.9 CM2/M	(FI 12 A	.250 M)
		AH.= 7.3 CM2/M	(FI 12 A	.150 M)

ARMADURA DE ZAPATA

CARA INFERIOR.	A. PRINCIPAL =	4.7 CM2/M	(FI 12 A	.225 M)
	A. DE REPARTO =	1.4 CM2/M	(FI 12 A	.250 M)
CARA SUPERIOR.	A. PRINCIPAL =	23.8 CM2/M	(FI 20 A	.125 M)
	A. DE REPARTO =	7.1 CM2/M	(FI 12 A	.150 M)

TENSIONES EN EL TERRENO (TN/M2) SIN SISMO. (S. ADM.= 24.18)

S1 = 30.23 SA = 25.52 SB = 20.08 S2 = 1.23

COEFICIENTE DE SEGURIDAD AL DESLIZAMIENTO	=	1.52
COEFICIENTE DE SEGURIDAD AL VUELCO	=	2.56

VOLUMEN DE HORMIGON = 8.76 M3. PESO DE ACERO = 456.4 KG

Modificación de Pasos Inferiores

MODIFICACIÓN PASOS INFERIORES

.1.-Estructura E-11 P.K. 305+529

.1.1.- Antecedentes

La obra proyectada que configura la estructura para el Paso Inferior en el P.K. 305+529, consiste en un pórtico abierto de 28,40 m de longitud, luz libre de 9,00 m y altura de hastíales de 9,50 m.

La elevación de la cota de rasante de la vía en este punto kilométrico de la traza de 1,24 m da lugar a un nuevo dimensionamiento de la estructura, que al estar más cargada transmitirá al terreno mayor tensión que en el Proyecto, a igualdad de otros parámetros.

La cimentación de la estructura se realiza en una zona de transición de desmonte a terraplén y por ello hay que buscar la cimentación en cotas más profundas que permitan una transmisión uniforme de las tensiones en ambas zapatas independientes.

La incertidumbre que dicha cimentación puede suponer en cuanto a esta transmisión uniforme y el incremento de tensiones que se producirá por la mayor carga de tierras, parece recomendar un cambio en la tipología de la estructura pasando de pórtico abierto a pórtico cerrado.

Ello permite asegurar un reparto uniforme de las tensiones sobre el terreno, bajar los valores de las mismas y reducir la altura de los hastíales a los valores estrictamente necesarios; es decir, tener la certeza de que el funcionamiento de la obra de fábrica durante su vida útil, será el que se plantea y desarrolla en los cálculos.

Por otra parte permite también una ejecución más razonable sin excavaciones innecesarias, una obra de menores dimensiones a la proyectada y con toda seguridad un ahorro de tiempo importante.

Se propone, por tanto, la ejecución de un pórtico cerrado unicelular de 34,40 m de longitud, 9,00 m de ancho libre y 6,25 m de altura, de modo que el gálibo resultante es de 5,30 m, mayor que el de Proyecto y todos los espesores de 0,75 m.

.1.2.- Descripción de la obra

El paso inferior que se proyecta consiste en un pórtico cerrado unicelular normal a la traza, que la corta en su P.K. 305+529, de 34,40 m de longitud, 9,00 m de ancho libre y 6,25 m de altura libre, por donde cruzará a la L.A.V. el vial correspondiente a la Reposición n° 7 consistente en un camino de 5,00 m de ancho. Dicha obra de fábrica se completa con aletas laterales a 30° para contener los derrames del terraplén de la traza.

Los espesores de todos los elementos del pórtico son de 0,75 m.

Para evitar que algunas zonas o elementos de la obra tengan unas dimensiones excesivas, en caso de ser cimentadas en el terreno natural y conseguir un apoyo uniforme, se prevé el relleno de la zona afectada hasta la cota 507, donde se cimentará toda la obra de fábrica.

.1.3.- Cálculos estructurales

Los presentes cálculos tienen por finalidad última el dimensionamiento de las diferentes secciones que componen el Paso Inferior al ferrocarril a ejecutar en el P .K. 305 + 529 de la Línea de Alta Velocidad Madrid – Zaragoza – Barcelona – Frontera Francesa. Tramo Lleida - Martorell. Subtramo III-A, a partir de la definición geométrica diseñada como variante a la que aparece en el Proyecto Original y de las Bases de Cálculo correspondiente según las diferentes Normas e Instrucciones vigentes en la actualidad y exigidas por el G.I.F.

1.3.1.- Hipótesis de cálculo

Para el cálculo de los diferentes elemento que componen la estructura, se han considerado los siguientes parámetros:

CARACTERISTICAS MECANICAS DEL TERRENO

Peso Específico de las Tierras	$\gamma_t = 1{,}9$ t/m^3
Angulo de Rozamiento interno	$\varphi = 35°$
Angulo de Rozamiento Terreno-Hastial	$\delta = 0°$
Angulo Talud del Terreno	$\beta = 0°$
Inclinación de Hastiales	$(b : h) = \cot \alpha = 0$
Coeficiente Empuje Activo Horizontal	$\lambda_a = 0{,}27$
Coeficiente Empuje Reposo Horizontal	$\lambda_r = 0{,}43$
Coeficiente o Módulo de Balasto Vertical	C = 3.500 t/m^3
Tensión Admisible del Terreno	$\sigma = 2{,}5$ kp/cm^2

CARACTERISTICAS MECANICAS DEL HORMIGON

Densidad del Hormigón Armado		$\gamma_h = 2{,}5$ t/m^3
Resistencia Característica	HA-25/P/20/IIb/H	$f_{ck} = 250$ kp/cm^2
Nivel de Control		Normal

CARACTERISTICAS MECANICAS DEL ACERO PARA ARMAR

Resistencia Característica	B-500 S	$f_{yk} = 5.100$ kp/cm^2
Recubrimientos		c = 40 mm
Nivel de Control		Normal

SOBRECARGAS CONSIDERADAS

Tren de Cargas RENFE

Tren de Cargas U.I.C.

Uniformemente Repartida en el Espaldón de 3 t/m^2

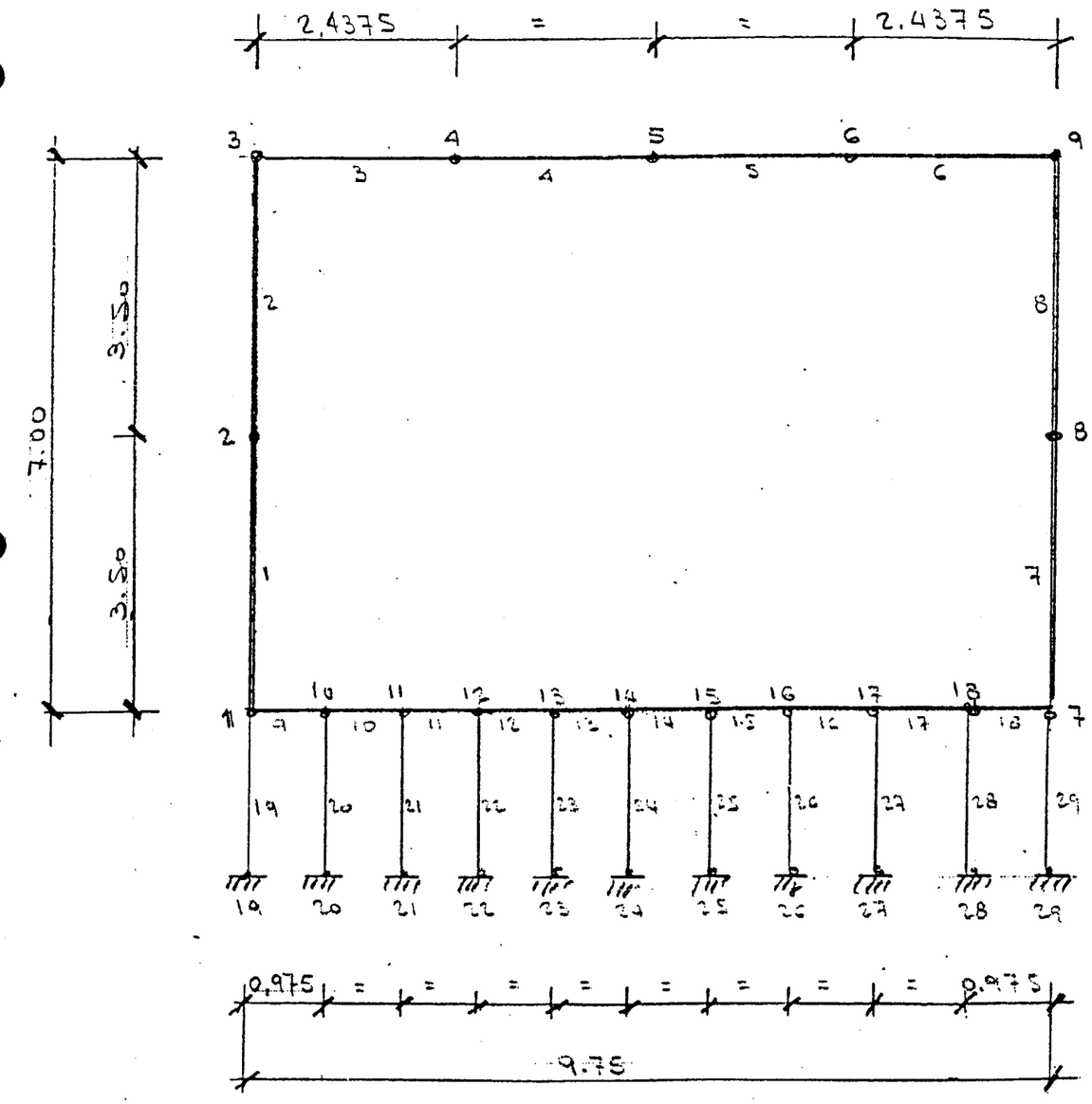
EJECUCION

Nivel de Control Normal

1.3.2.- Discretización de la estructura

STRESS EN ESTRUCTURA PLANA ORTOGONAL. DISCRETIZACION

N° de Barras	29
N° de Nudos	29
Ancho de banda de la matriz de rigidez	(29 - 7 + 1) x 3= 69
N° de Hipótesis	16



ASUNTO		FECHA	REF.	HOJA
DEFINICION DE BARRAS.				
-BARRAS 19 y 29 (Ficticias de Borde).				
Longitud de las barras	L: 3.267.500 / 200 x 3.500 = 4,582 m			
Area de las barras	A: 1,00 x 0,975 / 2 x 200 = 0,002438 m²			
Inercia de las barras	Iz: 10⁻⁶ m⁴			
-BARRAS 20 A 28 (Ficticias centrales).				
Longitud de las barras	L: 3.267.500 / 200 . 3.500 = 4,582 m			
Area de las barras	A: 1,00 x 0,975 / 200 = 0,004875 m²			
Inercia de las barras	Iz: 10⁻⁶ m⁴			
-RESTO DE BARRAS.				
Area de las barras	Ax = Ay = 1,00 x 0,75 = 0,75 m²			
Inercia de las barras	$Iz = \frac{1}{12} \cdot 1,00 \times 0,75^3 = 0,035156$ m⁴			

1.3.3.- Análisis de cargas

ANALISIS DE CARGAS

Los datos de partida que nos permitirán formular un reparto de cargas uniforme, a partir de las cargas de las diferentes Instrucciones a considerar, en función del efecto distribuidor del sistema carril, traviesa, balasto y el propio dintel, son:

Longitud de la obra de fábrica		34,40 m
Esviaje con las vías		100 g
Ancho libre		9,00 m
Altura libre		6,25 m
Espesor de losas y hastiales		0,75 m
Distancia media de C.C. a dintel		5,856 m
Separación entre ejes de carriles	1,435 + 0,0743	1,5093 m
Altura carril de 60 kg./ m		0,172 m
Ancho patín carril de 60 kg / m		0,150 m
Altura traviesa monobloque en el eje		0,222 m
Espesor placa de asiento		0,005 m
Ancho traviesa monobloque		0,300 m
Espesor mínimo de balasto bajo traviesa		0,300 m
Espesor de tierras bajo balasto		5,157 m
Entrevía		4,700 m
Separación cargas extremas tren tipo A de RENFE		3,000 m
Separación cargas extremas tren tipo UIC		4,800 m

Mediante reparto longitudinal de cargas obtenemos, en el eje de la losa superior, una longitud de reparto de:

m= 2(0,300/2 + 0,300/tg 75° + 5,157/tg 55° + 0,750/2)= **8,433** m

Debido al efecto distribuidor del carril y dado que los ejes que transmiten la carga no coinciden todos sobre las traviesas, la longitud de reparto será de:

RENFE m1= 3,000 + 8,433= 11 433 m

U.I.C. m2= 4,800 + 8,433= 13,233 m

Mediante reparto transversal de cargas obtenemos, en el eje de la losa superior, un ancho de reparto de:

1 vía n= 1,5093+2(0,150/2+0,222+0,300/tg 75°+5,157/tg 55°+0,750/2)= **10,236** m

2 vías Dos anchos de 10,236 m separados a 4,700 m entre sus centros. Habrá solape de cargas en una franja central de 10,236 - 4,700= 5,536 m que estará doblemente cargada.

Por ello vamos a realizar el cálculo con los dos valores de la carga y según los resultados veremos la necesidad de reforzar, o no, la zona central de la estructura Cómo la longitud de toda la obra de fábrica es de 34,40 m, en el caso de ser necesario cambiar de armadurs, la dividiremos en tres tramos: dos laterales de 11,20 m con una sóla carga y una central de 12,00 m con doble carga.

COEFICIENTE DE IMPACTO.

Masa = $(0,75 \times 2,5 + 5,856 \times 1,8) \times 1000 / 9,8 = 1.266,92$ kg/m

Longitud = 9,75 m.

Inercia = $\frac{1}{12} \times 1,00 \times 0,75^3 = 0,035156$ m^4

Módulo Elasticidad Hormigón HA-25 = 3.207500 kg/m^2

Velocidad máxima IAF-75 = 200 km/h = 55,56 m/s.

RL = 0,035156 / 9,75 = 0,003606

RH = 0,035156 / 7,00 = 0,005022

$CR = \frac{0,003606}{0,008628} = 0,417928$

$C = 3,56 - 0,417928 (3,56 - 1,57) = 2,73$

$\frac{1}{T} = 2,73 \cdot \sqrt{3,2075 \times 10^9 \times 0,035156 / 1.266,92 \times 9,75^4} = 8,567653$

$\mu = 55,56 \times 0,116718 / 2 \times 9,75 = 0,332557$

$i = 65 \times 0,332557 / 1 - 0,332557 + 0,332557^2 = 27,78\%$

Coeficiente de impacto según IPF de RENFE – 1,2778

Coeficiente de impacto UIC para momentos flectores

$\phi_2 = \frac{1,44}{\sqrt{10,29} - 0,2} + 0,82 - 0,10 (5,856 - 0,172 - 0,005 - 1,00) = 1,00$

Coeficiente de impacto UIC para esfuerzo cortante

$\phi_1 = \frac{0,96}{\sqrt{10,29} - 0,2} + 0,88 - 0,10 (5,856 - 0,172 - 0,005 - 1,00) = 1,00$

ASUNTO | FECHA | REF. | HOJA

CARGAS VERTICALES.

Carga permanente en losa superior

Peso propio	0,75 × 2,5	= 1,875	
Carga muerta	5,856 × 1.8	= 10,541	
	TOTAL	12,416	t/m²

Sobrecarga móvil de uso en losa superior.

RENFE. Tren tipo A.

30 × 1,2778 / 8,433 × 10,236 = 0,444 t/m²

60 × 1,2778 / 9,933 × 10,236 = 0,754 t/m²

90 × 1,2778 / 11,433 × 10,236 = 0,983 t/m²

RENFE. Tren tipo B.

12 × 1,2778 / 10,236 = 1,498 t/m²

UIC - 1971.

25 × 1,00 / 8,433 × 10,236 = 0,290 t/m²

50 × 1,00 / 10,033 × 10,236 = 0,487 t/m²

75 × 1,00 / 11,633 × 10,236 = 0,630 t/m²

100 × 1,00 / 13,233 × 10,236 = 0,738 t/m²

8 × 1,00 / 10,236 = 0,782 t/m²

UIC - SW/2

15 × 1,00 / 10,236 = 1,465 t/m²

Carga permanente en traviesas.

Debido al peso propio de las traviesas. Fuerza vertical

Nudos 1-2-7-8 = 3,50 × 0,75 × 2,5 = 6,563 t/m

ASUNTO | FECHA | REF. | HOJA

CARGAS HORIZONTALES

Frenado (en nudo 3)

RENFE. Tren tipo A	$\frac{1}{8}(90+0,9\times90)$ / 34,40	= 0,621	t/m
RENFE. Tren tipo B	$\frac{1}{8}(12+0,9\times12)\times10,50/34,40$	= 0,870	t/m
(UIC	1 - 0,25(100+100) / 34,40	= 1,453	t/m
	2 - 0,25(8+8)(10,80-4,80) / 34,40	= 0,663	t/m
	3 - 0,25(15+15) × 10,50 / 34,40	= 2,289	t/m

cargas sobre traviesas debido al empuje de las tierras

Empuje activo superior	$(5,856+0,75/2)\times1.8\times0,27$	= 3,028	t/m
Empuje activo Inferior	3,028 + 7,00 × 1,9 × 0,27	= 5,619	t/m
Empuje Reposo Superior	$(5,856+0,75/2)\times1.8\times0,43$	= 4,823	t/m
Empuje Reposo Inferior	4,823 + 7,00 × 1,9 × 0,43	= 10,542	t/m

Carga sobre traviesas debido a la sobrecarga de 3 t/m²

Empuje Activo Rectangular.	3 × 0,27	= 0,810
Empuje Reposo Rectangular	3 × 0,43	= 1,290

1.3.4.- Hipótesis de carga

HIPOTESIS DE CARGA

HIPOTESIS 01 - PESO PROPIO + CARGAS MUERTAS
HIPOTESIS 02 - EMPUJE ACTIVO DE TIERRAS EN LOS DOS HASTIALES
HIPOTESIS 03 - EMPUJE REPOSO DE TIERRAS EN LOS DOS HASTIALES
HIPOTESIS 04 - EMPUJE REPOSO DE SOBRECARGA MOVIL EN UN HASTIAL
HIPOTESIS 05 - SOBRECARGA TREN TIPO A. RENFE EN UN LATERAL DEL VANO
HIPOTESIS 06 - SOBRECARGA TREN TIPO A. RENFE EN EL CENTRO DEL VANO
HIPOTESIS 07 - SOBRECARGA TREN TIPO A. RENFE EN EL OTRO LATERAL
HIPOTESIS 08 - SOBRECARGA TREN TIPO B. RENFE
HIPOTESIS 09 - FRENADO TREN TIPO A. RENFE
HIPOTESIS 10 - FRENADO TREN TIPO B. RENFE
HIPOTESIS 11 - SOBRECARGA TREN UIC MODELO 1971 EN UN LATERAL DEL VANO
HIPOTESIS 12 - SOBRECARGA TREN UIC MODELO 1971 EN EL CENTRO DEL VANO
HIPOTESIS 13 - SOBRECARGA TREN UIC MODELO 1971 EN EL OTRO LATERAL
HIPOTESIS 14 - SOBRECARGA TREN UIC MODELO SW/2
HIPOTESIS 15 - FRENADO TREN UIC MODELO 1971
HIPOTESIS 16 - FRENADO TREN UIC MODELO SW/2

COMBINACION DE HIPOTESIS

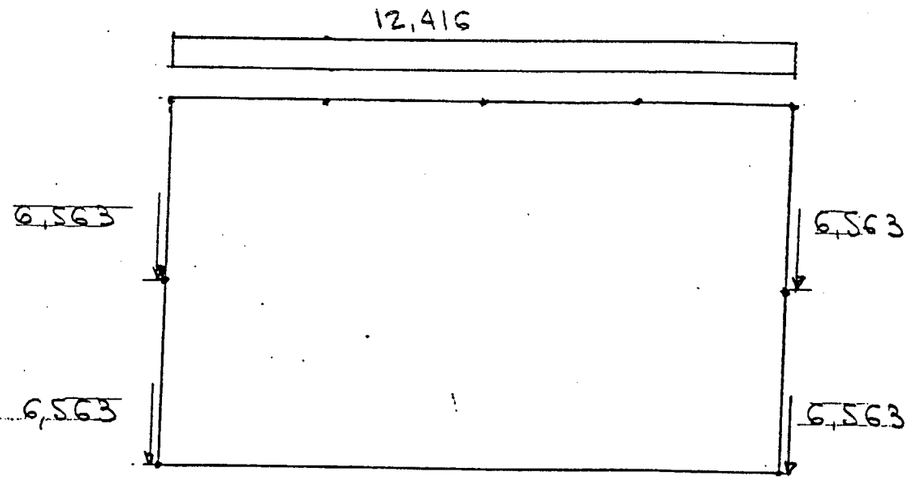
COMBINACION 01 - H-01 x 1,5 + H-02 x 1,6
COMBINACION 02 - H-01 x 1,5 + H-03 x 1,6
COMBINACION 03 - H-01 x 1,5 + (H-03 + H-04) x 1,6
COMBINACION 04 - H-01 x 1,5 + (H-02 + H-05) x 1,6
COMBINACION 05 - H-01 x 1,5 + (H-02 + H-06) x 1,6
COMBINACION 06 - H-01 x 1,5 + (H-02 + H-07) x 1,6
COMBINACION 07 - H-01 x 1,5 + (H-02 + H-11) x 1,6
COMBINACION 08 - H-01 x 1,5 + (H-02 + H-12) x 1,6
COMBINACION 09 - H-01 x 1,5 + (H-02 + H-13) x 1,6
COMBINACION 10 - H-01 x 1,5 + (H-02 + H-14) x 1,6
COMBINACION 11 - H-01 x 1,5 + (H-03 + H-04 + H-05 + H-09) x 1,6
COMBINACION 12 - H-01 x 1,5 + (H-03 + H-04 + H-06 + H-09) x 1,6
COMBINACION 13 - H-01 x 1,5 + (H-03 + H-04 + H-07 + H-09) x 1,6
COMBINACION 14 - H-01 x 1,5 + (H-03 + H-04 + H-08 + H-10) x 1,6
COMBINACION 15 - H-01 x 1,5 + (H-03 + H-04 + H-11 + H-15) x 1,6
COMBINACION 16 - H-01 x 1,5 + (H-03 + H-04 + H-12 + H-15) x 1,6
COMBINACION 17 - H-01 x 1,5 + (H-03 + H-04 + H-13 + H-15) x 1,6
COMBINACION 18 - H-01 x 1,5 + (H-03 + H-04 + H-14 + H-16) x 1,6

El dimensionamiento de las diferentes secciones se realizará con la envolvente de los esfuerzos pésimos resultantes de las combinaciones anteriores.

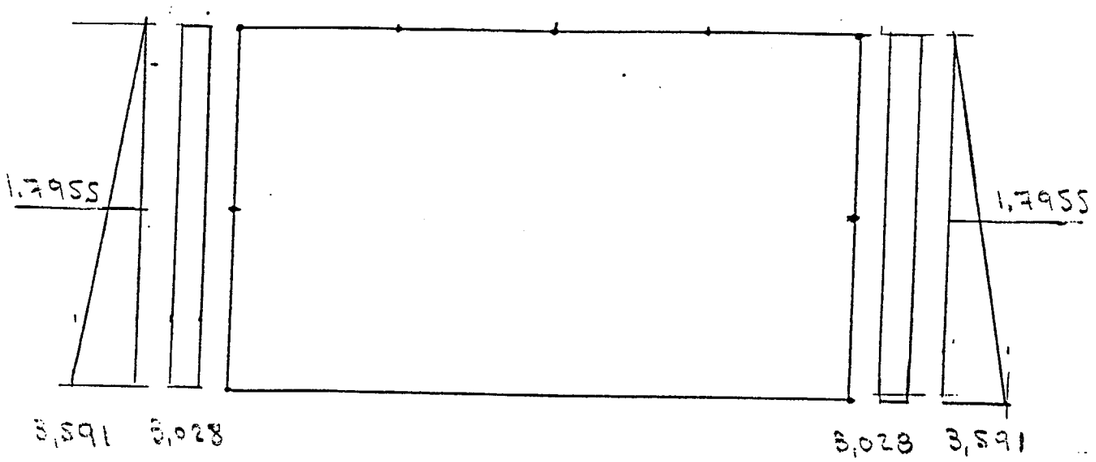
.1.3.5.- Zona central

ZONA CENTRAL

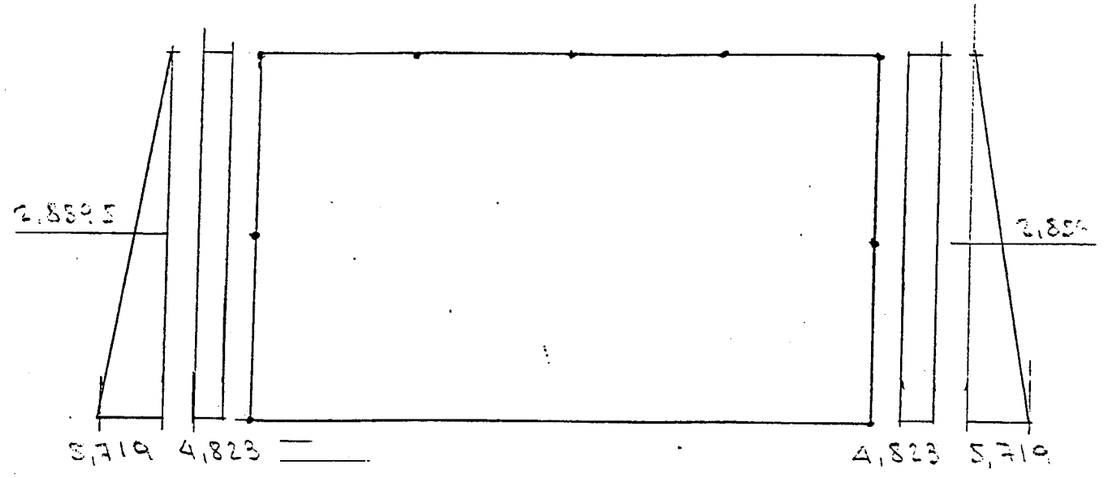
HIPOTESIS 01 - PESO PROPIO + CARGAS MUERTAS



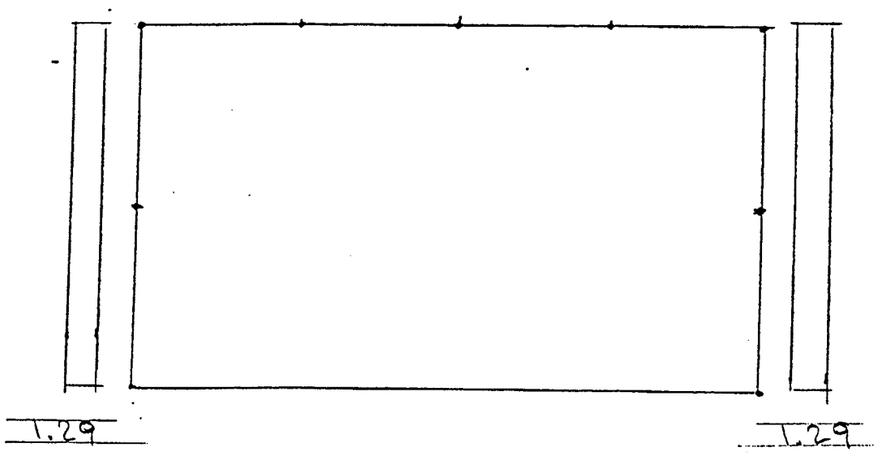
HIPOTESIS 02 - EMPUJE ACTIVO DE TIERRAS EN LOS DOS HASTIALES



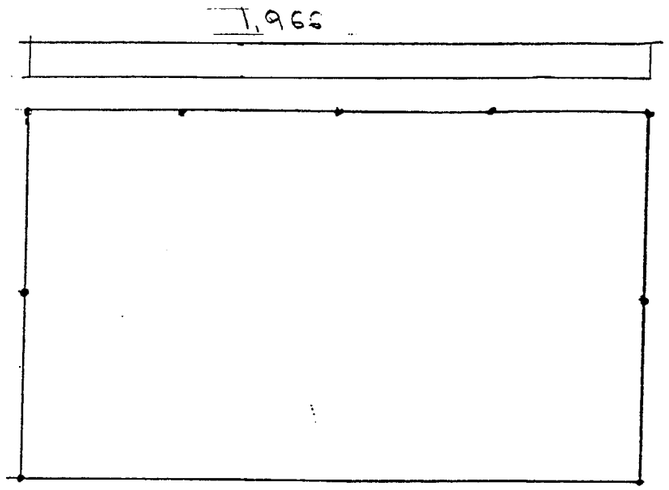
HIPOTESIS 03 - EMPUJE REPOSO DE TIERRAS EN LOS DOS HASTIALES



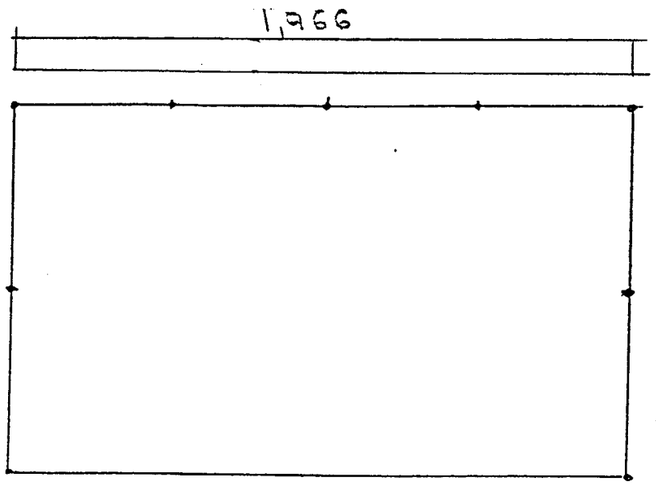
HIPOTESIS 04 - EMPUJE REPOSO DE SOBRECARGA MOVIL EN UN HASTIAL



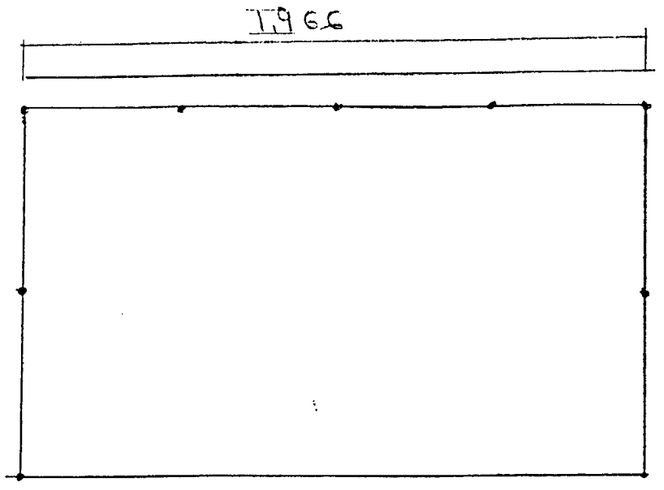
HIPOTESIS 05 - SOBRECARGA TREN TIPO A. RENFE EN UN LATERAL DEL VANO



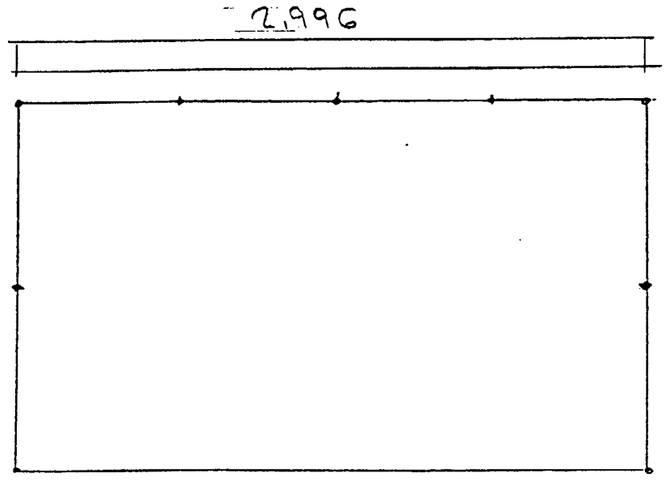
HIPOTESIS 06 - SOBRECARGA TREN TIPO A. RENFE EN EL CENTRO DEL VANO



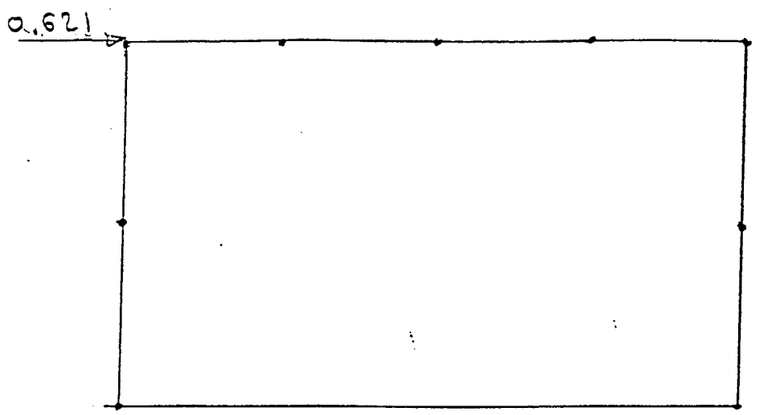
HIPOTESIS 07 - SOBRECARGA TREN TIPO A. RENFE EN EL OTRO LATERAL



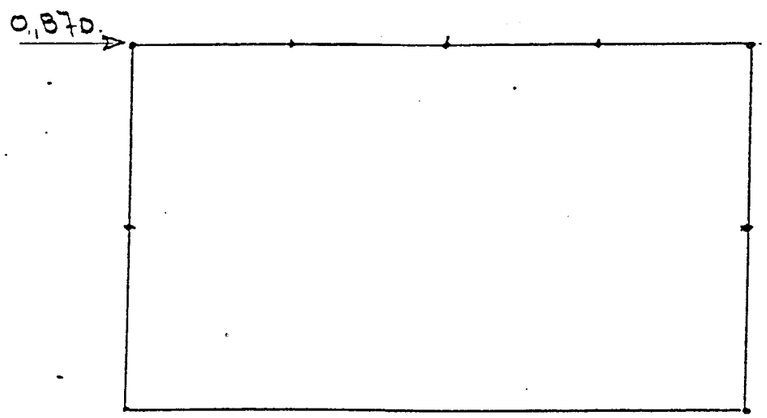
HIPOTESIS 08 - SOBRECARGA TREN TIPO B. RENFE



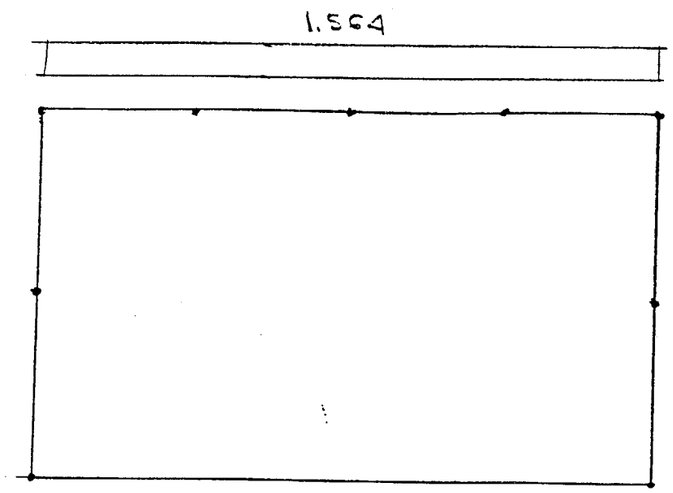
HIPOTESIS 09 - FRENADO TREN TIPO A. RENFE



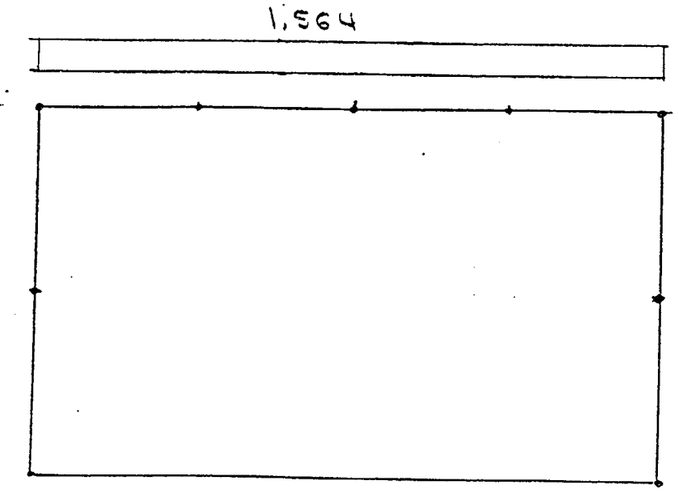
HIPOTESIS 10 - FRENADO TREN TIPO B. RENFE



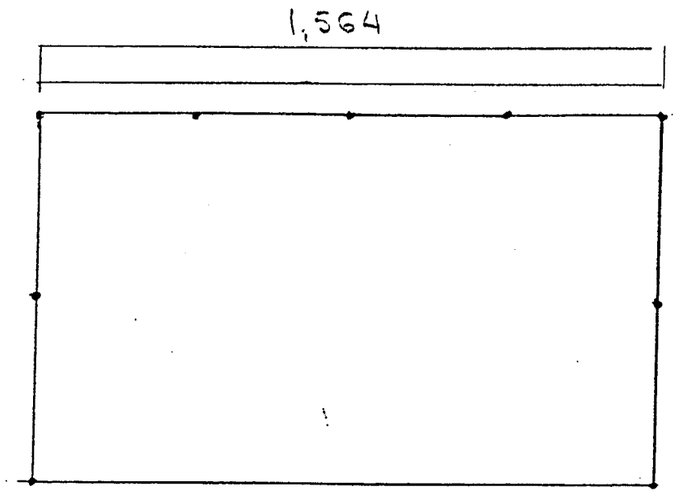
HIPOTESIS 11 - SOBRECARGA TREN UIC MODELO 1971 EN UN LATERAL DEL VANO



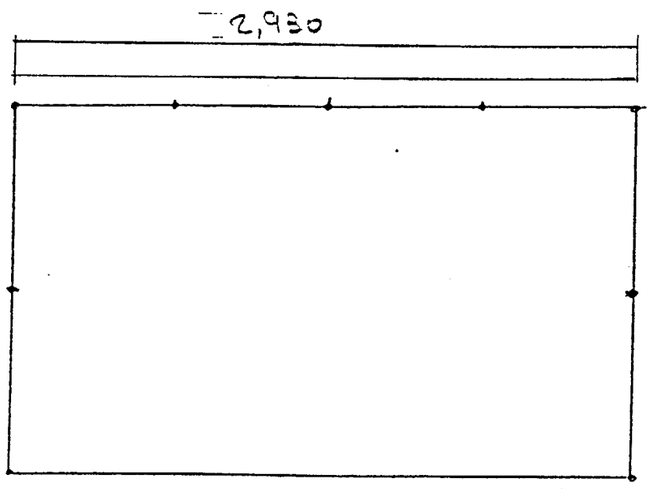
HIPOTESIS 12 - SOBRECARGA TREN UIC MODELO 1971 EN EL CENTRO DEL VANO



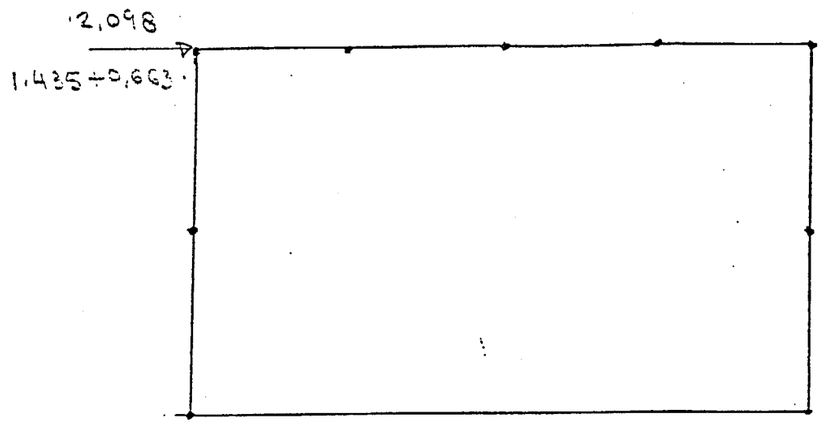
HIPOTESIS 13 - SOBRECARGA TREN UIC MODELO 1971 EN EL OTRO LATERAL



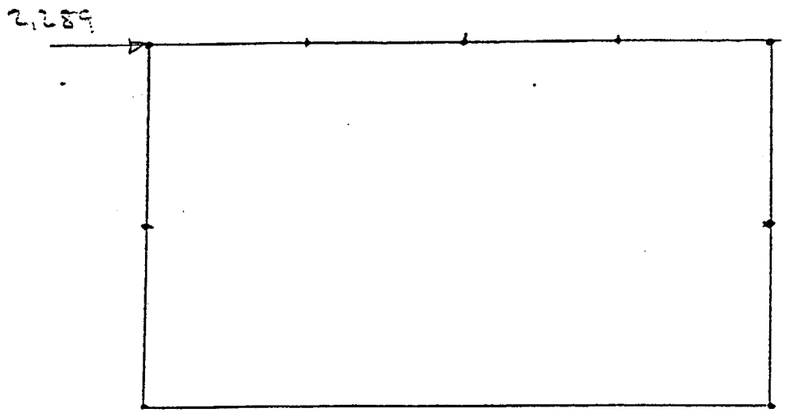
HIPOTESIS 14 - SOBRECARGA TREN UIC MODELO SW/2



HIPOTESIS 15 - FRENADO TREN UIC MODELO 1971



HIPOTESIS 16 - FRENADO TREN UIC MODELO SW/2



ESTRUCTURA PLANA P.I. ESTRUCTURA E-11 ZONA CENTRAL

NUMERO DE BARRAS 29

NUMERO DE NUDOS 29

ANCHO DE BANDA DE LA MATRIZ DE RIGIDEZ 69

NUMERO DE HIPOTESIS 16

STRESS PLANO . DATOS DE ENTRADA P.I. ESTRUCTURA E-11 ZONA CENTRAL

NUDO	COORDENADAS		NUDO	LIBERTADES				ORDEN EN
	X	Y	LIBRE	δx	δy	oz	TOTAL	K RIGDZ
1	0.0000	0.0000	0	0	1	1	2	0
2	0.0000	3.5000	1	1	1	1	3	2
3	0.0000	7.0000	1	1	1	1	3	5
4	2.4375	7.0000	1	1	1	1	3	8
5	4.8750	7.0000	1	1	1	1	3	11
6	7.3125	7.0000	1	1	1	1	3	14
7	9.7500	0.0000	1	1	1	1	3	17
8	9.7500	3.5000	1	1	1	1	3	20
9	9.7500	7.0000	1	1	1	1	3	23
10	0.9750	0.0000	1	1	1	1	3	26
11	1.9500	0.0000	1	1	1	1	3	29
12	2.9250	0.0000	1	1	1	1	3	32
13	3.9000	0.0000	1	1	1	1	3	35
14	4.8750	0.0000	1	1	1	1	3	38
15	5.8500	0.0000	1	1	1	1	3	41
16	6.8250	0.0000	1	1	1	1	3	44
17	7.8000	0.0000	1	1	1	1	3	47
18	8.7750	0.0000	1	1	1	1	3	50
19	0.0000	-4.5820	0	1	0	1	2	53
20	0.9750	-4.5820	0	1	0	1	2	55
21	1.9500	-4.5820	0	1	0	1	2	57
22	2.9250	-4.5820	0	1	0	1	2	59
23	3.9000	-4.5820	0	1	0	1	2	61
24	4.8750	-4.5820	0	1	0	1	2	63
25	5.8500	-4.5820	0	1	0	1	2	65
26	6.8250	-4.5820	0	1	0	1	2	67
27	7.8000	-4.5820	0	1	0	1	2	69
28	8.7750	-4.5820	0	1	0	1	2	71
29	9.7500	-4.5820	0	1	0	1	2	73

MODULO DE ELASTICIDAD DEL HORMIGON O ACERO.... 3207500

BARRA	NUDOS		SECCIONES		INERCIA	LONGITUD
	I	J	Ax	Ay	IZ	MTS
1	1	2	0.75000	0.75000	0.035156000	3.500
2	2	3	0.75000	0.75000	0.035156000	3.500
3	3	4	0.75000	0.75000	0.035156000	2.438
4	4	5	0.75000	0.75000	0.035156000	2.438
5	5	6	0.75000	0.75000	0.035156000	2.438
6	6	9	0.75000	0.75000	0.035156000	2.438
7	7	8	0.75000	0.75000	0.035156000	3.500
8	8	9	0.75000	0.75000	0.035156000	3.500
9	1	10	0.75000	0.75000	0.035156000	0.975
10	10	11	0.75000	0.75000	0.035156000	0.975

ESTRUCTURA PLANA P.I. ESTRUCTURA E-11 ZONA CENTRAL

BARRA	NUDOS		SECCIONES		INERCIA	LONGITUD
	I	J	Ax	Ay	IZ	MTS
11	11	12	0.75000	0.75000	0.035156000	0.975
12	12	13	0.75000	0.75000	0.035156000	0.975
13	13	14	0.75000	0.75000	0.035156000	0.975
14	14	15	0.75000	0.75000	0.035156000	0.975
15	15	16	0.75000	0.75000	0.035156000	0.975
16	16	17	0.75000	0.75000	0.035156000	0.975
17	17	18	0.75000	0.75000	0.035156000	0.975
18	7	18	0.75000	0.75000	0.035156000	0.975
19	1	19	0.00244	0.00244	0.000001000	4.582
20	10	20	0.00488	0.00488	0.000001000	4.582
21	11	21	0.00488	0.00488	0.000001000	4.582
22	12	22	0.00488	0.00488	0.000001000	4.582
23	13	23	0.00488	0.00488	0.000001000	4.582
24	14	24	0.00488	0.00488	0.000001000	4.582
25	15	25	0.00488	0.00488	0.000001000	4.582
26	16	26	0.00488	0.00488	0.000001000	4.582
27	17	27	0.00488	0.00488	0.000001000	4.582
28	18	28	0.00488	0.00488	0.000001000	4.582
29	7	29	0.00244	0.00244	0.000001000	4.582

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 1

CARGAS EN NUDOS ..

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-6.563	0.000
2	0.000	-6.563	0.000
7	0.000	-6.563	0.000
8	0.000	-6.563	0.000

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	12.42
4	CARGA UNIFORME	QY	12.42
5	CARGA UNIFORME	QY	12.42
6	CARGA UNIFORME	QY	12.42

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 2

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS		
1	CARGA UNIFORME	QY	3.03		
2	CARGA UNIFORME	QY	3.03		
7	CARGA UNIFORME	QY	-3.03		
8	CARGA UNIFORME	QY	-3.03		
2	TRIANGULAR M m	PY	1.80 A	0.000 A1	3.500
1	CARGA UNIFORME	QY	1.80		
1	TRIANGULAR M m	PY	1.80 A	0.000 A1	3.500
8	TRIANGULAR M m	PY	-1.80 A	0.000 A1	3.500
7	CARGA UNIFORME	QY	-1.80		
7	TRIANGULAR M m	PY	-1.80 A	0.000 A1	3.500

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 3

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS		
1	CARGA UNIFORME	QY	4.82		
2	CARGA UNIFORME	QY	4.82		
7	CARGA UNIFORME	QY	-4.82		
8	CARGA UNIFORME	QY	-4.82		
2	TRIANGULAR M m	PY	2.86 A	0.000 A1	3.500
1	CARGA UNIFORME	QY	2.86		
1	TRIANGULAR M m	PY	2.86 A	0.000 A1	3.500
8	TRIANGULAR M m	PY	-2.86 A	0.000 A1	3.500
7	CARGA UNIFORME	QY	-2.86		
7	TRIANGULAR M m	PY	-2.86 A	0.000 A1	3.500

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 4

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
1	CARGA UNIFORME	QY	1.29
2	CARGA UNIFORME	QY	1.29

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 5

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	1.97
4	CARGA UNIFORME	QY	1.97
5	CARGA UNIFORME	QY	1.97
6	CARGA UNIFORME	QY	1.97

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 6

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	1.97
4	CARGA UNIFORME	QY	1.97
5	CARGA UNIFORME	QY	1.97
6	CARGA UNIFORME	QY	1.97

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 7

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	1.97
4	CARGA UNIFORME	QY	1.97
5	CARGA UNIFORME	QY	1.97
6	CARGA UNIFORME	QY	1.97

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 8

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	3.00
4	CARGA UNIFORME	QY	3.00
5	CARGA UNIFORME	QY	3.00
6	CARGA UNIFORME	QY	3.00

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 9

CARGAS EN NUDOS ..

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
3	0.621	0.000	0.000

CARGAS EN BARRAS ..

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 10

CARGAS EN NUDOS ..

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
3	0.870	0.000	0.000

CARGAS EN BARRAS ..

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 11

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	1.56
4	CARGA UNIFORME	QY	1.56
5	CARGA UNIFORME	QY	1.56
6	CARGA UNIFORME	QY	1.56

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 12

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	1.56
4	CARGA UNIFORME	QY	1.56
5	CARGA UNIFORME	QY	1.56
6	CARGA UNIFORME	QY	1.56

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 13

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	1.56
4	CARGA UNIFORME	QY	1.56
5	CARGA UNIFORME	QY	1.56
6	CARGA UNIFORME	QY	1.56

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 14

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	2.93
4	CARGA UNIFORME	QY	2.93
5	CARGA UNIFORME	QY	2.93
6	CARGA UNIFORME	QY	2.93

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 15

CARGAS EN NUDOS ..

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
3	2.098	0.000	0.000

CARGAS EN BARRAS ..

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

HIPOTESIS 16

CARGAS EN NUDOS ..

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
3	2.289	0.000	0.000

CARGAS EN BARRAS ..

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

SALIDA DE DATOS - DESPLAZAMIENTOS

DESPLAZAMIENTO DE NUDOS HIPOTESIS 1

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.00829	0.00169
2	-0.00301	-0.00839	0.00001
3	0.00000	-0.00848	-0.00175
4	0.00000	-0.01324	-0.00167
5	0.00000	-0.01547	-0.00000
6	0.00000	-0.01324	0.00167
7	0.00000	-0.00829	-0.00169
8	0.00301	-0.00839	-0.00001
9	0.00000	-0.00848	0.00175
10	0.00000	-0.00645	0.00190
11	0.00000	-0.00463	0.00169
12	0.00000	-0.00317	0.00124
13	0.00000	-0.00223	0.00065
14	0.00000	-0.00191	-0.00000
15	0.00000	-0.00223	-0.00065
16	0.00000	-0.00317	-0.00124
17	0.00000	-0.00463	-0.00169
18	0.00000	-0.00645	-0.00190
19	0.00775	0.00000	0.00169
20	0.00869	0.00000	0.00190
21	0.00776	0.00000	0.00169
22	0.00568	0.00000	0.00124
23	0.00298	0.00000	0.00065
24	0.00000	0.00000	-0.00000
25	-0.00297	0.00000	-0.00065
26	-0.00568	0.00000	-0.00124
27	-0.00775	0.00000	-0.00169
28	-0.00868	0.00000	-0.00190
29	-0.00774	0.00000	-0.00169

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

DESPLAZAMIENTO DE NUDOS HIPOTESIS 2

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00048	-0.00033
2	0.00087	0.00048	0.00001
3	-0.00001	0.00048	0.00033
4	-0.00002	0.00108	0.00017
5	-0.00004	0.00128	0.00000
6	-0.00005	0.00108	-0.00017
7	-0.00008	0.00048	0.00033
8	-0.00095	0.00048	-0.00001
9	-0.00007	0.00048	-0.00033
10	-0.00001	0.00020	-0.00024
11	-0.00002	0.00000	-0.00017
12	-0.00002	-0.00013	-0.00010
13	-0.00003	-0.00020	-0.00005
14	-0.00004	-0.00022	0.00000
15	-0.00005	-0.00020	0.00005
16	-0.00005	-0.00013	0.00010
17	-0.00006	0.00000	0.00017
18	-0.00007	0.00020	0.00024
19	-0.00151	0.00000	-0.00033
20	-0.00112	0.00000	-0.00024
21	-0.00078	0.00000	-0.00017
22	-0.00049	0.00000	-0.00010
23	-0.00025	0.00000	-0.00005
24	-0.00004	0.00000	0.00000
25	0.00017	0.00000	0.00005
26	0.00041	0.00000	0.00010
27	0.00070	0.00000	0.00017
28	0.00104	0.00000	0.00024
29	0.00143	0.00000	0.00033

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

DESPLAZAMIENTO DE NUDOS HIPOTESIS 3

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00076	-0.00053
2	0.00139	0.00076	0.00001
3	-0.00002	0.00076	0.00053
4	-0.00004	0.00172	0.00026
5	-0.00006	0.00204	0.00000
6	-0.00009	0.00172	-0.00026
7	-0.00013	0.00076	0.00053
8	-0.00151	0.00076	-0.00001
9	-0.00011	0.00076	-0.00053
10	-0.00001	0.00031	-0.00039
11	-0.00003	0.00000	-0.00026
12	-0.00004	-0.00020	-0.00016
13	-0.00005	-0.00032	-0.00008
14	-0.00006	-0.00035	0.00000
15	-0.00008	-0.00032	0.00008
16	-0.00009	-0.00020	0.00016
17	-0.00010	0.00000	0.00026
18	-0.00011	0.00031	0.00039
19	-0.00241	0.00000	-0.00053
20	-0.00179	0.00000	-0.00039
21	-0.00124	0.00000	-0.00026
22	-0.00078	0.00000	-0.00016
23	-0.00040	0.00000	-0.00008
24	-0.00006	0.00000	0.00000
25	0.00027	0.00000	0.00008
26	0.00065	0.00000	0.00016
27	0.00111	0.00000	0.00026
28	0.00166	0.00000	0.00039
29	0.00228	0.00000	0.00053

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

DESPLAZAMIENTO DE NUDOS HIPOTESIS 4

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00079	-0.00036
2	0.00151	0.00079	-0.00041
3	0.00257	0.00079	-0.00020
4	0.00257	0.00043	-0.00012
5	0.00257	0.00017	-0.00010
6	0.00257	-0.00014	-0.00016
7	0.00001	-0.00067	-0.00028
8	0.00128	-0.00067	-0.00040
9	0.00257	-0.00067	-0.00029
10	0.00000	0.00048	-0.00027
11	0.00000	0.00026	-0.00019
12	0.00000	0.00012	-0.00012
13	0.00000	0.00003	-0.00007
14	0.00000	-0.00003	-0.00005
15	0.00001	-0.00008	-0.00006
16	0.00001	-0.00015	-0.00009
17	0.00001	-0.00026	-0.00014
18	0.00001	-0.00043	-0.00021
19	-0.00167	0.00000	-0.00036
20	-0.00124	0.00000	-0.00027
21	-0.00085	0.00000	-0.00019
22	-0.00054	0.00000	-0.00012
23	-0.00034	0.00000	-0.00007
24	-0.00025	0.00000	-0.00005
25	-0.00028	0.00000	-0.00006
26	-0.00041	0.00000	-0.00009
27	-0.00064	0.00000	-0.00014
28	-0.00094	0.00000	-0.00021
29	-0.00126	0.00000	-0.00028

DESPLAZAMIENTO DE NUDOS HIPOTESIS 5

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.00110	0.00023
2	-0.00043	-0.00111	0.00001
3	0.00000	-0.00112	-0.00026
4	0.00000	-0.00185	-0.00026
5	0.00000	-0.00220	-0.00000
6	0.00000	-0.00185	0.00026
7	0.00000	-0.00110	-0.00023
8	0.00043	-0.00111	-0.00001
9	0.00000	-0.00112	0.00026
10	0.00000	-0.00085	0.00026
11	0.00000	-0.00060	0.00023
12	0.00000	-0.00041	0.00016
13	0.00000	-0.00028	0.00009
14	0.00000	-0.00024	-0.00000
15	0.00000	-0.00028	-0.00009
16	0.00000	-0.00041	-0.00016
17	0.00000	-0.00060	-0.00023
18	0.00000	-0.00085	-0.00026
19	0.00106	0.00000	0.00023
20	0.00117	0.00000	0.00026
21	0.00104	0.00000	0.00023
22	0.00076	0.00000	0.00016
23	0.00040	0.00000	0.00009
24	0.00000	0.00000	-0.00000
25	-0.00039	0.00000	-0.00009
26	-0.00075	0.00000	-0.00016
27	-0.00103	0.00000	-0.00023
28	-0.00117	0.00000	-0.00026
29	-0.00106	0.00000	-0.00023

DESPLAZAMIENTO DE NUDOS HIPOTESIS 6

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.00110	0.00023
2	-0.00043	-0.00111	0.00001
3	0.00000	-0.00112	-0.00026
4	0.00000	-0.00185	-0.00026
5	0.00000	-0.00220	-0.00000
6	0.00000	-0.00185	0.00026
7	0.00000	-0.00110	-0.00023
8	0.00043	-0.00111	-0.00001
9	0.00000	-0.00112	0.00026
10	0.00000	-0.00085	0.00026
11	0.00000	-0.00060	0.00023
12	0.00000	-0.00041	0.00016
13	0.00000	-0.00028	0.00009
14	0.00000	-0.00024	-0.00000
15	0.00000	-0.00028	-0.00009
16	0.00000	-0.00041	-0.00016
17	0.00000	-0.00060	-0.00023
18	0.00000	-0.00085	-0.00026
19	0.00106	0.00000	0.00023
20	0.00117	0.00000	0.00026
21	0.00104	0.00000	0.00023
22	0.00076	0.00000	0.00016
23	0.00040	0.00000	0.00009
24	0.00000	0.00000	-0.00000
25	-0.00039	0.00000	-0.00009
26	-0.00075	0.00000	-0.00016
27	-0.00103	0.00000	-0.00023
28	-0.00117	0.00000	-0.00026
29	-0.00106	0.00000	-0.00023

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

DESPLAZAMIENTO DE NUDOS HIPOTESIS 7

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.00110	0.00023
2	-0.00043	-0.00111	0.00001
3	0.00000	-0.00112	-0.00026
4	0.00000	-0.00185	-0.00026
5	0.00000	-0.00220	-0.00000
6	0.00000	-0.00185	0.00026
7	0.00000	-0.00110	-0.00023
8	0.00043	-0.00111	-0.00001
9	0.00000	-0.00112	0.00026
10	0.00000	-0.00085	0.00026
11	0.00000	-0.00060	0.00023
12	0.00000	-0.00041	0.00016
13	0.00000	-0.00028	0.00009
14	0.00000	-0.00024	-0.00000
15	0.00000	-0.00028	-0.00009
16	0.00000	-0.00041	-0.00016
17	0.00000	-0.00060	-0.00023
18	0.00000	-0.00085	-0.00026
19	0.00106	0.00000	0.00023
20	0.00117	0.00000	0.00026
21	0.00104	0.00000	0.00023
22	0.00076	0.00000	0.00016
23	0.00040	0.00000	0.00009
24	0.00000	0.00000	-0.00000
25	-0.00039	0.00000	-0.00009
26	-0.00075	0.00000	-0.00016
27	-0.00103	0.00000	-0.00023
28	-0.00117	0.00000	-0.00026
29	-0.00106	0.00000	-0.00023

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

DESPLAZAMIENTO DE NUDOS HIPOTESIS 8

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.00167	0.00035
2	-0.00066	-0.00169	0.00001
3	0.00000	-0.00171	-0.00040
4	0.00000	-0.00283	-0.00039
5	0.00000	-0.00335	-0.00000
6	0.00000	-0.00283	0.00039
7	0.00000	-0.00167	-0.00035
8	0.00066	-0.00169	-0.00001
9	0.00000	-0.00171	0.00040
10	0.00000	-0.00129	0.00039
11	0.00000	-0.00092	0.00034
12	0.00000	-0.00062	0.00025
13	0.00000	-0.00043	0.00013
14	0.00000	-0.00037	-0.00000
15	0.00000	-0.00043	-0.00013
16	0.00000	-0.00062	-0.00025
17	0.00000	-0.00092	-0.00034
18	0.00000	-0.00129	-0.00039
19	0.00162	0.00000	0.00035
20	0.00178	0.00000	0.00039
21	0.00158	0.00000	0.00034
22	0.00115	0.00000	0.00025
23	0.00060	0.00000	0.00013
24	0.00000	0.00000	-0.00000
25	-0.00060	0.00000	-0.00013
26	-0.00115	0.00000	-0.00025
27	-0.00158	0.00000	-0.00034
28	-0.00178	0.00000	-0.00039
29	-0.00162	0.00000	-0.00035

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

DESPLAZAMIENTO DE NUDOS HIPOTESIS 9

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00010	-0.00004
2	0.00018	0.00010	-0.00006
3	0.00035	0.00010	-0.00004
4	0.00035	0.00003	-0.00002
5	0.00035	-0.00000	-0.00001
6	0.00035	-0.00003	-0.00002
7	0.00000	-0.00010	-0.00004
8	0.00018	-0.00010	-0.00005
9	0.00035	-0.00010	-0.00004
10	0.00000	0.00006	-0.00003
11	0.00000	0.00004	-0.00002
12	0.00000	0.00002	-0.00001
13	0.00000	0.00001	-0.00001
14	0.00000	-0.00000	-0.00001
15	0.00000	-0.00001	-0.00001
16	0.00000	-0.00002	-0.00001
17	0.00000	-0.00004	-0.00002
18	0.00000	-0.00006	-0.00003
19	-0.00018	0.00000	-0.00004
20	-0.00014	0.00000	-0.00003
21	-0.00010	0.00000	-0.00002
22	-0.00007	0.00000	-0.00001
23	-0.00005	0.00000	-0.00001
24	-0.00004	0.00000	-0.00001
25	-0.00005	0.00000	-0.00001
26	-0.00007	0.00000	-0.00001
27	-0.00010	0.00000	-0.00002
28	-0.00014	0.00000	-0.00003
29	-0.00018	0.00000	-0.00004

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

DESPLAZAMIENTO DE NUDOS HIPOTESIS 10

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00014	-0.00006
2	0.00025	0.00014	-0.00008
3	0.00049	0.00014	-0.00005
4	0.00049	0.00005	-0.00003
5	0.00049	-0.00000	-0.00002
6	0.00049	-0.00005	-0.00003
7	0.00000	-0.00014	-0.00006
8	0.00025	-0.00014	-0.00008
9	0.00049	-0.00014	-0.00005
10	0.00000	0.00009	-0.00004
11	0.00000	0.00005	-0.00003
12	0.00000	0.00003	-0.00002
13	0.00000	0.00001	-0.00001
14	0.00000	-0.00000	-0.00001
15	0.00000	-0.00001	-0.00001
16	0.00000	-0.00003	-0.00002
17	0.00000	-0.00005	-0.00003
18	0.00000	-0.00009	-0.00004
19	-0.00026	0.00000	-0.00006
20	-0.00020	0.00000	-0.00004
21	-0.00014	0.00000	-0.00003
22	-0.00009	0.00000	-0.00002
23	-0.00006	0.00000	-0.00001
24	-0.00005	0.00000	-0.00001
25	-0.00006	0.00000	-0.00001
26	-0.00009	0.00000	-0.00002
27	-0.00014	0.00000	-0.00003
28	-0.00019	0.00000	-0.00004
29	-0.00025	0.00000	-0.00006

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

DESPLAZAMIENTO DE NUDOS HIPOTESIS 11

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.00087	0.00018
2	-0.00034	-0.00088	0.00001
3	0.00000	-0.00089	-0.00021
4	0.00000	-0.00148	-0.00021
5	0.00000	-0.00175	-0.00000
6	0.00000	-0.00148	0.00021
7	0.00000	-0.00087	-0.00018
8	0.00035	-0.00088	-0.00001
9	0.00000	-0.00089	0.00021
10	0.00000	-0.00067	0.00020
11	0.00000	-0.00048	0.00018
12	0.00000	-0.00032	0.00013
13	0.00000	-0.00023	0.00007
14	0.00000	-0.00019	-0.00000
15	0.00000	-0.00023	-0.00007
16	0.00000	-0.00032	-0.00013
17	0.00000	-0.00048	-0.00018
18	0.00000	-0.00067	-0.00020
19	0.00084	0.00000	0.00018
20	0.00093	0.00000	0.00020
21	0.00082	0.00000	0.00018
22	0.00060	0.00000	0.00013
23	0.00031	0.00000	0.00007
24	0.00000	0.00000	-0.00000
25	-0.00031	0.00000	-0.00007
26	-0.00060	0.00000	-0.00013
27	-0.00082	0.00000	-0.00018
28	-0.00093	0.00000	-0.00020
29	-0.00084	0.00000	-0.00018

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

DESPLAZAMIENTO DE NUDOS HIPOTESIS 12

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.00087	0.00018
2	-0.00034	-0.00088	0.00001
3	0.00000	-0.00089	-0.00021
4	0.00000	-0.00148	-0.00021
5	0.00000	-0.00175	-0.00000
6	0.00000	-0.00148	0.00021
7	0.00000	-0.00087	-0.00018
8	0.00035	-0.00088	-0.00001
9	0.00000	-0.00089	0.00021
10	0.00000	-0.00067	0.00020
11	0.00000	-0.00048	0.00018
12	0.00000	-0.00032	0.00013
13	0.00000	-0.00023	0.00007
14	0.00000	-0.00019	-0.00000
15	0.00000	-0.00023	-0.00007
16	0.00000	-0.00032	-0.00013
17	0.00000	-0.00048	-0.00018
18	0.00000	-0.00067	-0.00020
19	0.00084	0.00000	0.00018
20	0.00093	0.00000	0.00020
21	0.00082	0.00000	0.00018
22	0.00060	0.00000	0.00013
23	0.00031	0.00000	0.00007
24	0.00000	0.00000	-0.00000
25	-0.00031	0.00000	-0.00007
26	-0.00060	0.00000	-0.00013
27	-0.00082	0.00000	-0.00018
28	-0.00093	0.00000	-0.00020
29	-0.00084	0.00000	-0.00018

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

DESPLAZAMIENTO DE NUDOS HIPOTESIS 13

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.00087	0.00018
2	-0.00034	-0.00088	0.00001
3	0.00000	-0.00089	-0.00021
4	0.00000	-0.00148	-0.00021
5	0.00000	-0.00175	-0.00000
6	0.00000	-0.00148	0.00021
7	0.00000	-0.00087	-0.00018
8	0.00035	-0.00088	-0.00001
9	0.00000	-0.00089	0.00021
10	0.00000	-0.00067	0.00020
11	0.00000	-0.00048	0.00018
12	0.00000	-0.00032	0.00013
13	0.00000	-0.00023	0.00007
14	0.00000	-0.00019	-0.00000
15	0.00000	-0.00023	-0.00007
16	0.00000	-0.00032	-0.00013
17	0.00000	-0.00048	-0.00018
18	0.00000	-0.00067	-0.00020
19	0.00084	0.00000	0.00018
20	0.00093	0.00000	0.00020
21	0.00082	0.00000	0.00018
22	0.00060	0.00000	0.00013
23	0.00031	0.00000	0.00007
24	0.00000	0.00000	-0.00000
25	-0.00031	0.00000	-0.00007
26	-0.00060	0.00000	-0.00013
27	-0.00082	0.00000	-0.00018
28	-0.00093	0.00000	-0.00020
29	-0.00084	0.00000	-0.00018

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

DESPLAZAMIENTO DE NUDOS HIPOTESIS 14

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.00163	0.00035
2	-0.00064	-0.00165	0.00001
3	0.00000	-0.00168	-0.00039
4	0.00000	-0.00276	-0.00038
5	0.00000	-0.00328	-0.00000
6	0.00000	-0.00276	0.00038
7	0.00000	-0.00163	-0.00035
8	0.00065	-0.00165	-0.00001
9	0.00000	-0.00168	0.00039
10	0.00000	-0.00126	0.00038
11	0.00000	-0.00090	0.00034
12	0.00000	-0.00061	0.00025
13	0.00000	-0.00042	0.00013
14	0.00000	-0.00036	-0.00000
15	0.00000	-0.00042	-0.00013
16	0.00000	-0.00061	-0.00025
17	0.00000	-0.00090	-0.00034
18	0.00000	-0.00126	-0.00038
19	0.00158	0.00000	0.00035
20	0.00174	0.00000	0.00038
21	0.00154	0.00000	0.00034
22	0.00113	0.00000	0.00025
23	0.00059	0.00000	0.00013
24	0.00000	0.00000	-0.00000
25	-0.00059	0.00000	-0.00013
26	-0.00112	0.00000	-0.00025
27	-0.00154	0.00000	-0.00034
28	-0.00174	0.00000	-0.00038
29	-0.00158	0.00000	-0.00035

DESPLAZAMIENTO DE NUDOS HIPOTESIS 15

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00033	-0.00014
2	0.00060	0.00033	-0.00019
3	0.00118	0.00033	-0.00012
4	0.00118	0.00011	-0.00006
5	0.00118	-0.00000	-0.00004
6	0.00118	-0.00011	-0.00006
7	0.00000	-0.00033	-0.00013
8	0.00060	-0.00033	-0.00019
9	0.00118	-0.00033	-0.00012
10	0.00000	0.00021	-0.00010
11	0.00000	0.00013	-0.00007
12	0.00000	0.00007	-0.00005
13	0.00000	0.00003	-0.00003
14	0.00000	-0.00000	-0.00003
15	0.00000	-0.00003	-0.00003
16	0.00000	-0.00007	-0.00005
17	0.00000	-0.00013	-0.00007
18	0.00000	-0.00021	-0.00010
19	-0.00062	0.00000	-0.00014
20	-0.00048	0.00000	-0.00010
21	-0.00034	0.00000	-0.00007
22	-0.00023	0.00000	-0.00005
23	-0.00015	0.00000	-0.00003
24	-0.00013	0.00000	-0.00003
25	-0.00015	0.00000	-0.00003
26	-0.00022	0.00000	-0.00005
27	-0.00033	0.00000	-0.00007
28	-0.00047	0.00000	-0.00010
29	-0.00061	0.00000	-0.00013

DESPLAZAMIENTO DE NUDOS HIPOTESIS 16

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00036	-0.00015
2	0.00066	0.00036	-0.00020
3	0.00129	0.00036	-0.00014
4	0.00129	0.00012	-0.00007
5	0.00129	-0.00000	-0.00004
6	0.00129	-0.00013	-0.00007
7	0.00000	-0.00036	-0.00015
8	0.00066	-0.00036	-0.00020
9	0.00129	-0.00036	-0.00013
10	0.00000	0.00023	-0.00011
11	0.00000	0.00014	-0.00008
12	0.00000	0.00007	-0.00005
13	0.00000	0.00003	-0.00004
14	0.00000	-0.00000	-0.00003
15	0.00000	-0.00003	-0.00004
16	0.00000	-0.00007	-0.00005
17	0.00000	-0.00014	-0.00008
18	0.00000	-0.00023	-0.00011
19	-0.00068	0.00000	-0.00015
20	-0.00052	0.00000	-0.00011
21	-0.00037	0.00000	-0.00008
22	-0.00025	0.00000	-0.00005
23	-0.00017	0.00000	-0.00004
24	-0.00014	0.00000	-0.00003
25	-0.00017	0.00000	-0.00004
26	-0.00024	0.00000	-0.00005
27	-0.00036	0.00000	-0.00008
28	-0.00051	0.00000	-0.00011
29	-0.00067	0.00000	-0.00015

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 1

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	67.091	0.741	-52.771	2	-67.091	-0.741	55.366
2	2	60.528	0.741	-55.366	3	-60.528	-0.741	57.960
3	3	0.741	-60.528	-57.960	4	-0.741	30.264	-52.692
4	4	0.741	-30.264	52.692	5	-0.741	-0.000	-89.577
5	5	0.741	-0.000	89.577	6	-0.741	-30.264	-52.692
6	6	0.741	30.264	52.692	9	-0.741	-60.528	57.960
7	7	67.091	-0.741	52.771	8	-67.091	0.741	-55.366
8	8	60.528	-0.741	55.366	9	-60.528	0.741	-57.960
9	1	-0.741	59.500	52.771	10	0.741	-59.500	5.241
10	10	-0.741	37.501	-5.241	11	0.741	-37.501	41.805
11	11	-0.741	21.684	-41.805	12	0.741	-21.684	62.947
12	12	-0.741	10.868	-62.947	13	0.741	-10.868	73.543
13	13	-0.741	3.256	-73.543	14	0.741	-3.256	76.717
14	14	-0.741	-3.256	-76.717	15	0.741	3.256	73.543
15	15	-0.741	-10.868	-73.543	16	0.741	10.868	62.947
16	16	-0.741	-21.684	-62.947	17	0.741	21.684	41.805
17	17	-0.741	-37.501	-41.805	18	0.741	37.501	5.241
18	7	-0.741	-59.500	-52.771	18	0.741	59.500	-5.241
19	1	14.154	-0.000	0.000	19	-14.154	0.000	0.000
20	10	21.999	0.000	0.000	20	-21.999	-0.000	0.000
21	11	15.817	0.000	0.000	21	-15.817	-0.000	0.000
22	12	10.816	0.000	0.000	22	-10.816	-0.000	0.000
23	13	7.612	0.000	0.000	23	-7.612	-0.000	0.000
24	14	6.512	0.000	0.000	24	-6.512	-0.000	0.000
25	15	7.612	-0.000	-0.000	25	-7.612	0.000	-0.000
26	16	10.816	-0.000	-0.000	26	-10.816	0.000	-0.000
27	17	15.817	-0.000	-0.000	27	-15.817	0.000	-0.000
28	18	21.999	-0.000	-0.000	28	-21.999	0.000	-0.000
29	7	14.154	0.000	-0.000	29	-14.154	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 1

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-6.563	0.000
2	-0.000	-6.563	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-6.563	-0.000
8	0.000	-6.563	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	14.154	-0.000
20	0.000	21.999	-0.000
21	0.000	15.817	-0.000
22	0.000	10.816	-0.000
23	0.000	7.612	-0.000
24	0.000	6.512	-0.000
25	-0.000	7.612	0.000
26	-0.000	10.816	0.000
27	-0.000	15.817	0.000
28	-0.000	21.999	0.000
29	0.000	14.154	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 2

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-0.000	-19.371	-10.424	2	0.000	-0.653	-20.499
2	2	0.000	0.653	20.499	3	-0.000	-14.393	7.666
3	3	14.393	-0.000	-7.666	4	-14.393	0.000	7.666
4	4	14.393	-0.000	-7.666	5	-14.393	0.000	7.666
5	5	14.393	0.000	-7.666	6	-14.393	-0.000	7.666
6	6	14.393	0.000	-7.666	9	-14.393	-0.000	7.666
7	7	0.000	19.371	10.424	8	-0.000	0.653	20.499
8	8	0.000	-0.653	-20.499	9	-0.000	14.393	-7.666
9	1	19.371	0.812	10.424	10	-19.371	-0.812	-9.633
10	10	19.371	1.486	9.633	11	-19.371	-1.486	-8.184
11	11	19.371	1.488	8.184	12	-19.371	-1.488	-6.733
12	12	19.371	1.054	6.733	13	-19.371	-1.054	-5.706
13	13	19.371	0.377	5.706	14	-19.371	-0.377	-5.338
14	14	19.371	-0.377	5.338	15	-19.371	0.377	-5.706
15	15	19.371	-1.054	5.706	16	-19.371	1.054	-6.733
16	16	19.371	-1.488	6.733	17	-19.371	1.488	-8.184
17	17	19.371	-1.486	8.184	18	-19.371	1.486	-9.633
18	7	19.371	-0.812	-10.424	18	-19.371	0.812	9.633
19	1	-0.812	0.000	-0.000	19	0.812	-0.000	-0.000
20	10	-0.674	-0.000	-0.000	20	0.674	0.000	-0.000
21	11	-0.002	-0.000	-0.000	21	0.002	0.000	-0.000
22	12	0.434	-0.000	-0.000	22	-0.434	0.000	-0.000
23	13	0.677	-0.000	-0.000	23	-0.677	0.000	-0.000
24	14	0.754	0.000	0.000	24	-0.754	-0.000	0.000
25	15	0.677	0.000	0.000	25	-0.677	-0.000	0.000
26	16	0.434	0.000	0.000	26	-0.434	-0.000	0.000
27	17	-0.002	0.000	0.000	27	0.002	-0.000	0.000
28	18	-0.674	0.000	0.000	28	0.674	-0.000	0.000
29	7	-0.812	-0.000	0.000	29	0.812	0.000	0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 2

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-0.000	0.000	-0.000
2	0.000	0.000	0.000
3	-0.000	0.000	-0.000
4	0.000	-0.000	-0.000
5	0.000	-0.000	0.000
6	-0.000	-0.000	0.000
7	0.000	0.000	0.000
8	-0.000	0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	0.000
15	-0.000	-0.000	0.000
16	-0.000	-0.000	0.000
17	-0.000	-0.000	0.000
18	-0.000	-0.000	0.000
19	0.000	-0.812	0.000
20	-0.000	-0.674	0.000
21	-0.000	-0.002	0.000
22	-0.000	0.434	0.000
23	-0.000	0.677	0.000
24	0.000	0.754	-0.000
25	0.000	0.677	-0.000
26	0.000	0.434	-0.000
27	0.000	-0.002	-0.000
28	0.000	-0.674	-0.000
29	-0.000	-0.812	-0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 3

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-0.000	-30.852	-16.603	2	0.000	-1.040	-32.649
2	2	0.000	1.040	32.649	3	-0.000	-22.925	12.210
3	3	22.925	-0.000	-12.210	4	-22.925	0.000	12.210
4	4	22.925	-0.000	-12.210	5	-22.925	0.000	12.210
5	5	22.925	0.000	-12.210	6	-22.925	-0.000	12.210
6	6	22.925	0.000	-12.210	9	-22.925	-0.000	12.210
7	7	0.000	30.852	16.603	8	-0.000	1.040	32.649
8	8	-0.000	-1.040	-32.649	9	0.000	22.925	-12.210
9	1	30.852	1.293	16.603	10	-30.852	-1.293	-15.343
10	10	30.852	2.367	15.343	11	-30.852	-2.367	-13.035
11	11	30.852	2.370	13.035	12	-30.852	-2.370	-10.724
12	12	30.852	1.678	10.724	13	-30.852	-1.678	-9.088
13	13	30.852	0.601	9.088	14	-30.852	-0.601	-8.502
14	14	30.852	-0.601	8.502	15	-30.852	0.601	-9.088
15	15	30.852	-1.678	9.088	16	-30.852	1.678	-10.724
16	16	30.852	-2.370	10.724	17	-30.852	2.370	-13.035
17	17	30.852	-2.367	13.035	18	-30.852	2.367	-15.343
18	7	30.852	-1.293	-16.603	18	-30.852	1.293	15.343
19	1	-1.293	0.000	-0.000	19	1.293	-0.000	-0.000
20	10	-1.074	-0.000	-0.000	20	1.074	0.000	-0.000
21	11	-0.004	-0.000	-0.000	21	0.004	0.000	-0.000
22	12	0.692	-0.000	-0.000	22	-0.692	0.000	-0.000
23	13	1.078	-0.000	-0.000	23	-1.078	0.000	-0.000
24	14	1.201	0.000	0.000	24	-1.201	-0.000	0.000
25	15	1.078	0.000	0.000	25	-1.078	-0.000	0.000
26	16	0.692	0.000	0.000	26	-0.692	-0.000	0.000
27	17	-0.004	0.000	0.000	27	0.004	-0.000	0.000
28	18	-1.074	0.000	0.000	28	1.074	-0.000	0.000
29	7	-1.293	-0.000	0.000	29	1.293	0.000	0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 3

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-0.000	0.000	-0.000
2	0.000	0.000	0.000
3	-0.000	0.000	-0.000
4	0.000	-0.000	-0.000
5	0.000	-0.000	0.000
6	-0.000	-0.000	0.000
7	0.000	0.000	0.000
8	-0.000	-0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	-0.000
15	-0.000	-0.000	0.000
16	-0.000	-0.000	0.000
17	-0.000	-0.000	0.000
18	-0.000	-0.000	0.000
19	0.000	-1.293	0.000
20	-0.000	-1.074	0.000
21	-0.000	-0.004	0.000
22	-0.000	0.692	0.000
23	-0.000	1.078	0.000
24	0.000	1.201	-0.000
25	0.000	1.078	-0.000
26	0.000	0.692	-0.000
27	0.000	-0.004	-0.000
28	0.000	-1.074	-0.000
29	-0.000	-1.293	-0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 4

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-1.329	-6.822	-10.704	2	1.329	2.307	-5.270
2	2	-1.329	-2.307	5.270	3	1.329	-2.208	-5.443
3	3	2.208	1.329	5.443	4	-2.208	-1.329	-2.203
4	4	2.208	1.329	2.203	5	-2.208	-1.329	1.036
5	5	2.208	1.329	-1.036	6	-2.208	-1.329	4.276
6	6	2.208	1.329	-4.276	9	-2.208	-1.329	7.515
7	7	1.329	-2.208	-7.943	8	-1.329	2.208	0.214
8	8	1.329	-2.208	-0.214	9	-1.329	2.208	-7.515
9	1	-2.208	0.021	10.704	10	2.208	-0.021	-10.684
10	10	-2.208	1.664	10.684	11	2.208	-1.664	-9.061
11	11	-2.208	2.557	9.061	12	2.208	-2.557	-6.569
12	12	-2.208	2.957	6.569	13	2.208	-2.957	-3.685
13	13	-2.208	3.055	3.685	14	2.208	-3.055	-0.707
14	14	-2.208	2.955	0.707	15	2.208	-2.955	2.174
15	15	-2.208	2.678	-2.174	16	2.208	-2.678	4.785
16	16	-2.208	2.162	-4.785	17	2.208	-2.162	6.893
17	17	-2.208	1.271	-6.893	18	2.208	-1.271	8.132
18	7	-2.208	-0.194	7.943	18	2.208	0.194	-8.132
19	1	-1.350	0.000	-0.000	19	1.350	-0.000	-0.000
20	10	-1.643	-0.000	-0.000	20	1.643	0.000	-0.000
21	11	-0.892	-0.000	-0.000	21	0.892	0.000	-0.000
22	12	-0.401	-0.000	-0.000	22	0.401	0.000	-0.000
23	13	-0.097	-0.000	-0.000	23	0.097	0.000	-0.000
24	14	0.100	-0.000	-0.000	24	-0.100	0.000	-0.000
25	15	0.277	-0.000	-0.000	25	-0.277	0.000	-0.000
26	16	0.516	-0.000	-0.000	26	-0.516	0.000	-0.000
27	17	0.892	-0.000	-0.000	27	-0.892	0.000	-0.000
28	18	1.465	-0.000	-0.000	28	-1.465	0.000	-0.000
29	7	1.135	0.000	-0.000	29	-1.135	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 4

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-9.030	0.000	-0.000
2	0.000	0.000	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	-0.000	0.000
6	-0.000	-0.000	0.000
7	-0.000	-0.000	-0.000
8	-0.000	0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	0.000	-0.000
19	0.000	-1.350	0.000
20	-0.000	-1.643	0.000
21	-0.000	-0.892	0.000
22	-0.000	-0.401	0.000
23	-0.000	-0.097	0.000
24	-0.000	0.100	0.000
25	-0.000	0.277	0.000
26	-0.000	0.516	0.000
27	-0.000	0.892	0.000
28	-0.000	1.465	0.000
29	0.000	1.135	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 5

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	9.584	0.425	-6.495	2	-9.584	-0.425	7.983
2	2	9.584	0.425	-7.983	3	-9.584	-0.425	9.471
3	3	0.425	-9.584	-9.471	4	-0.425	4.792	-8.050
4	4	0.425	-4.792	8.050	5	-0.425	-0.000	-13.890
5	5	0.425	-0.000	13.890	6	-0.425	-4.792	-8.050
6	6	0.425	4.792	8.050	9	-0.425	-9.584	9.471
7	7	9.584	-0.425	6.495	8	-9.584	0.425	-7.983
8	8	9.584	-0.425	7.983	9	-9.584	0.425	-9.471
9	1	-0.425	7.714	6.495	10	0.425	-7.714	1.025
10	10	-0.425	4.827	-1.025	11	0.425	-4.827	5.732
11	11	-0.425	2.769	-5.732	12	0.425	-2.769	8.431
12	12	-0.425	1.377	-8.431	13	0.425	-1.377	9.773
13	13	-0.425	0.410	-9.773	14	0.425	-0.410	10.173
14	14	-0.425	-0.410	-10.173	15	0.425	0.410	9.773
15	15	-0.425	-1.377	-9.773	16	0.425	1.377	8.431
16	16	-0.425	-2.769	-8.431	17	0.425	2.769	5.732
17	17	-0.425	-4.827	-5.732	18	0.425	4.827	1.025
18	7	-0.425	-7.714	-6.495	18	0.425	7.714	-1.025
19	1	1.871	-0.000	0.000	19	-1.871	0.000	0.000
20	10	2.887	0.000	0.000	20	-2.887	-0.000	0.000
21	11	2.058	0.000	0.000	21	-2.058	-0.000	0.000
22	12	1.392	0.000	0.000	22	-1.392	-0.000	0.000
23	13	0.966	0.000	0.000	23	-0.966	-0.000	0.000
24	14	0.821	0.000	-0.000	24	-0.821	-0.000	0.000
25	15	0.966	-0.000	-0.000	25	-0.966	0.000	-0.000
26	16	1.392	-0.000	-0.000	26	-1.392	0.000	-0.000
27	17	2.058	-0.000	-0.000	27	-2.058	0.000	-0.000
28	18	2.887	-0.000	-0.000	28	-2.887	0.000	-0.000
29	7	1.871	0.000	-0.000	29	-1.871	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 5

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	-0.000	0.000	-0.000
6	0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	1.871	-0.000
20	0.000	2.887	-0.000
21	0.000	2.058	-0.000
22	0.000	1.392	-0.000
23	0.000	0.966	-0.000
24	0.000	0.821	-0.000
25	-0.000	0.966	0.000
26	-0.000	1.392	0.000
27	-0.000	2.058	0.000
28	-0.000	2.887	0.000
29	0.000	1.871	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 6

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	9.584	0.425	-6.495	2	-9.584	-0.425	7.983
2	2	9.584	0.425	-7.983	3	-9.584	-0.425	9.471
3	3	0.425	-9.584	-9.471	4	-0.425	4.792	-8.050
4	4	0.425	-4.792	8.050	5	-0.425	-0.000	-13.890
5	5	0.425	-0.000	13.890	6	-0.425	-4.792	-8.050
6	6	0.425	4.792	8.050	9	-0.425	-9.584	9.471
7	7	9.584	-0.425	6.495	8	-9.584	0.425	-7.983
8	8	9.584	-0.425	7.983	9	-9.584	0.425	-9.471
9	1	-0.425	7.714	6.495	10	0.425	-7.714	1.025
10	10	-0.425	4.827	-1.025	11	0.425	-4.827	5.732
11	11	-0.425	2.769	-5.732	12	0.425	-2.769	8.431
12	12	-0.425	1.377	-8.431	13	0.425	-1.377	9.773
13	13	-0.425	0.410	-9.773	14	0.425	-0.410	10.173
14	14	-0.425	-0.410	-10.173	15	0.425	0.410	9.773
15	15	-0.425	-1.377	-9.773	16	0.425	1.377	8.431
16	16	-0.425	-2.769	-8.431	17	0.425	2.769	5.732
17	17	-0.425	-4.827	-5.732	18	0.425	4.827	1.025
18	7	-0.425	-7.714	-6.495	18	0.425	7.714	-1.025
19	1	1.871	-0.000	0.000	19	-1.871	0.000	0.000
20	10	2.887	0.000	0.000	20	-2.887	-0.000	0.000
21	11	2.058	0.000	0.000	21	-2.058	-0.000	0.000
22	12	1.392	0.000	0.000	22	-1.392	-0.000	0.000
23	13	0.966	0.000	0.000	23	-0.966	-0.000	0.000
24	14	0.821	0.000	-0.000	24	-0.821	-0.000	0.000
25	15	0.966	-0.000	-0.000	25	-0.966	0.000	-0.000
26	16	1.392	-0.000	-0.000	26	-1.392	0.000	-0.000
27	17	2.058	-0.000	-0.000	27	-2.058	0.000	-0.000
28	18	2.887	-0.000	-0.000	28	-2.887	0.000	-0.000
29	7	1.871	0.000	-0.000	29	-1.871	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 6

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	-0.000	0.000	-0.000
6	0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	1.871	-0.000
20	0.000	2.887	-0.000
21	0.000	2.058	-0.000
22	0.000	1.392	-0.000
23	0.000	0.966	-0.000
24	0.000	0.821	-0.000
25	-0.000	0.966	0.000
26	-0.000	1.392	0.000
27	-0.000	2.058	0.000
28	-0.000	2.887	0.000
29	0.000	1.871	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 7

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	9.584	0.425	-6.495	2	-9.584	-0.425	7.983
2	2	9.584	0.425	-7.983	3	-9.584	-0.425	9.471
3	3	0.425	-9.584	-9.471	4	-0.425	4.792	-8.050
4	4	0.425	-4.792	8.050	5	-0.425	-0.000	-13.890
5	5	0.425	-0.000	13.890	6	-0.425	-4.792	-8.050
6	6	0.425	4.792	8.050	9	-0.425	-9.584	9.471
7	7	9.584	-0.425	6.495	8	-9.584	0.425	-7.983
8	8	9.584	-0.425	7.983	9	-9.584	0.425	-9.471
9	1	-0.425	7.714	6.495	10	0.425	-7.714	1.025
10	10	-0.425	4.827	-1.025	11	0.425	-4.827	5.732
11	11	-0.425	2.769	-5.732	12	0.425	-2.769	8.431
12	12	-0.425	1.377	-8.431	13	0.425	-1.377	9.773
13	13	-0.425	0.410	-9.773	14	0.425	-0.410	10.173
14	14	-0.425	-0.410	-10.173	15	0.425	0.410	9.773
15	15	-0.425	-1.377	-9.773	16	0.425	1.377	8.431
16	16	-0.425	-2.769	-8.431	17	0.425	2.769	5.732
17	17	-0.425	-4.827	-5.732	18	0.425	4.827	1.025
18	7	-0.425	-7.714	-6.495	18	0.425	7.714	-1.025
19	1	1.871	-0.000	0.000	19	-1.871	0.000	0.000
20	10	2.887	0.000	0.000	20	-2.887	-0.000	0.000
21	11	2.058	0.000	0.000	21	-2.058	-0.000	0.000
22	12	1.392	0.000	0.000	22	-1.392	-0.000	0.000
23	13	0.966	0.000	0.000	23	-0.966	-0.000	0.000
24	14	0.821	0.000	-0.000	24	-0.821	-0.000	0.000
25	15	0.966	-0.000	-0.000	25	-0.966	0.000	-0.000
26	16	1.392	-0.000	-0.000	26	-1.392	0.000	-0.000
27	17	2.058	-0.000	-0.000	27	-2.058	0.000	-0.000
28	18	2.887	-0.000	-0.000	28	-2.887	0.000	-0.000
29	7	1.871	0.000	-0.000	29	-1.871	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 7

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	-0.000	0.000	-0.000
6	0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	1.871	-0.000
20	0.000	2.887	-0.000
21	0.000	2.058	-0.000
22	0.000	1.392	-0.000
23	0.000	0.966	-0.000
24	0.000	0.821	-0.000
25	-0.000	0.966	0.000
26	-0.000	1.392	0.000
27	-0.000	2.058	0.000
28	-0.000	2.887	0.000
29	0.000	1.871	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 8

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	14.606	0.648	-9.898	2	-14.606	-0.648	12.166
2	2	14.606	0.648	-12.166	3	-14.606	-0.648	14.433
3	3	0.648	-14.605	-14.433	4	-0.648	7.303	-12.267
4	4	0.648	-7.303	12.267	5	-0.648	-0.000	-21.168
5	5	0.648	-0.000	21.168	6	-0.648	-7.303	-12.267
6	6	0.648	7.303	12.267	9	-0.648	-14.605	14.433
7	7	14.606	-0.648	9.898	8	-14.606	0.648	-12.166
8	8	14.606	-0.648	12.166	9	-14.606	0.648	-14.433
9	1	-0.648	11.755	9.898	10	0.648	-11.755	1.563
10	10	-0.648	7.356	-1.563	11	0.648	-7.356	8.734
11	11	-0.648	4.219	-8.734	12	0.648	-4.219	12.848
12	12	-0.648	2.098	-12.848	13	0.648	-2.098	14.893
13	13	-0.648	0.625	-14.893	14	0.648	-0.625	15.503
14	14	-0.648	-0.625	-15.503	15	0.648	0.625	14.893
15	15	-0.648	-2.098	-14.893	16	0.648	2.098	12.848
16	16	-0.648	-4.219	-12.848	17	0.648	4.219	8.734
17	17	-0.648	-7.356	-8.734	18	0.648	7.356	1.563
18	7	-0.648	-11.755	-9.898	18	0.648	11.755	-1.563
19	1	2.851	-0.000	0.000	19	-2.851	0.000	0.000
20	10	4.399	0.000	0.000	20	-4.399	-0.000	0.000
21	11	3.137	0.000	0.000	21	-3.137	-0.000	0.000
22	12	2.121	0.000	0.000	22	-2.121	-0.000	0.000
23	13	1.473	0.000	0.000	23	-1.473	-0.000	0.000
24	14	1.250	-0.000	-0.000	24	-1.250	0.000	0.000
25	15	1.473	-0.000	-0.000	25	-1.473	0.000	-0.000
26	16	2.121	-0.000	-0.000	26	-2.121	0.000	-0.000
27	17	3.137	-0.000	-0.000	27	-3.137	0.000	-0.000
28	18	4.399	-0.000	-0.000	28	-4.399	0.000	-0.000
29	7	2.851	0.000	-0.000	29	-2.851	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 8

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	-0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	2.851	-0.000
20	0.000	4.399	-0.000
21	0.000	3.137	-0.000
22	0.000	2.121	-0.000
23	0.000	1.473	-0.000
24	-0.000	1.250	-0.000
25	-0.000	1.473	0.000
26	-0.000	2.121	0.000
27	-0.000	3.137	0.000
28	-0.000	4.399	0.000
29	0.000	2.851	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 9

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-0.234	-0.312	-1.039	2	0.234	0.312	-0.052
2	2	-0.234	-0.312	0.052	3	0.234	0.312	-1.142
3	3	0.309	0.234	1.142	4	-0.309	-0.234	-0.573
4	4	0.309	0.234	0.573	5	-0.309	-0.234	-0.003
5	5	0.309	0.234	0.003	6	-0.309	-0.234	0.566
6	6	0.309	0.234	-0.566	9	-0.309	-0.234	1.135
7	7	0.234	-0.309	-1.031	8	-0.234	0.309	-0.052
8	8	0.234	-0.309	0.052	9	-0.234	0.309	-1.135
9	1	-0.309	-0.068	1.039	10	0.309	0.068	-1.105
10	10	-0.309	0.146	1.105	11	0.309	-0.146	-0.962
11	11	-0.309	0.273	0.962	12	0.309	-0.273	-0.696
12	12	-0.309	0.341	0.696	13	0.309	-0.341	-0.363
13	13	-0.309	0.370	0.363	14	0.309	-0.370	-0.002
14	14	-0.309	0.370	0.002	15	0.309	-0.370	0.358
15	15	-0.309	0.340	-0.358	16	0.309	-0.340	0.690
16	16	-0.309	0.272	-0.690	17	0.309	-0.272	0.956
17	17	-0.309	0.145	-0.956	18	0.309	-0.145	1.097
18	7	-0.309	-0.068	1.031	18	0.309	0.068	-1.097
19	1	-0.166	0.000	-0.000	19	0.166	-0.000	-0.000
20	10	-0.214	-0.000	-0.000	20	0.214	0.000	-0.000
21	11	-0.127	-0.000	-0.000	21	0.127	0.000	-0.000
22	12	-0.068	-0.000	-0.000	22	0.068	0.000	-0.000
23	13	-0.029	-0.000	-0.000	23	0.029	0.000	-0.000
24	14	0.000	-0.000	-0.000	24	-0.000	0.000	-0.000
25	15	0.029	-0.000	-0.000	25	-0.029	0.000	-0.000
26	16	0.068	-0.000	-0.000	26	-0.068	0.000	-0.000
27	17	0.127	-0.000	-0.000	27	-0.127	0.000	-0.000
28	18	0.213	-0.000	-0.000	28	-0.213	0.000	-0.000
29	7	0.165	0.000	-0.000	29	-0.165	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 9

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-0.621	0.000	-0.000
2	0.000	0.000	-0.000
3	0.621	-0.000	0.000
4	-0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	-0.000	0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	0.000	-0.000
19	0.000	-0.166	0.000
20	-0.000	-0.214	0.000
21	-0.000	-0.127	0.000
22	-0.000	-0.068	0.000
23	-0.000	-0.029	0.000
24	-0.000	0.000	0.000
25	-0.000	0.029	0.000
26	-0.000	0.068	0.000
27	-0.000	0.127	0.000
28	-0.000	0.213	0.000
29	0.000	0.165	0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 10

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-0.327	-0.437	-1.456	2	0.327	0.437	-0.072
2	2	-0.327	-0.437	0.072	3	0.327	0.437	-1.600
3	3	0.433	0.327	1.600	4	-0.433	-0.327	-0.802
4	4	0.433	0.327	0.802	5	-0.433	-0.327	-0.005
5	5	0.433	0.327	0.005	6	-0.433	-0.327	0.793
6	6	0.433	0.327	-0.793	9	-0.433	-0.327	1.590
7	7	0.327	-0.433	-1.444	8	-0.327	0.433	-0.073
8	8	0.327	-0.433	0.073	9	-0.327	0.433	-1.590
9	1	-0.433	-0.095	1.456	10	0.433	0.095	-1.548
10	10	-0.433	0.205	1.548	11	0.433	-0.205	-1.348
11	11	-0.433	0.383	1.348	12	0.433	-0.383	-0.974
12	12	-0.433	0.478	0.974	13	0.433	-0.478	-0.508
13	13	-0.433	0.518	0.508	14	0.433	-0.518	-0.003
14	14	-0.433	0.518	0.003	15	0.433	-0.518	0.502
15	15	-0.433	0.477	-0.502	16	0.433	-0.477	0.967
16	16	-0.433	0.381	-0.967	17	0.433	-0.381	1.339
17	17	-0.433	0.203	-1.339	18	0.433	-0.203	1.537
18	7	-0.433	-0.095	1.444	18	0.433	0.095	-1.537
19	1	-0.233	0.000	-0.000	19	0.233	-0.000	-0.000
20	10	-0.300	-0.000	-0.000	20	0.300	0.000	-0.000
21	11	-0.178	-0.000	-0.000	21	0.178	0.000	-0.000
22	12	-0.095	-0.000	-0.000	22	0.095	0.000	-0.000
23	13	-0.040	-0.000	-0.000	23	0.040	0.000	-0.000
24	14	0.000	-0.000	-0.000	24	-0.000	0.000	-0.000
25	15	0.041	-0.000	-0.000	25	-0.041	0.000	-0.000
26	16	0.096	-0.000	-0.000	26	-0.096	0.000	-0.000
27	17	0.178	-0.000	-0.000	27	-0.178	0.000	-0.000
28	18	0.299	-0.000	-0.000	28	-0.299	0.000	-0.000
29	7	0.232	0.000	-0.000	29	-0.232	-0.000	-0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 10

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-0.870	0.000	-0.000
2	0.000	0.000	-0.000
3	0.870	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	-0.000	-0.000	0.000
7	-0.000	-0.000	-0.000
8	0.000	0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	0.000	-0.000
19	0.000	-0.233	0.000
20	-0.000	-0.300	0.000
21	-0.000	-0.178	0.000
22	-0.000	-0.095	0.000
23	-0.000	-0.040	0.000
24	-0.000	0.000	0.000
25	-0.000	0.041	0.000
26	-0.000	0.096	0.000
27	-0.000	0.178	0.000
28	-0.000	0.299	0.000
29	0.000	0.232	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 11

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	7.625	0.338	-5.167	2	-7.625	-0.338	6.351
2	2	7.625	0.338	-6.351	3	-7.625	-0.338	7.535
3	3	0.338	-7.624	-7.535	4	-0.338	3.812	-6.404
4	4	0.338	-3.812	6.404	5	-0.338	-0.000	-11.050
5	5	0.338	-0.000	11.050	6	-0.338	-3.812	-6.404
6	6	0.338	3.812	6.404	9	-0.338	-7.624	7.535
7	7	7.625	-0.338	5.167	8	-7.625	0.338	-6.351
8	8	7.625	-0.338	6.351	9	-7.625	0.338	-7.535
9	1	-0.338	6.136	5.167	10	0.338	-6.136	0.816
10	10	-0.338	3.840	-0.816	11	0.338	-3.840	4.560
11	11	-0.338	2.202	-4.560	12	0.338	-2.202	6.707
12	12	-0.338	1.095	-6.707	13	0.338	-1.095	7.775
13	13	-0.338	0.326	-7.775	14	0.338	-0.326	8.093
14	14	-0.338	-0.326	-8.093	15	0.338	0.326	7.775
15	15	-0.338	-1.095	-7.775	16	0.338	1.095	6.707
16	16	-0.338	-2.202	-6.707	17	0.338	2.202	4.560
17	17	-0.338	-3.840	-4.560	18	0.338	3.840	0.816
18	7	-0.338	-6.136	-5.167	18	0.338	6.136	-0.816
19	1	1.488	-0.000	0.000	19	-1.488	0.000	0.000
20	10	2.296	0.000	0.000	20	-2.296	-0.000	0.000
21	11	1.637	0.000	0.000	21	-1.637	-0.000	0.000
22	12	1.107	0.000	0.000	22	-1.107	-0.000	0.000
23	13	0.769	0.000	0.000	23	-0.769	-0.000	0.000
24	14	0.653	-0.000	-0.000	24	-0.653	0.000	0.000
25	15	0.769	-0.000	-0.000	25	-0.769	0.000	-0.000
26	16	1.107	-0.000	-0.000	26	-1.107	0.000	-0.000
27	17	1.637	-0.000	-0.000	27	-1.637	0.000	-0.000
28	18	2.296	-0.000	-0.000	28	-2.296	0.000	-0.000
29	7	1.488	0.000	-0.000	29	-1.488	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 11

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	-0.000	0.000	-0.000
6	-0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	1.488	-0.000
20	0.000	2.296	-0.000
21	0.000	1.637	-0.000
22	0.000	1.107	-0.000
23	0.000	0.769	-0.000
24	-0.000	0.653	-0.000
25	-0.000	0.769	0.000
26	-0.000	1.107	0.000
27	-0.000	1.637	0.000
28	-0.000	2.296	0.000
29	0.000	1.488	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 12

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	7.625	0.338	-5.167	2	-7.625	-0.338	6.351
2	2	7.625	0.338	-6.351	3	-7.625	-0.338	7.535
3	3	0.338	-7.624	-7.535	4	-0.338	3.812	-6.404
4	4	0.338	-3.812	6.404	5	-0.338	-0.000	-11.050
5	5	0.338	-0.000	11.050	6	-0.338	-3.812	-6.404
6	6	0.338	3.812	6.404	9	-0.338	-7.624	7.535
7	7	7.625	-0.338	5.167	8	-7.625	0.338	-6.351
8	8	7.625	-0.338	6.351	9	-7.625	0.338	-7.535
9	1	-0.338	6.136	5.167	10	0.338	-6.136	0.816
10	10	-0.338	3.840	-0.816	11	0.338	-3.840	4.560
11	11	-0.338	2.202	-4.560	12	0.338	-2.202	6.707
12	12	-0.338	1.095	-6.707	13	0.338	-1.095	7.775
13	13	-0.338	0.326	-7.775	14	0.338	-0.326	8.093
14	14	-0.338	-0.326	-8.093	15	0.338	0.326	7.775
15	15	-0.338	-1.095	-7.775	16	0.338	1.095	6.707
16	16	-0.338	-2.202	-6.707	17	0.338	2.202	4.560
17	17	-0.338	-3.840	-4.560	18	0.338	3.840	0.816
18	7	-0.338	-6.136	-5.167	18	0.338	6.136	-0.816
19	1	1.488	-0.000	0.000	19	-1.488	0.000	0.000
20	10	2.296	0.000	0.000	20	-2.296	-0.000	0.000
21	11	1.637	0.000	0.000	21	-1.637	-0.000	0.000
22	12	1.107	0.000	0.000	22	-1.107	-0.000	0.000
23	13	0.769	0.000	0.000	23	-0.769	-0.000	0.000
24	14	0.653	-0.000	-0.000	24	-0.653	0.000	0.000
25	15	0.769	-0.000	-0.000	25	-0.769	0.000	-0.000
26	16	1.107	-0.000	-0.000	26	-1.107	0.000	-0.000
27	17	1.637	-0.000	-0.000	27	-1.637	0.000	-0.000
28	18	2.296	-0.000	-0.000	28	-2.296	0.000	-0.000
29	7	1.488	0.000	-0.000	29	-1.488	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 12

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	-0.000	0.000	-0.000
6	-0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	1.488	-0.000
20	0.000	2.296	-0.000
21	0.000	1.637	-0.000
22	0.000	1.107	-0.000
23	0.000	0.769	-0.000
24	-0.000	0.653	-0.000
25	-0.000	0.769	0.000
26	-0.000	1.107	0.000
27	-0.000	1.637	0.000
28	-0.000	2.296	0.000
29	0.000	1.488	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 13

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	7.625	0.338	-5.167	2	-7.625	-0.338	6.351
2	2	7.625	0.338	-6.351	3	-7.625	-0.338	7.535
3	3	0.338	-7.624	-7.535	4	-0.338	3.812	-6.404
4	4	0.338	-3.812	6.404	5	-0.338	-0.000	-11.050
5	5	0.338	-0.000	11.050	6	-0.338	-3.812	-6.404
6	6	0.338	3.812	6.404	9	-0.338	-7.624	7.535
7	7	7.625	-0.338	5.167	8	-7.625	0.338	-6.351
8	8	7.625	-0.338	6.351	9	-7.625	0.338	-7.535
9	1	-0.338	6.136	5.167	10	0.338	-6.136	0.816
10	10	-0.338	3.840	-0.816	11	0.338	-3.840	4.560
11	11	-0.338	2.202	-4.560	12	0.338	-2.202	6.707
12	12	-0.338	1.095	-6.707	13	0.338	-1.095	7.775
13	13	-0.338	0.326	-7.775	14	0.338	-0.326	8.093
14	14	-0.338	-0.326	-8.093	15	0.338	0.326	7.775
15	15	-0.338	-1.095	-7.775	16	0.338	1.095	6.707
16	16	-0.338	-2.202	-6.707	17	0.338	2.202	4.560
17	17	-0.338	-3.840	-4.560	18	0.338	3.840	0.816
18	7	-0.338	-6.136	-5.167	18	0.338	6.136	-0.816
19	1	1.488	-0.000	0.000	19	-1.488	0.000	0.000
20	10	2.296	0.000	0.000	20	-2.296	-0.000	0.000
21	11	1.637	0.000	0.000	21	-1.637	-0.000	0.000
22	12	1.107	0.000	0.000	22	-1.107	-0.000	0.000
23	13	0.769	0.000	0.000	23	-0.769	-0.000	0.000
24	14	0.653	-0.000	-0.000	24	-0.653	0.000	0.000
25	15	0.769	-0.000	-0.000	25	-0.769	0.000	-0.000
26	16	1.107	-0.000	-0.000	26	-1.107	0.000	-0.000
27	17	1.637	-0.000	-0.000	27	-1.637	0.000	-0.000
28	18	2.296	-0.000	-0.000	28	-2.296	0.000	-0.000
29	7	1.488	0.000	-0.000	29	-1.488	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 13

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	-0.000	0.000	-0.000
6	-0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	1.488	-0.000
20	0.000	2.296	-0.000
21	0.000	1.637	-0.000
22	0.000	1.107	-0.000
23	0.000	0.769	-0.000
24	-0.000	0.653	-0.000
25	-0.000	0.769	0.000
26	-0.000	1.107	0.000
27	-0.000	1.637	0.000
28	-0.000	2.296	0.000
29	0.000	1.488	0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 14

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	14.284	0.634	-9.680	2	-14.284	-0.634	11.898
2	2	14.284	0.634	-11.898	3	-14.284	-0.634	14.115
3	3	0.634	-14.284	-14.115	4	-0.634	7.142	-11.997
4	4	0.634	-7.142	11.997	5	-0.634	-0.000	-20.701
5	5	0.634	-0.000	20.701	6	-0.634	-7.142	-11.997
6	6	0.634	7.142	11.997	9	-0.634	-14.284	14.115
7	7	14.284	-0.634	9.680	8	-14.284	0.634	-11.898
8	8	14.284	-0.634	11.898	9	-14.284	0.634	-14.115
9	1	-0.634	11.496	9.680	10	0.634	-11.496	1.528
10	10	-0.634	7.194	-1.528	11	0.634	-7.194	8.542
11	11	-0.634	4.126	-8.542	12	0.634	-4.126	12.565
12	12	-0.634	2.052	-12.565	13	0.634	-2.052	14.565
13	13	-0.634	0.611	-14.565	14	0.634	-0.611	15.161
14	14	-0.634	-0.611	-15.161	15	0.634	0.611	14.565
15	15	-0.634	-2.052	-14.565	16	0.634	2.052	12.565
16	16	-0.634	-4.126	-12.565	17	0.634	4.126	8.542
17	17	-0.634	-7.194	-8.542	18	0.634	7.194	1.528
18	7	-0.634	-11.496	-9.680	18	0.634	11.496	-1.528
19	1	2.788	-0.000	0.000	19	-2.788	0.000	0.000
20	10	4.302	0.000	0.000	20	-4.302	-0.000	0.000
21	11	3.068	0.000	0.000	21	-3.068	-0.000	0.000
22	12	2.075	0.000	0.000	22	-2.075	-0.000	0.000
23	13	1.440	0.000	0.000	23	-1.440	-0.000	0.000
24	14	1.223	-0.000	-0.000	24	-1.223	0.000	-0.000
25	15	1.440	-0.000	-0.000	25	-1.440	0.000	-0.000
26	16	2.075	-0.000	-0.000	26	-2.075	0.000	-0.000
27	17	3.068	-0.000	-0.000	27	-3.068	0.000	-0.000
28	18	4.302	-0.000	-0.000	28	-4.302	0.000	-0.000
29	7	2.788	0.000	-0.000	29	-2.788	-0.000	-0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 14

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	0.000	0.000	-0.000
6	-0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	2.788	-0.000
20	0.000	4.302	-0.000
21	0.000	3.068	-0.000
22	0.000	2.075	-0.000
23	0.000	1.440	-0.000
24	-0.000	1.223	0.000
25	-0.000	1.440	0.000
26	-0.000	2.075	0.000
27	-0.000	3.068	0.000
28	-0.000	4.302	0.000
29	0.000	2.788	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 15

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-0.789	-1.053	-3.510	2	0.789	1.053	-0.174
2	2	-0.789	-1.053	0.174	3	0.789	1.053	-3.858
3	3	1.045	0.789	3.858	4	-1.045	-0.789	-1.935
4	4	1.045	0.789	1.935	5	-1.045	-0.789	-0.012
5	5	1.045	0.789	0.012	6	-1.045	-0.789	1.912
6	6	1.045	0.789	-1.912	9	-1.045	-0.789	3.835
7	7	0.789	-1.045	-3.483	8	-0.789	1.045	-0.176
8	8	0.789	-1.045	0.176	9	-0.789	1.045	-3.835
9	1	-1.045	-0.228	3.510	10	1.045	0.228	-3.733
10	10	-1.045	0.494	3.733	11	1.045	-0.494	-3.251
11	11	-1.045	0.924	3.251	12	1.045	-0.924	-2.350
12	12	-1.045	1.153	2.350	13	1.045	-1.153	-1.226
13	13	-1.045	1.250	1.226	14	1.045	-1.250	-0.007
14	14	-1.045	1.249	0.007	15	1.045	-1.249	1.210
15	15	-1.045	1.150	-1.210	16	1.045	-1.150	2.332
16	16	-1.045	0.920	-2.332	17	1.045	-0.920	3.229
17	17	-1.045	0.490	-3.229	18	1.045	-0.490	3.707
18	7	-1.045	-0.230	3.483	18	1.045	0.230	-3.707
19	1	-0.561	0.000	-0.000	19	0.561	-0.000	-0.000
20	10	-0.722	-0.000	-0.000	20	0.722	0.000	-0.000
21	11	-0.429	-0.000	-0.000	21	0.429	0.000	-0.000
22	12	-0.229	-0.000	-0.000	22	0.229	0.000	-0.000
23	13	-0.097	-0.000	-0.000	23	0.097	0.000	-0.000
24	14	0.001	-0.000	-0.000	24	-0.001	0.000	-0.000
25	15	0.098	-0.000	-0.000	25	-0.098	0.000	-0.000
26	16	0.231	-0.000	-0.000	26	-0.231	0.000	-0.000
27	17	0.429	-0.000	-0.000	27	-0.429	0.000	-0.000
28	18	0.721	-0.000	-0.000	28	-0.721	0.000	-0.000
29	7	0.559	0.000	-0.000	29	-0.559	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 15

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-2.098	0.000	-0.000
2	0.000	0.000	-0.000
3	2.098	-0.000	0.000
4	-0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	-0.000	0.000
7	-0.000	-0.000	-0.000
8	0.000	0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	0.000	-0.000
19	0.000	-0.561	0.000
20	-0.000	-0.722	0.000
21	-0.000	-0.429	0.000
22	-0.000	-0.229	0.000
23	-0.000	-0.097	0.000
24	-0.000	0.001	0.000
25	-0.000	0.098	0.000
26	-0.000	0.231	0.000
27	-0.000	0.429	0.000
28	-0.000	0.721	0.000
29	0.000	0.559	0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL HIPOTESIS 16

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-0.861	-1.148	-3.830	2	0.861	1.148	-0.190
2	2	-0.861	-1.148	0.190	3	0.861	1.148	-4.210
3	3	1.141	0.861	4.210	4	-1.141	-0.861	-2.111
4	4	1.141	0.861	2.111	5	-1.141	-0.861	-0.013
5	5	1.141	0.861	0.013	6	-1.141	-0.861	2.086
6	6	1.141	0.861	-2.086	9	-1.141	-0.861	4.184
7	7	0.861	-1.141	-3.800	8	-0.861	1.141	-0.192
8	8	0.861	-1.141	0.192	9	-0.861	1.141	-4.184
9	1	-1.141	-0.249	3.830	10	1.141	0.249	-4.072
10	10	-1.141	0.539	4.072	11	1.141	-0.539	-3.546
11	11	-1.141	1.008	3.546	12	1.141	-1.008	-2.564
12	12	-1.141	1.258	2.564	13	1.141	-1.258	-1.337
13	13	-1.141	1.364	1.337	14	1.141	-1.364	-0.008
14	14	-1.141	1.362	0.008	15	1.141	-1.362	1.321
15	15	-1.141	1.255	-1.321	16	1.141	-1.255	2.544
16	16	-1.141	1.004	-2.544	17	1.141	-1.004	3.523
17	17	-1.141	0.535	-3.523	18	1.141	-0.535	4.044
18	7	-1.141	-0.251	3.800	18	1.141	0.251	-4.044
19	1	-0.612	0.000	-0.000	19	0.612	-0.000	-0.000
20	10	-0.788	-0.000	-0.000	20	0.788	0.000	-0.000
21	11	-0.469	-0.000	-0.000	21	0.469	0.000	-0.000
22	12	-0.250	-0.000	-0.000	22	0.250	0.000	-0.000
23	13	-0.105	-0.000	-0.000	23	0.105	0.000	-0.000
24	14	0.001	-0.000	-0.000	24	-0.001	0.000	-0.000
25	15	0.107	-0.000	-0.000	25	-0.107	0.000	-0.000
26	16	0.252	-0.000	-0.000	26	-0.252	0.000	-0.000
27	17	0.469	-0.000	-0.000	27	-0.469	0.000	-0.000
28	18	0.786	-0.000	-0.000	28	-0.786	0.000	-0.000
29	7	0.610	0.000	-0.000	29	-0.610	-0.000	-0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONA CENTRAL

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONA CENTRAL 16

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-2.289	0.000	-0.000
2	0.000	-0.000	-0.000
3	2.289	-0.000	0.000
4	-0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	-0.000	0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	0.000	-0.000
19	0.000	-0.612	0.000
20	-0.000	-0.788	0.000
21	-0.000	-0.469	0.000
22	-0.000	-0.250	0.000
23	-0.000	-0.105	0.000
24	-0.000	0.001	0.000
25	-0.000	0.107	0.000
26	-0.000	0.252	0.000
27	-0.000	0.469	0.000
28	-0.000	0.786	0.000
29	0.000	0.610	0.000

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COMB. HIPOTESIS 01 01 1.50 02 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 1

NUDO	@X	@Y	@Z
1	0.00000	-0.01168	0.00201
2	-0.00312	-0.01183	0.00003
3	-0.00001	-0.01196	-0.00209
4	-0.00004	-0.01813	-0.00224
5	-0.00006	-0.02116	-0.00000
6	-0.00009	-0.01813	0.00224
7	-0.00012	-0.01168	-0.00201
8	0.00299	-0.01183	-0.00003
9	-0.00011	-0.01196	0.00209
10	-0.00001	-0.00935	0.00246
11	-0.00002	-0.00695	0.00227
12	-0.00004	-0.00496	0.00170
13	-0.00005	-0.00366	0.00090
14	-0.00006	-0.00322	-0.00000
15	-0.00007	-0.00366	-0.00090
16	-0.00008	-0.00496	-0.00170
17	-0.00010	-0.00695	-0.00227
18	-0.00011	-0.00935	-0.00246
19	0.00920	0.00000	0.00201
20	0.01124	0.00000	0.00246
21	0.01039	0.00000	0.00227
22	0.00774	0.00000	0.00170
23	0.00407	0.00000	0.00090
24	-0.00006	0.00000	-0.00000
25	-0.00419	0.00000	-0.00090
26	-0.00786	0.00000	-0.00170
27	-0.01051	0.00000	-0.00227
28	-0.01136	0.00000	-0.00246
29	-0.00932	0.00000	-0.00201

COMB. HIPOTESIS 01 01 1.50 02 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 1

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	100.637	29.882	-95.836	2	100.637	-2.157	-50.250
2	2	90.792	-2.157	-50.250	3	90.792	-24.141	-99.206
3	3	24.141	90.792	-99.206	4	24.141	45.396	66.773
4	4	24.141	45.396	66.773	5	24.141	-0.000	122.100
5	5	24.141	0.000	122.100	6	24.141	-45.396	66.773
6	6	24.141	-45.396	66.773	9	24.141	-90.792	-99.206
7	7	100.637	-29.882	95.836	8	100.637	2.157	50.250
8	8	90.792	2.157	50.250	9	90.792	24.141	99.206
9	1	29.882	-90.548	95.835	10	29.882	-90.548	7.551
10	10	29.882	-58.629	7.551	11	29.882	-58.629	-49.612
11	11	29.882	-34.907	-49.612	12	29.882	-34.907	-83.647
12	12	29.882	-17.988	-83.647	13	29.882	-17.988	-101.185
13	13	29.882	-5.488	-101.185	14	29.882	-5.488	-106.535
14	14	29.882	5.488	-106.535	15	29.882	5.488	-101.185
15	15	29.882	17.988	-101.185	16	29.882	17.988	-83.647
16	16	29.882	34.907	-83.647	17	29.882	34.907	-49.612
17	17	29.882	58.629	-49.612	18	29.882	58.629	7.551
18	7	29.882	90.548	-95.835	18	29.882	90.548	-7.551

COMB. HIPOTESIS 01 01 1.50 02 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 1

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	19.933	0.000	0.000	19	19.933	0.000	-0.000
20	10	31.920	-0.000	0.000	20	31.920	-0.000	-0.000
21	11	23.722	-0.000	0.000	21	23.722	-0.000	-0.000
22	12	16.919	-0.000	0.000	22	16.919	-0.000	-0.000
23	13	12.500	-0.000	0.000	23	12.500	-0.000	-0.000
24	14	10.975	-0.000	0.000	24	10.975	-0.000	-0.000
25	15	12.500	0.000	-0.000	25	12.500	0.000	0.000
26	16	16.919	0.000	-0.000	26	16.919	0.000	0.000
27	17	23.722	0.000	-0.000	27	23.722	0.000	0.000
28	18	31.920	0.000	-0.000	28	31.920	0.000	0.000
29	7	19.933	-0.000	-0.000	29	19.933	-0.000	0.000

COMB. HIPOTESIS 01 01 1.50 02 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 1

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	19.933	-0.000
20	0.000	31.920	-0.000
21	0.000	23.722	-0.000
22	0.000	16.919	-0.000
23	0.000	12.500	-0.000
24	0.000	10.975	-0.000
25	-0.000	12.500	0.000
26	-0.000	16.919	0.000
27	-0.000	23.722	0.000
28	-0.000	31.920	0.000
29	0.000	19.933	0.000

COMB. HIPOTESIS 02 01 1.50 03 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 2

NUDO	@X	@Y	@Z
1	0.00000	-0.01123	0.00170
2	-0.00229	-0.01137	0.00004
3	-0.00002	-0.01151	-0.00178
4	-0.00006	-0.01710	-0.00208
5	-0.00010	-0.01994	-0.00000
6	-0.00014	-0.01710	0.00208
7	-0.00020	-0.01123	-0.00170
8	0.00210	-0.01137	-0.00004
9	-0.00017	-0.01151	0.00178
10	-0.00002	-0.00917	0.00222
11	-0.00004	-0.00695	0.00212
12	-0.00006	-0.00508	0.00160
13	-0.00008	-0.00385	0.00085
14	-0.00010	-0.00343	-0.00000
15	-0.00012	-0.00385	-0.00085
16	-0.00014	-0.00508	-0.00160
17	-0.00016	-0.00695	-0.00212
18	-0.00018	-0.00917	-0.00222
19	0.00777	0.00000	0.00170
20	0.01017	0.00000	0.00222
21	0.00966	0.00000	0.00212
22	0.00728	0.00000	0.00160
23	0.00383	0.00000	0.00085
24	-0.00010	0.00000	-0.00000
25	-0.00402	0.00000	-0.00085
26	-0.00747	0.00000	-0.00160
27	-0.00985	0.00000	-0.00212
28	-0.01037	0.00000	-0.00222
29	-0.00796	0.00000	-0.00170

COMB. HIPOTESIS 02 01 1.50 03 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 2

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	100.637	48.252	-105.721	2	100.637	-2.777	-30.810
2	2	90.792	-2.777	-30.810	3	90.792	-37.792	-106.476
3	3	37.792	90.792	-106.476	4	37.792	45.396	59.503
4	4	37.792	45.396	59.503	5	37.792	-0.000	114.830
5	5	37.792	0.000	114.830	6	37.792	-45.396	59.503
6	6	37.792	-45.396	59.503	9	37.792	-90.792	-106.476
7	7	100.637	-48.252	105.721	8	100.637	2.777	30.810
8	8	90.792	2.777	30.810	9	90.792	37.792	106.476
9	1	48.252	-91.318	105.721	10	48.252	-91.318	16.686
10	10	48.252	-60.038	16.686	11	48.252	-60.038	-41.851
11	11	48.252	-36.318	-41.851	12	48.252	-36.318	-77.261
12	12	48.252	-18.987	-77.261	13	48.252	-18.987	-95.773
13	13	48.252	-5.845	-95.773	14	48.252	-5.845	-101.472
14	14	48.252	5.845	-101.472	15	48.252	5.845	-95.773
15	15	48.252	18.987	-95.773	16	48.252	18.987	-77.261
16	16	48.252	36.318	-77.261	17	48.252	36.318	-41.851
17	17	48.252	60.038	-41.851	18	48.252	60.038	16.686
18	7	48.252	91.318	-105.721	18	48.252	91.318	-16.686

COMB. HIPOTESIS 02 01 1.50 03 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 2

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	19.163	0.000	0.000	19	19.163	0.000	-0.000
20	10	31.280	-0.000	0.000	20	31,280	-0.000	-0.000
21	11	23.720	-0.000	0.000	21	23.720	-0.000	-0.000
22	12	17.331	-0.000	0.000	22	17.331	-0.000	-0.000
23	13	13.142	-0.000	0.000	23	13.142	-0.000	-0.000
24	14	11.690	-0.000	0.000	24	11.690	-0.000	-0.000
25	15	13.142	0.000	-0.000	25	13.142	0.000	0.000
26	16	17.331	0.000	-0.000	26	17.331	0.000	0.000
27	17	23.720	0.000	-0.000	27	23.720	0.000	0.000
28	18	31.280	0.000	-0.000	28	31.280	0.000	0.000
29	7	19.163	-0.000	-0.000	29	19.163	-0.000	0.000

COMB. HIPOTESIS 02 01 1.50 03 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 2

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	19.163	-0.000
20	0.000	31.280	-0.000
21	0.000	23.720	-0.000
22	0.000	17.331	-0.000
23	0.000	13.142	-0.000
24	0.000	11.690	-0.000
25	-0.000	13.142	0.000
26	-0.000	17.331	0.000
27	-0.000	23.720	0.000
28	-0.000	31.280	0.000
29	0.000	19.163	0.000

COMB. HIPOTESIS 03 01 1.50 03 1.60 04 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 3

NUDO	@X	@Y	@Z
1	0.00000	-0.00996	0.00111
2	0.00012	-0.01011	-0.00061
3	0.00410	-0.01024	-0.00210
4	0.00406	-0.01642	-0.00227
5	0.00401	-0.01967	-0.00017
6	0.00397	-0.01732	0.00182
7	-0.00018	-0.01229	-0.00214
8	0.00414	-0.01244	-0.00068
9	0.00393	-0.01258	0.00131
10	-0.00002	-0.00840	0.00179
11	-0.00004	-0.00653	0.00182
12	-0.00005	-0.00489	0.00141
13	-0.00007	-0.00381	0.00073
14	-0.00009	-0.00347	-0.00009
15	-0.00011	-0.00398	-0.00095
16	-0.00013	-0.00532	-0.00175
17	-0.00014	-0.00737	-0.00234
18	-0.00016	-0.00985	-0.00256
19	0.00510	0.00000	0.00111
20	0.00819	0.00000	0.00179
21	0.00830	0.00000	0.00182
22	0.00641	0.00000	0.00141
23	0.00329	0.00000	0.00073
24	-0.00049	0.00000	-0.00009
25	-0.00447	0.00000	-0.00095
26	-0.00813	0.00000	-0.00175
27	-0.01088	0.00000	-0.00234
28	-0.01187	0.00000	-0.00256
29	-0.00998	0.00000	-0.00214

COMB. HIPOTESIS 03 01 1.50 03 1.60 04 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 3

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	98.510	59.167	-122.849	2	98.510	0.914	-22.378
2	2	88.666	0.914	-22.378	3	88.666	-41.325	-97.767
3	3	41.325	88.666	-97.767	4	41.325	43.270	63.029
4	4	41.325	43.270	63.029	5	41.325	-2.126	113.172
5	5	41.325	-2.126	113.172	6	41.325	-47.522	52.662
6	6	41.325	-47.522	52.662	9	41.325	-92.918	-118.500
7	7	102.763	-44.719	93.013	8	102.763	6.310	30.468
8	8	92.918	6.310	30.468	9	92.918	41.325	118.500
9	1	44.719	-91.352	122.849	10	44.719	-91.352	33.781
10	10	44.719	-62.701	33.781	11	44.719	-62.701	-27.353
11	11	44.719	-40.409	-27.353	12	44.719	-40.409	-66.751
12	12	44.719	-23.719	-66.751	13	44.719	-23.719	-89.877
13	13	44.719	-10.732	-89.877	14	44.719	-10.732	-100.341
14	14	44.719	1.118	-100.341	15	44.719	1.118	-99.251
15	15	44.719	14.702	-99.251	16	44.719	14.702	-84.917
16	16	44.719	32.859	-84.916	17	44.719	32.859	-52.879
17	17	44.719	58.005	-52.879	18	44.719	58.005	3.675
18	7	44.719	91.628	-93.013	18	44.719	91.628	-3.676

COMB. HIPOTESIS 03 01 1.50 03 1.60 04 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 3

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	17.003	0.000	0.000	19	17.003	0.000	-0.000
20	10	28.651	-0.000	0.000	20	28.651	-0.000	-0.000
21	11	22.292	-0.000	0.000	21	22.292	-0.000	-0.000
22	12	16.690	-0.000	0.000	22	16.690	-0.000	-0.000
23	13	12.986	-0.000	0.000	23	12.986	-0.000	-0.000
24	14	11.850	0.000	-0.000	24	11.850	0.000	0.000
25	15	13.585	0.000	-0.000	25	13.585	0.000	0.000
26	16	18.156	0.000	-0.000	26	18.156	0.000	0.000
27	17	25.146	0.000	-0.000	27	25.146	0.000	0.000
28	18	33.623	0.000	-0.000	28	33.623	0.000	0.000
29	7	20.979	-0.000	-0.000	29	20.979	-0.000	0.000

COMB. HIPOTESIS 03 01 1.50 03 1.60 04 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 3

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-14.448	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	17.003	-0.000
20	0.000	28.651	-0.000
21	0.000	22.292	-0.000
22	0.000	16.690	-0.000
23	0.000	12.986	-0.000
24	-0.000	11.850	0.000
25	-0.000	13.585	0.000
26	-0.000	18.156	0.000
27	-0.000	25.146	0.000
28	-0.000	33.623	0.000
29	0.000	20.979	0.000

COMB. HIPOTESIS 04 01 1.50 02 1.60 05 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 4

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01343	0.00238
2	-0.00381	-0.01360	0.00004
3	-0.00001	-0.01376	-0.00251
4	-0.00003	-0.02110	-0.00265
5	-0.00006	-0.02468	-0.00000
6	-0.00008	-0.02110	0.00265
7	-0.00012	-0.01343	-0.00238
8	0.00369	-0.01360	-0.00004
9	-0.00011	-0.01376	0.00251
10	-0.00001	-0.01071	0.00286
11	-0.00002	-0.00792	0.00264
12	-0.00004	-0.00561	0.00196
13	-0.00005	-0.00412	0.00104
14	-0.00006	-0.00360	-0.00000
15	-0.00007	-0.00412	-0.00104
16	-0.00008	-0.00561	-0.00196
17	-0.00009	-0.00792	-0.00264
18	-0.00011	-0.01071	-0.00286
19	0.01090	0.00000	0.00238
20	0.01311	0.00000	0.00286
21	0.01205	0.00000	0.00264
22	0.00895	0.00000	0.00196
23	0.00470	0.00000	0.00104
24	-0.00006	0.00000	-0.00000
25	-0.00482	0.00000	-0.00104
26	-0.00907	0.00000	-0.00196
27	-0.01217	0.00000	-0.00264
28	-0.01323	0.00000	-0.00286
29	-0.01102	0.00000	-0.00238

COMB. HIPOTESIS 04 01 1.50 02 1.60 05 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 4

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	115.971	29.202	-106.228	2	115.971	-2.837	-63.024
2	2	106.127	-2.837	-63.024	3	106.127	-24.822	-114.360
3	3	24.822	106.127	-114.360	4	24.822	53.063	79.653
4	4	24.822	53.063	79.653	5	24.822	-0.000	144.324
5	5	24.822	0.000	144.324	6	24.822	-53.063	79.653
6	6	24.822	-53.063	79.653	9	24.822	-106.127	-114.360
7	7	115.971	-29.202	106.228	8	115.971	2.837	63.024
8	8	106.127	2.837	63.024	9	106.127	24.822	114.360
9	1	29.202	-102.890	106.228	10	29.202	-102.890	5.910
10	10	29.202	-66.352	5.910	11	29.202	-66.352	-58.783
11	11	29.202	-39.337	-58.783	12	29.202	-39.337	-97.136
12	12	29.202	-20.190	-97.136	13	29.202	-20.190	-116.822
13	13	29.202	-6.144	-116.822	14	29.202	-6.144	-122.812
14	14	29.202	6.144	-122.812	15	29.202	6.144	-116.822
15	15	29.202	20.190	-116.822	16	29.202	20.190	-97.136
16	16	29.202	39.337	-97.136	17	29.202	39.337	-58.783
17	17	29.202	66.352	-58.783	18	29.202	66.352	5.910
18	7	29.202	102.890	-106.228	18	29.202	102.890	-5.910

COMB. HIPOTESIS 04 01 1.50 02 1.60 05 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 4

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	22.926	0.000	0.000	19	22.926	0.000	-0.000
20	10	36.538	-0.000	0.000	20	36.538	-0.000	-0.000
21	11	27.015	-0.000	0.000	21	27.015	-0.000	-0.000
22	12	19.146	-0.000	0.000	22	19.146	-0.000	-0.000
23	13	14.046	-0.000	0.000	23	14.046	-0.000	-0.000
24	14	12.288	-0.000	0.000	24	12.288	-0.000	-0.000
25	15	14.046	0.000	-0.000	25	14.046	0.000	0.000
26	16	19.146	0.000	-0.000	26	19.146	0.000	0.000
27	17	27.015	0.000	-0.000	27	27.015	0.000	0.000
28	18	36.538	0.000	-0.000	28	36.538	0.000	0.000
29	7	22.926	-0.000	-0.000	29	22.926	-0.000	0.000

COMB. HIPOTESIS 04 01 1.50 02 1.60 05 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 4

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	22.926	-0.000
20	0.000	36.538	-0.000
21	0.000	27.015	-0.000
22	0.000	19.146	-0.000
23	0.000	14.046	-0.000
24	0.000	12.288	-0.000
25	-0.000	14.046	0.000
26	-0.000	19.146	0.000
27	-0.000	27.015	0.000
28	-0.000	36.538	0.000
29	0.000	22.926	0.000

COMB. HIPOTESIS 05 01 1.50 02 1.60 06 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 5

NUDO	@X	@Y	@Z
1	0.00000	-0.01343	0.00238
2	-0.00381	-0.01360	0.00004
3	-0.00001	-0.01376	-0.00251
4	-0.00003	-0.02110	-0.00265
5	-0.00006	-0.02468	-0.00000
6	-0.00008	-0.02110	0.00265
7	-0.00012	-0.01343	-0.00238
8	0.00369	-0.01360	-0.00004
9	-0.00011	-0.01376	0.00251
10	-0.00001	-0.01071	0.00286
11	-0.00002	-0.00792	0.00264
12	-0.00004	-0.00561	0.00196
13	-0.00005	-0.00412	0.00104
14	-0.00006	-0.00360	-0.00000
15	-0.00007	-0.00412	-0.00104
16	-0.00008	-0.00561	-0.00196
17	-0.00009	-0.00792	-0.00264
18	-0.00011	-0.01071	-0.00286
19	0.01090	0.00000	0.00238
20	0.01311	0.00000	0.00286
21	0.01205	0.00000	0.00264
22	0.00895	0.00000	0.00196
23	0.00470	0.00000	0.00104
24	-0.00006	0.00000	-0.00000
25	-0.00482	0.00000	-0.00104
26	-0.00907	0.00000	-0.00196
27	-0.01217	0.00000	-0.00264
28	-0.01323	0.00000	-0.00286
29	-0.01102	0.00000	-0.00238

COMB. HIPOTESIS 05 01 1.50 02 1.60 06 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 5

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	115.971	29.202	-106.228	2	115.971	-2.837	-63.024
2	2	106.127	-2.837	-63.024	3	106.127	-24.822	-114.360
3	3	24.822	106.127	-114.360	4	24.822	53.063	79.653
4	4	24.822	53.063	79.653	5	24.822	-0.000	144.324
5	5	24.822	0.000	144.324	6	24.822	-53.063	79.653
6	6	24.822	-53.063	79.653	9	24.822	-106.127	-114.360
7	7	115.971	-29.202	106.228	8	115.971	2.837	63.024
8	8	106.127	2.837	63.024	9	106.127	24.822	114.360
9	1	29.202	-102.890	106.228	10	29.202	-102.890	5.910
10	10	29.202	-66.352	5.910	11	29.202	-66.352	-58.783
11	11	29.202	-39.337	-58.783	12	29.202	-39.337	-97.136
12	12	29.202	-20.190	-97.136	13	29.202	-20.190	-116.822
13	13	29.202	-6.144	-116.822	14	29.202	-6.144	-122.812
14	14	29.202	6.144	-122.812	15	29.202	6.144	-116.822
15	15	29.202	20.190	-116.822	16	29.202	20.190	-97.136
16	16	29.202	39.337	-97.136	17	29.202	39.337	-58.783
17	17	29.202	66.352	-58.783	18	29.202	66.352	5.910
18	7	29.202	102.890	-106.228	18	29.202	102.890	-5.910

COMB. HIPOTESIS 05 01 1.50 02 1.60 06 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 5

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	22.926	0.000	0.000	19	22.926	0.000	-0.000
20	10	36.538	-0.000	0.000	20	36.538	-0.000	-0.000
21	11	27.015	-0.000	0.000	21	27.015	-0.000	-0.000
22	12	19.146	-0.000	0.000	22	19.146	-0.000	-0.000
23	13	14.046	-0.000	0.000	23	14.046	-0.000	-0.000
24	14	12.288	-0.000	0.000	24	12.288	-0.000	-0.000
25	15	14.046	0.000	-0.000	25	14.046	0.000	0.000
26	16	19.146	0.000	-0.000	26	19.146	0.000	0.000
27	17	27.015	0.000	-0.000	27	27.015	0.000	0.000
28	18	36.538	0.000	-0.000	28	36.538	0.000	0.000
29	7	22.926	-0.000	-0.000	29	22.926	-0.000	0.000

COMB. HIPOTESIS 05 01 1.50 02 1.60 06 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 5

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	22.926	-0.000
20	0.000	36.538	-0.000
21	0.000	27.015	-0.000
22	0.000	19.146	-0.000
23	0.000	14.046	-0.000
24	0.000	12.288	-0.000
25	-0.000	14.046	0.000
26	-0.000	19.146	0.000
27	-0.000	27.015	0.000
28	-0.000	36.538	0.000
29	0.000	22.926	0.000

COMB. HIPOTESIS 06 01 1.50 02 1.60 07 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 6

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01343	0.00238
2	-0.00381	-0.01360	0.00004
3	-0.00001	-0.01376	-0.00251
4	-0.00003	-0.02110	-0.00265
5	-0.00006	-0.02468	-0.00000
6	-0.00008	-0.02110	0.00265
7	-0.00012	-0.01343	-0.00238
8	0.00369	-0.01360	-0.00004
9	-0.00011	-0.01376	0.00251
10	-0.00001	-0.01071	0.00286
11	-0.00002	-0.00792	0.00264
12	-0.00004	-0.00561	0.00196
13	-0.00005	-0.00412	0.00104
14	-0.00006	-0.00360	-0.00000
15	-0.00007	-0.00412	-0.00104
16	-0.00008	-0.00561	-0.00196
17	-0.00009	-0.00792	-0.00264
18	-0.00011	-0.01071	-0.00286
19	0.01090	0.00000	0.00238
20	0.01311	0.00000	0.00286
21	0.01205	0.00000	0.00264
22	0.00895	0.00000	0.00196
23	0.00470	0.00000	0.00104
24	-0.00006	0.00000	-0.00000
25	-0.00482	0.00000	-0.00104
26	-0.00907	0.00000	-0.00196
27	-0.01217	0.00000	-0.00264
28	-0.01323	0.00000	-0.00286
29	-0.01102	0.00000	-0.00238

COMB. HIPOTESIS 06 01 1.50 02 1.60 07 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 6

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	115.971	29.202	-106.228	2	115.971	-2.837	-63.024
2	2	106.127	-2.837	-63.024	3	106.127	-24.822	-114.360
3	3	24.822	106.127	-114.360	4	24.822	53.063	79.653
4	4	24.822	53.063	79.653	5	24.822	-0.000	144.324
5	5	24.822	0.000	144.324	6	24.822	-53.063	79.653
6	6	24.822	-53.063	79.653	9	24.822	-106.127	-114.360
7	7	115.971	-29.202	106.228	8	115.971	2.837	63.024
8	8	106.127	2.837	63.024	9	106.127	24.822	114.360
9	1	29.202	-102.890	106.228	10	29.202	-102.890	5.910
10	10	29.202	-66.352	5.910	11	29.202	-66.352	-58.783
11	11	29.202	-39.337	-58.783	12	29.202	-39.337	-97.136
12	12	29.202	-20.190	-97.136	13	29.202	-20.190	-116.822
13	13	29.202	-6.144	-116.822	14	29.202	-6.144	-122.812
14	14	29.202	6.144	-122.812	15	29.202	6.144	-116.822
15	15	29.202	20.190	-116.822	16	29.202	20.190	-97.136
16	16	29.202	39.337	-97.136	17	29.202	39.337	-58.783
17	17	29.202	66.352	-58.783	18	29.202	66.352	5.910
18	7	29.202	102.890	-106.228	18	29.202	102.890	-5.910

COMB. HIPOTESIS 06 01 1.50 02 1.60 07 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 6

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	22.926	0.000	0.000	19	22.926	0.000	-0.000
20	10	36.538	-0.000	0.000	20	36.538	-0.000	-0.000
21	11	27.015	-0.000	0.000	21	27.015	-0.000	-0.000
22	12	19.146	-0.000	0.000	22	19.146	-0.000	-0.000
23	13	14.046	-0.000	0.000	23	14.046	-0.000	-0.000
24	14	12.288	-0.000	0.000	24	12.288	-0.000	-0.000
25	15	14.046	0.000	-0.000	25	14.046	0.000	0.000
26	16	19.146	0.000	-0.000	26	19.146	0.000	0.000
27	17	27.015	0.000	-0.000	27	27.015	0.000	0.000
28	18	36.538	0.000	-0.000	28	36.538	0.000	0.000
29	7	22.926	-0.000	-0.000	29	22.926	-0.000	0.000

COMB. HIPOTESIS 06 01 1.50 02 1.60 07 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 6

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	22.926	-0.000
20	0.000	36.538	-0.000
21	0.000	27.015	-0.000
22	0.000	19.146	-0.000
23	0.000	14.046	-0.000
24	0.000	12.288	-0.000
25	-0.000	14.046	0.000
26	-0.000	19.146	0.000
27	-0.000	27.015	0.000
28	-0.000	36.538	0.000
29	0.000	22.926	0.000

COMB. HIPOTESIS 07 01 1.50 02 1.60 11 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 7

NUDO	@X	@Y	0Z
1	0.00000	-0.01307	0.00230
2	-0.00367	-0.01324	0.00004
3	-0.00001	-0.01339	-0.00243
4	-0.00003	-0.02049	-0.00257
5	-0.00006	-0.02396	-0.00000
6	-0.00008	-0.02049	0.00257
7	-0.00012	-0.01307	-0.00230
8	0.00355	-0.01324	-0.00004
9	-0.00011	-0.01339	0.00243
10	-0.00001	-0.01043	0.00278
11	-0.00002	-0.00772	0.00256
12	-0.00004	-0.00548	0.00191
13	-0.00005	-0.00402	0.00101
14	-0.00006	-0.00352	-0.00000
15	-0.00007	-0.00402	-0.00101
16	-0.00008	-0.00548	-0.00191
17	-0.00010	-0.00772	-0.00256
18	-0.00011	-0.01043	-0.00278
19	0.01055	0.00000	0.00230
20	0.01273	0.00000	0.00278
21	0.01171	0.00000	0.00256
22	0.00870	0.00000	0.00191
23	0.00457	0.00000	0.00101
24	-0.00006	0.00000	-0.00000
25	-0.00469	0.00000	-0.00101
26	-0.00882	0.00000	-0.00191
27	-0.01183	0.00000	-0.00256
28	-0.01285	0.00000	-0.00278
29	-0.01067	0.00000	-0.00230

COMB. HIPOTESIS 07 01 1.50 02 1.60 11 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 7

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	112.836	29.341	-104.103	2	112.836	-2.698	-60.412
2	2	102.991	-2.698	-60.412	3	102.991	-24.683	-111.261
3	3	24.683	102.991	-111.261	4	24.683	51.496	77.020
4	4	24.683	51.496	77.019	5	24.683	-0.000	139.780
5	5	24.683	0.000	139.780	6	24.683	-51.496	77.019
6	6	24.683	-51.496	77.020	9	24.683	-102.991	-111.261
7	7	112.836	-29.341	104.103	8	112.836	2.698	60.412
8	8	102.991	2.698	60.412	9	102.991	24.683	111.261
9	1	29.341	-100.367	104.103	10	29.341	-100.367	6.246
10	10	29.341	-64.773	6.246	11	29.341	-64.773	-56.908
11	11	29.341	-38.431	-56.908	12	29.341	-38.431	-94.378
12	12	29.341	-19.740	-94.378	13	29.341	-19.740	-113.624
13	13	29.341	-6.010	-113.624	14	29.341	-6.010	-119.484
14	14	29.341	6.010	-119.484	15	29.341	6.010	-113.624
15	15	29.341	19.740	-113.624	16	29.341	19.740	-94.378
16	16	29.341	38.431	-94.378	17	29.341	38.431	-56.908
17	17	29.341	64.773	-56.908	18	29.341	64.773	6.246
18	7	29.341	100.367	-104.103	18	29.341	100.367	-6.246

COMB. HIPOTESIS 07 01 1.50 02 1.60 11 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 7

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	22.314	0.000	0.000	19	22.314	0.000	-0.000
20	10	35.594	-0.000	0.000	20	35.594	-0.000	-0.000
21	11	26.342	-0.000	0.000	21	26.342	-0.000	-0.000
22	12	18.691	-0.000	0.000	22	18.691	-0.000	-0.000
23	13	13.730	-0.000	0.000	23	13.730	-0.000	-0.000
24	14	12.020	-0.000	0.000	24	12.020	-0.000	-0.000
25	15	13.730	0.000	-0.000	25	13.730	0.000	0.000
26	16	18.691	0.000	-0.000	26	18.691	0.000	0.000
27	17	26.342	0.000	-0.000	27	26.342	0.000	0.000
28	18	35.594	0.000	-0.000	28	35.594	0.000	0.000
29	7	22.314	-0.000	-0.000	29	22.314	-0.000	0.000

COMB. HIPOTESIS 07 01 1.50 02 1.60 11 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 7

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	22.314	-0.000
20	0.000	35.594	-0.000
21	0.000	26.342	-0.000
22	0.000	18.691	-0.000
23	0.000	13.730	-0.000
24	0.000	12.020	-0.000
25	-0.000	13.730	0.000
26	-0.000	18.691	0.000
27	-0.000	26.342	0.000
28	-0.000	35.594	0.000
29	0.000	22.314	0.000

COMB. HIPOTESIS 08 01 1.50 02 1.60 12 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 8

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01307	0.00230
2	-0.00367	-0.01324	0.00004
3	-0.00001	-0.01339	-0.00243
4	-0.00003	-0.02049	-0.00257
5	-0.00006	-0.02396	-0.00000
6	-0.00008	-0.02049	0.00257
7	-0.00012	-0.01307	-0.00230
8	0.00355	-0.01324	-0.00004
9	-0.00011	-0.01339	0.00243
10	-0.00001	-0.01043	0.00278
11	-0.00002	-0.00772	0.00256
12	-0.00004	-0.00548	0.00191
13	-0.00005	-0.00402	0.00101
14	-0.00006	-0.00352	-0.00000
15	-0.00007	-0.00402	-0.00101
16	-0.00008	-0.00548	-0.00191
17	-0.00010	-0.00772	-0.00256
18	-0.00011	-0.01043	-0.00278
19	0.01055	0.00000	0.00230
20	0.01273	0.00000	0.00278
21	0.01171	0.00000	0.00256
22	0.00870	0.00000	0.00191
23	0.00457	0.00000	0.00101
24	-0.00006	0.00000	-0.00000
25	-0.00469	0.00000	-0.00101
26	-0.00882	0.00000	-0.00191
27	-0.01183	0.00000	-0.00256
28	-0.01285	0.00000	-0.00278
29	-0.01067	0.00000	-0.00230

COMB. HIPOTESIS 08 01 1.50 02 1.60 12 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 8

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	112.836	29.341	-104.103	2	112.836	-2.698	-60.412
2	2	102.991	-2.698	-60.412	3	102.991	-24.683	-111.261
3	3	24.683	102.991	-111.261	4	24.683	51.496	77.020
4	4	24.683	51.496	77.019	5	24.683	-0.000	139.780
5	5	24.683	0.000	139.780	6	24.683	-51.496	77.019
6	6	24.683	-51.496	77.020	9	24.683	-102.991	-111.261
7	7	112.836	-29.341	104.103	8	112.836	2.698	60.412
8	8	102.991	2.698	60.412	9	102.991	24.683	111.261
9	1	29.341	-100.367	104.103	10	29.341	-100.367	6.246
10	10	29.341	-64.773	6.246	11	29.341	-64.773	-56.908
11	11	29.341	-38.431	-56.908	12	29.341	-38.431	-94.378
12	12	29.341	-19.740	-94.378	13	29.341	-19.740	-113.624
13	13	29.341	-6.010	-113.624	14	29.341	-6.010	-119.484
14	14	29.341	6.010	-119.484	15	29.341	6.010	-113.624
15	15	29.341	19.740	-113.624	16	29.341	19.740	-94.378
16	16	29.341	38.431	-94.378	17	29.341	38.431	-56.908
17	17	29.341	64.773	-56.908	18	29.341	64.773	6.246
18	7	29.341	100.367	-104.103	18	29.341	100.367	-6.246

COMB. HIPOTESIS 08 01 1.50 02 1.60 12 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 8

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	22.314	0.000	0.000	19	22.314	0.000	-0.000
20	10	35.594	-0.000	0.000	20	35.594	-0.000	-0.000
21	11	26.342	-0.000	0.000	21	26.342	-0.000	-0.000
22	12	18.691	-0.000	0.000	22	18.691	-0.000	-0.000
23	13	13.730	-0.000	0.000	23	13.730	-0.000	-0.000
24	14	12.020	-0.000	0.000	24	12.020	-0.000	-0.000
25	15	13.730	0.000	-0.000	25	13.730	0.000	0.000
26	16	18.691	0.000	-0.000	26	18.691	0.000	0.000
27	17	26.342	0.000	-0.000	27	26.342	0.000	0.000
28	18	35.594	0.000	-0.000	28	35.594	0.000	0.000
29	7	22.314	-0.000	-0.000	29	22.314	-0.000	0.000

COMB. HIPOTESIS 08 01 1.50 02 1.60 12 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 8

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	22.314	-0.000
20	0.000	35.594	-0.000
21	0.000	26.342	-0.000
22	0.000	18.691	-0.000
23	0.000	13.730	-0.000
24	0.000	12.020	-0.000
25	-0.000	13.730	0.000
26	-0.000	18.691	0.000
27	-0.000	26.342	0.000
28	-0.000	35.594	0.000
29	0.000	22.314	0.000

COMB. HIPOTESIS 09 01 1.50 02 1.60 13 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 9

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01307	0.00230
2	-0.00367	-0.01324	0.00004
3	-0.00001	-0.01339	-0.00243
4	-0.00003	-0.02049	-0.00257
5	-0.00006	-0.02396	-0.00000
6	-0.00008	-0.02049	0.00257
7	-0.00012	-0.01307	-0.00230
8	0.00355	-0.01324	-0.00004
9	-0.00011	-0.01339	0.00243
10	-0.00001	-0.01043	0.00278
11	-0.00002	-0.00772	0.00256
12	-0.00004	-0.00548	0.00191
13	-0.00005	-0.00402	0.00101
14	-0.00006	-0.00352	-0.00000
15	-0.00007	-0.00402	-0.00101
16	-0.00008	-0.00548	-0.00191
17	-0.00010	-0.00772	-0.00256
18	-0.00011	-0.01043	-0.00278
19	0.01055	0.00000	0.00230
20	0.01273	0.00000	0.00278
21	0.01171	0.00000	0.00256
22	0.00870	0.00000	0.00191
23	0.00457	0.00000	0.00101
24	-0.00006	0.00000	-0.00000
25	-0.00469	0.00000	-0.00101
26	-0.00882	0.00000	-0.00191
27	-0.01183	0.00000	-0.00256
28	-0.01285	0.00000	-0.00278
29	-0.01067	0.00000	-0.00230

COMB. HIPOTESIS 09 01 1.50 02 1.60 13 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 9

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	112.836	29.341	-104.103	2	112.836	-2.698	-60.412
2	2	102.991	-2.698	-60.412	3	102.991	-24.683	-111.261
3	3	24.683	102.991	-111.261	4	24.683	51.496	77.020
4	4	24.683	51.496	77.019	5	24.683	-0.000	139.780
5	5	24.683	0.000	139.780	6	24.683	-51.496	77.019
6	6	24.683	-51.496	77.020	9	24.683	-102.991	-111.261
7	7	112.836	-29.341	104.103	8	112.836	2.698	60.412
8	8	102.991	2.698	60.412	9	102.991	24.683	111.261
9	1	29.341	-100.367	104.103	10	29.341	-100.367	6.246
10	10	29.341	-64.773	6.246	11	29.341	-64.773	-56.908
11	11	29.341	-38.431	-56.908	12	29.341	-38.431	-94.378
12	12	29.341	-19.740	-94.378	13	29.341	-19.740	-113.624
13	13	29.341	-6.010	-113.624	14	29.341	-6.010	-119.484
14	14	29.341	6.010	-119.484	15	29.341	6.010	-113.624
15	15	29.341	19.740	-113.624	16	29.341	19.740	-94.378
16	16	29.341	38.431	-94.378	17	29.341	38.431	-56.908
17	17	29.341	64.773	-56.908	18	29.341	64.773	6.246
18	7	29.341	100.367	-104.103	18	29.341	100.367	-6.246

COMB. HIPOTESIS 09 01 1.50 02 1.60 13 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 9

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	22.314	0.000	0.000	19	22.314	0.000	-0.000
20	10	35.594	-0.000	0.000	20	35.594	-0.000	-0.000
21	11	26.342	-0.000	0.000	21	26.342	-0.000	-0.000
22	12	18.691	-0.000	0.000	22	18.691	-0.000	-0.000
23	13	13.730	-0.000	0.000	23	13.730	-0.000	-0.000
24	14	12.020	-0.000	0.000	24	12.020	-0.000	-0.000
25	15	13.730	0.000	-0.000	25	13.730	0.000	0.000
26	16	18.691	0.000	-0.000	26	18.691	0.000	0.000
27	17	26.342	0.000	-0.000	27	26.342	0.000	0.000
28	18	35.594	0.000	-0.000	28	35.594	0.000	0.000
29	7	22.314	-0.000	-0.000	29	22.314	-0.000	0.000

COMB. HIPOTESIS 09 01 1.50 02 1.60 13 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 9

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	22.314	-0.000
20	0.000	35.594	-0.000
21	0.000	26.342	-0.000
22	0.000	18.691	-0.000
23	0.000	13.730	-0.000
24	0.000	12.020	-0.000
25	-0.000	13.730	0.000
26	-0.000	18.691	0.000
27	-0.000	26.342	0.000
28	-0.000	35.594	0.000
29	0.000	22.314	0.000

COMB. HIPOTESIS 10 01 1.50 02 1.60 14 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 10

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01429	0.00256
2	-0.00415	-0.01447	0.00005
3	-0.00001	-0.01464	-0.00272
4	-0.00003	-0.02255	-0.00286
5	-0.00006	-0.02641	-0.00000
6	-0.00008	-0.02255	0.00286
7	-0.00012	-0.01429	-0.00256
8	0.00403	-0.01447	-0.00005
9	-0.00011	-0.01464	0.00272
10	-0.00001	-0.01137	0.00306
11	-0.00002	-0.00839	0.00281
12	-0.00004	-0.00593	0.00209
13	-0.00005	-0.00434	0.00110
14	-0.00006	-0.00379	-0.00000
15	-0.00007	-0.00434	-0.00110
16	-0.00008	-0.00593	-0.00209
17	-0.00009	-0.00839	-0.00281
18	-0.00011	-0.01137	-0.00306
19	0.01173	0.00000	0.00256
20	0.01403	0.00000	0.00306
21	0.01286	0.00000	0.00281
22	0.00954	0.00000	0.00209
23	0.00501	0.00000	0.00110
24	-0.00006	0.00000	-0.00000
25	-0.00513	0.00000	-0.00110
26	-0.00966	0.00000	-0.00209
27	-0.01298	0.00000	-0.00281
28	-0.01414	0.00000	-0.00306
29	-0.01185	0.00000	-0.00256

COMB. HIPOTESIS 10 01 1.50 02 1.60 14 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 10

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	123.491	28.868	-111.324	2	123.491	-3.171	-69.287
2	2	113.646	-3.171	-69.287	3	113.646	-25.155	-121.790
3	3	25.155	113.646	-121.790	4	25.155	56.823	85.969
4	4	25.155	56.823	85.969	5	25.155	-0.000	155.222
5	5	25.155	0.000	155.222	6	25.155	-56.823	85.969
6	6	25.155	-56.823	85.969	9	25.155	-113.646	-121.790
7	7	123.491	-28.868	111.324	8	123.491	3.171	69.287
8	8	113.646	3.171	69.287	9	113.646	25.155	121.790
9	1	28.868	-108.942	111.324	10	28.868	-108.942	5.106
10	10	28.868	-70.139	5.106	11	28.868	-70.139	-63.279
11	11	28.868	-41.509	-63.279	12	28.868	-41.509	-103.750
12	12	28.868	-21.270	-103.750	13	28.868	-21.270	-124.489
13	13	28.868	-6.466	-124.489	14	28.868	-6.466	-130.793
14	14	28.868	6.466	-130.793	15	28.868	6.466	-124.489
15	15	28.868	21.270	-124.489	16	28.868	21.270	-103.750
16	16	28.868	41.509	-103.750	17	28.868	41.509	-63.279
17	17	28.868	70.139	-63.279	18	28.868	70.139	5.106
18	7	28.868	108.942	-111.324	18	28.868	108.942	-5.106

COMB. HIPOTESIS 10 01 1.50 02 1.60 14 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 10

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	24.393	0.000	0.000	19	24.393	0.000	-0.000
20	10	38.803	-0.000	0.000	20	38.803	-0.000	-0.000
21	11	28.630	-0.000	0.000	21	28.630	-0.000	-0.000
22	12	20.238	-0.000	0.000	22	20.238	-0.000	-0.000
23	13	14.804	-0.000	0.000	23	14.804	-0.000	-0.000
24	14	12.932	-0.000	0.000	24	12.932	-0.000	-0.000
25	15	14.804	0.000	-0.000	25	14.804	0.000	0.000
26	16	20.238	0.000	-0.000	26	20.238	0.000	0.000
27	17	28.630	0.000	-0.000	27	28.630	0.000	0.000
28	18	38.803	0.000	-0.000	28	38.803	0.000	0.000
29	7	24.393	-0.000	-0.000	29	24.393	-0.000	0.000

COMB. HIPOTESIS 10 01 1.50 02 1.60 14 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 10

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	24.393	-0.000
20	0.000	38.803	-0.000
21	0.000	28.630	-0.000
22	0.000	20.238	-0.000
23	0.000	14.804	-0.000
24	0.000	12.932	-0.000
25	-0.000	14.804	0.000
26	-0.000	20.238	0.000
27	-0.000	28.630	0.000
28	-0.000	38.803	0.000
29	0.000	24.393	0.000

COMB. HIPOTESIS 11 01 1.50 03 1.60 04 1.60 05 1.60 09 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 11

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01156	0.00142
2	-0.00028	-0.01173	-0.00069
3	0.00466	-0.01188	-0.00258
4	0.00462	-0.01934	-0.00271
5	0.00457	-0.02319	-0.00019
6	0.00453	-0.02034	0.00221
7	-0.00018	-0.01420	-0.00257
8	0.00512	-0.01437	-0.00078
9	0.00449	-0.01453	0.00168
10	-0.00002	-0.00965	0.00215
11	-0.00004	-0.00744	0.00215
12	-0.00005	-0.00551	0.00165
13	-0.00007	-0.00424	0.00086
14	-0.00009	-0.00386	-0.00010
15	-0.00011	-0.00445	-0.00110
16	-0.00012	-0.00600	-0.00203
17	-0.00014	-0.00839	-0.00274
18	-0.00016	-0.01131	-0.00301
19	0.00651	0.00000	0.00142
20	0.00983	0.00000	0.00215
21	0.00979	0.00000	0.00215
22	0.00752	0.00000	0.00165
23	0.00385	0.00000	0.00086
24	-0.00055	0.00000	-0.00010
25	-0.00517	0.00000	-0.00110
26	-0.00944	0.00000	-0.00203
27	-0.01269	0.00000	-0.00274
28	-0.01396	0.00000	-0.00301
29	-0.01196	0.00000	-0.00257

COMB. HIPOTESIS 11 01 1.50 03 1.60 04 1.60 05 1.60 09 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 11

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	113.471	58.985	-134.904	2	113.471	0.732	-35.068
2	2	103.627	0.732	-35.068	3	103.627	-41.507	-111.094
3	3	42.501	103.627	-111.094	4	42.501	50.563	76.825
4	4	42.501	50.563	76.825	5	42.501	-2.500	135.402
5	5	42.501	-2.500	135.402	6	42.501	-55.564	64.637
6	6	42.501	-55.563	64.637	9	42.501	-108.627	-135.470
7	7	118.471	-43.543	101.756	8	118.471	7.485	43.325
8	8	108.627	7.485	43.325	9	108.627	42.501	135.470
9	1	43.543	-103.585	134.904	10	43.543	-103.585	33.908
10	10	43.543	-70.658	33.908	11	43.543	-70.658	-34.984
11	11	43.543	-45.276	-34.984	12	43.543	-45.276	-79.128
12	12	43.543	-26.467	-79.128	13	43.543	-26.467	-104.933
13	13	43.543	-11.981	-104.933	14	43.543	-11.981	-116.615
14	14	43.543	1.183	-116.615	15	43.543	1.183	-115.462
15	15	43.543	16.360	-115.462	16	43.543	16.360	-99.510
16	16	43.543	36.853	-99.510	17	43.543	36.853	-63.579
17	17	43.543	65.496	-63.579	18	43.543	65.496	0.279
18	7	43.543	104.079	-101.756	18	43.543	104.079	-0.279

COMB. HIPOTESIS 11 01 1.50 03 1.60 04 1.60 05 1.60 09 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 11

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	19.730	0.000	0.000	19	19.730	0.000	-0.000
20	10	32.927	-0.000	0.000	20	32.927	-0.000	-0.000
21	11	25.382	-0.000	0.000	21	25.382	-0.000	-0.000
22	12	18.809	-0.000	0.000	22	18.809	-0.000	-0.000
23	13	14.486	-0.000	0.000	23	14.486	-0.000	-0.000
24	14	13.163	0.000	-0.000	24	13.163	0.000	0.000
25	15	15.177	0.000	-0.000	25	15.177	0.000	0.000
26	16	20.493	0.000	-0.000	26	20.493	0.000	0.000
27	17	28.643	0.000	-0.000	27	28.643	0.000	0.000
28	18	38.583	0.000	-0.000	28	38.583	0.000	0.000
29	7	24.237	-0.000	-0.000	29	24.237	-0.000	0.000

COMB. HIPOTESIS 11 01 1.50 03 1.60 04 1.60 05 1.60 09 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 11

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-15.442	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.994	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	19.730	-0.000
20	0.000	32.927	-0.000
21	0.000	25.382	-0.000
22	0.000	18.809	-0.000
23	0.000	14.486	-0.000
24	-0.000	13.163	0.000
25	-0.000	15.177	0.000
26	-0.000	20.493	0.000
27	-0.000	28.643	0.000
28	-0.000	38.583	0.000
29	0.000	24.237	0.000

COMB. HIPOTESIS 12 01 1.50 03 1.60 04 1.60 06 1.60 09 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 12

NUDO	@X	@Y	@Z
1	0.00000	-0.01156	0.00142
2	-0.00028	-0.01173	-0.00069
3	0.00466	-0.01188	-0.00258
4	0.00462	-0.01934	-0.00271
5	0.00457	-0.02319	-0.00019
6	0.00453	-0.02034	0.00221
7	-0.00018	-0.01420	-0.00257
8	0.00512	-0.01437	-0.00078
9	0.00449	-0.01453	0.00168
10	-0.00002	-0.00965	0.00215
11	-0.00004	-0.00744	0.00215
12	-0.00005	-0.00551	0.00165
13	-0.00007	-0.00424	0.00086
14	-0.00009	-0.00386	-0.00010
15	-0.00011	-0.00445	-0.00110
16	-0.00012	-0.00600	-0.00203
17	-0.00014	-0.00839	-0.00274
18	-0.00016	-0.01131	-0.00301
19	0.00651	0.00000	0.00142
20	0.00983	0.00000	0.00215
21	0.00979	0.00000	0.00215
22	0.00752	0.00000	0.00165
23	0.00385	0.00000	0.00086
24	-0.00055	0.00000	-0.00010
25	-0.00517	0.00000	-0.00110
26	-0.00944	0.00000	-0.00203
27	-0.01269	0.00000	-0.00274
28	-0.01396	0.00000	-0.00301
29	-0.01196	0.00000	-0.00257

COMB. HIPOTESIS 12 01 1.50 03 1.60 04 1.60 06 1.60 09 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 12

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	113.471	58.985	-134.904	2	113.471	0.732	-35.068
2	2	103.627	0.732	-35.068	3	103.627	-41.507	-111.094
3	3	42.501	103.627	-111.094	4	42.501	50.563	76.825
4	4	42.501	50.563	76.825	5	42.501	-2.500	135.402
5	5	42.501	-2.500	135.402	6	42.501	-55.564	64.637
6	6	42.501	-55.563	64.637	9	42.501	-108.627	-135.470
7	7	118.471	-43.543	101.756	8	118.471	7.485	43.325
8	8	108.627	7.485	43.325	9	108.627	42.501	135.470
9	1	43.543	-103.585	134.904	10	43.543	-103.585	33.908
10	10	43.543	-70.658	33.908	11	43.543	-70.658	-34.984
11	11	43.543	-45.276	-34.984	12	43.543	-45.276	-79.128
12	12	43.543	-26.467	-79.128	13	43.543	-26.467	-104.933
13	13	43.543	-11.981	-104.933	14	43.543	-11.981	-116.615
14	14	43.543	1.183	-116.615	15	43.543	1.183	-115.462
15	15	43.543	16.360	-115.462	16	43.543	16.360	-99.510
16	16	43.543	36.853	-99.510	17	43.543	36.853	-63.579
17	17	43.543	65.496	-63.579	18	43.543	65.496	0.279
18	7	43.543	104.079	-101.756	18	43.543	104.079	-0.279

COMB. HIPOTESIS 12 01 1.50 03 1.60 04 1.60 06 1.60 09 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 12

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	19.730	0.000	0.000	19	19.730	0.000	-0.000
20	10	32.927	-0.000	0.000	20	32.927	-0.000	-0.000
21	11	25.382	-0.000	0.000	21	25.382	-0.000	-0.000
22	12	18.809	-0.000	0.000	22	18.809	-0.000	-0.000
23	13	14.486	-0.000	0.000	23	14.486	-0.000	-0.000
24	14	13.163	0.000	-0.000	24	13.163	0.000	0.000
25	15	15.177	0.000	-0.000	25	15.177	0.000	0.000
26	16	20.493	0.000	-0.000	26	20.493	0.000	0.000
27	17	28.643	0.000	-0.000	27	28.643	0.000	0.000
28	18	38.583	0.000	-0.000	28	38.583	0.000	0.000
29	7	24.237	-0.000	-0.000	29	24.237	-0.000	0.000

COMB. HIPOTESIS 12 01 1.50 03 1.60 04 1.60 06 1.60 09 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 12

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-15.442	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.994	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	19.730	-0.000
20	0.000	32.927	-0.000
21	0.000	25.382	-0.000
22	0.000	18.809	-0.000
23	0.000	14.486	-0.000
24	-0.000	13.163	0.000
25	-0.000	15.177	0.000
26	-0.000	20.493	0.000
27	-0.000	28.643	0.000
28	-0.000	38.583	0.000
29	0.000	24.237	0.000

COMB. HIPOTESIS 13 01 1.50 03 1.60 04 1.60 07 1.60 09 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 13

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01156	0.00142
2	-0.00028	-0.01173	-0.00069
3	0.00466	-0.01188	-0.00258
4	0.00462	-0.01934	-0.00271
5	0.00457	-0.02319	-0.00019
6	0.00453	-0.02034	0.00221
7	-0.00018	-0.01420	-0.00257
8	0.00512	-0.01437	-0.00078
9	0.00449	-0.01453	0.00168
10	-0.00002	-0.00965	0.00215
11	-0.00004	-0.00744	0.00215
12	-0.00005	-0.00551	0.00165
13	-0.00007	-0.00424	0.00086
14	-0.00009	-0.00386	-0.00010
15	-0.00011	-0.00445	-0.00110
16	-0.00012	-0.00600	-0.00203
17	-0.00014	-0.00839	-0.00274
18	-0.00016	-0.01131	-0.00301
19	0.00651	0.00000	0.00142
20	0.00983	0.00000	0.00215
21	0.00979	0.00000	0.00215
22	0.00752	0.00000	0.00165
23	0.00385	0.00000	0.00086
24	-0.00055	0.00000	-0.00010
25	-0.00517	0.00000	-0.00110
26	-0.00944	0.00000	-0.00203
27	-0.01269	0.00000	-0.00274
28	-0.01396	0.00000	-0.00301
29	-0.01196	0.00000	-0.00257

COMB. HIPOTESIS 13 01 1.50 03 1.60 04 1.60 07 1.60 09 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 13

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	113.471	58.985	-134.904	2	113.471	0.732	-35.068
2	2	103.627	0.732	-35.068	3	103.627	-41.507	-111.094
3	3	42.501	103.627	-111.094	4	42.501	50.563	76.825
4	4	42.501	50.563	76.825	5	42.501	-2.500	135.402
5	5	42.501	-2.500	135.402	6	42.501	-55.564	64.637
6	6	42.501	-55.563	64.637	9	42.501	-108.627	-135.470
7	7	118.471	-43.543	101.756	8	118.471	7.485	43.325
8	8	108.627	7.485	43.325	9	108.627	42.501	135.470
9	1	43.543	-103.585	134.904	10	43.543	-103.585	33.908
10	10	43.543	-70.658	33.908	11	43.543	-70.658	-34.984
11	11	43.543	-45.276	-34.984	12	43.543	-45.276	-79.128
12	12	43.543	-26.467	-79.128	13	43.543	-26.467	-104.933
13	13	43.543	-11.981	-104.933	14	43.543	-11.981	-116.615
14	14	43.543	1.183	-116.615	15	43.543	1.183	-115.462
15	15	43.543	16.360	-115.462	16	43.543	16.360	-99.510
16	16	43.543	36.853	-99.510	17	43.543	36.853	-63.579
17	17	43.543	65.496	-63.579	18	43.543	65.496	0.279
18	7	43.543	104.079	-101.756	18	43.543	104.079	-0.279

COMB. HIPOTESIS 13 01 1.50 03 1.60 04 1.60 07 1.60 09 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 13

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	19.730	0.000	0.000	19	19.730	0.000	-0.000
20	10	32.927	-0.000	0.000	20	32.927	-0.000	-0.000
21	11	25.382	-0.000	0.000	21	25.382	-0.000	-0.000
22	12	18.809	-0.000	0.000	22	18.809	-0.000	-0.000
23	13	14.486	-0.000	0.000	23	14.486	-0.000	-0.000
24	14	13.163	0.000	-0.000	24	13.163	0.000	0.000
25	15	15.177	0.000	-0.000	25	15.177	0.000	0.000
26	16	20.493	0.000	-0.000	26	20.493	0.000	0.000
27	17	28.643	0.000	-0.000	27	28.643	0.000	0.000
28	18	38.583	0.000	-0.000	28	38.583	0.000	0.000
29	7	24.237	-0.000	-0.000	29	24.237	-0.000	0.000

COMB. HIPOTESIS 13 01 1.50 03 1.60 04 1.60 07 1.60 09 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 13

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-15.442	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.994	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	19.730	-0.000
20	0.000	32.927	-0.000
21	0.000	25.382	-0.000
22	0.000	18.809	-0.000
23	0.000	14.486	-0.000
24	-0.000	13.163	0.000
25	-0.000	15.177	0.000
26	-0.000	20.493	0.000
27	-0.000	28.643	0.000
28	-0.000	38.583	0.000
29	0.000	24.237	0.000

COMB. HIPOTESIS 14 01 1.50 03 1.60 04 1.60 08 1.60 10 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 14

NUDO	@X	@Y	@Z
1	0.00000	-0.01242	0.00159
2	-0.00053	-0.01259	-0.00072
3	0.00489	-0.01276	-0.00282
4	0.00484	-0.02087	-0.00294
5	0.00480	-0.02503	-0.00019
6	0.00476	-0.02192	0.00241
7	-0.00017	-0.01518	-0.00279
8	0.00559	-0.01537	-0.00082
9	0.00471	-0.01554	0.00187
10	-0.00002	-0.01032	0.00234
11	-0.00003	-0.00792	0.00232
12	-0.00005	-0.00584	0.00178
13	-0.00007	-0.00448	0.00092
14	-0.00009	-0.00406	-0.00011
15	-0.00010	-0.00469	-0.00118
16	-0.00012	-0.00636	-0.00218
17	-0.00014	-0.00892	-0.00294
18	-0.00016	-0.01206	-0.00325
19	0.00728	0.00000	0.00159
20	0.01072	0.00000	0.00234
21	0.01060	0.00000	0.00232
22	0.00811	0.00000	0.00178
23	0.00415	0.00000	0.00092
24	-0.00058	0.00000	-0.00011
25	-0.00553	0.00000	-0.00118
26	-0.01012	0.00000	-0.00218
27	-0.01362	0.00000	-0.00294
28	-0.01503	0.00000	-0.00325
29	-0.01297	0.00000	-0.00279

COMB. HIPOTESIS 14 01 1.50 03 1.60 04 1.60 08 1.60 10 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 14

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	121.355	58.829	-141.015	2	121.355	0.576	-41.727
2	2	111.511	0.576	-41.727	3	111.511	-41.663	-118.301
3	3	43.055	111.511	-118.301	4	43.055	54.430	83.940
4	4	43.055	54.430	83.940	5	43.055	-2.650	147.048
5	5	43.055	-2.650	147.048	6	43.055	-59.730	71.022
6	6	43.055	-59.730	71.022	9	43.055	-116.811	-144.138
7	7	126.655	-42.989	106.540	8	126.655	8.040	50.050
8	8	116.811	8.040	50.050	9	116.811	43.055	144.138
9	1	42.989	-110.008	141.015	10	42.989	-110.008	33.757
10	10	42.989	-74.798	33.757	11	42.989	-74.798	-39.171
11	11	42.989	-47.772	-39.171	12	42.989	-47.772	-85.749
12	12	42.989	-27.840	-85.749	13	42.989	-27.840	-112.893
13	13	42.989	-12.562	-112.893	14	42.989	-12.562	-125.141
14	14	42.989	1.289	-125.141	15	42.989	1.289	-123.884
15	15	42.989	17.296	-123.884	16	42.989	17.296	-107.021
16	16	42.989	38.999	-107.020	17	42.989	38.999	-68.997
17	17	42.989	69.449	-68.997	18	42.989	69.449	-1.284
18	7	42.989	110.589	-106.540	18	42.989	110.589	1.284

COMB. HIPOTESIS 14 01 1.50 03 1.60 04 1.60 08 1.60 10 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 14

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	21.192	0.000	0.000	19	21.192	0.000	-0.000
20	10	35.210	-0.000	0.000	20	35.210	-0.000	-0.000
21	11	27.026	-0.000	0.000	21	27.026	-0.000	-0.000
22	12	19.932	-0.000	0.000	22	19.932	-0.000	-0.000
23	13	15.278	-0.000	0.000	23	15.278	-0.000	-0.000
24	14	13.851	0.000	-0.000	24	13.851	0.000	0.000
25	15	16.006	0.000	-0.000	25	16.006	0.000	0.000
26	16	21.703	0.000	-0.000	26	21.703	0.000	0.000
27	17	30.450	0.000	-0.000	27	30.450	0.000	0.000
28	18	41.140	0.000	-0.000	28	41.140	0.000	0.000
29	7	25.911	-0.000	-0.000	29	25.911	-0.000	0.000

COMB. HIPOTESIS 14 01 1.50 03 1.60 04 1.60 08 1.60 10 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 14

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-15.840	-9.845	0.000
2	-0.000	-9.845	-0.000
3	1.392	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	21.192	-0.000
20	0.000	35.210	-0.000
21	0.000	27.026	-0.000
22	0.000	19.932	-0.000
23	0.000	15.278	-0.000
24	-0.000	13.851	0.000
25	-0.000	16.006	0.000
26	-0.000	21.703	0.000
27	-0.000	30.450	0.000
28	-0.000	41.140	0.000
29	0.000	25.911	0.000

COMB. HIPOTESIS 15 01 1.50 03 1.60 04 1.60 11 1.60 15 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 15

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01083	0.00119
2	0.00054	-0.01099	-0.00090
3	0.00599	-0.01114	-0.00263
4	0.00595	-0.01860	-0.00270
5	0.00590	-0.02247	-0.00023
6	0.00586	-0.01987	0.00205
7	-0.00017	-0.01421	-0.00265
8	0.00565	-0.01438	-0.00099
9	0.00582	-0.01454	0.00145
10	-0.00002	-0.00913	0.00195
11	-0.00003	-0.00710	0.00199
12	-0.00005	-0.00530	0.00154
13	-0.00007	-0.00412	0.00079
14	-0.00009	-0.00378	-0.00013
15	-0.00010	-0.00439	-0.00112
16	-0.00012	-0.00595	-0.00204
17	-0.00014	-0.00834	-0.00275
18	-0.00016	-0.01127	-0.00305
19	0.00546	0.00000	0.00119
20	0.00891	0.00000	0.00195
21	0.00908	0.00000	0.00199
22	0.00701	0.00000	0.00154
23	0.00355	0.00000	0.00079
24	-0.00070	0.00000	-0.00013
25	-0.00521	0.00000	-0.00112
26	-0.00945	0.00000	-0.00204
27	-0.01273	0.00000	-0.00275
28	-0.01411	0.00000	-0.00305
29	-0.01230	0.00000	-0.00265

COMB. HIPOTESIS 15 01 1.50 03 1.60 04 1.60 11 1.60 15 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 15

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	109.447	60.310	-136.732	2	109.447	2.057	-32.260
2	2	99.602	2.057	-32.260	3	99.602	-40.182	-103.650
3	3	43.539	99.602	-103.650	4	43.539	48.107	76.371
4	4	43.539	48.107	76.371	5	43.539	-3.389	130.871
5	5	43.539	-3.389	130.871	6	43.539	-54.884	59.850
6	6	43.539	-54.884	59.850	9	43.539	-106.380	-136.691
7	7	116.225	-42.505	95.709	8	116.225	8.524	40.911
8	8	106.380	8.524	40.911	9	106.380	43.539	136.691
9	1	42.505	-100.805	136.732	10	42.505	-100.805	38.448
10	10	42.505	-69.636	38.448	11	42.505	-69.636	-29.447
11	11	42.505	-45.411	-29.447	12	42.505	-45.411	-73.723
12	12	42.505	-27.316	-73.723	13	42.505	-27.316	-100.356
13	13	42.505	-13.254	-100.356	14	42.505	-13.254	-113.278
14	14	42.505	-0.358	-113.278	15	42.505	-0.358	-113.628
15	15	42.505	14.614	-113.628	16	42.505	14.614	-99.379
16	16	42.505	34.911	-99.379	17	42.505	34.911	-65.341
17	17	42.505	63.364	-65.341	18	42.505	63.364	-3.561
18	7	42.505	101.815	-95.709	18	42.505	101.815	3.561

COMB. HIPOTESIS 15 01 1.50 03 1.60 04 1.60 11 1.60 15 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 15

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	18.486	0.000	0.000	19	18.486	0.000	-0.000
20	10	31.169	-0.000	0.000	20	31.169	-0.000	-0.000
21	11	24.225	-0.000	0.000	21	24.225	-0.000	-0.000
22	12	18.095	-0.000	0.000	22	18.095	-0.000	-0.000
23	13	14.062	-0.000	0.000	23	14.062	-0.000	-0.000
24	14	12.896	0.000	-0.000	24	12.896	0.000	0.000
25	15	14.972	0.000	-0.000	25	14.972	0.000	0.000
26	16	20.297	0.000	-0.000	26	20.297	0.000	0.000
27	17	28.453	0.000	-0.000	27	28.453	0.000	0.000
28	18	38.451	0.000	-0.000	28	38.451	0.000	0.000
29	7	24.254	-0.000	-0.000	29	24.254	-0.000	0.000

COMB. HIPOTESIS 15 01 1.50 03 1.60 04 1.60 11 1.60 15 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 15

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-17.805	-9.845	0.000
2	-0.000	-9.845	-0.000
3	3.357	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	18.486	-0.000
20	0.000	31.169	-0.000
21	0.000	24.225	-0.000
22	0.000	18.095	-0.000
23	0.000	14.062	-0.000
24	-0.000	12.896	0.000
25	-0.000	14.972	0.000
26	-0.000	20.297	0.000
27	-0.000	28.453	0.000
28	-0.000	38.451	0.000
29	0.000	24.254	0.000

COMB. HIPOTESIS 16 01 1.50 03 1.60 04 1.60 12 1.60 15 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 16

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01083	0.00119
2	0.00054	-0.01099	-0.00090
3	0.00599	-0.01114	-0.00263
4	0.00595	-0.01860	-0.00270
5	0.00590	-0.02247	-0.00023
6	0.00586	-0.01987	0.00205
7	-0.00017	-0.01421	-0.00265
8	0.00565	-0.01438	-0.00099
9	0.00582	-0.01454	0.00145
10	-0.00002	-0.00913	0.00195
11	-0.00003	-0.00710	0.00199
12	-0.00005	-0.00530	0.00154
13	-0.00007	-0.00412	0.00079
14	-0.00009	-0.00378	-0.00013
15	-0.00010	-0.00439	-0.00112
16	-0.00012	-0.00595	-0.00204
17	-0.00014	-0.00834	-0.00275
18	-0.00016	-0.01127	-0.00305
19	0.00546	0.00000	0.00119
20	0.00891	0.00000	0.00195
21	0.00908	0.00000	0.00199
22	0.00701	0.00000	0.00154
23	0.00355	0.00000	0.00079
24	-0.00070	0.00000	-0.00013
25	-0.00521	0.00000	-0.00112
26	-0.00945	0.00000	-0.00204
27	-0.01273	0.00000	-0.00275
28	-0.01411	0.00000	-0.00305
29	-0.01230	0.00000	-0.00265

COMB. HIPOTESIS 16 01 1.50 03 1.60 04 1.60 12 1.60 15 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 16

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	109.447	60.310	-136.732	2	109.447	2.057	-32.260
2	2	99.602	2.057	-32.260	3	99.602	-40.182	-103.650
3	3	43.539	99.602	-103.650	4	43.539	48.107	76.371
4	4	43.539	48.107	76.371	5	43.539	-3.389	130.871
5	5	43.539	-3.389	130.871	6	43.539	-54.884	59.850
6	6	43.539	-54.884	59.850	9	43.539	-106.380	-136.691
7	7	116.225	-42.505	95.709	8	116.225	8.524	40.911
8	8	106.380	8.524	40.911	9	106.380	43.539	136.691
9	1	42.505	-100.805	136.732	10	42.505	-100.805	38.448
10	10	42.505	-69.636	38.448	11	42.505	-69.636	-29.447
11	11	42.505	-45.411	-29.447	12	42.505	-45.411	-73.723
12	12	42.505	-27.316	-73.723	13	42.505	-27.316	-100.356
13	13	42.505	-13.254	-100.356	14	42.505	-13.254	-113.278
14	14	42.505	-0.358	-113.278	15	42.505	-0.358	-113.628
15	15	42.505	14.614	-113.628	16	42.505	14.614	-99.379
16	16	42.505	34.911	-99.379	17	42.505	34.911	-65.341
17	17	42.505	63.364	-65.341	18	42.505	63.364	-3.561
18	7	42.505	101.815	-95.709	18	42.505	101.815	3.561

COMB. HIPOTESIS 16 01 1.50 03 1.60 04 1.60 12 1.60 15 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 16

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	18.486	0.000	0.000	19	18.486	0.000	-0.000
20	10	31.169	-0.000	0.000	20	31.169	-0.000	-0.000
21	11	24.225	-0.000	0.000	21	24.225	-0.000	-0.000
22	12	18.095	-0.000	0.000	22	18.095	-0.000	-0.000
23	13	14.062	-0.000	0.000	23	14.062	-0.000	-0.000
24	14	12.896	0.000	-0.000	24	12.896	0.000	0.000
25	15	14.972	0.000	-0.000	25	14.972	0.000	0.000
26	16	20.297	0.000	-0.000	26	20.297	0.000	0.000
27	17	28.453	0.000	-0.000	27	28.453	0.000	0.000
28	18	38.451	0.000	-0.000	28	38.451	0.000	0.000
29	7	24.254	-0.000	-0.000	29	24.254	-0.000	0.000

COMB. HIPOTESIS 16 01 1.50 03 1.60 04 1.60 12 1.60 15 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 16

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-17.805	-9.845	0.000
2	-0.000	-9.845	-0.000
3	3.357	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	18.486	-0.000
20	0.000	31.169	-0.000
21	0.000	24.225	-0.000
22	0.000	18.095	-0.000
23	0.000	14.062	-0.000
24	-0.000	12.896	0.000
25	-0.000	14.972	0.000
26	-0.000	20.297	0.000
27	-0.000	28.453	0.000
28	-0.000	38.451	0.000
29	0.000	24.254	0.000

COMB. HIPOTESIS 17 01 1.50 03 1.60 04 1.60 13 1.60 15 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 17

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01083	0.00119
2	0.00054	-0.01099	-0.00090
3	0.00599	-0.01114	-0.00263
4	0.00595	-0.01860	-0.00270
5	0.00590	-0.02247	-0.00023
6	0.00586	-0.01987	0.00205
7	-0.00017	-0.01421	-0.00265
8	0.00565	-0.01438	-0.00099
9	0.00582	-0.01454	0.00145
10	-0.00002	-0.00913	0.00195
11	-0.00003	-0.00710	0.00199
12	-0.00005	-0.00530	0.00154
13	-0.00007	-0.00412	0.00079
14	-0.00009	-0.00378	-0.00013
15	-0.00010	-0.00439	-0.00112
16	-0.00012	-0.00595	-0.00204
17	-0.00014	-0.00834	-0.00275
18	-0.00016	-0.01127	-0.00305
19	0.00546	0.00000	0.00119
20	0.00891	0.00000	0.00195
21	0.00908	0.00000	0.00199
22	0.00701	0.00000	0.00154
23	0.00355	0.00000	0.00079
24	-0.00070	0.00000	-0.00013
25	-0.00521	0.00000	-0.00112
26	-0.00945	0.00000	-0.00204
27	-0.01273	0.00000	-0.00275
28	-0.01411	0.00000	-0.00305
29	-0.01230	0.00000	-0.00265

COMB. HIPOTESIS 17 01 1.50 03 1.60 04 1.60 13 1.60 15 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 17

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	109.447	60.310	-136.732	2	109.447	2.057	-32.260
2	2	99.602	2.057	-32.260	3	99.602	-40.182	-103.650
3	3	43.539	99.602	-103.650	4	43.539	48.107	76.371
4	4	43.539	48.107	76.371	5	43.539	-3.389	130.871
5	5	43.539	-3.389	130.871	6	43.539	-54.884	59.850
6	6	43.539	-54.884	59.850	9	43.539	-106.380	-136.691
7	7	116.225	-42.505	95.709	8	116.225	8.524	40.911
8	8	106.380	8.524	40.911	9	106.380	43.539	136.691
9	1	42.505	-100.805	136.732	10	42.505	-100.805	38.448
10	10	42.505	-69.636	38.448	11	42.505	-69.636	-29.447
11	11	42.505	-45.411	-29.447	12	42.505	-45.411	-73.723
12	12	42.505	-27.316	-73.723	13	42.505	-27.316	-100.356
13	13	42.505	-13.254	-100.356	14	42.505	-13.254	-113.278
14	14	42.505	-0.358	-113.278	15	42.505	-0.358	-113.628
15	15	42.505	14.614	-113.628	16	42.505	14.614	-99.379
16	16	42.505	34.911	-99.379	17	42.505	34.911	-65.341
17	17	42.505	63.364	-65.341	18	42.505	63.364	-3.561
18	7	42.505	101.815	-95.709	18	42.505	101.815	3.561

COMB. HIPOTESIS 17 01 1.50 03 1.60 04 1.60 13 1.60 15 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 17

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	18.486	0.000	0.000	19	18.486	0.000	-0.000
20	10	31.169	-0.000	0.000	20	31.169	-0.000	-0.000
21	11	24.225	-0.000	0.000	21	24.225	-0.000	-0.000
22	12	18.095	-0.000	0.000	22	18.095	-0.000	-0.000
23	13	14.062	-0.000	0.000	23	14.062	-0.000	-0.000
24	14	12.896	0.000	-0.000	24	12.896	0.000	0.000
25	15	14.972	0.000	-0.000	25	14.972	0.000	0.000
26	16	20.297	0.000	-0.000	26	20.297	0.000	0.000
27	17	28.453	0.000	-0.000	27	28.453	0.000	0.000
28	18	38.451	0.000	-0.000	28	38.451	0.000	0.000
29	7	24.254	-0.000	-0.000	29	24.254	-0.000	0.000

COMB. HIPOTESIS 17 01 1.50 03 1.60 04 1.60 13 1.60 15 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 17

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-17.805	-9.845	0.000
2	-0.000	-9.845	-0.000
3	3.357	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	18.486	-0.000
20	0.000	31.169	-0.000
21	0.000	24.225	-0.000
22	0.000	18.095	-0.000
23	0.000	14.062	-0.000
24	-0.000	12.896	0.000
25	-0.000	14.972	0.000
26	-0.000	20.297	0.000
27	-0.000	28.453	0.000
28	-0.000	38.451	0.000
29	0.000	24.254	0.000

COMB. HIPOTESIS 18 01 1.50 03 1.60 04 1.60 14 1.60 16 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 18

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01200	0.00143
2	0.00014	-0.01218	-0.00092
3	0.00617	-0.01234	-0.00294
4	0.00612	-0.02065	-0.00300
5	0.00608	-0.02491	-0.00024
6	0.00603	-0.02194	0.00233
7	-0.00017	-0.01548	-0.00292
8	0.00622	-0.01566	-0.00102
9	0.00599	-0.01583	0.00173
10	-0.00002	-0.01004	0.00222
11	-0.00003	-0.00775	0.00223
12	-0.00005	-0.00575	0.00172
13	-0.00007	-0.00443	0.00088
14	-0.00008	-0.00405	-0.00014
15	-0.00010	-0.00471	-0.00122
16	-0.00012	-0.00641	-0.00223
17	-0.00014	-0.00903	-0.00301
18	-0.00015	-0.01224	-0.00334
19	0.00655	0.00000	0.00143
20	0.01015	0.00000	0.00222
21	0.01018	0.00000	0.00223
22	0.00782	0.00000	0.00172
23	0.00397	0.00000	0.00088
24	-0.00072	0.00000	-0.00014
25	-0.00567	0.00000	-0.00122
26	-0.01032	0.00000	-0.00223
27	-0.01393	0.00000	-0.00301
28	-0.01548	0.00000	-0.00334
29	-0.01357	0.00000	-0.00292

COMB. HIPOTESIS 18 01 1.50 03 1.60 04 1.60 14 1.60 16 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 18

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	119.987	59.991	-144.465	2	119.987	1.738	-41.110
2	2	110.142	1.738	-41.110	3	110.142	-40.501	-113.617
3	3	44.164	110.142	-113.617	4	44.164	53.319	85.602
4	4	44.164	53.319	85.602	5	44.164	-3.504	146.314
5	5	44.164	-3.504	146.314	6	44.164	-60.327	68.521
6	6	44.164	-60.327	68.521	9	44.164	-117.150	-147.779
7	7	126.994	-41.880	102.422	8	126.994	9.148	49.812
8	8	117.150	9.148	49.812	9	117.150	44.164	147.779
9	1	41.880	-109.347	144.465	10	41.880	-109.347	37.851
10	10	41.880	-75.074	37.851	11	41.880	-75.074	-35.345
11	11	41.880	-48.623	-35.346	12	41.880	-48.623	-82.753
12	12	41.880	-29.014	-82.753	13	41.880	-29.014	-111.042
13	13	41.880	-13.892	-111.042	14	41.880	-13.892	-124.587
14	14	41.880	-0.084	-124.587	15	41.880	-0.084	-124.669
15	15	41.880	15.977	-124.669	16	41.880	15.977	-109.091
16	16	41.880	37.855	-109.091	17	41.880	37.855	-72.183
17	17	41.880	68.659	-72.183	18	41.880	68.659	-5.241
18	7	41.880	110.424	-102.422	18	41.880	110.424	5.241

COMB. HIPOTESIS 18 01 1.50 03 1.60 04 1.60 14 1.60 16 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 18

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	20.484	0.000	0.000	19	20.484	0.000	-0.000
20	10	34.273	-0.000	0.000	20	34.273	-0.000	-0.000
21	11	26.451	-0.000	0.000	21	26.451	-0.000	-0.000
22	12	19.609	-0.000	0.000	22	19.609	-0.000	-0.000
23	13	15.122	-0.000	0.000	23	15.122	-0.000	-0.000
24	14	13.808	0.000	-0.000	24	13.808	0.000	0.000
25	15	16.061	0.000	-0.000	25	16.061	0.000	0.000
26	16	21.878	0.000	-0.000	26	21.878	0.000	0.000
27	17	30.804	0.000	-0.000	27	30.804	0.000	0.000
28	18	41.765	0.000	-0.000	28	41.765	0.000	0.000
29	7	26.415	-0.000	-0.000	29	26.415	-0.000	0.000

COMB. HIPOTESIS 18 01 1.50 03 1.60 04 1.60 14 1.60 16 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 18

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-18.110	-9.845	0.000
2	-0.000	-9.845	-0.000
3	3.662	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	20.484	-0.000
20	0.000	34.273	-0.000
21	0.000	26.451	-0.000
22	0.000	19.609	-0.000
23	0.000	15.122	-0.000
24	-0.000	13.808	0.000
25	-0.000	16.061	0.000
26	-0.000	21.878	0.000
27	-0.000	30.804	0.000
28	-0.000	41.765	0.000
29	0.000	26.415	0.000

TOTALES DE LAS COMBINACIONES ESTUDIADAS

DESPLAZAMIENTO DE NUDOS. P.I. ESTRUCTURA E-11 ZONA CENTRA

NUDO	∂X SUMA(+)	∂X SUMA(-)	∂X TOTAL	∂Y SUMA(+)	∂Y SUMA(-)	∂Y TOTAL	∂Z SUMA(+)	∂Z SUMA(-)	∂Z TOTAL
1	0.000	0.000	0.000	0.000	-0.218	-0.218	0.032	0.000	0.032
2	0.002	-0.033	-0.031	0.000	-0.221	-0.221	0.000	-0.007	-0.007
3	0.047	-0.000	0.047	0.000	-0.224	-0.224	0.000	-0.045	-0.045
4	0.047	-0.000	0.046	0.000	-0.354	-0.354	0.000	-0.047	-0.047
5	0.046	-0.001	0.046	0.000	-0.420	-0.420	0.000	-0.002	-0.002
6	0.046	-0.001	0.045	0.000	-0.364	-0.364	0.042	0.000	0.042
7	0.000	-0.003	-0.003	0.000	-0.245	-0.245	0.000	-0.044	-0.044
8	0.079	0.000	0.079	0.000	-0.248	-0.248	0.000	-0.008	-0.008
9	0.046	-0.001	0.044	0.000	-0.251	-0.251	0.036	0.000	0.036
10	0.000	-0.000	-0.000	0.000	-0.178	-0.178	0.043	0.000	0.043
11	0.000	-0.001	-0.001	0.000	-0.135	-0.135	0.042	0.000	0.042
12	0.000	-0.001	-0.001	0.000	-0.098	-0.098	0.031	0.000	0.031
13	0.000	-0.001	-0.001	0.000	-0.074	-0.074	0.016	0.000	0.016
14	0.000	-0.001	-0.001	0.000	-0.066	-0.066	0.000	-0.001	-0.001
15	0.000	-0.002	-0.002	0.000	-0.076	-0.076	0.000	-0.019	-0.019
16	0.000	-0.002	-0.002	0.000	-0.103	-0.103	0.000	-0.035	-0.035
17	0.000	-0.002	-0.002	0.000	-0.145	-0.145	0.000	-0.048	-0.048
18	0.000	-0.002	-0.002	0.000	-0.195	-0.195	0.000	-0.052	-0.052
19	0.148	0.000	0.148	0.000	0.000	0.000	0.032	0.000	0.032
20	0.198	0.000	0.198	0.000	0.000	0.000	0.043	0.000	0.043
21	0.190	0.000	0.190	0.000	0.000	0.000	0.042	0.000	0.042
22	0.143	0.000	0.143	0.000	0.000	0.000	0.031	0.000	0.031
23	0.074	0.000	0.074	0.000	0.000	0.000	0.016	0.000	0.016
24	0.000	-0.006	-0.006	0.000	0.000	0.000	0.000	-0.001	-0.001
25	0.000	-0.089	-0.089	0.000	0.000	0.000	0.000	-0.019	-0.019
26	0.000	-0.164	-0.164	0.000	0.000	0.000	0.000	-0.035	-0.035
27	0.000	-0.220	-0.220	0.000	0.000	0.000	0.000	-0.048	-0.048
28	0.000	-0.241	-0.241	0.000	0.000	0.000	0.000	-0.052	-0.052
29	0.000	-0.204	-0.204	0.000	0.000	0.000	0.000	-0.044	-0.044

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 1 BARRA 1

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	100.6	100.6	98.5	116.0	116.0	116.0	112.8	112.8	112.8	123.5			
FX	113.5	113.5	113.5	121.4	109.4	109.4	109.4	120.0	2019.8	0.0	2019.8	10	3
FY	29.9	48.3	59.2	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FY	59.0	59.0	59.0	58.8	60.3	60.3	60.3	60.0	818.5	0.0	818.5	15	10
MZ	-95.8	-105.7	-122.8	-106.2	-106.2	-106.2	-104.1	-104.1	-104.1	-111.3			
MZ	-134.9	-134.9	-134.9	-141.0	-136.7	-136.7	-136.7	-144.5	0.0	-2167.1	-2167.1	1	18

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 1 BARRA 9

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	-90.5	-91.3	-91.4	-102.9	-102.9	-102.9	-100.4	-100.4	-100.4	-108.9			
FY	-103.6	-103.6	-103.6	-110.0	-100.8	-100.8	-100.8	-109.3	0.0	-1824.5	-1824.5	1	14
MZ	95.8	105.7	122.8	106.2	106.2	106.2	104.1	104.1	104.1	111.3			
MZ	134.9	134.9	134.9	141.0	136.7	136.7	136.7	144.5	2167.1	0.0	2167.1	18	1

NUDO 1 BARRA 19

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	19.9	19.2	17.0	22.9	22.9	22.9	22.3	22.3	22.3	24.4			
FX	19.7	19.7	19.7	21.2	18.5	18.5	18.5	20.5	372.5	0.0	372.5	10	3
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	3
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	3

NUDO 2 BARRA 1

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	100.6	100.6	98.5	116.0	116.0	116.0	112.8	112.8	112.8	123.5			
FX	113.5	113.5	113.5	121.4	109.4	109.4	109.4	120.0	2019.8	0.0	2019.8	10	3
FY	-2.2	-2.8	0.9	-2.8	-2.8	-2.8	-2.7	-2.7	-2.7	-3.2			
FY	0.7	0.7	0.7	0.6	2.1	2.1	2.1	1.7	11.6	-24.7	-13.1	15	10
MZ	-50.3	-30.8	-22.4	-63.0	-63.0	-63.0	-60.4	-60.4	-60.4	-69.3			
MZ	-35.1	-35.1	-35.1	-41.7	-32.3	-32.3	-32.3	-41.1	0.0	-827.9	-827.9	3	10

NUDO 2 BARRA 2

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	90.8	90.8	88.7	106.1	106.1	106.1	103.0	103.0	103.0	113.6			
FX	103.6	103.6	103.6	111.5	99.6	99.6	99.6	110.1	1842.6	0.0	1842.6	10	3
FY	-2.2	-2.8	0.9	-2.8	-2.8	-2.8	-2.7	-2.7	-2.7	-3.2			
FY	0.7	0.7	0.7	0.6	2.1	2.1	2.1	1.7	11.6	-24.7	-13.1	15	10
MZ	-50.3	-30.8	-22.4	-63.0	-63.0	-63.0	-60.4	-60.4	-60.4	-69.3			
MZ	-35.1	-35.1	-35.1	-41.7	-32.3	-32.3	-32.3	-41.1	0.0	-827.9	-827.9	3	10

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 3 BARRA 2

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	90.8	90.8	88.7	106.1	106.1	106.1	103.0	103.0	103.0	113.6			
FX	103.6	103.6	103.6	111.5	99.6	99.6	99.6	110.1	1842.6	0.0	1842.6	10	3
FY	-24.1	-37.8	-41.3	-24.8	-24.8	-24.8	-24.7	-24.7	-24.7	-25.2			
FY	-41.5	-41.5	-41.5	-41.7	-40.2	-40.2	-40.2	-40.5	0.0	-604.2	-604.2	1	14
MZ	-99.2	-106.5	-97.8	-114.4	-114.4	-114.4	-111.3	-111.3	-111.3	-121.8			
MZ	-111.1	-111.1	-111.1	-118.3	-103.6	-103.6	-103.6	-113.6	0.0	-1978.3	-1978.3	3	10

NUDO 3 BARRA 3

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.8	24.8	24.8	24.7	24.7	24.7	25.2			
FX	42.5	42.5	42.5	43.1	43.5	43.5	43.5	44.2	622.3	0.0	622.3	18	1
FY	90.8	90.8	88.7	106.1	106.1	106.1	103.0	103.0	103.0	113.6			
FY	103.6	103.6	103.6	111.5	99.6	99.6	99.6	110.1	1842.6	0.0	1842.6	10	3
MZ	-99.2	-106.5	-97.8	-114.4	-114.4	-114.4	-111.3	-111.3	-111.3	-121.8			
MZ	-111.1	-111.1	-111.1	-118.3	-103.6	-103.6	-103.6	-113.6	0.0	-1978.3	-1978.3	3	10

NUDO 4 BARRA 3

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.8	24.8	24.8	24.7	24.7	24.7	25.2			
FX	42.5	42.5	42.5	43.1	43.5	43.5	43.5	44.2	622.3	0.0	622.3	18	1
FY	45.4	45.4	43.3	53.1	53.1	53.1	51.5	51.5	51.5	56.8			
FY	50.6	50.6	50.6	54.4	48.1	48.1	48.1	53.3	908.3	0.0	908.3	10	3
MZ	66.8	59.5	63.0	79.7	79.7	79.7	77.0	77.0	77.0	86.0			
MZ	76.8	76.8	76.8	83.9	76.4	76.4	76.4	85.6	1374.4	0.0	1374.4	10	2

NUDO 4 BARRA 4

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.8	24.8	24.8	24.7	24.7	24.7	25.2			
FX	42.5	42.5	42.5	43.1	43.5	43.5	43.5	44.2	622.3	0.0	622.3	18	1
FY	45.4	45.4	43.3	53.1	53.1	53.1	51.5	51.5	51.5	56.8			
FY	50.6	50.6	50.6	54.4	48.1	48.1	48.1	53.3	908.3	0.0	908.3	10	3
MZ	66.8	59.5	63.0	79.7	79.7	79.7	77.0	77.0	77.0	86.0			
MZ	76.8	76.8	76.8	83.9	76.4	76.4	76.4	85.6	1374.4	0.0	1374.4	10	2

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 5 BARRA 4

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.8	24.8	24.8	24.7	24.7	24.7	25.2			
FX	42.5	42.5	42.5	43.1	43.5	43.5	43.5	44.2	622.3	0.0	622.3	18	1
FY	-0.0	-0.0	-2.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-2.5	-2.5	-2.5	-2.6	-3.4	-3.4	-3.4	-3.5	0.0	-25.9	-25.9	2	18
MZ	122.1	114.8	113.2	144.3	144.3	144.3	139.8	139.8	139.8	155.2			
MZ	135.4	135.4	135.4	147.0	130.9	130.9	130.9	146.3	2449.8	0.0	2449.8	10	3

NUDO 5 BARRA 5

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.8	24.8	24.8	24.7	24.7	24.7	25.2			
FX	42.5	42.5	42.5	43.1	43.5	43.5	43.5	44.2	622.3	0.0	622.3	18	1
FY	0.0	0.0	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	-2.5	-2.5	-2.5	-2.6	-3.4	-3.4	-3.4	-3.5	0.0	-25.9	-25.9	10	18
MZ	122.1	114.8	113.2	144.3	144.3	144.3	139.8	139.8	139.8	155.2			
MZ	135.4	135.4	135.4	147.0	130.9	130.9	130.9	146.3	2449.8	0.0	2449.8	10	3

NUDO 6 BARRA 5

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.8	24.8	24.8	24.7	24.7	24.7	25.2			
FX	42.5	42.5	42.5	43.1	43.5	43.5	43.5	44.2	622.3	0.0	622.3	18	1
FY	-45.4	-45.4	-47.5	-53.1	-53.1	-53.1	-51.5	-51.5	-51.5	-56.8			
FY	-55.6	-55.6	-55.6	-59.7	-54.9	-54.9	-54.9	-60.3	0.0	-960.2	-960.2	1	18
MZ	66.8	59.5	52.7	79.7	79.7	79.7	77.0	77.0	77.0	86.0			
MZ	64.6	64.6	64.6	71.0	59.8	59.8	59.8	68.5	1247.9	0.0	1247.9	10	3

NUDO 6 BARRA 6

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.8	24.8	24.8	24.7	24.7	24.7	25.2			
FX	42.5	42.5	42.5	43.1	43.5	43.5	43.5	44.2	622.3	0.0	622.3	18	1
FY	-45.4	-45.4	-47.5	-53.1	-53.1	-53.1	-51.5	-51.5	-51.5	-56.8			
FY	-55.6	-55.6	-55.6	-59.7	-54.9	-54.9	-54.9	-60.3	0.0	-960.2	-960.2	1	18
MZ	66.8	59.5	52.7	79.7	79.7	79.7	77.0	77.0	77.0	86.0			
MZ	64.6	64.6	64.6	71.0	59.8	59.8	59.8	68.5	1247.9	0.0	1247.9	10	3

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 7 BARRA 7

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	100.6	100.6	102.8	116.0	116.0	116.0	112.8	112.8	112.8	123.5			
FX	118.5	118.5	118.5	126.7	116.2	116.2	116.2	127.0	2071.7	0.0	2071.7	18	1
FY	-29.9	-48.3	-44.7	-29.2	-29.2	-29.2	-29.3	-29.3	-29.3	-28.9			
FY	-43.5	-43.5	-43.5	-43.0	-42.5	-42.5	-42.5	-41.9	0.0	-670.4	-670.4	10	2
MZ	95.8	105.7	93.0	106.2	106.2	106.2	104.1	104.1	104.1	111.3			
MZ	101.8	101.8	101.8	106.5	95.7	95.7	95.7	102.4	1838.2	0.0	1838.2	10	3

NUDO 7 BARRA 18

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	90.5	91.3	91.6	102.9	102.9	102.9	100.4	100.4	100.4	108.9			
FY	104.1	104.1	104.1	110.6	101.8	101.8	101.8	110.4	1830.9	0.0	1830.9	14	1
MZ	-95.8	-105.7	-93.0	-106.2	-106.2	-106.2	-104.1	-104.1	-104.1	-111.3			
MZ	-101.8	-101.8	-101.8	-106.5	-95.7	-95.7	-95.7	-102.4	0.0	-1838.2	-1838.2	3	10

NUDO 7 BARRA 29

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	19.9	19.2	21.0	22.9	22.9	22.9	22.3	22.3	22.3	24.4			
FX	24.2	24.2	24.2	25.9	24.3	24.3	24.3	26.4	418.0	0.0	418.0	18	2
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18

NUDO 8 BARRA 7

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	100.6	100.6	102.8	116.0	116.0	116.0	112.8	112.8	112.8	123.5			
FX	118.5	118.5	118.5	126.7	116.2	116.2	116.2	127.0	2071.7	0.0	2071.7	18	1
FY	2.2	2.8	6.3	2.8	2.8	2.8	2.7	2.7	2.7	3.2			
FY	7.5	7.5	7.5	8.0	8.5	8.5	8.5	9.1	96.2	0.0	96.2	18	1
MZ	50.3	30.8	30.5	63.0	63.0	63.0	60.4	60.4	60.4	69.3			
MZ	43.3	43.3	43.3	50.1	40.9	40.9	40.9	49.8	903.7	0.0	903.7	10	3

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 8 BARRA 8

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	90.8	90.8	92.9	106.1	106.1	106.1	103.0	103.0	103.0	113.6			
FX	108.6	108.6	108.6	116.8	106.4	106.4	106.4	117.1	1894.5	0.0	1894.5	18	2
FY	2.2	2.8	6.3	2.8	2.8	2.8	2.7	2.7	2.7	3.2			
FY	7.5	7.5	7.5	8.0	8.5	8.5	8.5	9.1	96.2	0.0	96.2	18	1
MZ	50.3	30.8	30.5	63.0	63.0	63.0	60.4	60.4	60.4	69.3			
MZ	43.3	43.3	43.3	50.1	40.9	40.9	40.9	49.8	903.7	0.0	903.7	10	3

NUDO 9 BARRA 6

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.8	24.8	24.8	24.7	24.7	24.7	25.2			
FX	42.5	42.5	42.5	43.1	43.5	43.5	43.5	44.2	622.3	0.0	622.3	18	1
FY	-90.8	-90.8	-92.9	-106.1	-106.1	-106.1	-103.0	-103.0	-103.0	-113.6			
FY	-108.6	-108.6	-108.6	-116.8	-106.4	-106.4	-106.4	-117.1	0.0	-1894.5	-1894.5	1	18
MZ	-99.2	-106.5	-118.5	-114.4	-114.4	-114.4	-111.3	-111.3	-111.3	-121.8			
MZ	-135.5	-135.5	-135.5	-144.1	-136.7	-136.7	-136.7	-147.8	0.0	-2231.2	-2231.2	1	18

NUDO 9 BARRA 8

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	90.8	90.8	92.9	106.1	106.1	106.1	103.0	103.0	103.0	113.6			
FX	108.6	108.6	108.6	116.8	106.4	106.4	106.4	117.1	1894.5	0.0	1894.5	18	2
FY	24.1	37.8	41.3	24.8	24.8	24.8	24.7	24.7	24.7	25.2			
FY	42.5	42.5	42.5	43.1	43.5	43.5	43.5	44.2	622.3	0.0	622.3	18	1
MZ	99.2	106.5	118.5	114.4	114.4	114.4	111.3	111.3	111.3	121.8			
MZ	135.5	135.5	135.5	144.1	136.7	136.7	136.7	147.8	2231.2	0.0	2231.2	18	1

NUDO 10 BARRA 9

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	-90.5	-91.3	-91.4	-102.9	-102.9	-102.9	-100.4	-100.4	-100.4	-108.9			
FY	-103.6	-103.6	-103.6	-110.0	-100.8	-100.8	-100.8	-109.3	0.0	-1824.5	-1824.5	1	14
MZ	7.6	16.7	33.8	5.9	5.9	5.9	6.2	6.2	6.2	5.1			
MZ	33.9	33.9	33.9	33.8	38.4	38.4	38.4	37.9	388.3	0.0	388.3	15	10

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 10 BARRA 10

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	-58.6	-60.0	-62.7	-66.4	-66.4	-66.4	-64.8	-64.8	-64.8	-70.1			
FY	-70.7	-70.7	-70.7	-74.8	-69.6	-69.6	-69.6	-75.1	0.0	-1215.6	-1215.6	1	18
MZ	7.6	16.7	33.8	5.9	5.9	5.9	6.2	6.2	6.2	5.1			
MZ	33.9	33.9	33.9	33.8	38.4	38.4	38.4	37.9	388.3	0.0	388.3	15	10

NUDO 10 BARRA 20

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
	31.9	31.3	28.7	36.5	36.5	36.5	35.6	35.6	35.6	38.8			
FX	32.9	32.9	32.9	35.2	31.2	31.2	31.2	34.3	608.8	0.0	608.8	10	3
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	3

NUDO 11 BARRA 10

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	-58.6	-60.0	-62.7	-66.4	-66.4	-66.4	-64.8	-64.8	-64.8	-70.1			
FY	-70.7	-70.7	-70.7	-74.8	-69.6	-69.6	-69.6	-75.1	0.0	-1215.6	-1215.6	1	18
MZ	-49.6	-41.9	-27.4	-58.8	-58.8	-58.8	-56.9	-56.9	-56.9	-63.3			
MZ	-35.0	-35.0	-35.0	-39.2	-29.4	-29.4	-29.4	-35.3	0.0	-797.0	-797.0	3	10

NUDO 11 BARRA 11

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	-34.9	-36.3	-40.4	-39.3	-39.3	-39.3	-38.4	-38.4	-38.4	-41.5			
FY	-45.3	-45.3	-45.3	-47.8	-45.4	-45.4	-45.4	-48.6	0.0	-754.9	-754.9	1	18
MZ	-49.6	-41.9	-27.4	-58.8	-58.8	-58.8	-56.9	-56.9	-56.9	-63.3			
MZ	-35.0	-35.0	-35.0	-39.2	-29.4	-29.4	-29.4	-35.3	0.0	-797.0	-797.0	3	10

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 11 BARRA 21

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
FX	23.7	23.7	22.3	27.0	27.0	27.0	26.3	26.3	26.3	28.6			
FX	25.4	25.4	25.4	27.0	24.2	24.2	24.2	26.5	460.7	0.0	460.7	10	3
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	3

NUDO 12 BARRA 11

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	-34.9	-36.3	-40.4	-39.3	-39.3	-39.3	-38.4	-38.4	-38.4	-41.5			
FY	-45.3	-45.3	-45.3	-47.8	-45.4	-45.4	-45.4	-48.6	0.0	-754.9	-754.9	1	18
MZ	-83.6	-77.3	-66.8	-97.1	-97.1	-97.1	-94.4	-94.4	-94.4	-103.8			
MZ	-79.1	-79.1	-79.1	-85.7	-73.7	-73.7	-73.7	-82.8	0.0	-1533.0	-1533.0	3	10

NUDO 12 BARRA 12

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	-18.0	-19.0	-23.7	-20.2	-20.2	-20.2	-19.7	-19.7	-19.7	-21.3			
FY	-26.5	-26.5	-26.5	-27.8	-27.3	-27.3	-27.3	-29.0	0.0	-420.0	-420.0	1	18
MZ	-83.6	-77.3	-66.8	-97.1	-97.1	-97.1	-94.4	-94.4	-94.4	-103.8			
MZ	-79.1	-79.1	-79.1	-85.7	-73.7	-73.7	-73.7	-82.8	0.0	-1533.0	-1533.0	3	10

NUDO 12 BARRA 22

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
FX	16.9	17.3	16.7	19.1	19.1	19.1	18.7	18.7	18.7	20.2			
FX	18.8	18.8	18.8	19.9	18.1	18.1	18.1	19.6	334.9	0.0	334.9	10	3
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	3

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 13 BARRA 12

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	-18.0	-19.0	-23.7	-20.2	-20.2	-20.2	-19.7	-19.7	-19.7	-21.3			
FY	-26.5	-26.5	-26.5	-27.8	-27.3	-27.3	-27.3	-29.0	0.0	-420.0	-420.0	1	18
MZ	-101.2	-95.8	-89.9	-116.8	-116.8	-116.8	-113.6	-113.6	-113.6	-124.5			
MZ	-104.9	-104.9	-104.9	-112.9	-100.4	-100.4	-100.4	-111.0	0.0	-1942.5	-1942.5	3	10

NUDO 13 BARRA 13

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	-5.5	-5.8	-10.7	-6.1	-6.1	-6.1	-6.0	-6.0	-6.0	-6.5			
FY	-12.0	-12.0	-12.0	-12.6	-13.3	-13.3	-13.3	-13.9	0.0	-167.2	-167.2	1	18
MZ	-101.2	-95.8	-89.9	-116.8	-116.8	-116.8	-113.6	-113.6	-113.6	-124.5			
MZ	-104.9	-104.9	-104.9	-112.9	-100.4	-100.4	-100.4	-111.0	0.0	-1942.5	-1942.5	3	10

NUDO 13 BARRA 23

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	12.5	13.1	13.0	14.0	14.0	14.0	13.7	13.7	13.7	14.8			
FX	14.5	14.5	14.5	15.3	14.1	14.1	14.1	15.1	252.8	0.0	252.8	14	1
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	3

NUDO 14 BARRA 13

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	-5.5	-5.8	-10.7	-6.1	-6.1	-6.1	-6.0	-6.0	-6.0	-6.5			
FY	-12.0	-12.0	-12.0	-12.6	-13.3	-13.3	-13.3	-13.9	0.0	-167.2	-167.2	1	18
MZ	-106.5	-101.5	-100.3	-122.8	-122.8	-122.8	-119.5	-119.5	-119.5	-130.8			
MZ	-116.6	-116.6	-116.6	-125.1	-113.3	-113.3	-113.3	-124.6	0.0	-2105.4	-2105.4	3	10

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 14 BARRA 14

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	5.5	5.8	1.1	6.1	6.1	6.1	6.0	6.0	6.0	6.5			
FY	1.2	1.2	1.2	1.3	-0.4	-0.4	-0.4	-0.1	60.2	-1.2	59.1	10	15
MZ	-106.5	-101.5	-100.3	-122.8	-122.8	-122.8	-119.5	-119.5	-119.5	-130.8			
MZ	-116.6	-116.6	-116.6	-125.1	-113.3	-113.3	-113.3	-124.6	0.0	-2105.4	-2105.4	3	10

NUDO 14 BARRA 24

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
	11.0	11.7	11.9	12.3	12.3	12.3	12.0	12.0	12.0	12.9			
FX	13.2	13.2	13.2	13.9	12.9	12.9	12.9	13.8	226.2	0.0	226.2	14	1
FY	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	18	2
MZ	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18

NUDO 15 BARRA 14

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	5.5	5.8	1.1	6.1	6.1	6.1	6.0	6.0	6.0	6.5			
FY	1.2	1.2	1.2	1.3	-0.4	-0.4	-0.4	-0.1	60.2	-1.2	59.1	10	15
MZ	-101.2	-95.8	-99.3	-116.8	-116.8	-116.8	-113.6	-113.6	-113.6	-124.5			
MZ	-115.5	-115.5	-115.5	-123.9	-113.6	-113.6	-113.6	-124.7	0.0	-2047.9	-2047.9	2	18

NUDO 15 BARRA 15

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	18.0	19.0	14.7	20.2	20.2	20.2	19.7	19.7	19.7	21.3			
FY	16.4	16.4	16.4	17.3	14.6	14.6	14.6	16.0	318.9	0.0	318.9	10	15
MZ	-101.2	-95.8	-99.3	-116.8	-116.8	-116.8	-113.6	-113.6	-113.6	-124.5			
MZ	-115.5	-115.5	-115.5	-123.9	-113.6	-113.6	-113.6	-124.7	0.0	-2047.9	-2047.9	2	18

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 15 BARRA 25

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	12.5	13.1	13.6	14.0	14.0	14.0	13.7	13.7	13.7	14.8			
FX	15.2	15.2	15.2	16.0	15.0	15.0	15.0	16.1	259.9	0.0	259.9	18	1
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18

NUDO 16 BARRA 15

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	18.0	19.0	14.7	20.2	20.2	20.2	19.7	19.7	19.7	21.3			
FY	16.4	16.4	16.4	17.3	14.6	14.6	14.6	16.0	318.9	0.0	318.9	10	15
MZ	-83.6	-77.3	-84.9	-97.1	-97.1	-97.1	-94.4	-94.4	-94.4	-103.8			
MZ	-99.5	-99.5	-99.5	-107.0	-99.4	-99.4	-99.4	-109.1	0.0	-1736.9	-1736.9	2	18

NUDO 16 BARRA 16

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	34.9	36.3	32.9	39.3	39.3	39.3	38.4	38.4	38.4	41.5			
FY	36.9	36.9	36.9	39.0	34.9	34.9	34.9	37.9	671.0	0.0	671.0	10	3
MZ	-83.6	-77.3	-84.9	-97.1	-97.1	-97.1	-94.4	-94.4	-94.4	-103.8			
MZ	-99.5	-99.5	-99.5	-107.0	-99.4	-99.4	-99.4	-109.1	0.0	-1736.9	-1736.9	2	18

NUDO 16 BARRA 26

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	16.9	17.3	18.2	19.1	19.1	19.1	18.7	18.7	18.7	20.2			
FX	20.5	20.5	20.5	21.7	20.3	20.3	20.3	21.9	352.1	0.0	352.1	18	1
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 17 BARRA 16

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	34.9	36.3	32.9	39.3	39.3	39.3	38.4	38.4	38.4	41.5			
FY	36.9	36.9	36.9	39.0	34.9	34.9	34.9	37.9	671.0	0.0	671.0	10	3
MZ	-49.6	-41.9	-52.9	-58.8	-58.8	-58.8	-56.9	-56.9	-56.9	-63.3			
MZ	-63.6	-63.6	-63.6	-69.0	-65.3	-65.3	-65.3	-72.2	0.0	-1082.6	-1082.6	2	18

NUDO 17 BARRA 17

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	58.6	60.0	58.0	66.4	66.4	66.4	64.8	64.8	64.8	70.1			
FY	65.5	65.5	65.5	69.4	63.4	63.4	63.4	68.7	1164.9	0.0	1164.9	10	3
MZ	-49.6	-41.9	-52.9	-58.8	-58.8	-58.8	-56.9	-56.9	-56.9	-63.3			
MZ	-63.6	-63.6	-63.6	-69.0	-65.3	-65.3	-65.3	-72.2	0.0	-1082.6	-1082.6	2	18

NUDO 17 BARRA 27

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	23.7	23.7	25.1	27.0	27.0	27.0	26.3	26.3	26.3	28.6			
FX	28.6	28.6	28.6	30.4	28.5	28.5	28.5	30.8	493.8	0.0	493.8	18	2
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18

NUDO 18 BARRA 17

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	58.6	60.0	58.0	66.4	66.4	66.4	64.8	64.8	64.8	70.1			
FY	65.5	65.5	65.5	69.4	63.4	63.4	63.4	68.7	1164.9	0.0	1164.9	10	3
MZ	7.6	16.7	3.7	5.9	5.9	5.9	6.2	6.2	6.2	5.1			
MZ	0.3	0.3	0.3	-1.3	-3.6	-3.6	-3.6	-5.2	70.3	-17.2	53.1	2	18

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 18 BARRA 18

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.2	29.2	29.2	29.3	29.3	29.3	28.9			
FX	43.5	43.5	43.5	43.0	42.5	42.5	42.5	41.9	670.4	0.0	670.4	2	10
FY	90.5	91.3	91.6	102.9	102.9	102.9	100.4	100.4	100.4	108.9			
FY	104.1	104.1	104.1	110.6	101.8	101.8	101.8	110.4	1830.9	0.0	1830.9	14	1
MZ	-7.6	-16.7	-3.7	-5.9	-5.9	-5.9	-6.2	-6.2	-6.2	-5.1			
MZ	-0.3	-0.3	-0.3	1.3	3.6	3.6	3.6	5.2	17.2	-70.3	-53.1	18	2

NUDO 18 BARRA 28

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
	31.9	31.3	33.6	36.5	36.5	36.5	35.6	35.6	35.6	38.8			
FX	38.6	38.6	38.6	41.1	38.5	38.5	38.5	41.8	666.0	0.0	666.0	18	2
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18

NUDO 19 BARRA 19

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	19.9	19.2	17.0	22.9	22.9	22.9	22.3	22.3	22.3	24.4			
FX	19.7	19.7	19.7	21.2	18.5	18.5	18.5	20.5	372.5	0.0	372.5	10	3
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	3
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10

NUDO 20 BARRA 20

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	31.9	31.3	28.7	36.5	36.5	36.5	35.6	35.6	35.6	38.8			
FX	32.9	32.9	32.9	35.2	31.2	31.2	31.2	34.3	608.8	0.0	608.8	10	3
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 21 BARRA 21

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	23.7	23.7	22.3	27.0	27.0	27.0	26.3	26.3	26.3	28.6			
FX	25.4	25.4	25.4	27.0	24.2	24.2	24.2	26.5	460.7	0.0	460.7	10	3
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10

NUDO 22 BARRA 22

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
	16.9	17.3	16.7	19.1	19.1	19.1	18.7	18.7	18.7	20.2			
FX	18.8	18.8	18.8	19.9	18.1	18.1	18.1	19.6	334.9	0.0	334.9	10	3
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10

NUDO 23 BARRA 23

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	12.5	13.1	13.0	14.0	14.0	14.0	13.7	13.7	13.7	14.8			
FX	14.5	14.5	14.5	15.3	14.1	14.1	14.1	15.1	252.8	0.0	252.8	14	1
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10

NUDO 24 BARRA 24

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	11.0	11.7	11.9	12.3	12.3	12.3	12.0	12.0	12.0	12.9			
FX	13.2	13.2	13.2	13.9	12.9	12.9	12.9	13.8	226.2	0.0	226.2	14	1
FY	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	18	2
MZ	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	18	4

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 25 BARRA 25

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	12.5	13.1	13.6	14.0	14.0	14.0	13.7	13.7	13.7	14.8			
FX	15.2	15.2	15.2	16.0	15.0	15.0	15.0	16.1	259.9	0.0	259.9	18	1
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2

NUDO 26 BARRA 26

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
	16.9	17.3	18.2	19.1	19.1	19.1	18.7	18.7	18.7	20.2			
FX	20.5	20.5	20.5	21.7	20.3	20.3	20.3	21.9	352.1	0.0	352.1	18	1
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2

NUDO 27 BARRA 27

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	23.7	23.7	25.1	27.0	27.0	27.0	26.3	26.3	26.3	28.6			
FX	28.6	28.6	28.6	30.4	28.5	28.5	28.5	30.8	493.8	0.0	493.8	18	2
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2

NUDO 28 BARRA 28

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	31.9	31.3	33.6	36.5	36.5	36.5	35.6	35.6	35.6	38.8			
FX	38.6	38.6	38.6	41.1	38.5	38.5	38.5	41.8	666.0	0.0	666.0	18	2
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 29 BARRA 29

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	19.9	19.2	21.0	22.9	22.9	22.9	22.3	22.3	22.3	24.4			
FX	24.2	24.2	24.2	25.9	24.3	24.3	24.3	26.4	418.0	0.0	418.0	18	2
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2

DIMENSIONAMIENTO A FLEXION Y CORTANTE.

A partir de los esfuerzos obtenidos, se dimensionan las armaduras de las diferentes secciones mediante la aplicación de las formulas en flexión compuesta.

1. ESFUERZOS MAXIMOS.

a. Hastiales. Inferior. Barra 1 – Nudo 1. C-18

Nd = 119,987 t/m Vd = 60,310 t/m Md = 144,465 mt/m (−)

Superior. Barra 8 – Nudo 9. C-18

Nd = 117,150 t/m Vd = 44,164 t/m Md = 147,779 mt/m (−)

Centro.

Vd = 0 Md = 0 (+)

b. Losa Superior. Cara Superior Barra 6 – Nudo 9. C-18

Nd = 44,164 t/m Vd = 117,150 t/m Md = 147,779 mt/m (−)

Cara Inferior Barra 4. Nudo 5. C-10

Nd = 25,155 t/m Md = 155,222 mt/m (+)

c. Losa Inferior. Cara Inferior Barra 9 – Nudo 1. C-18

Nd = 41,880 t/m Vd = 110,859 t/m Md = 144,465 mt/m (−)

Cara Superior Barra 13 – Nudo 14. C-10

Nd = 28,868 t/m Md = 130,793 mt/m (+)

2. ARMADURAS.

a – HASTIALES.

– Armadura Exterior Inferior. Vr = 1,00 · 0,71 · 0,9 · 2500/1,5 = 1.065 t/m

Momento de cálculo Md = 144,465 + 119,987 (0,75/2 − 0,04 − 0,025/2) = 183,16

Axil de cálculo Nd = 119,987 · 0,9/1,6 = 67,49 t/m

μ = 0,242 ν = 0,063 ω = 0,238 Vf = 253 t/m

Armadura mínima. Vf mín = 43 t/m

Disponemos 4 Φ32 + 6 Φ25 pmf y Refuerzo Φ16 a 20 cm

– Armadura Exterior Superior Vr = 1.065 t/m

Momento de cálculo Md = 147,779 + 117,150 (0,75/2 − 0,04 − 0,025/2) = 185,56

Axil de cálculo. Nd = 117,150 · 0,9/1,6 = 65,90 t/m

μ = 0,245 ν = 0,062 ω = 0,244 Vf = 259 t/m

Armadura mínima. Vf mín = 43 t/m

Disponemos 4 Φ32 + 6 Φ25 pmf Refuerzo Φ16 a 20 cm

– Armadura Interior. Vr = 1.065 t/m

Momento de cálculo. Md = 0

Axil de cálculo Nd = 0

μ = 0,00 ν = 0,00 ω = 0,00 Vf = 0 t/m

Armadura mínima. Vf mín = 43 t/m

Disponemos 5 Φ16 pmf y Refuerzo Φ12 a 20 cm.

comprobación a cortante.

$V_{cu} = \frac{1}{10.000} \times 1000 \cdot 710 \times \left(1 + \sqrt{\frac{200}{710}}\right)(100 \times 0,02 \times 25 \times 0,9)^{1/3} = 38,66$ t/m

Vr = 60,310 − 38,66 = 21,65 t/m

Disponemos cercos de Φ10 a 20 cm / cada 40 cm.

$0,9 \cdot \frac{0,71}{0,20} \cdot 2,5 \cdot 0,79 \cdot 4,0 = 25,24$ t/m

b - LOSA SUPERIOR

- Armadura Exterior. $V_R = 1.00 \cdot 0.71 \cdot 2500 / 1.5 = 1.183$ t/m

Momento de cálculo $M_d = 147,779 + 44,164 \left(\frac{0,75}{2} - 0,04 - \frac{0,025}{2}\right) = 162,02$

Axil de cálculo $N_d = 44,164 \cdot 0,9 / 1.6 = 24,84$ t/m

$\mu = 0,191$ $\nu = 0,021$ $\omega = 0,207$ $V_S = 245$ t/m

Armadura mínima. $V_{Pmin} = 47$ t/m

Dispondremos 4 Φ32 + 6 Φ25 pmf. Reparto Φ16 a 20 cm.

- Armadura Interior $V_R = 1.183$ t/m

Momento de cálculo $M_d = 155,222 + 25,155 \left(\frac{0,75}{2} - 0,04 - \frac{0,025}{2}\right) = 163,33$

Axil de cálculo $N_d = 25.155 \cdot 0,9 / 1.6 = 14,15$ t/m

$\mu = 0,194$ $\nu = 0,012$ $\omega = 0,220$ $V_P = 260$ t/m

Dispondremos 4 Φ32 + 6 Φ25 pmf. Reparto Φ16 a 20 cm.

Comprobación a cortante

$V_{cu} = \frac{1}{10.000} \cdot 1.000 \cdot 710 \cdot \left(1 + \sqrt{\frac{200}{710}}\right) (100 \cdot 0,02 \cdot 25)^{1/3} = 40,04$ t/m

$V_S = 117,150 - 40,04 = 77,11$ t/m.

Dispondremos cercos de Φ12 a 20 cm/cada 20 cm

$0,9 \cdot \frac{0,71}{0,20} \cdot 5 \cdot 1,13 \cdot 4,0 = 72,21$ t/m.

c - LOSA INFERIOR.

- Armadura Inferior $V_R = 1.00 \cdot 0.71 \cdot 2500 / 1.5 = 1.183$ t/m

Momento de cálculo $M_d = 144,465 + 41,880 \left(\frac{0,75}{2} - 0,04 - \frac{0,025}{2}\right) = 157,97$

Axil de cálculo $N_d = 41,880 \cdot 0,9 / 1,6 = 23,56$ t/m

$\mu = 0,188$ $\nu = 0,020$ $\omega = 0,203$ $V_P = 241$ t/m

Armadura mínima. $V_{Pmin} = 47$ t/m

Dispondremos 4 Φ32 + 6 Φ25 pmf. Reparto Φ16 a 20 cm

- Armadura Superior. $V_R = 1.183$ t/m

Momento de cálculo $M_d = 130,793 + 28,868 \left(\frac{0,75}{2} - 0,04 - \frac{0,025}{2}\right) = 140,10$

Axil de cálculo $N_d = 28,868 \cdot 0,9 / 1.6 = 16,24$ t/m

$\mu = 0,167$ $\nu = 0,014$ $\omega = 0,181$ $V_S = 214$ t/m

Armadura mínima $V_{Pmin} = 47$ t/m

Dispondremos 4 Φ32 + 6 Φ25 pmf Reparto Φ16 a 20 cm

Comprobación a cortante

$V_{cu} = \frac{1}{10.000} \cdot 1000 \cdot 710 \cdot \left(1 + \sqrt{\frac{200}{710}}\right) (100 \cdot 0,02 \cdot 25)^{1/3} = 40,04$ t/m

$V_S = 110,859 - 40,04 = 70,82$ t/m

Dispondremos cercos de Φ12 a 20 cm / cada 20 cm.

3. CUMPLIMIENTO DEL ESTADO LÍMITE ÚLTIMO

3.1 - TENSIONES.

Las tensiones máximas que se transmiten al terreno son:

Axil máximo en el Nudo 7 - Barra 29 - Comb. 18

$N_d = 26,4$ t/m

$\sigma = 26,4 \cdot 2 / 1.6 - 0,975 = 33,546$ t/m²

Peso propio de la losa inferior. $0,75 \cdot 2,5 = 1,875$ t/m²

Tensión máxima transmitida al terreno.

$\sigma = (33,546 + 1,875) / 1,20 = 27,48$ t/m²

3.2 - FISURACIÓN.

Comprobamos la fisuración en la sección más comprometida para Combinación II.b.

La sección más desfavorable es la correspondiente a la losa in-

pción y cara interior.

$\phi = 32$ mm. $c = 40$ mm. $\rho = 6 \times 4{,}91 + 4 \times 8{,}04 / 100 \times 75 = 0{,}008216$

Tensión de servicio máx. $\sigma_s = 0{,}75 \frac{5.100}{1{,}6 \times 1{,}15} \times \frac{260}{273} = 1.980$ kp/mm²

Tensión de trabajo máx. $\sigma_t = (200 \times 0{,}008216 + 2)\sqrt{10/32} \times 1.000 = 2.037 > \sigma_s$.

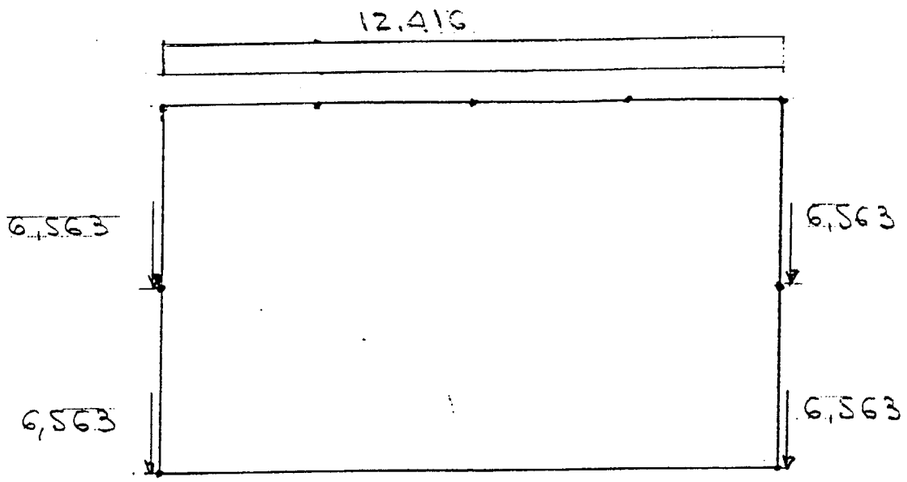
3.3- DEFORMACIONES.

La flecha máxima se produce en el nudo 5 - barra 4 y corresponde a la combinación 10, siendo su valor de 0,02728 m. de modo que en el estado último será de $0{,}02641 / 1{,}6 = 0{,}016506$ m. que equivale a $L/591 < L/500$

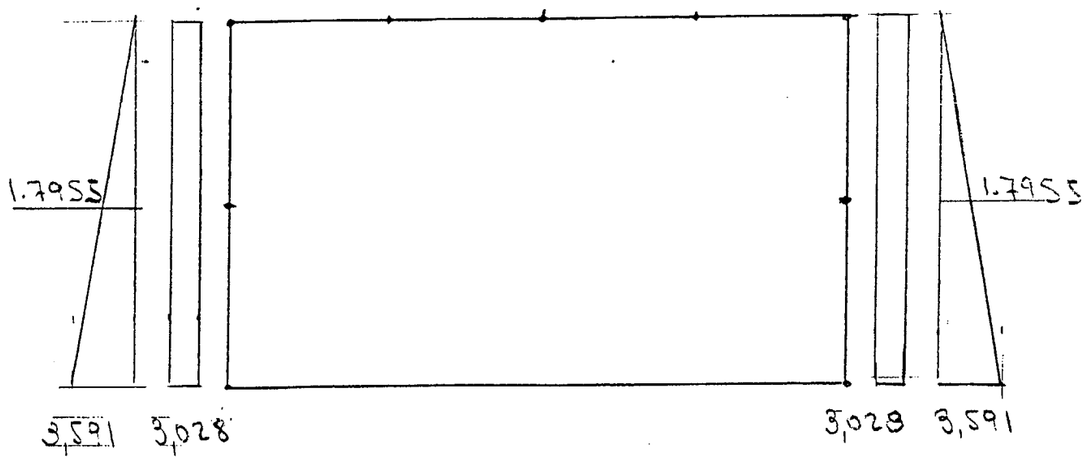
1.3.6.- Zonas laterales

ZONAS LATERALES

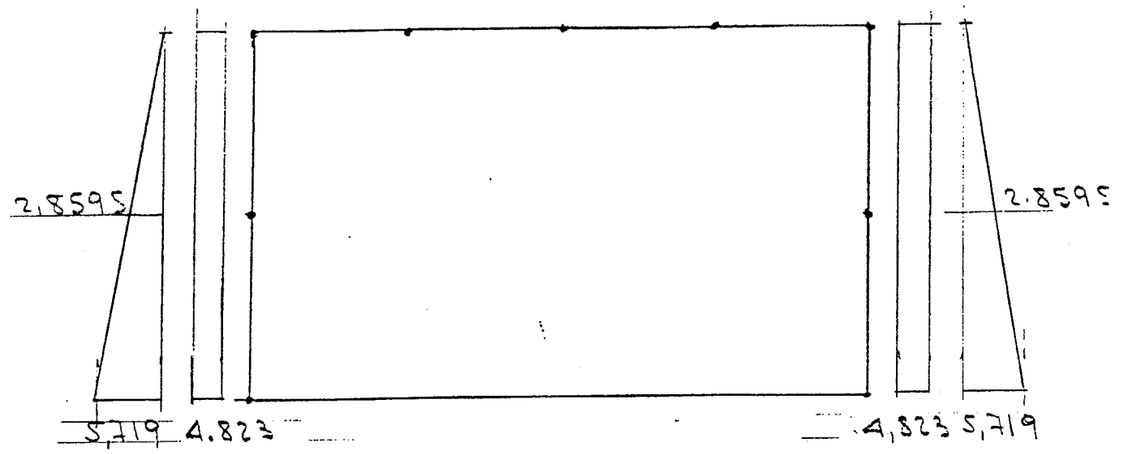
HIPOTESIS 01 - PESO PROPIO + CARGAS MUERTAS



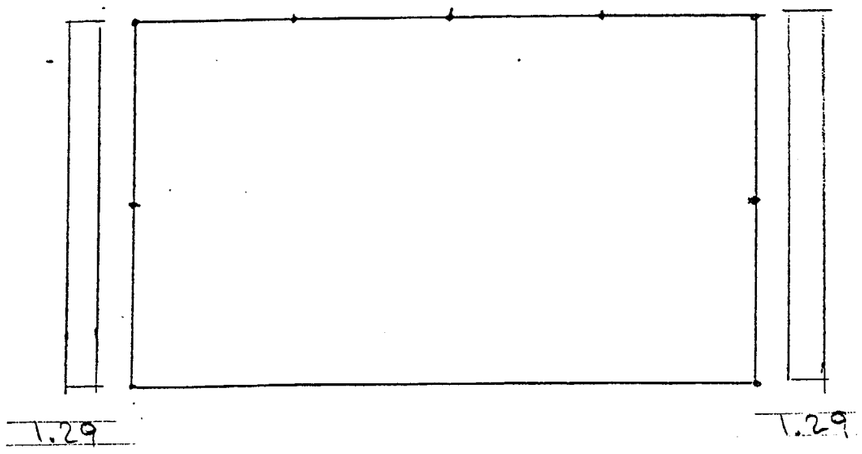
HIPOTESIS 02 - EMPUJE ACTIVO DE TIERRAS EN LOS DOS HASTIALES



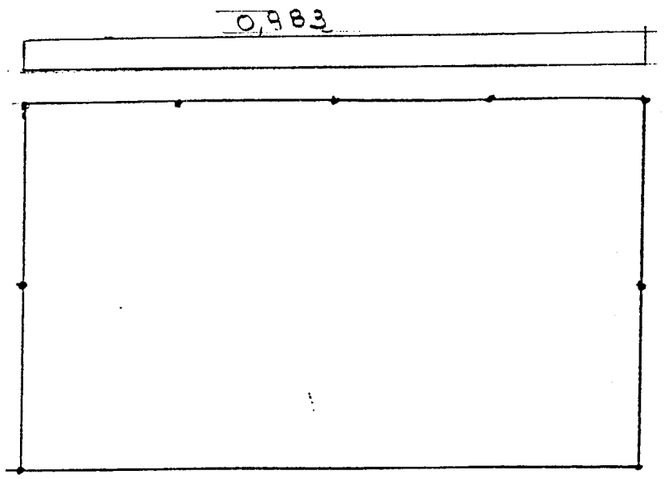
HIPOTESIS 03 - EMPUJE REPOSO DE TIERRAS EN LOS DOS HASTIALES



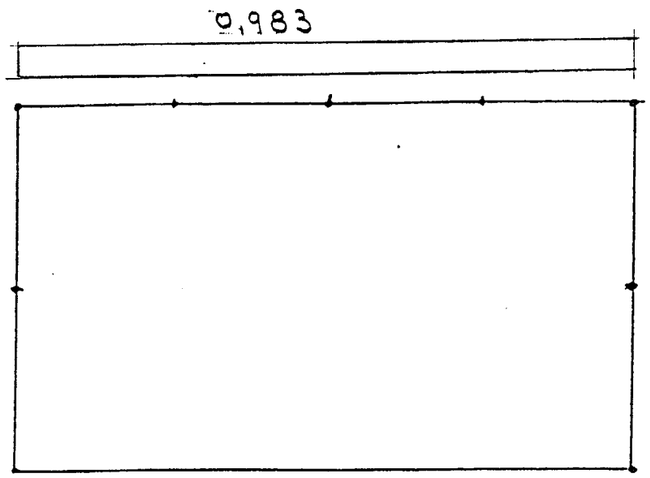
HIPOTESIS 04 - EMPUJE REPOSO DE SOBRECARGA MOVIL EN UN HASTIAL



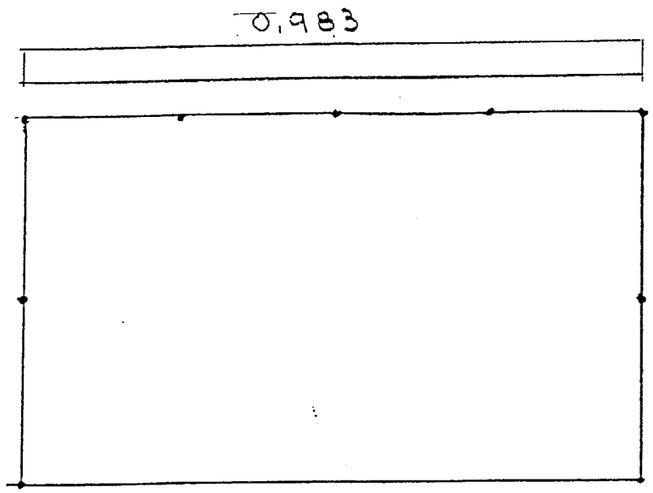
HIPOTESIS 05 - SOBRECARGA TREN TIPO A. RENFE EN UN LATERAL DEL VANO



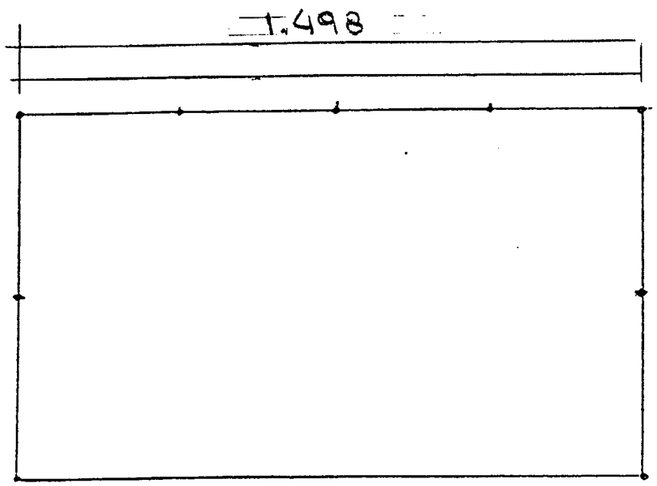
HIPOTESIS 06 - SOBRECARGA TREN TIPO A. RENFE EN EL CENTRO DEL VANO



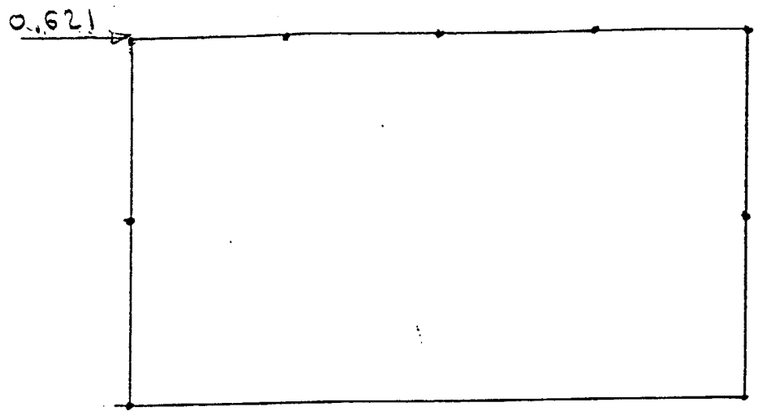
HIPOTESIS 07 - SOBRECARGA TREN TIPO A. RENFE EN EL OTRO LATERAL



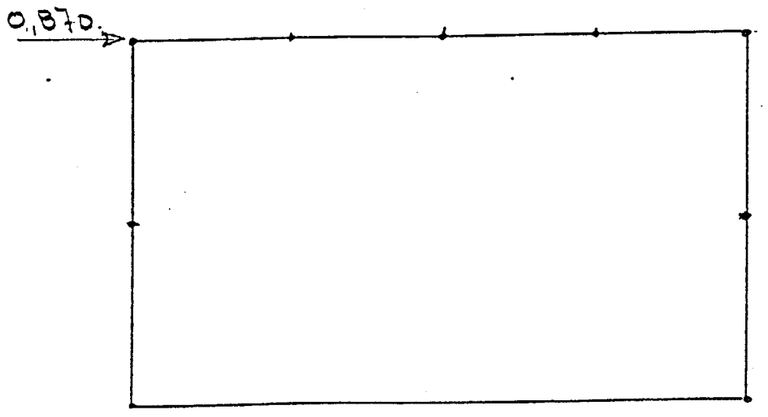
HIPOTESIS 08 - SOBRECARGA TREN TIPO B. RENFE



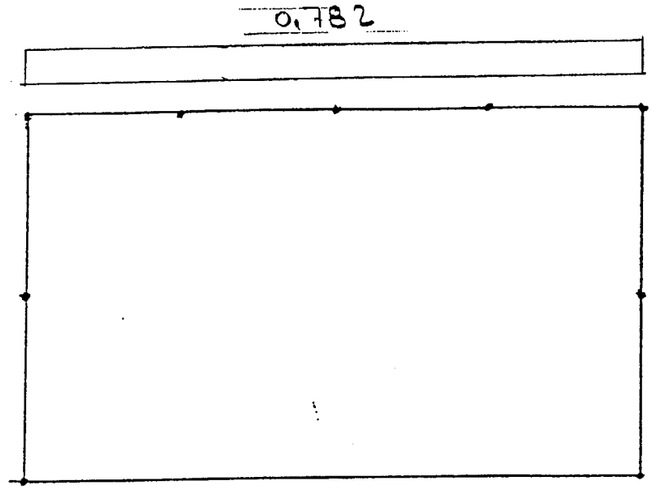
HIPOTESIS 09 - FRENADO TREN TIPO A. RENFE



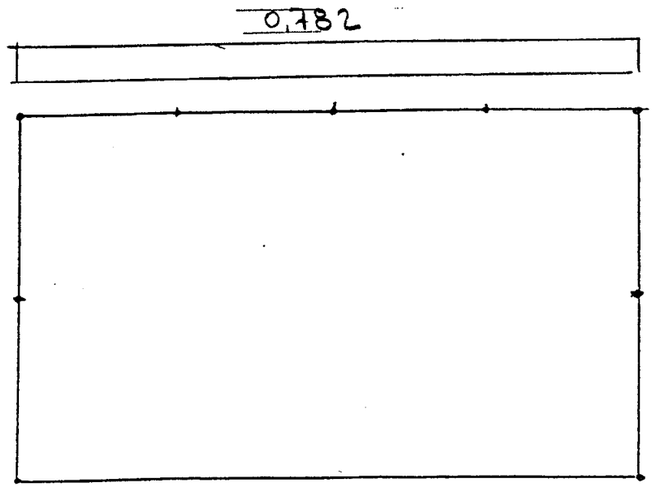
HIPOTESIS 10 - FRENADO TREN TIPO B. RENFE



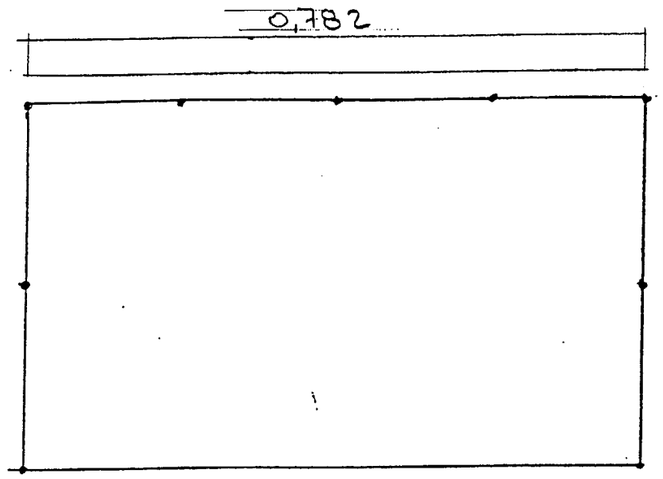
HIPOTESIS 11 - SOBRECARGA TREN UIC MODELO 1971 EN UN LATERAL DEL VANO



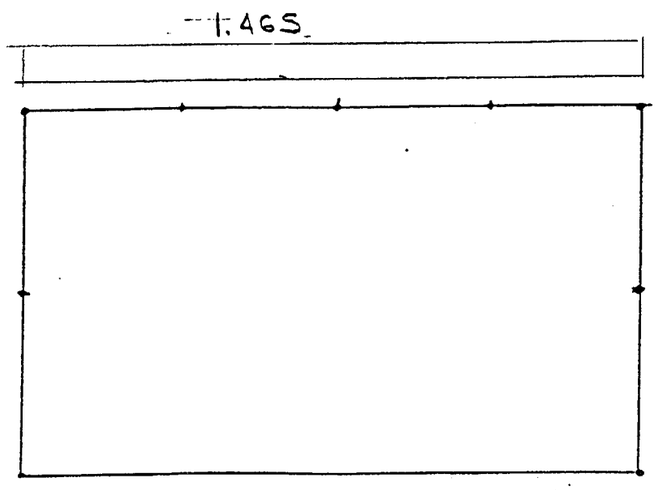
HIPOTESIS 12 - SOBRECARGA TREN UIC MODELO 1971 EN EL CENTRO DEL VANO



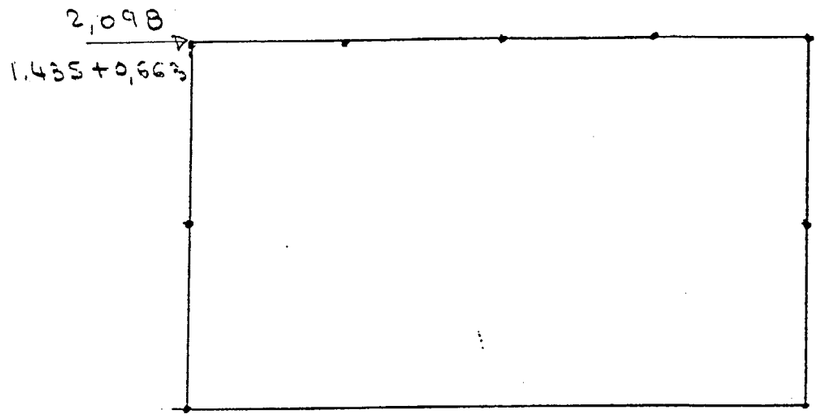
HIPOTESIS 13 - SOBRECARGA TREN UIC MODELO 1971 EN EL OTRO LATERAL



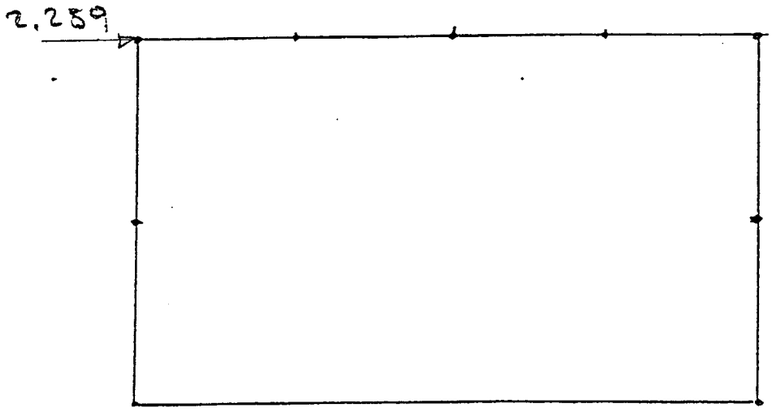
HIPOTESIS 14 - SOBRECARGA TREN UIC MODELO SW/2



HIPOTESIS 15 - FRENADO TREN UIC MODELO 1971



HIPOTESIS 16 - FRENADO TREN UIC MODELO SW/2



ESTRUCTURA PLANA P.I. ESTRUCTURA E-11 ZONAS LATERALES

NUMERO DE BARRAS 29

NUMERO DE NUDOS 29

ANCHO DE BANDA DE LA MATRIZ DE RIGIDEZ 69

NUMERO DE HIPOTESIS 16

STRESS PLANO . DATOS DE ENTRADA P.I. ESTRUCTURA E-11 ZONAS LATERALES

NUDO	COORDENADAS X	Y	NUDO LIBRE	LIBERTADES δx	δy	oz	TOTAL	ORDEN EN K RIGDZ
1	0.0000	0.0000	0	0	1	1	2	0
2	0.0000	3.5000	1	1	1	1	3	2
3	0.0000	7.0000	1	1	1	1	3	5
4	2.4375	7.0000	1	1	1	1	3	8
5	4.8750	7.0000	1	1	1	1	3	11
6	7.3125	7.0000	1	1	1	1	3	14
7	9.7500	0.0000	1	1	1	1	3	17
8	9.7500	3.5000	1	1	1	1	3	20
9	9.7500	7.0000	1	1	1	1	3	23
10	0.9750	0.0000	1	1	1	1	3	26
11	1.9500	0.0000	1	1	1	1	3	29
12	2.9250	0.0000	1	1	1	1	3	32
13	3.9000	0.0000	1	1	1	1	3	35
14	4.8750	0.0000	1	1	1	1	3	38
15	5.8500	0.0000	1	1	1	1	3	41
16	6.8250	0.0000	1	1	1	1	3	44
17	7.8000	0.0000	1	1	1	1	3	47
18	8.7750	0.0000	1	1	1	1	3	50
19	0.0000	-4.5820	0	1	0	1	2	53
20	0.9750	-4.5820	0	1	0	1	2	55
21	1.9500	-4.5820	0	1	0	1	2	57
22	2.9250	-4.5820	0	1	0	1	2	59
23	3.9000	-4.5820	0	1	0	1	2	61
24	4.8750	-4.5820	0	1	0	1	2	63
25	5.8500	-4.5820	0	1	0	1	2	65
26	6.8250	-4.5820	0	1	0	1	2	67
27	7.8000	-4.5820	0	1	0	1	2	69
28	8.7750	-4.5820	0	1	0	1	2	71
29	9.7500	-4.5820	0	1	0	1	2	73

MODULO DE ELASTICIDAD DEL HORMIGON O ACERO.... 3207500

BARRA	NUDOS I	J	SECCIONES Ax	Ay	INERCIA IZ	LONGITUD MTS
1	1	2	0.75000	0.75000	0.035156000	3.500
2	2	3	0.75000	0.75000	0.035156000	3.500
3	3	4	0.75000	0.75000	0.035156000	2.438
4	4	5	0.75000	0.75000	0.035156000	2.438
5	5	6	0.75000	0.75000	0.035156000	2.438
6	6	9	0.75000	0.75000	0.035156000	2.438
7	7	8	0.75000	0.75000	0.035156000	3.500
8	8	9	0.75000	0.75000	0.035156000	3.500
9	1	10	0.75000	0.75000	0.035156000	0.975
10	10	11	0.75000	0.75000	0.035156000	0.975

ESTRUCTURA PLANA P.I. ESTRUCTURA E-11 ZONAS LATERALES

BARRA	NUDOS I	J	SECCIONES Ax	Ay	INERCIA IZ	LONGITUD MTS
11	11	12	0.75000	0.75000	0.035156000	0.975
12	12	13	0.75000	0.75000	0.035156000	0.975
13	13	14	0.75000	0.75000	0.035156000	0.975
14	14	15	0.75000	0.75000	0.035156000	0.975
15	15	16	0.75000	0.75000	0.035156000	0.975
16	16	17	0.75000	0.75000	0.035156000	0.975
17	17	18	0.75000	0.75000	0.035156000	0.975
18	7	18	0.75000	0.75000	0.035156000	0.975
19	1	19	0.00244	0.00244	0.000001000	4.582
20	10	20	0.00488	0.00488	0.000001000	4.582
21	11	21	0.00488	0.00488	0.000001000	4.582
22	12	22	0.00488	0.00488	0.000001000	4.582
23	13	23	0.00488	0.00488	0.000001000	4.582
24	14	24	0.00488	0.00488	0.000001000	4.582
25	15	25	0.00488	0.00488	0.000001000	4.582
26	16	26	0.00488	0.00488	0.000001000	4.582
27	17	27	0.00488	0.00488	0.000001000	4.582
28	18	28	0.00488	0.00488	0.000001000	4.582
29	7	29	0.00244	0.00244	0.000001000	4.582

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 1

CARGAS EN NUDOS ..

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-6.563	0.000
2	0.000	-6.563	0.000
7	0.000	-6.563	0.000
8	0.000	-6.563	0.000

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	12.42
4	CARGA UNIFORME	QY	12.42
5	CARGA UNIFORME	QY	12.42
6	CARGA UNIFORME	QY	12.42

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 2

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS		
1	CARGA UNIFORME	QY	3.03		
2	CARGA UNIFORME	QY	3.03		
7	CARGA UNIFORME	QY	-3.03		
8	CARGA UNIFORME	QY	-3.03		
2	TRIANGULAR M m	PY	1.80 A	0.000 A1	3.500
1	CARGA UNIFORME	QY	1.80		
1	TRIANGULAR M m	PY	1.80 A	0.000 A1	3.500
8	TRIANGULAR M m	PY	-1.80 A	0.000 A1	3.500
7	CARGA UNIFORME	QY	-1.80		
7	TRIANGULAR M m	PY	-1.80 A	0.000 A1	3.500

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 3

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS		
1	CARGA UNIFORME	QY	4.82		
2	CARGA UNIFORME	QY	4.82		
7	CARGA UNIFORME	QY	-4.82		
8	CARGA UNIFORME	QY	-4.82		
2	TRIANGULAR M m	PY	2.86 A	0.000 A1	3.500
1	CARGA UNIFORME	QY	2.86		
1	TRIANGULAR M m	PY	2.86 A	0.000 A1	3.500
8	TRIANGULAR M m	PY	-2.86 A	0.000 A1	3.500
7	CARGA UNIFORME	QY	-2.86		
7	TRIANGULAR M m	PY	-2.86 A	0.000 A1	3.500

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 4

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
1	CARGA UNIFORME	QY	1.29
2	CARGA UNIFORME	QY	1.29

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 5

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	0.98
4	CARGA UNIFORME	QY	0.98
5	CARGA UNIFORME	QY	0.98
6	CARGA UNIFORME	QY	0.98

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 6

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	0.98
4	CARGA UNIFORME	QY	0.98
5	CARGA UNIFORME	QY	0.98
6	CARGA UNIFORME	QY	0.98

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 7

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	0.98
4	CARGA UNIFORME	QY	0.98
5	CARGA UNIFORME	QY	0.98
6	CARGA UNIFORME	QY	0.98

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 8

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	1.50
4	CARGA UNIFORME	QY	1.50
5	CARGA UNIFORME	QY	1.50
6	CARGA UNIFORME	QY	1.50

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 9

CARGAS EN NUDOS ..

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
3	0.621	0.000	0.000

CARGAS EN BARRAS ..

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 10

CARGAS EN NUDOS ..

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
3	0.870	0.000	0.000

CARGAS EN BARRAS ..

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 11

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	0.78
4	CARGA UNIFORME	QY	0.78
5	CARGA UNIFORME	QY	0.78
6	CARGA UNIFORME	QY	0.78

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 12

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	0.78
4	CARGA UNIFORME	QY	0.78
5	CARGA UNIFORME	QY	0.78
6	CARGA UNIFORME	QY	0.78

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 13

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	0.78
4	CARGA UNIFORME	QY	0.78
5	CARGA UNIFORME	QY	0.78
6	CARGA UNIFORME	QY	0.78

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 14

CARGAS EN BARRAS ..

BARRA	TIPO DE CARGA		CARGAS
3	CARGA UNIFORME	QY	1.47
4	CARGA UNIFORME	QY	1.47
5	CARGA UNIFORME	QY	1.47
6	CARGA UNIFORME	QY	1.47

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 15

CARGAS EN NUDOS ..

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
3	2.098	0.000	0.000

CARGAS EN BARRAS ..

CALCULO EN ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

HIPOTESIS 16

CARGAS EN NUDOS ..

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
3	2.289	0.000	0.000

CARGAS EN BARRAS ..

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

SALIDA DE DATOS - DESPLAZAMIENTOS

DESPLAZAMIENTO DE NUDOS HIPOTESIS 1

NUDO	@X	@Y	0Z
1	0.00000	-0.00829	0.00169
2	-0.00301	-0.00839	0.00001
3	0.00000	-0.00848	-0.00175
4	0.00000	-0.01324	-0.00167
5	0.00000	-0.01547	-0.00000
6	0.00000	-0.01324	0.00167
7	0.00000	-0.00829	-0.00169
8	0.00301	-0.00839	-0.00001
9	0.00000	-0.00848	0.00175
10	0.00000	-0.00645	0.00190
11	0.00000	-0.00463	0.00169
12	0.00000	-0.00317	0.00124
13	0.00000	-0.00223	0.00065
14	0.00000	-0.00191	-0.00000
15	0.00000	-0.00223	-0.00065
16	0.00000	-0.00317	-0.00124
17	0.00000	-0.00463	-0.00169
18	0.00000	-0.00645	-0.00190
19	0.00775	0.00000	0.00169
20	0.00869	0.00000	0.00190
21	0.00776	0.00000	0.00169
22	0.00568	0.00000	0.00124
23	0.00298	0.00000	0.00065
24	0.00000	0.00000	-0.00000
25	-0.00297	0.00000	-0.00065
26	-0.00568	0.00000	-0.00124
27	-0.00775	0.00000	-0.00169
28	-0.00868	0.00000	-0.00190
29	-0.00774	0.00000	-0.00169

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

DESPLAZAMIENTO DE NUDOS HIPOTESIS 2

NUDO	@X	@Y	0Z
1	0.00000	0.00048	-0.00033
2	0.00087	0.00048	0.00001
3	-0.00001	0.00048	0.00033
4	-0.00002	0.00108	0.00017
5	-0.00004	0.00128	0.00000
6	-0.00005	0.00108	-0.00017
7	-0.00008	0.00048	0.00033
8	-0.00095	0.00048	-0.00001
9	-0.00007	0.00048	-0.00033
10	-0.00001	0.00020	-0.00024
11	-0.00002	0.00000	-0.00017
12	-0.00002	-0.00013	-0.00010
13	-0.00003	-0.00020	-0.00005
14	-0.00004	-0.00022	0.00000
15	-0.00005	-0.00020	0.00005
16	-0.00005	-0.00013	0.00010
17	-0.00006	0.00000	0.00017
18	-0.00007	0.00020	0.00024
19	-0.00151	0.00000	-0.00033
20	-0.00112	0.00000	-0.00024
21	-0.00078	0.00000	-0.00017
22	-0.00049	0.00000	-0.00010
23	-0.00025	0.00000	-0.00005
24	-0.00004	0.00000	0.00000
25	0.00017	0.00000	0.00005
26	0.00041	0.00000	0.00010
27	0.00070	0.00000	0.00017
28	0.00104	0.00000	0.00024
29	0.00143	0.00000	0.00033

DESPLAZAMIENTO DE NUDOS HIPOTESIS 3

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00076	-0.00053
2	0.00139	0.00076	0.00001
3	-0.00002	0.00076	0.00053
4	-0.00004	0.00172	0.00026
5	-0.00006	0.00204	0.00000
6	-0.00009	0.00172	-0.00026
7	-0.00013	0.00076	0.00053
8	-0.00151	0.00076	-0.00001
9	-0.00011	0.00076	-0.00053
10	-0.00001	0.00031	-0.00039
11	-0.00003	0.00000	-0.00026
12	-0.00004	-0.00020	-0.00016
13	-0.00005	-0.00032	-0.00008
14	-0.00006	-0.00035	0.00000
15	-0.00008	-0.00032	0.00008
16	-0.00009	-0.00020	0.00016
17	-0.00010	0.00000	0.00026
18	-0.00011	0.00031	0.00039
19	-0.00241	0.00000	-0.00053
20	-0.00179	0.00000	-0.00039
21	-0.00124	0.00000	-0.00026
22	-0.00078	0.00000	-0.00016
23	-0.00040	0.00000	-0.00008
24	-0.00006	0.00000	0.00000
25	0.00027	0.00000	0.00008
26	0.00065	0.00000	0.00016
27	0.00111	0.00000	0.00026
28	0.00166	0.00000	0.00039
29	0.00228	0.00000	0.00053

DESPLAZAMIENTO DE NUDOS HIPOTESIS 4

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00079	-0.00036
2	0.00151	0.00079	-0.00041
3	0.00257	0.00079	-0.00020
4	0.00257	0.00043	-0.00012
5	0.00257	0.00017	-0.00010
6	0.00257	-0.00014	-0.00016
7	0.00001	-0.00067	-0.00028
8	0.00128	-0.00067	-0.00040
9	0.00257	-0.00067	-0.00029
10	0.00000	0.00048	-0.00027
11	0.00000	0.00026	-0.00019
12	0.00000	0.00012	-0.00012
13	0.00000	0.00003	-0.00007
14	0.00000	-0.00003	-0.00005
15	0.00001	-0.00008	-0.00006
16	0.00001	-0.00015	-0.00009
17	0.00001	-0.00026	-0.00014
18	0.00001	-0.00043	-0.00021
19	-0.00167	0.00000	-0.00036
20	-0.00124	0.00000	-0.00027
21	-0.00085	0.00000	-0.00019
22	-0.00054	0.00000	-0.00012
23	-0.00034	0.00000	-0.00007
24	-0.00025	0.00000	-0.00005
25	-0.00028	0.00000	-0.00006
26	-0.00041	0.00000	-0.00009
27	-0.00064	0.00000	-0.00014
28	-0.00094	0.00000	-0.00021
29	-0.00126	0.00000	-0.00028

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

DESPLAZAMIENTO DE NUDOS HIPOTESIS 5

NUDO	@X	@Y	OZ
1	0.00000	-0.00055	0.00012
2	-0.00022	-0.00056	0.00000
3	0.00000	-0.00056	-0.00013
4	0.00000	-0.00093	-0.00013
5	0.00000	-0.00110	-0.00000
6	0.00000	-0.00093	0.00013
7	0.00000	-0.00055	-0.00012
8	0.00022	-0.00056	-0.00000
9	0.00000	-0.00056	0.00013
10	0.00000	-0.00042	0.00013
11	0.00000	-0.00030	0.00011
12	0.00000	-0.00020	0.00008
13	0.00000	-0.00014	0.00004
14	0.00000	-0.00012	-0.00000
15	0.00000	-0.00014	-0.00004
16	0.00000	-0.00020	-0.00008
17	0.00000	-0.00030	-0.00011
18	0.00000	-0.00042	-0.00013
19	0.00053	0.00000	0.00012
20	0.00059	0.00000	0.00013
21	0.00052	0.00000	0.00011
22	0.00038	0.00000	0.00008
23	0.00020	0.00000	0.00004
24	0.00000	0.00000	-0.00000
25	-0.00020	0.00000	-0.00004
26	-0.00038	0.00000	-0.00008
27	-0.00052	0.00000	-0.00011
28	-0.00058	0.00000	-0.00013
29	-0.00053	0.00000	-0.00012

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

DESPLAZAMIENTO DE NUDOS HIPOTESIS 6

NUDO	@X	@Y	OZ
1	0.00000	-0.00055	0.00012
2	-0.00022	-0.00056	0.00000
3	0.00000	-0.00056	-0.00013
4	0.00000	-0.00093	-0.00013
5	0.00000	-0.00110	-0.00000
6	0.00000	-0.00093	0.00013
7	0.00000	-0.00055	-0.00012
8	0.00022	-0.00056	-0.00000
9	0.00000	-0.00056	0.00013
10	0.00000	-0.00042	0.00013
11	0.00000	-0.00030	0.00011
12	0.00000	-0.00020	0.00008
13	0.00000	-0.00014	0.00004
14	0.00000	-0.00012	-0.00000
15	0.00000	-0.00014	-0.00004
16	0.00000	-0.00020	-0.00008
17	0.00000	-0.00030	-0.00011
18	0.00000	-0.00042	-0.00013
19	0.00053	0.00000	0.00012
20	0.00059	0.00000	0.00013
21	0.00052	0.00000	0.00011
22	0.00038	0.00000	0.00008
23	0.00020	0.00000	0.00004
24	0.00000	0.00000	-0.00000
25	-0.00020	0.00000	-0.00004
26	-0.00038	0.00000	-0.00008
27	-0.00052	0.00000	-0.00011
28	-0.00058	0.00000	-0.00013
29	-0.00053	0.00000	-0.00012

DESPLAZAMIENTO DE NUDOS HIPOTESIS 7

NUDO	@X	@Y	0Z
1	0.00000	-0.00055	0.00012
2	-0.00022	-0.00056	0.00000
3	0.00000	-0.00056	-0.00013
4	0.00000	-0.00093	-0.00013
5	0.00000	-0.00110	-0.00000
6	0.00000	-0.00093	0.00013
7	0.00000	-0.00055	-0.00012
8	0.00022	-0.00056	-0.00000
9	0.00000	-0.00056	0.00013
10	0.00000	-0.00042	0.00013
11	0.00000	-0.00030	0.00011
12	0.00000	-0.00020	0.00008
13	0.00000	-0.00014	0.00004
14	0.00000	-0.00012	-0.00000
15	0.00000	-0.00014	-0.00004
16	0.00000	-0.00020	-0.00008
17	0.00000	-0.00030	-0.00011
18	0.00000	-0.00042	-0.00013
19	0.00053	0.00000	0.00012
20	0.00059	0.00000	0.00013
21	0.00052	0.00000	0.00011
22	0.00038	0.00000	0.00008
23	0.00020	0.00000	0.00004
24	0.00000	0.00000	-0.00000
25	-0.00020	0.00000	-0.00004
26	-0.00038	0.00000	-0.00008
27	-0.00052	0.00000	-0.00011
28	-0.00058	0.00000	-0.00013
29	-0.00053	0.00000	-0.00012

DESPLAZAMIENTO DE NUDOS HIPOTESIS 8

NUDO	@X	@Y	0Z
1	0.00000	-0.00084	0.00018
2	-0.00033	-0.00085	0.00001
3	0.00000	-0.00086	-0.00020
4	0.00000	-0.00141	-0.00020
5	0.00000	-0.00168	-0.00000
6	0.00000	-0.00141	0.00020
7	0.00000	-0.00084	-0.00018
8	0.00033	-0.00085	-0.00001
9	0.00000	-0.00086	0.00020
10	0.00000	-0.00064	0.00019
11	0.00000	-0.00046	0.00017
12	0.00000	-0.00031	0.00013
13	0.00000	-0.00022	0.00007
14	0.00000	-0.00018	-0.00000
15	0.00000	-0.00022	-0.00007
16	0.00000	-0.00031	-0.00013
17	0.00000	-0.00046	-0.00017
18	0.00000	-0.00064	-0.00019
19	0.00081	0.00000	0.00018
20	0.00089	0.00000	0.00019
21	0.00079	0.00000	0.00017
22	0.00058	0.00000	0.00013
23	0.00030	0.00000	0.00007
24	0.00000	0.00000	-0.00000
25	-0.00030	0.00000	-0.00007
26	-0.00057	0.00000	-0.00013
27	-0.00079	0.00000	-0.00017
28	-0.00089	0.00000	-0.00019
29	-0.00081	0.00000	-0.00018

DESPLAZAMIENTO DE NUDOS HIPOTESIS 9

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00010	-0.00004
2	0.00018	0.00010	-0.00006
3	0.00035	0.00010	-0.00004
4	0.00035	0.00003	-0.00002
5	0.00035	-0.00000	-0.00001
6	0.00035	-0.00003	-0.00002
7	0.00000	-0.00010	-0.00004
8	0.00018	-0.00010	-0.00005
9	0.00035	-0.00010	-0.00004
10	0.00000	0.00006	-0.00003
11	0.00000	0.00004	-0.00002
12	0.00000	0.00002	-0.00001
13	0.00000	0.00001	-0.00001
14	0.00000	-0.00000	-0.00001
15	0.00000	-0.00001	-0.00001
16	0.00000	-0.00002	-0.00001
17	0.00000	-0.00004	-0.00002
18	0.00000	-0.00006	-0.00003
19	-0.00018	0.00000	-0.00004
20	-0.00014	0.00000	-0.00003
21	-0.00010	0.00000	-0.00002
22	-0.00007	0.00000	-0.00001
23	-0.00005	0.00000	-0.00001
24	-0.00004	0.00000	-0.00001
25	-0.00005	0.00000	-0.00001
26	-0.00007	0.00000	-0.00001
27	-0.00010	0.00000	-0.00002
28	-0.00014	0.00000	-0.00003
29	-0.00018	0.00000	-0.00004

DESPLAZAMIENTO DE NUDOS HIPOTESIS 10

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00014	-0.00006
2	0.00025	0.00014	-0.00008
3	0.00049	0.00014	-0.00005
4	0.00049	0.00005	-0.00003
5	0.00049	-0.00000	-0.00002
6	0.00049	-0.00005	-0.00003
7	0.00000	-0.00014	-0.00006
8	0.00025	-0.00014	-0.00008
9	0.00049	-0.00014	-0.00005
10	0.00000	0.00009	-0.00004
11	0.00000	0.00005	-0.00003
12	0.00000	0.00003	-0.00002
13	0.00000	0.00001	-0.00001
14	0.00000	-0.00000	-0.00001
15	0.00000	-0.00001	-0.00001
16	0.00000	-0.00003	-0.00002
17	0.00000	-0.00005	-0.00003
18	0.00000	-0.00009	-0.00004
19	-0.00026	0.00000	-0.00006
20	-0.00020	0.00000	-0.00004
21	-0.00014	0.00000	-0.00003
22	-0.00009	0.00000	-0.00002
23	-0.00006	0.00000	-0.00001
24	-0.00005	0.00000	-0.00001
25	-0.00006	0.00000	-0.00001
26	-0.00009	0.00000	-0.00002
27	-0.00014	0.00000	-0.00003
28	-0.00019	0.00000	-0.00004
29	-0.00025	0.00000	-0.00006

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

DESPLAZAMIENTO DE NUDOS HIPOTESIS 11

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.00044	0.00009
2	-0.00017	-0.00044	0.00000
3	0.00000	-0.00045	-0.00010
4	0.00000	-0.00074	-0.00010
5	0.00000	-0.00088	-0.00000
6	0.00000	-0.00074	0.00010
7	0.00000	-0.00044	-0.00009
8	0.00017	-0.00044	-0.00000
9	0.00000	-0.00045	0.00010
10	0.00000	-0.00034	0.00010
11	0.00000	-0.00024	0.00009
12	0.00000	-0.00016	0.00007
13	0.00000	-0.00011	0.00003
14	0.00000	-0.00010	-0.00000
15	0.00000	-0.00011	-0.00003
16	0.00000	-0.00016	-0.00007
17	0.00000	-0.00024	-0.00009
18	0.00000	-0.00034	-0.00010
19	0.00042	0.00000	0.00009
20	0.00047	0.00000	0.00010
21	0.00041	0.00000	0.00009
22	0.00030	0.00000	0.00007
23	0.00016	0.00000	0.00003
24	0.00000	0.00000	-0.00000
25	-0.00016	0.00000	-0.00003
26	-0.00030	0.00000	-0.00007
27	-0.00041	0.00000	-0.00009
28	-0.00046	0.00000	-0.00010
29	-0.00042	0.00000	-0.00009

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

DESPLAZAMIENTO DE NUDOS HIPOTESIS 12

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.00044	0.00009
2	-0.00017	-0.00044	0.00000
3	0.00000	-0.00045	-0.00010
4	0.00000	-0.00074	-0.00010
5	0.00000	-0.00088	-0.00000
6	0.00000	-0.00074	0.00010
7	0.00000	-0.00044	-0.00009
8	0.00017	-0.00044	-0.00000
9	0.00000	-0.00045	0.00010
10	0.00000	-0.00034	0.00010
11	0.00000	-0.00024	0.00009
12	0.00000	-0.00016	0.00007
13	0.00000	-0.00011	0.00003
14	0.00000	-0.00010	-0.00000
15	0.00000	-0.00011	-0.00003
16	0.00000	-0.00016	-0.00007
17	0.00000	-0.00024	-0.00009
18	0.00000	-0.00034	-0.00010
19	0.00042	0.00000	0.00009
20	0.00047	0.00000	0.00010
21	0.00041	0.00000	0.00009
22	0.00030	0.00000	0.00007
23	0.00016	0.00000	0.00003
24	0.00000	0.00000	-0.00000
25	-0.00016	0.00000	-0.00003
26	-0.00030	0.00000	-0.00007
27	-0.00041	0.00000	-0.00009
28	-0.00046	0.00000	-0.00010
29	-0.00042	0.00000	-0.00009

DESPLAZAMIENTO DE NUDOS HIPOTESIS 13

NUDO	@X	@Y	OZ
1	0.00000	-0.00044	0.00009
2	-0.00017	-0.00044	0.00000
3	0.00000	-0.00045	-0.00010
4	0.00000	-0.00074	-0.00010
5	0.00000	-0.00088	-0.00000
6	0.00000	-0.00074	0.00010
7	0.00000	-0.00044	-0.00009
8	0.00017	-0.00044	-0.00000
9	0.00000	-0.00045	0.00010
10	0.00000	-0.00034	0.00010
11	0.00000	-0.00024	0.00009
12	0.00000	-0.00016	0.00007
13	0.00000	-0.00011	0.00003
14	0.00000	-0.00010	-0.00000
15	0.00000	-0.00011	-0.00003
16	0.00000	-0.00016	-0.00007
17	0.00000	-0.00024	-0.00009
18	0.00000	-0.00034	-0.00010
19	0.00042	0.00000	0.00009
20	0.00047	0.00000	0.00010
21	0.00041	0.00000	0.00009
22	0.00030	0.00000	0.00007
23	0.00016	0.00000	0.00003
24	0.00000	0.00000	-0.00000
25	-0.00016	0.00000	-0.00003
26	-0.00030	0.00000	-0.00007
27	-0.00041	0.00000	-0.00009
28	-0.00046	0.00000	-0.00010
29	-0.00042	0.00000	-0.00009

DESPLAZAMIENTO DE NUDOS HIPOTESIS 14

NUDO	@X	@Y	OZ
1	0.00000	-0.00082	0.00017
2	-0.00032	-0.00083	0.00001
3	0.00000	-0.00084	-0.00020
4	0.00000	-0.00138	-0.00019
5	0.00000	-0.00164	-0.00000
6	0.00000	-0.00138	0.00019
7	0.00000	-0.00082	-0.00017
8	0.00032	-0.00083	-0.00001
9	0.00000	-0.00084	0.00020
10	0.00000	-0.00063	0.00019
11	0.00000	-0.00045	0.00017
12	0.00000	-0.00030	0.00012
13	0.00000	-0.00021	0.00006
14	0.00000	-0.00018	-0.00000
15	0.00000	-0.00021	-0.00006
16	0.00000	-0.00030	-0.00012
17	0.00000	-0.00045	-0.00017
18	0.00000	-0.00063	-0.00019
19	0.00079	0.00000	0.00017
20	0.00087	0.00000	0.00019
21	0.00077	0.00000	0.00017
22	0.00056	0.00000	0.00012
23	0.00029	0.00000	0.00006
24	0.00000	0.00000	-0.00000
25	-0.00029	0.00000	-0.00006
26	-0.00056	0.00000	-0.00012
27	-0.00077	0.00000	-0.00017
28	-0.00087	0.00000	-0.00019
29	-0.00079	0.00000	-0.00017

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

DESPLAZAMIENTO DE NUDOS HIPOTESIS 15

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00033	-0.00014
2	0.00060	0.00033	-0.00019
3	0.00118	0.00033	-0.00012
4	0.00118	0.00011	-0.00006
5	0.00118	-0.00000	-0.00004
6	0.00118	-0.00011	-0.00006
7	0.00000	-0.00033	-0.00013
8	0.00060	-0.00033	-0.00019
9	0.00118	-0.00033	-0.00012
10	0.00000	0.00021	-0.00010
11	0.00000	0.00013	-0.00007
12	0.00000	0.00007	-0.00005
13	0.00000	0.00003	-0.00003
14	0.00000	-0.00000	-0.00003
15	0.00000	-0.00003	-0.00003
16	0.00000	-0.00007	-0.00005
17	0.00000	-0.00013	-0.00007
18	0.00000	-0.00021	-0.00010
19	-0.00062	0.00000	-0.00014
20	-0.00048	0.00000	-0.00010
21	-0.00034	0.00000	-0.00007
22	-0.00023	0.00000	-0.00005
23	-0.00015	0.00000	-0.00003
24	-0.00013	0.00000	-0.00003
25	-0.00015	0.00000	-0.00003
26	-0.00022	0.00000	-0.00005
27	-0.00033	0.00000	-0.00007
28	-0.00047	0.00000	-0.00010
29	-0.00061	0.00000	-0.00013

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

DESPLAZAMIENTO DE NUDOS HIPOTESIS 16

NUDO	∂X	∂Y	∂Z
1	0.00000	0.00036	-0.00015
2	0.00066	0.00036	-0.00020
3	0.00129	0.00036	-0.00014
4	0.00129	0.00012	-0.00007
5	0.00129	-0.00000	-0.00004
6	0.00129	-0.00013	-0.00007
7	0.00000	-0.00036	-0.00015
8	0.00066	-0.00036	-0.00020
9	0.00129	-0.00036	-0.00013
10	0.00000	0.00023	-0.00011
11	0.00000	0.00014	-0.00008
12	0.00000	0.00007	-0.00005
13	0.00000	0.00003	-0.00004
14	0.00000	-0.00000	-0.00003
15	0.00000	-0.00003	-0.00004
16	0.00000	-0.00007	-0.00005
17	0.00000	-0.00014	-0.00008
18	0.00000	-0.00023	-0.00011
19	-0.00068	0.00000	-0.00015
20	-0.00052	0.00000	-0.00011
21	-0.00037	0.00000	-0.00008
22	-0.00025	0.00000	-0.00005
23	-0.00017	0.00000	-0.00004
24	-0.00014	0.00000	-0.00003
25	-0.00017	0.00000	-0.00004
26	-0.00024	0.00000	-0.00005
27	-0.00036	0.00000	-0.00008
28	-0.00051	0.00000	-0.00011
29	-0.00067	0.00000	-0.00015

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS

1

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	67.091	0.741	-52.771	2	-67.091	-0.741	55.366
2	2	60.528	0.741	-55.366	3	-60.528	-0.741	57.960
3	3	0.741	-60.528	-57.960	4	-0.741	30.264	-52.692
4	4	0.741	-30.264	52.692	5	-0.741	-0.000	-89.577
5	5	0.741	-0.000	89.577	6	-0.741	-30.264	-52.692
6	6	0.741	30.264	52.692	9	-0.741	-60.528	57.960
7	7	67.091	-0.741	52.771	8	-67.091	0.741	-55.366
8	8	60.528	-0.741	55.366	9	-60.528	0.741	-57.960
9	1	-0.741	59.500	52.771	10	0.741	-59.500	5.241
10	10	-0.741	37.501	-5.241	11	0.741	-37.501	41.805
11	11	-0.741	21.684	-41.805	12	0.741	-21.684	62.947
12	12	-0.741	10.868	-62.947	13	0.741	-10.868	73.543
13	13	-0.741	3.256	-73.543	14	0.741	-3.256	76.717
14	14	-0.741	-3.256	-76.717	15	0.741	3.256	73.543
15	15	-0.741	-10.868	-73.543	16	0.741	10.868	62.947
16	16	-0.741	-21.684	-62.947	17	0.741	21.684	41.805
17	17	-0.741	-37.501	-41.805	18	0.741	37.501	5.241
18	7	-0.741	-59.500	-52.771	18	0.741	59.500	-5.241
19	1	14.154	-0.000	0.000	19	-14.154	0.000	0.000
20	10	21.999	0.000	0.000	20	-21.999	-0.000	0.000
21	11	15.817	0.000	0.000	21	-15.817	-0.000	0.000
22	12	10.816	0.000	0.000	22	-10.816	-0.000	0.000
23	13	7.612	0.000	0.000	23	-7.612	-0.000	0.000
24	14	6.512	0.000	0.000	24	-6.512	-0.000	0.000
25	15	7.612	-0.000	-0.000	25	-7.612	0.000	-0.000
26	16	10.816	-0.000	-0.000	26	-10.816	0.000	-0.000
27	17	15.817	-0.000	-0.000	27	-15.817	0.000	-0.000
28	18	21.999	-0.000	-0.000	28	-21.999	0.000	-0.000
29	7	14.154	0.000	-0.000	29	-14.154	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 1

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-6.563	0.000
2	-0.000	-6.563	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-6.563	-0.000
8	0.000	-6.563	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	14.154	-0.000
20	0.000	21.999	-0.000
21	0.000	15.817	-0.000
22	0.000	10.816	-0.000
23	0.000	7.612	-0.000
24	0.000	6.512	-0.000
25	-0.000	7.612	0.000
26	-0.000	10.816	0.000
27	-0.000	15.817	0.000
28	-0.000	21.999	0.000
29	0.000	14.154	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS

2

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-0.000	-19.371	-10.424	2	0.000	-0.653	-20.499
2	2	0.000	0.653	20.499	3	-0.000	-14.393	7.666
3	3	14.393	-0.000	-7.666	4	-14.393	0.000	7.666
4	4	14.393	-0.000	-7.666	5	-14.393	0.000	7.666
5	5	14.393	0.000	-7.666	6	-14.393	-0.000	7.666
6	6	14.393	0.000	-7.666	9	-14.393	-0.000	7.666
7	7	0.000	19.371	10.424	8	-0.000	0.653	20.499
8	8	0.000	-0.653	-20.499	9	-0.000	14.393	-7.666
9	1	19.371	0.812	10.424	10	-19.371	-0.812	-9.633
10	10	19.371	1.486	9.633	11	-19.371	-1.486	-8.184
11	11	19.371	1.488	8.184	12	-19.371	-1.488	-6.733
12	12	19.371	1.054	6.733	13	-19.371	-1.054	-5.706
13	13	19.371	0.377	5.706	14	-19.371	-0.377	-5.338
14	14	19.371	-0.377	5.338	15	-19.371	0.377	-5.706
15	15	19.371	-1.054	5.706	16	-19.371	1.054	-6.733
16	16	19.371	-1.488	6.733	17	-19.371	1.488	-8.184
17	17	19.371	-1.486	8.184	18	-19.371	1.486	-9.633
18	7	19.371	-0.812	-10.424	18	-19.371	0.812	9.633
19	1	-0.812	0.000	-0.000	19	0.812	-0.000	-0.000
20	10	-0.674	-0.000	-0.000	20	0.674	0.000	-0.000
21	11	-0.002	-0.000	-0.000	21	0.002	0.000	-0.000
22	12	0.434	-0.000	-0.000	22	-0.434	0.000	-0.000
23	13	0.677	-0.000	-0.000	23	-0.677	0.000	-0.000
24	14	0.754	0.000	0.000	24	-0.754	-0.000	0.000
25	15	0.677	0.000	0.000	25	-0.677	-0.000	0.000
26	16	0.434	0.000	0.000	26	-0.434	-0.000	0.000
27	17	-0.002	0.000	0.000	27	0.002	-0.000	0.000
28	18	-0.674	0.000	0.000	28	0.674	-0.000	0.000
29	7	-0.812	-0.000	0.000	29	0.812	0.000	0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 2

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-0.000	0.000	-0.000
2	0.000	0.000	0.000
3	-0.000	0.000	-0.000
4	0.000	-0.000	-0.000
5	0.000	-0.000	0.000
6	-0.000	-0.000	0.000
7	0.000	0.000	0.000
8	-0.000	0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	0.000
15	-0.000	-0.000	0.000
16	-0.000	-0.000	0.000
17	-0.000	-0.000	0.000
18	-0.000	-0.000	0.000
19	0.000	-0.812	0.000
20	-0.000	-0.674	0.000
21	-0.000	-0.002	0.000
22	-0.000	0.434	0.000
23	-0.000	0.677	0.000
24	0.000	0.754	-0.000
25	0.000	0.677	-0.000
26	0.000	0.434	-0.000
27	0.000	-0.002	-0.000
28	0.000	-0.674	-0.000
29	-0.000	-0.812	-0.000

3

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-0.000	-30.852	-16.603	2	0.000	-1.040	-32.649
2	2	0.000	1.040	32.649	3	-0.000	-22.925	12.210
3	3	22.925	-0.000	-12.210	4	-22.925	0.000	12.210
4	4	22.925	-0.000	-12.210	5	-22.925	0.000	12.210
5	5	22.925	0.000	-12.210	6	-22.925	-0.000	12.210
6	6	22.925	0.000	-12.210	9	-22.925	-0.000	12.210
7	7	0.000	30.852	16.603	8	-0.000	1.040	32.649
8	8	-0.000	-1.040	-32.649	9	0.000	22.925	-12.210
9	1	30.852	1.293	16.603	10	-30.852	-1.293	-15.343
10	10	30.852	2.367	15.343	11	-30.852	-2.367	-13.035
11	11	30.852	2.370	13.035	12	-30.852	-2.370	-10.724
12	12	30.852	1.678	10.724	13	-30.852	-1.678	-9.088
13	13	30.852	0.601	9.088	14	-30.852	-0.601	-8.502
14	14	30.852	-0.601	8.502	15	-30.852	0.601	-9.088
15	15	30.852	-1.678	9.088	16	-30.852	1.678	-10.724
16	16	30.852	-2.370	10.724	17	-30.852	2.370	-13.035
17	17	30.852	-2.367	13.035	18	-30.852	2.367	-15.343
18	7	30.852	-1.293	-16.603	18	-30.852	1.293	15.343
19	1	-1.293	0.000	-0.000	19	1.293	-0.000	-0.000
20	10	-1.074	-0.000	-0.000	20	1.074	0.000	-0.000
21	11	-0.004	-0.000	-0.000	21	0.004	0.000	-0.000
22	12	0.692	-0.000	-0.000	22	-0.692	0.000	-0.000
23	13	1.078	-0.000	-0.000	23	-1.078	0.000	-0.000
24	14	1.201	0.000	0.000	24	-1.201	-0.000	0.000
25	15	1.078	0.000	0.000	25	-1.078	-0.000	0.000
26	16	0.692	0.000	0.000	26	-0.692	-0.000	0.000
27	17	-0.004	0.000	0.000	27	0.004	-0.000	0.000
28	18	-1.074	0.000	0.000	28	1.074	-0.000	0.000
29	7	-1.293	-0.000	0.000	29	1.293	0.000	0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 3

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-0.000	0.000	-0.000
2	0.000	0.000	0.000
3	-0.000	0.000	-0.000
4	0.000	-0.000	-0.000
5	0.000	-0.000	0.000
6	-0.000	-0.000	0.000
7	0.000	0.000	0.000
8	-0.000	-0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	-0.000
15	-0.000	-0.000	0.000
16	-0.000	-0.000	0.000
17	-0.000	-0.000	0.000
18	-0.000	-0.000	0.000
19	0.000	-1.293	0.000
20	-0.000	-1.074	0.000
21	-0.000	-0.004	0.000
22	-0.000	0.692	0.000
23	-0.000	1.078	0.000
24	0.000	1.201	-0.000
25	0.000	1.078	-0.000
26	0.000	0.692	-0.000
27	0.000	-0.004	-0.000
28	0.000	-1.074	-0.000
29	-0.000	-1.293	-0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS 4

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-1.329	-6.822	-10.704	2	1.329	2.307	-5.270
2	2	-1.329	-2.307	5.270	3	1.329	-2.208	-5.443
3	3	2.208	1.329	5.443	4	-2.208	-1.329	-2.203
4	4	2.208	1.329	2.203	5	-2.208	-1.329	1.036
5	5	2.208	1.329	-1.036	6	-2.208	-1.329	4.276
6	6	2.208	1.329	-4.276	9	-2.208	-1.329	7.515
7	7	1.329	-2.208	-7.943	8	-1.329	2.208	0.214
8	8	1.329	-2.208	-0.214	9	-1.329	2.208	-7.515
9	1	-2.208	0.021	10.704	10	2.208	-0.021	-10.684
10	10	-2.208	1.664	10.684	11	2.208	-1.664	-9.061
11	11	-2.208	2.557	9.061	12	2.208	-2.557	-6.569
12	12	-2.208	2.957	6.569	13	2.208	-2.957	-3.685
13	13	-2.208	3.055	3.685	14	2.208	-3.055	-0.707
14	14	-2.208	2.955	0.707	15	2.208	-2.955	2.174
15	15	-2.208	2.678	-2.174	16	2.208	-2.678	4.785
16	16	-2.208	2.162	-4.785	17	2.208	-2.162	6.893
17	17	-2.208	1.271	-6.893	18	2.208	-1.271	8.132
18	7	-2.208	-0.194	7.943	18	2.208	0.194	-8.132
19	1	-1.350	0.000	-0.000	19	1.350	-0.000	-0.000
20	10	-1.643	-0.000	-0.000	20	1.643	0.000	-0.000
21	11	-0.892	-0.000	-0.000	21	0.892	0.000	-0.000
22	12	-0.401	-0.000	-0.000	22	0.401	0.000	-0.000
23	13	-0.097	-0.000	-0.000	23	0.097	0.000	-0.000
24	14	0.100	-0.000	-0.000	24	-0.100	0.000	-0.000
25	15	0.277	-0.000	-0.000	25	-0.277	0.000	-0.000
26	16	0.516	-0.000	-0.000	26	-0.516	0.000	-0.000
27	17	0.892	-0.000	-0.000	27	-0.892	0.000	-0.000
28	18	1.465	-0.000	-0.000	28	-1.465	0.000	-0.000
29	7	1.135	0.000	-0.000	29	-1.135	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 4

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-9.030	0.000	-0.000
2	0.000	0.000	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	-0.000	0.000
6	-0.000	-0.000	0.000
7	-0.000	-0.000	-0.000
8	-0.000	0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	0.000	-0.000
19	0.000	-1.350	0.000
20	-0.000	-1.643	0.000
21	-0.000	-0.892	0.000
22	-0.000	-0.401	0.000
23	-0.000	-0.097	0.000
24	-0.000	0.100	0.000
25	-0.000	0.277	0.000
26	-0.000	0.516	0.000
27	-0.000	0.892	0.000
28	-0.000	1.465	0.000
29	0.000	1.135	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS

5

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	4.792	0.213	-3.248	2	-4.792	-0.213	3.992
2	2	4.792	0.213	-3.992	3	-4.792	-0.213	4.736
3	3	0.213	-4.792	-4.736	4	-0.213	2.396	-4.025
4	4	0.213	-2.396	4.025	5	-0.213	-0.000	-6.945
5	5	0.213	-0.000	6.945	6	-0.213	-2.396	-4.025
6	6	0.213	2.396	4.025	9	-0.213	-4.792	4.736
7	7	4.792	-0.213	3.248	8	-4.792	0.213	-3.992
8	8	4.792	-0.213	3.992	9	-4.792	0.213	-4.736
9	1	-0.213	3.857	3.248	10	0.213	-3.857	0.513
10	10	-0.213	2.413	-0.513	11	0.213	-2.413	2.866
11	11	-0.213	1.384	-2.866	12	0.213	-1.384	4.215
12	12	-0.213	0.688	-4.215	13	0.213	-0.688	4.887
13	13	-0.213	0.205	-4.887	14	0.213	-0.205	5.087
14	14	-0.213	-0.205	-5.087	15	0.213	0.205	4.887
15	15	-0.213	-0.688	-4.887	16	0.213	0.688	4.215
16	16	-0.213	-1.384	-4.215	17	0.213	1.384	2.866
17	17	-0.213	-2.413	-2.866	18	0.213	2.413	0.513
18	7	-0.213	-3.857	-3.248	18	0.213	3.857	-0.513
19	1	0.935	-0.000	0.000	19	-0.935	0.000	0.000
20	10	1.443	0.000	0.000	20	-1.443	-0.000	0.000
21	11	1.029	0.000	0.000	21	-1.029	-0.000	0.000
22	12	0.696	0.000	0.000	22	-0.696	-0.000	0.000
23	13	0.483	0.000	0.000	23	-0.483	-0.000	0.000
24	14	0.410	0.000	-0.000	24	-0.410	-0.000	0.000
25	15	0.483	-0.000	-0.000	25	-0.483	0.000	-0.000
26	16	0.696	-0.000	-0.000	26	-0.696	0.000	-0.000
27	17	1.029	-0.000	-0.000	27	-1.029	0.000	-0.000
28	18	1.443	-0.000	-0.000	28	-1.443	0.000	-0.000
29	7	0.935	0.000	-0.000	29	-0.935	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 5

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	-0.000	0.000	-0.000
6	0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	0.935	-0.000
20	0.000	1.443	-0.000
21	0.000	1.029	-0.000
22	0.000	0.696	-0.000
23	0.000	0.483	-0.000
24	0.000	0.410	-0.000
25	-0.000	0.483	0.000
26	-0.000	0.696	0.000
27	-0.000	1.029	0.000
28	-0.000	1.443	0.000
29	0.000	0.935	0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS
6

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	4.792	0.213	-3.248	2	-4.792	-0.213	3.992
2	2	4.792	0.213	-3.992	3	-4.792	-0.213	4.736
3	3	0.213	-4.792	-4.736	4	-0.213	2.396	-4.025
4	4	0.213	-2.396	4.025	5	-0.213	-0.000	-6.945
5	5	0.213	-0.000	6.945	6	-0.213	-2.396	-4.025
6	6	0.213	2.396	4.025	9	-0.213	-4.792	4.736
7	7	4.792	-0.213	3.248	8	-4.792	0.213	-3.992
8	8	4.792	-0.213	3.992	9	-4.792	0.213	-4.736
9	1	-0.213	3.857	3.248	10	0.213	-3.857	0.513
10	10	-0.213	2.413	-0.513	11	0.213	-2.413	2.866
11	11	-0.213	1.384	-2.866	12	0.213	-1.384	4.215
12	12	-0.213	0.688	-4.215	13	0.213	-0.688	4.887
13	13	-0.213	0.205	-4.887	14	0.213	-0.205	5.087
14	14	-0.213	-0.205	-5.087	15	0.213	0.205	4.887
15	15	-0.213	-0.688	-4.887	16	0.213	0.688	4.215
16	16	-0.213	-1.384	-4.215	17	0.213	1.384	2.866
17	17	-0.213	-2.413	-2.866	18	0.213	2.413	0.513
18	7	-0.213	-3.857	-3.248	18	0.213	3.857	-0.513
19	1	0.935	-0.000	0.000	19	-0.935	0.000	0.000
20	10	1.443	0.000	0.000	20	-1.443	-0.000	0.000
21	11	1.029	0.000	0.000	21	-1.029	-0.000	0.000
22	12	0.696	0.000	0.000	22	-0.696	-0.000	0.000
23	13	0.483	0.000	0.000	23	-0.483	-0.000	0.000
24	14	0.410	0.000	-0.000	24	-0.410	-0.000	0.000
25	15	0.483	-0.000	-0.000	25	-0.483	0.000	-0.000
26	16	0.696	-0.000	-0.000	26	-0.696	0.000	-0.000
27	17	1.029	-0.000	-0.000	27	-1.029	0.000	-0.000
28	18	1.443	-0.000	-0.000	28	-1.443	0.000	-0.000
29	7	0.935	0.000	-0.000	29	-0.935	-0.000	-0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 6

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	-0.000	0.000	-0.000
6	0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	0.935	-0.000
20	0.000	1.443	-0.000
21	0.000	1.029	-0.000
22	0.000	0.696	-0.000
23	0.000	0.483	-0.000
24	0.000	0.410	-0.000
25	-0.000	0.483	0.000
26	-0.000	0.696	0.000
27	-0.000	1.029	0.000
28	-0.000	1.443	0.000
29	0.000	0.935	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	4.792	0.213	-3.248	2	-4.792	-0.213	3.992
2	2	4.792	0.213	-3.992	3	-4.792	-0.213	4.736
3	3	0.213	-4.792	-4.736	4	-0.213	2.396	-4.025
4	4	0.213	-2.396	4.025	5	-0.213	-0.000	-6.945
5	5	0.213	-0.000	6.945	6	-0.213	-2.396	-4.025
6	6	0.213	2.396	4.025	9	-0.213	-4.792	4.736
7	7	4.792	-0.213	3.248	8	-4.792	0.213	-3.992
8	8	4.792	-0.213	3.992	9	-4.792	0.213	-4.736
9	1	-0.213	3.857	3.248	10	0.213	-3.857	0.513
10	10	-0.213	2.413	-0.513	11	0.213	-2.413	2.866
11	11	-0.213	1.384	-2.866	12	0.213	-1.384	4.215
12	12	-0.213	0.688	-4.215	13	0.213	-0.688	4.887
13	13	-0.213	0.205	-4.887	14	0.213	-0.205	5.087
14	14	-0.213	-0.205	-5.087	15	0.213	0.205	4.887
15	15	-0.213	-0.688	-4.887	16	0.213	0.688	4.215
16	16	-0.213	-1.384	-4.215	17	0.213	1.384	2.866
17	17	-0.213	-2.413	-2.866	18	0.213	2.413	0.513
18	7	-0.213	-3.857	-3.248	18	0.213	3.857	-0.513
19	1	0.935	-0.000	0.000	19	-0.935	0.000	0.000
20	10	1.443	0.000	0.000	20	-1.443	-0.000	0.000
21	11	1.029	0.000	0.000	21	-1.029	-0.000	0.000
22	12	0.696	0.000	0.000	22	-0.696	-0.000	0.000
23	13	0.483	0.000	0.000	23	-0.483	-0.000	0.000
24	14	0.410	0.000	-0.000	24	-0.410	-0.000	0.000
25	15	0.483	-0.000	-0.000	25	-0.483	0.000	-0.000
26	16	0.696	-0.000	-0.000	26	-0.696	0.000	-0.000
27	17	1.029	-0.000	-0.000	27	-1.029	0.000	-0.000
28	18	1.443	-0.000	-0.000	28	-1.443	0.000	-0.000
29	7	0.935	0.000	-0.000	29	-0.935	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 7

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	-0.000	0.000	-0.000
6	0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	0.935	-0.000
20	0.000	1.443	-0.000
21	0.000	1.029	-0.000
22	0.000	0.696	-0.000
23	0.000	0.483	-0.000
24	0.000	0.410	-0.000
25	-0.000	0.483	0.000
26	-0.000	0.696	0.000
27	-0.000	1.029	0.000
28	-0.000	1.443	0.000
29	0.000	0.935	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS

8

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	7.303	0.324	-4.949	2	-7.303	-0.324	6.083
2	2	7.303	0.324	-6.083	3	-7.303	-0.324	7.217
3	3	0.324	-7.303	-7.217	4	-0.324	3.651	-6.134
4	4	0.324	-3.651	6.134	5	-0.324	-0.000	-10.584
5	5	0.324	-0.000	10.584	6	-0.324	-3.651	-6.134
6	6	0.324	3.651	6.134	9	-0.324	-7.303	7.217
7	7	7.303	-0.324	4.949	8	-7.303	0.324	-6.083
8	8	7.303	-0.324	6.083	9	-7.303	0.324	-7.217
9	1	-0.324	5.877	4.949	10	0.324	-5.877	0.781
10	10	-0.324	3.678	-0.781	11	0.324	-3.678	4.367
11	11	-0.324	2.110	-4.367	12	0.324	-2.110	6.424
12	12	-0.324	1.049	-6.424	13	0.324	-1.049	7.447
13	13	-0.324	0.313	-7.447	14	0.324	-0.313	7.751
14	14	-0.324	-0.313	-7.751	15	0.324	0.313	7.447
15	15	-0.324	-1.049	-7.447	16	0.324	1.049	6.424
16	16	-0.324	-2.110	-6.424	17	0.324	2.110	4.367
17	17	-0.324	-3.678	-4.367	18	0.324	3.678	0.781
18	7	-0.324	-5.877	-4.949	18	0.324	5.877	-0.781
19	1	1.425	-0.000	0.000	19	-1.425	0.000	0.000
20	10	2.200	0.000	0.000	20	-2.200	-0.000	0.000
21	11	1.568	0.000	0.000	21	-1.568	-0.000	0.000
22	12	1.061	0.000	0.000	22	-1.061	-0.000	0.000
23	13	0.736	0.000	0.000	23	-0.736	-0.000	0.000
24	14	0.625	-0.000	-0.000	24	-0.625	0.000	0.000
25	15	0.736	-0.000	-0.000	25	-0.736	0.000	-0.000
26	16	1.061	-0.000	-0.000	26	-1.061	0.000	-0.000
27	17	1.568	-0.000	-0.000	27	-1.568	0.000	-0.000
28	18	2.200	-0.000	-0.000	28	-2.200	0.000	-0.000
29	7	1.425	0.000	-0.000	29	-1.425	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 8

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	-0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	1.425	-0.000
20	0.000	2.200	-0.000
21	0.000	1.568	-0.000
22	0.000	1.061	-0.000
23	0.000	0.736	-0.000
24	-0.000	0.625	-0.000
25	-0.000	0.736	0.000
26	-0.000	1.061	0.000
27	-0.000	1.568	0.000
28	-0.000	2.200	0.000
29	0.000	1.425	0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS 9

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-0.234	-0.312	-1.039	2	0.234	0.312	-0.052
2	2	-0.234	-0.312	0.052	3	0.234	0.312	-1.142
3	3	0.309	0.234	1.142	4	-0.309	-0.234	-0.573
4	4	0.309	0.234	0.573	5	-0.309	-0.234	-0.003
5	5	0.309	0.234	0.003	6	-0.309	-0.234	0.566
6	6	0.309	0.234	-0.566	9	-0.309	-0.234	1.135
7	7	0.234	-0.309	-1.031	8	-0.234	0.309	-0.052
8	8	0.234	-0.309	0.052	9	-0.234	0.309	-1.135
9	1	-0.309	-0.068	1.039	10	0.309	0.068	-1.105
10	10	-0.309	0.146	1.105	11	0.309	-0.146	-0.962
11	11	-0.309	0.273	0.962	12	0.309	-0.273	-0.696
12	12	-0.309	0.341	0.696	13	0.309	-0.341	-0.363
13	13	-0.309	0.370	0.363	14	0.309	-0.370	-0.002
14	14	-0.309	0.370	0.002	15	0.309	-0.370	0.358
15	15	-0.309	0.340	-0.358	16	0.309	-0.340	0.690
16	16	-0.309	0.272	-0.690	17	0.309	-0.272	0.956
17	17	-0.309	0.145	-0.956	18	0.309	-0.145	1.097
18	7	-0.309	-0.068	1.031	18	0.309	0.068	-1.097
19	1	-0.166	0.000	-0.000	19	0.166	-0.000	-0.000
20	10	-0.214	-0.000	-0.000	20	0.214	0.000	-0.000
21	11	-0.127	-0.000	-0.000	21	0.127	0.000	-0.000
22	12	-0.068	-0.000	-0.000	22	0.068	0.000	-0.000
23	13	-0.029	-0.000	-0.000	23	0.029	0.000	-0.000
24	14	0.000	-0.000	-0.000	24	-0.000	0.000	-0.000
25	15	0.029	-0.000	-0.000	25	-0.029	0.000	-0.000
26	16	0.068	-0.000	-0.000	26	-0.068	0.000	-0.000
27	17	0.127	-0.000	-0.000	27	-0.127	0.000	-0.000
28	18	0.213	-0.000	-0.000	28	-0.213	0.000	-0.000
29	7	0.165	0.000	-0.000	29	-0.165	-0.000	-0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 9

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-0.621	0.000	-0.000
2	0.000	0.000	-0.000
3	0.621	-0.000	0.000
4	-0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	-0.000	0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	0.000	-0.000
19	0.000	-0.166	0.000
20	-0.000	-0.214	0.000
21	-0.000	-0.127	0.000
22	-0.000	-0.068	0.000
23	-0.000	-0.029	0.000
24	-0.000	0.000	0.000
25	-0.000	0.029	0.000
26	-0.000	0.068	0.000
27	-0.000	0.127	0.000
28	-0.000	0.213	0.000
29	0.000	0.165	0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS 1

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-0.327	-0.437	-1.456	2	0.327	0.437	-0.072
2	2	-0.327	-0.437	0.072	3	0.327	0.437	-1.600
3	3	0.433	0.327	1.600	4	-0.433	-0.327	-0.802
4	4	0.433	0.327	0.802	5	-0.433	-0.327	-0.005
5	5	0.433	0.327	0.005	6	-0.433	-0.327	0.793
6	6	0.433	0.327	-0.793	9	-0.433	-0.327	1.590
7	7	0.327	-0.433	-1.444	8	-0.327	0.433	-0.073
8	8	0.327	-0.433	0.073	9	-0.327	0.433	-1.590
9	1	-0.433	-0.095	1.456	10	0.433	0.095	-1.548
10	10	-0.433	0.205	1.548	11	0.433	-0.205	-1.348
11	11	-0.433	0.383	1.348	12	0.433	-0.383	-0.974
12	12	-0.433	0.478	0.974	13	0.433	-0.478	-0.508
13	13	-0.433	0.518	0.508	14	0.433	-0.518	-0.003
14	14	-0.433	0.518	0.003	15	0.433	-0.518	0.502
15	15	-0.433	0.477	-0.502	16	0.433	-0.477	0.967
16	16	-0.433	0.381	-0.967	17	0.433	-0.381	1.339
17	17	-0.433	0.203	-1.339	18	0.433	-0.203	1.537
18	7	-0.433	-0.095	1.444	18	0.433	0.095	-1.537
19	1	-0.233	0.000	-0.000	19	0.233	-0.000	-0.000
20	10	-0.300	-0.000	-0.000	20	0.300	0.000	-0.000
21	11	-0.178	-0.000	-0.000	21	0.178	0.000	-0.000
22	12	-0.095	-0.000	-0.000	22	0.095	0.000	-0.000
23	13	-0.040	-0.000	-0.000	23	0.040	0.000	-0.000
24	14	0.000	-0.000	-0.000	24	-0.000	0.000	-0.000
25	15	0.041	-0.000	-0.000	25	-0.041	0.000	-0.000
26	16	0.096	-0.000	-0.000	26	-0.096	0.000	-0.000
27	17	0.178	-0.000	-0.000	27	-0.178	0.000	-0.000
28	18	0.299	-0.000	-0.000	28	-0.299	0.000	-0.000
29	7	0.232	0.000	-0.000	29	-0.232	-0.000	-0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 10

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-0.870	0.000	-0.000
2	0.000	0.000	-0.000
3	0.870	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	-0.000	-0.000	0.000
7	-0.000	-0.000	-0.000
8	0.000	0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	0.000	-0.000
19	0.000	-0.233	0.000
20	-0.000	-0.300	0.000
21	-0.000	-0.178	0.000
22	-0.000	-0.095	0.000
23	-0.000	-0.040	0.000
24	-0.000	0.000	0.000
25	-0.000	0.041	0.000
26	-0.000	0.096	0.000
27	-0.000	0.178	0.000
28	-0.000	0.299	0.000
29	0.000	0.232	0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS 1

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	3.812	0.169	-2.584	2	-3.812	-0.169	3.175
2	2	3.812	0.169	-3.175	3	-3.812	-0.169	3.767
3	3	0.169	-3.812	-3.767	4	-0.169	1.906	-3.202
4	4	0.169	-1.906	3.202	5	-0.169	-0.000	-5.525
5	5	0.169	-0.000	5.525	6	-0.169	-1.906	-3.202
6	6	0.169	1.906	3.202	9	-0.169	-3.812	3.767
7	7	3.812	-0.169	2.584	8	-3.812	0.169	-3.175
8	8	3.812	-0.169	3.175	9	-3.812	0.169	-3.767
9	1	-0.169	3.068	2.584	10	0.169	-3.068	0.408
10	10	-0.169	1.920	-0.408	11	0.169	-1.920	2.280
11	11	-0.169	1.101	-2.280	12	0.169	-1.101	3.354
12	12	-0.169	0.548	-3.354	13	0.169	-0.548	3.887
13	13	-0.169	0.163	-3.887	14	0.169	-0.163	4.046
14	14	-0.169	-0.163	-4.046	15	0.169	0.163	3.887
15	15	-0.169	-0.548	-3.887	16	0.169	0.548	3.354
16	16	-0.169	-1.101	-3.354	17	0.169	1.101	2.280
17	17	-0.169	-1.920	-2.280	18	0.169	1.920	0.408
18	7	-0.169	-3.068	-2.584	18	0.169	3.068	-0.408
19	1	0.744	-0.000	0.000	19	-0.744	0.000	0.000
20	10	1.148	0.000	0.000	20	-1.148	-0.000	0.000
21	11	0.819	0.000	0.000	21	-0.819	-0.000	0.000
22	12	0.554	0.000	0.000	22	-0.554	-0.000	0.000
23	13	0.384	0.000	0.000	23	-0.384	-0.000	0.000
24	14	0.326	-0.000	-0.000	24	-0.326	0.000	0.000
25	15	0.384	-0.000	-0.000	25	-0.384	0.000	-0.000
26	16	0.554	-0.000	-0.000	26	-0.554	0.000	-0.000
27	17	0.819	-0.000	-0.000	27	-0.819	0.000	-0.000
28	18	1.148	-0.000	-0.000	28	-1.148	0.000	-0.000
29	7	0.744	0.000	-0.000	29	-0.744	-0.000	-0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 11

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	-0.000	0.000	-0.000
6	-0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	0.744	-0.000
20	0.000	1.148	-0.000
21	0.000	0.819	-0.000
22	0.000	0.554	-0.000
23	0.000	0.384	-0.000
24	-0.000	0.326	-0.000
25	-0.000	0.384	0.000
26	-0.000	0.554	0.000
27	-0.000	0.819	0.000
28	-0.000	1.148	0.000
29	0.000	0.744	0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS 1

2

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	3.812	0.169	-2.584	2	-3.812	-0.169	3.175
2	2	3.812	0.169	-3.175	3	-3.812	-0.169	3.767
3	3	0.169	-3.812	-3.767	4	-0.169	1.906	-3.202
4	4	0.169	-1.906	3.202	5	-0.169	-0.000	-5.525
5	5	0.169	-0.000	5.525	6	-0.169	-1.906	-3.202
6	6	0.169	1.906	3.202	9	-0.169	-3.812	3.767
7	7	3.812	-0.169	2.584	8	-3.812	0.169	-3.175
8	8	3.812	-0.169	3.175	9	-3.812	0.169	-3.767
9	1	-0.169	3.068	2.584	10	0.169	-3.068	0.408
10	10	-0.169	1.920	-0.408	11	0.169	-1.920	2.280
11	11	-0.169	1.101	-2.280	12	0.169	-1.101	3.354
12	12	-0.169	0.548	-3.354	13	0.169	-0.548	3.887
13	13	-0.169	0.163	-3.887	14	0.169	-0.163	4.046
14	14	-0.169	-0.163	-4.046	15	0.169	0.163	3.887
15	15	-0.169	-0.548	-3.887	16	0.169	0.548	3.354
16	16	-0.169	-1.101	-3.354	17	0.169	1.101	2.280
17	17	-0.169	-1.920	-2.280	18	0.169	1.920	0.408
18	7	-0.169	-3.068	-2.584	18	0.169	3.068	-0.408
19	1	0.744	-0.000	0.000	19	-0.744	0.000	0.000
20	10	1.148	0.000	0.000	20	-1.148	-0.000	0.000
21	11	0.819	0.000	0.000	21	-0.819	-0.000	0.000
22	12	0.554	0.000	0.000	22	-0.554	-0.000	0.000
23	13	0.384	0.000	0.000	23	-0.384	-0.000	0.000
24	14	0.326	-0.000	-0.000	24	-0.326	0.000	0.000
25	15	0.384	-0.000	-0.000	25	-0.384	0.000	-0.000
26	16	0.554	-0.000	-0.000	26	-0.554	0.000	-0.000
27	17	0.819	-0.000	-0.000	27	-0.819	0.000	-0.000
28	18	1.148	-0.000	-0.000	28	-1.148	0.000	-0.000
29	7	0.744	0.000	-0.000	29	-0.744	-0.000	-0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 12

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	-0.000	0.000	-0.000
6	-0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	0.744	-0.000
20	0.000	1.148	-0.000
21	0.000	0.819	-0.000
22	0.000	0.554	-0.000
23	0.000	0.384	-0.000
24	-0.000	0.326	-0.000
25	-0.000	0.384	0.000
26	-0.000	0.554	0.000
27	-0.000	0.819	0.000
28	-0.000	1.148	0.000
29	0.000	0.744	0.000

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS 1

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	3.812	0.169	-2.584	2	-3.812	-0.169	3.175
2	2	3.812	0.169	-3.175	3	-3.812	-0.169	3.767
3	3	0.169	-3.812	-3.767	4	-0.169	1.906	-3.202
4	4	0.169	-1.906	3.202	5	-0.169	-0.000	-5.525
5	5	0.169	-0.000	5.525	6	-0.169	-1.906	-3.202
6	6	0.169	1.906	3.202	9	-0.169	-3.812	3.767
7	7	3.812	-0.169	2.584	8	-3.812	0.169	-3.175
8	8	3.812	-0.169	3.175	9	-3.812	0.169	-3.767
9	1	-0.169	3.068	2.584	10	0.169	-3.068	0.408
10	10	-0.169	1.920	-0.408	11	0.169	-1.920	2.280
11	11	-0.169	1.101	-2.280	12	0.169	-1.101	3.354
12	12	-0.169	0.548	-3.354	13	0.169	-0.548	3.887
13	13	-0.169	0.163	-3.887	14	0.169	-0.163	4.046
14	14	-0.169	-0.163	-4.046	15	0.169	0.163	3.887
15	15	-0.169	-0.548	-3.887	16	0.169	0.548	3.354
16	16	-0.169	-1.101	-3.354	17	0.169	1.101	2.280
17	17	-0.169	-1.920	-2.280	18	0.169	1.920	0.408
18	7	-0.169	-3.068	-2.584	18	0.169	3.068	-0.408
19	1	0.744	-0.000	0.000	19	-0.744	0.000	0.000
20	10	1.148	0.000	0.000	20	-1.148	-0.000	0.000
21	11	0.819	0.000	0.000	21	-0.819	-0.000	0.000
22	12	0.554	0.000	0.000	22	-0.554	-0.000	0.000
23	13	0.384	0.000	0.000	23	-0.384	-0.000	0.000
24	14	0.326	-0.000	-0.000	24	-0.326	0.000	0.000
25	15	0.384	-0.000	-0.000	25	-0.384	0.000	-0.000
26	16	0.554	-0.000	-0.000	26	-0.554	0.000	-0.000
27	17	0.819	-0.000	-0.000	27	-0.819	0.000	-0.000
28	18	1.148	-0.000	-0.000	28	-1.148	0.000	-0.000
29	7	0.744	0.000	-0.000	29	-0.744	-0.000	-0.000

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 13

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	-0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	-0.000	0.000	-0.000
6	-0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	0.744	-0.000
20	0.000	1.148	-0.000
21	0.000	0.819	-0.000
22	0.000	0.554	-0.000
23	0.000	0.384	-0.000
24	-0.000	0.326	-0.000
25	-0.000	0.384	0.000
26	-0.000	0.554	0.000
27	-0.000	0.819	0.000
28	-0.000	1.148	0.000
29	0.000	0.744	0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS 1

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	7.142	0.317	-4.840	2	-7.142	-0.317	5.949
2	2	7.142	0.317	-5.949	3	-7.142	-0.317	7.058
3	3	0.317	-7.142	-7.058	4	-0.317	3.571	-5.999
4	4	0.317	-3.571	5.999	5	-0.317	-0.000	-10.351
5	5	0.317	-0.000	10.351	6	-0.317	-3.571	-5.999
6	6	0.317	3.571	5.999	9	-0.317	-7.142	7.058
7	7	7.142	-0.317	4.840	8	-7.142	0.317	-5.949
8	8	7.142	-0.317	5.949	9	-7.142	0.317	-7.058
9	1	-0.317	5.748	4.840	10	0.317	-5.748	0.764
10	10	-0.317	3.597	-0.764	11	0.317	-3.597	4.271
11	11	-0.317	2.063	-4.271	12	0.317	-2.063	6.282
12	12	-0.317	1.026	-6.282	13	0.317	-1.026	7.283
13	13	-0.317	0.306	-7.283	14	0.317	-0.306	7.581
14	14	-0.317	-0.306	-7.581	15	0.317	0.306	7.283
15	15	-0.317	-1.026	-7.283	16	0.317	1.026	6.282
16	16	-0.317	-2.063	-6.282	17	0.317	2.063	4.271
17	17	-0.317	-3.597	-4.271	18	0.317	3.597	0.764
18	7	-0.317	-5.748	-4.840	18	0.317	5.748	-0.764
19	1	1.394	-0.000	0.000	19	-1.394	0.000	0.000
20	10	2.151	0.000	0.000	20	-2.151	-0.000	0.000
21	11	1.534	0.000	0.000	21	-1.534	-0.000	0.000
22	12	1.037	0.000	0.000	22	-1.037	-0.000	0.000
23	13	0.720	0.000	0.000	23	-0.720	-0.000	0.000
24	14	0.611	-0.000	-0.000	24	-0.611	0.000	-0.000
25	15	0.720	-0.000	-0.000	25	-0.720	0.000	-0.000
26	16	1.037	-0.000	-0.000	26	-1.037	0.000	-0.000
27	17	1.534	-0.000	-0.000	27	-1.534	0.000	-0.000
28	18	2.151	-0.000	-0.000	28	-2.151	0.000	-0.000
29	7	1.394	0.000	-0.000	29	-1.394	-0.000	-0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 14

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-0.000	0.000
2	-0.000	0.000	-0.000
3	0.000	-0.000	0.000
4	-0.000	0.000	0.000
5	0.000	0.000	-0.000
6	-0.000	0.000	-0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	1.394	-0.000
20	0.000	2.151	-0.000
21	0.000	1.534	-0.000
22	0.000	1.037	-0.000
23	0.000	0.720	-0.000
24	-0.000	0.611	0.000
25	-0.000	0.720	0.000
26	-0.000	1.037	0.000
27	-0.000	1.534	0.000
28	-0.000	2.151	0.000
29	0.000	1.394	0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS 1

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-0.789	-1.053	-3.510	2	0.789	1.053	-0.174
2	2	-0.789	-1.053	0.174	3	0.789	1.053	-3.858
3	3	1.045	0.789	3.858	4	-1.045	-0.789	-1.935
4	4	1.045	0.789	1.935	5	-1.045	-0.789	-0.012
5	5	1.045	0.789	0.012	6	-1.045	-0.789	1.912
6	6	1.045	0.789	-1.912	9	-1.045	-0.789	3.835
7	7	0.789	-1.045	-3.483	8	-0.789	1.045	-0.176
8	8	0.789	-1.045	0.176	9	-0.789	1.045	-3.835
9	1	-1.045	-0.228	3.510	10	1.045	0.228	-3.733
10	10	-1.045	0.494	3.733	11	1.045	-0.494	-3.251
11	11	-1.045	0.924	3.251	12	1.045	-0.924	-2.350
12	12	-1.045	1.153	2.350	13	1.045	-1.153	-1.226
13	13	-1.045	1.250	1.226	14	1.045	-1.250	-0.007
14	14	-1.045	1.249	0.007	15	1.045	-1.249	1.210
15	15	-1.045	1.150	-1.210	16	1.045	-1.150	2.332
16	16	-1.045	0.920	-2.332	17	1.045	-0.920	3.229
17	17	-1.045	0.490	-3.229	18	1.045	-0.490	3.707
18	7	-1.045	-0.230	3.483	18	1.045	0.230	-3.707
19	1	-0.561	0.000	-0.000	19	0.561	-0.000	-0.000
20	10	-0.722	-0.000	-0.000	20	0.722	0.000	-0.000
21	11	-0.429	-0.000	-0.000	21	0.429	0.000	-0.000
22	12	-0.229	-0.000	-0.000	22	0.229	0.000	-0.000
23	13	-0.097	-0.000	-0.000	23	0.097	0.000	-0.000
24	14	0.001	-0.000	-0.000	24	-0.001	0.000	-0.000
25	15	0.098	-0.000	-0.000	25	-0.098	0.000	-0.000
26	16	0.231	-0.000	-0.000	26	-0.231	0.000	-0.000
27	17	0.429	-0.000	-0.000	27	-0.429	0.000	-0.000
28	18	0.721	-0.000	-0.000	28	-0.721	0.000	-0.000
29	7	0.559	0.000	-0.000	29	-0.559	-0.000	-0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 15

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-2.098	0.000	-0.000
2	0.000	0.000	-0.000
3	2.098	-0.000	0.000
4	-0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	-0.000	0.000
7	-0.000	-0.000	-0.000
8	0.000	0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	0.000	-0.000
19	0.000	-0.561	0.000
20	-0.000	-0.722	0.000
21	-0.000	-0.429	0.000
22	-0.000	-0.229	0.000
23	-0.000	-0.097	0.000
24	-0.000	0.001	0.000
25	-0.000	0.098	0.000
26	-0.000	0.231	0.000
27	-0.000	0.429	0.000
28	-0.000	0.721	0.000
29	0.000	0.559	0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

ESFUERZOS EN BARRAS (EJES LOCALES) P.I. ESTRUCTURA E-11 ZONAS LATERALES HIPOTESIS 1

6

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	-0.861	-1.148	-3.830	2	0.861	1.148	-0.190
2	2	-0.861	-1.148	0.190	3	0.861	1.148	-4.210
3	3	1.141	0.861	4.210	4	-1.141	-0.861	-2.111
4	4	1.141	0.861	2.111	5	-1.141	-0.861	-0.013
5	5	1.141	0.861	0.013	6	-1.141	-0.861	2.086
6	6	1.141	0.861	-2.086	9	-1.141	-0.861	4.184
7	7	0.861	-1.141	-3.800	8	-0.861	1.141	-0.192
8	8	0.861	-1.141	0.192	9	-0.861	1.141	-4.184
9	1	-1.141	-0.249	3.830	10	1.141	0.249	-4.072
10	10	-1.141	0.539	4.072	11	1.141	-0.539	-3.546
11	11	-1.141	1.008	3.546	12	1.141	-1.008	-2.564
12	12	-1.141	1.258	2.564	13	1.141	-1.258	-1.337
13	13	-1.141	1.364	1.337	14	1.141	-1.364	-0.008
14	14	-1.141	1.362	0.008	15	1.141	-1.362	1.321
15	15	-1.141	1.255	-1.321	16	1.141	-1.255	2.544
16	16	-1.141	1.004	-2.544	17	1.141	-1.004	3.523
17	17	-1.141	0.535	-3.523	18	1.141	-0.535	4.044
18	7	-1.141	-0.251	3.800	18	1.141	0.251	-4.044
19	1	-0.612	0.000	-0.000	19	0.612	-0.000	-0.000
20	10	-0.788	-0.000	-0.000	20	0.788	0.000	-0.000
21	11	-0.469	-0.000	-0.000	21	0.469	0.000	-0.000
22	12	-0.250	-0.000	-0.000	22	0.250	0.000	-0.000
23	13	-0.105	-0.000	-0.000	23	0.105	0.000	-0.000
24	14	0.001	-0.000	-0.000	24	-0.001	0.000	-0.000
25	15	0.107	-0.000	-0.000	25	-0.107	0.000	-0.000
26	16	0.252	-0.000	-0.000	26	-0.252	0.000	-0.000
27	17	0.469	-0.000	-0.000	27	-0.469	0.000	-0.000
28	18	0.786	-0.000	-0.000	28	-0.786	0.000	-0.000
29	7	0.610	0.000	-0.000	29	-0.610	-0.000	-0.000

ESTRUCTURA PLANA -- P.I. ESTRUCTURA E-11 ZONAS LATERALES

REACCIONES EN NUDOS (EJES GENERALES) P.I. ESTRUCTURA E-11 ZONAS LATERALE 16

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-2.289	0.000	-0.000
2	0.000	-0.000	-0.000
3	2.289	-0.000	0.000
4	-0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	-0.000	0.000
7	-0.000	-0.000	-0.000
8	0.000	-0.000	-0.000
9	0.000	0.000	0.000
10	0.000	-0.000	-0.000
11	0.000	-0.000	-0.000
12	0.000	-0.000	-0.000
13	0.000	-0.000	-0.000
14	0.000	-0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	0.000	-0.000
19	0.000	-0.612	0.000
20	-0.000	-0.788	0.000
21	-0.000	-0.469	0.000
22	-0.000	-0.250	0.000
23	-0.000	-0.105	0.000
24	-0.000	0.001	0.000
25	-0.000	0.107	0.000
26	-0.000	0.252	0.000
27	-0.000	0.469	0.000
28	-0.000	0.786	0.000
29	0.000	0.610	0.000

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COMB. HIPOTESIS 01 01 1.50 02 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 1

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	19.933	0.000	0.000	19	19.933	0.000	-0.000
20	10	31.920	-0.000	0.000	20	31.920	-0.000	-0.000
21	11	23.722	-0.000	0.000	21	23.722	-0.000	-0.000
22	12	16.919	-0.000	0.000	22	16.919	-0.000	-0.000
23	13	12.500	-0.000	0.000	23	12.500	-0.000	-0.000
24	14	10.975	-0.000	0.000	24	10.975	-0.000	-0.000
25	15	12.500	0.000	-0.000	25	12.500	0.000	0.000
26	16	16.919	0.000	-0.000	26	16.919	0.000	0.000
27	17	23.722	0.000	-0.000	27	23.722	0.000	0.000
28	18	31.920	0.000	-0.000	28	31.920	0.000	0.000
29	7	19.933	-0.000	-0.000	29	19.933	-0.000	0.000

COMB. HIPOTESIS 01 01 1.50 02 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 1

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	19.933	-0.000
20	0.000	31.920	-0.000
21	0.000	23.722	-0.000
22	0.000	16.919	-0.000
23	0.000	12.500	-0.000
24	0.000	10.975	-0.000
25	-0.000	12.500	0.000
26	-0.000	16.919	0.000
27	-0.000	23.722	0.000
28	-0.000	31.920	0.000
29	0.000	19.933	0.000

COMB. HIPOTESIS 01 01 1.50 02 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 1

NUDO	@X	@Y	@Z
1	0.00000	-0.01168	0.00201
2	-0.00312	-0.01183	0.00003
3	-0.00001	-0.01196	-0.00209
4	-0.00004	-0.01813	-0.00224
5	-0.00006	-0.02116	-0.00000
6	-0.00009	-0.01813	0.00224
7	-0.00012	-0.01168	-0.00201
8	0.00299	-0.01183	-0.00003
9	-0.00011	-0.01196	0.00209
10	-0.00001	-0.00935	0.00246
11	-0.00002	-0.00695	0.00227
12	-0.00004	-0.00496	0.00170
13	-0.00005	-0.00366	0.00090
14	-0.00006	-0.00322	-0.00000
15	-0.00007	-0.00366	-0.00090
16	-0.00008	-0.00496	-0.00170
17	-0.00010	-0.00695	-0.00227
18	-0.00011	-0.00935	-0.00246
19	0.00920	0.00000	0.00201
20	0.01124	0.00000	0.00246
21	0.01039	0.00000	0.00227
22	0.00774	0.00000	0.00170
23	0.00407	0.00000	0.00090
24	-0.00006	0.00000	-0.00000
25	-0.00419	0.00000	-0.00090
26	-0.00786	0.00000	-0.00170
27	-0.01051	0.00000	-0.00227
28	-0.01136	0.00000	-0.00246
29	-0.00932	0.00000	-0.00201

COMB. HIPOTESIS 01 01 1.50 02 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 1

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	100.637	29.882	-95.836	2	100.637	-2.157	-50.250
2	2	90.792	-2.157	-50.250	3	90.792	-24.141	-99.206
3	3	24.141	90.792	-99.206	4	24.141	45.396	66.773
4	4	24.141	45.396	66.773	5	24.141	-0.000	122.100
5	5	24.141	0.000	122.100	6	24.141	-45.396	66.773
6	6	24.141	-45.396	66.773	9	24.141	-90.792	-99.206
7	7	100.637	-29.882	95.836	8	100.637	2.157	50.250
8	8	90.792	2.157	50.250	9	90.792	24.141	99.206
9	1	29.882	-90.548	95.835	10	29.882	-90.548	7.551
10	10	29.882	-58.629	7.551	11	29.882	-58.629	-49.612
11	11	29.882	-34.907	-49.612	12	29.882	-34.907	-83.647
12	12	29.882	-17.988	-83.647	13	29.882	-17.988	-101.185
13	13	29.882	-5.488	-101.185	14	29.882	-5.488	-106.535
14	14	29.882	5.488	-106.535	15	29.882	5.488	-101.185
15	15	29.882	17.988	-101.185	16	29.882	17.988	-83.647
16	16	29.882	34.907	-83.647	17	29.882	34.907	-49.612
17	17	29.882	58.629	-49.612	18	29.882	58.629	7.551
18	7	29.882	90.548	-95.835	18	29.882	90.548	-7.551

COMB. HIPOTESIS 02 01 1.50 03 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 2

NUDO	@X	@Y	OZ
1	0.00000	-0.01123	0.00170
2	-0.00229	-0.01137	0.00004
3	-0.00002	-0.01151	-0.00178
4	-0.00006	-0.01710	-0.00208
5	-0.00010	-0.01994	-0.00000
6	-0.00014	-0.01710	0.00208
7	-0.00020	-0.01123	-0.00170
8	0.00210	-0.01137	-0.00004
9	-0.00017	-0.01151	0.00178
10	-0.00002	-0.00917	0.00222
11	-0.00004	-0.00695	0.00212
12	-0.00006	-0.00508	0.00160
13	-0.00008	-0.00385	0.00085
14	-0.00010	-0.00343	-0.00000
15	-0.00012	-0.00385	-0.00085
16	-0.00014	-0.00508	-0.00160
17	-0.00016	-0.00695	-0.00212
18	-0.00018	-0.00917	-0.00222
19	0.00777	0.00000	0.00170
20	0.01017	0.00000	0.00222
21	0.00966	0.00000	0.00212
22	0.00728	0.00000	0.00160
23	0.00383	0.00000	0.00085
24	-0.00010	0.00000	-0.00000
25	-0.00402	0.00000	-0.00085
26	-0.00747	0.00000	-0.00160
27	-0.00985	0.00000	-0.00212
28	-0.01037	0.00000	-0.00222
29	-0.00796	0.00000	-0.00170

COMB. HIPOTESIS 02 01 1.50 03 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 2

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	100.637	48.252	-105.721	2	100.637	-2.777	-30.810
2	2	90.792	-2.777	-30.810	3	90.792	-37.792	-106.476
3	3	37.792	90.792	-106.476	4	37.792	45.396	59.503
4	4	37.792	45.396	59.503	5	37.792	-0.000	114.830
5	5	37.792	0.000	114.830	6	37.792	-45.396	59.503
6	6	37.792	-45.396	59.503	9	37.792	-90.792	-106.476
7	7	100.637	-48.252	105.721	8	100.637	2.777	30.810
8	8	90.792	2.777	30.810	9	90.792	37.792	106.476
9	1	48.252	-91.318	105.721	10	48.252	-91.318	16.686
10	10	48.252	-60.038	16.686	11	48.252	-60.038	-41.851
11	11	48.252	-36.318	-41.851	12	48.252	-36.318	-77.261
12	12	48.252	-18.987	-77.261	13	48.252	-18.987	-95.773
13	13	48.252	-5.845	-95.773	14	48.252	-5.845	-101.472
14	14	48.252	5.845	-101.472	15	48.252	5.845	-95.773
15	15	48.252	18.987	-95.773	16	48.252	18.987	-77.261
16	16	48.252	36.318	-77.261	17	48.252	36.318	-41.851
17	17	48.252	60.038	-41.851	18	48.252	60.038	16.686
18	7	48.252	91.318	-105.721	18	48.252	91.318	-16.686

COMB. HIPOTESIS 02 01 1.50 03 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 2

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	19.163	0.000	0.000	19	19.163	0.000	-0.000
20	10	31.280	-0.000	0.000	20	31.280	-0.000	-0.000
21	11	23.720	-0.000	0.000	21	23.720	-0.000	-0.000
22	12	17.331	-0.000	0.000	22	17.331	-0.000	-0.000
23	13	13.142	-0.000	0.000	23	13.142	-0.000	-0.000
24	14	11.690	-0.000	0.000	24	11.690	-0.000	-0.000
25	15	13.142	0.000	-0.000	25	13.142	0.000	0.000
26	16	17.331	0.000	-0.000	26	17.331	0.000	0.000
27	17	23.720	0.000	-0.000	27	23.720	0.000	0.000
28	18	31.280	0.000	-0.000	28	31.280	0.000	0.000
29	7	19.163	-0.000	-0.000	29	19.163	-0.000	0.000

COMB. HIPOTESIS 02 01 1.50 03 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 2

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	19.163	-0.000
20	0.000	31.280	-0.000
21	0.000	23.720	-0.000
22	0.000	17.331	-0.000
23	0.000	13.142	-0.000
24	0.000	11.690	-0.000
25	-0.000	13.142	0.000
26	-0.000	17.331	0.000
27	-0.000	23.720	0.000
28	-0.000	31.280	0.000
29	0.000	19.163	0.000

COMB. HIPOTESIS 03 01 1.50 03 1.60 04 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 3

NUDO	aX	aY	aZ
1	0.00000	-0.00996	0.00111
2	0.00012	-0.01011	-0.00061
3	0.00410	-0.01024	-0.00210
4	0.00406	-0.01642	-0.00227
5	0.00401	-0.01967	-0.00017
6	0.00397	-0.01732	0.00182
7	-0.00018	-0.01229	-0.00214
8	0.00414	-0.01244	-0.00068
9	0.00393	-0.01258	0.00131
10	-0.00002	-0.00840	0.00179
11	-0.00004	-0.00653	0.00182
12	-0.00005	-0.00489	0.00141
13	-0.00007	-0.00381	0.00073
14	-0.00009	-0.00347	-0.00009
15	-0.00011	-0.00398	-0.00095
16	-0.00013	-0.00532	-0.00175
17	-0.00014	-0.00737	-0.00234
18	-0.00016	-0.00985	-0.00256
19	0.00510	0.00000	0.00111
20	0.00819	0.00000	0.00179
21	0.00830	0.00000	0.00182
22	0.00641	0.00000	0.00141
23	0.00329	0.00000	0.00073
24	-0.00049	0.00000	-0.00009
25	-0.00447	0.00000	-0.00095
26	-0.00813	0.00000	-0.00175
27	-0.01088	0.00000	-0.00234
28	-0.01187	0.00000	-0.00256
29	-0.00998	0.00000	-0.00214

COMB. HIPOTESIS 03 01 1.50 03 1.60 04 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 3

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	98.510	59.167	-122.849	2	98.510	0.914	-22.378
2	2	88.666	0.914	-22.378	3	88.666	-41.325	-97.767
3	3	41.325	88.666	-97.767	4	41.325	43.270	63.029
4	4	41.325	43.270	63.029	5	41.325	-2.126	113.172
5	5	41.325	-2.126	113.172	6	41.325	-47.522	52.662
6	6	41.325	-47.522	52.662	9	41.325	-92.918	-118.500
7	7	102.763	-44.719	93.013	8	102.763	6.310	30.468
8	8	92.918	6.310	30.468	9	92.918	41.325	118.500
9	1	44.719	-91.352	122.849	10	44.719	-91.352	33.781
10	10	44.719	-62.701	33.781	11	44.719	-62.701	-27.353
11	11	44.719	-40.409	-27.353	12	44.719	-40.409	-66.751
12	12	44.719	-23.719	-66.751	13	44.719	-23.719	-89.877
13	13	44.719	-10.732	-89.877	14	44.719	-10.732	-100.341
14	14	44.719	1.118	-100.341	15	44.719	1.118	-99.251
15	15	44.719	14.702	-99.251	16	44.719	14.702	-84.917
16	16	44.719	32.859	-84.916	17	44.719	32.859	-52.879
17	17	44.719	58.005	-52.879	18	44.719	58.005	3.675
18	7	44.719	91.628	-93.013	18	44.719	91.628	-3.676

COMB. HIPOTESIS 03 01 1.50 03 1.60 04 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 3

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	17.003	0.000	0.000	19	17.003	0.000	-0.000
20	10	28.651	-0.000	0.000	20	28.651	-0.000	-0.000
21	11	22.292	-0.000	0.000	21	22.292	-0.000	-0.000
22	12	16.690	-0.000	0.000	22	16.690	-0.000	-0.000
23	13	12.986	-0.000	0.000	23	12.986	-0.000	-0.000
24	14	11.850	0.000	-0.000	24	11.850	0.000	0.000
25	15	13.585	0.000	-0.000	25	13.585	0.000	0.000
26	16	18.156	0.000	-0.000	26	18.156	0.000	0.000
27	17	25.146	0.000	-0.000	27	25.146	0.000	0.000
28	18	33.623	0.000	-0.000	28	33.623	0.000	0.000
29	7	20.979	-0.000	-0.000	29	20.979	-0.000	0.000

COMB. HIPOTESIS 03 01 1.50 03 1.60 04 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 3

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-14.448	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	17.003	-0.000
20	0.000	28.651	-0.000
21	0.000	22.292	-0.000
22	0.000	16.690	-0.000
23	0.000	12.986	-0.000
24	-0.000	11.850	0.000
25	-0.000	13.585	0.000
26	-0.000	18.156	0.000
27	-0.000	25.146	0.000
28	-0.000	33.623	0.000
29	0.000	20.979	0.000

COMB. HIPOTESIS 04 01 1.50 02 1.60 05 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 4

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01256	0.00219
2	-0.00346	-0.01271	0.00004
3	-0.00001	-0.01286	-0.00230
4	-0.00004	-0.01961	-0.00245
5	-0.00006	-0.02292	-0.00000
6	-0.00008	-0.01961	0.00245
7	-0.00012	-0.01256	-0.00219
8	0.00334	-0.01271	-0.00004
9	-0.00011	-0.01286	0.00230
10	-0.00001	-0.01003	0.00266
11	-0.00002	-0.00743	0.00245
12	-0.00004	-0.00528	0.00183
13	-0.00005	-0.00389	0.00097
14	-0.00006	-0.00341	-0.00000
15	-0.00007	-0.00389	-0.00097
16	-0.00008	-0.00528	-0.00183
17	-0.00010	-0.00743	-0.00245
18	-0.00011	-0.01003	-0.00266
19	0.01005	0.00000	0.00219
20	0.01217	0.00000	0.00266
21	0.01122	0.00000	0.00245
22	0.00834	0.00000	0.00183
23	0.00438	0.00000	0.00097
24	-0.00006	0.00000	-0.00000
25	-0.00450	0.00000	-0.00097
26	-0.00846	0.00000	-0.00183
27	-0.01134	0.00000	-0.00245
28	-0.01229	0.00000	-0.00266
29	-0.01017	0.00000	-0.00219

COMB. HIPOTESIS 04 01 1.50 02 1.60 05 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 4

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	108.304	29.542	-101.032	2	108.304	-2.497	-56.637
2	2	98.459	-2.497	-56.637	3	98.459	-24.482	-106.783
3	3	24.482	98.459	-106.783	4	24.482	49.230	73.213
4	4	24.482	49.230	73.213	5	24.482	-0.000	133.212
5	5	24.482	0.000	133.212	6	24.482	-49.230	73.213
6	6	24.482	-49.230	73.213	9	24.482	-98.459	-106.783
7	7	108.304	-29.542	101.032	8	108.304	2.497	56.637
8	8	98.459	2.497	56.637	9	98.459	24.482	106.783
9	1	29.542	-96.719	101.032	10	29.542	-96.719	6.731
10	10	29.542	-62.490	6.730	11	29.542	-62.490	-54.198
11	11	29.542	-37.122	-54.198	12	29.542	-37.122	-90.391
12	12	29.542	-19.089	-90.391	13	29.542	-19.089	-109.003
13	13	29.542	-5.816	-109.003	14	29.542	-5.816	-114.673
14	14	29.542	5.816	-114.673	15	29.542	5.816	-109.003
15	15	29.542	19.089	-109.003	16	29.542	19.089	-90.391
16	16	29.542	37.122	-90.391	17	29.542	37.122	-54.198
17	17	29.542	62.490	-54.198	18	29.542	62.490	6.730
18	7	29.542	96.719	-101.032	18	29.542	96.719	-6.731

COMB. HIPOTESIS 04 01 1.50 02 1.60 05 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 4

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	21.429	0.000	0.000	19	21.429	0.000	-0.000
20	10	34.229	-0.000	0.000	20	34.229	-0.000	-0.000
21	11	25.368	-0.000	0.000	21	25.368	-0.000	-0.000
22	12	18.033	-0.000	0.000	22	18.033	-0.000	-0.000
23	13	13.273	-0.000	0.000	23	13.273	-0.000	-0.000
24	14	11.632	-0.000	0.000	24	11.632	-0.000	-0.000
25	15	13.273	0.000	-0.000	25	13.273	0.000	0.000
26	16	18.033	0.000	-0.000	26	18.033	0.000	0.000
27	17	25.368	0.000	-0.000	27	25.368	0.000	0.000
28	18	34.229	0.000	-0.000	28	34.229	0.000	0.000
29	7	21.429	-0.000	-0.000	29	21.429	-0.000	0.000

COMB. HIPOTESIS 04 01 1.50 02 1.60 05 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 4

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	21.429	-0.000
20	0.000	34.229	-0.000
21	0.000	25.368	-0.000
22	0.000	18.033	-0.000
23	0.000	13.273	-0.000
24	0.000	11.632	-0.000
25	-0.000	13.273	0.000
26	-0.000	18.033	0.000
27	-0.000	25.368	0.000
28	-0.000	34.229	0.000
29	0.000	21.429	0.000

COMB. HIPOTESIS 05 01 1.50 02 1.60 06 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 5

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01256	0.00219
2	-0.00346	-0.01271	0.00004
3	-0.00001	-0.01286	-0.00230
4	-0.00004	-0.01961	-0.00245
5	-0.00006	-0.02292	-0.00000
6	-0.00008	-0.01961	0.00245
7	-0.00012	-0.01256	-0.00219
8	0.00334	-0.01271	-0.00004
9	-0.00011	-0.01286	0.00230
10	-0.00001	-0.01003	0.00266
11	-0.00002	-0.00743	0.00245
12	-0.00004	-0.00528	0.00183
13	-0.00005	-0.00389	0.00097
14	-0.00006	-0.00341	-0.00000
15	-0.00007	-0.00389	-0.00097
16	-0.00008	-0.00528	-0.00183
17	-0.00010	-0.00743	-0.00245
18	-0.00011	-0.01003	-0.00266
19	0.01005	0.00000	0.00219
20	0.01217	0.00000	0.00266
21	0.01122	0.00000	0.00245
22	0.00834	0.00000	0.00183
23	0.00438	0.00000	0.00097
24	-0.00006	0.00000	-0.00000
25	-0.00450	0.00000	-0.00097
26	-0.00846	0.00000	-0.00183
27	-0.01134	0.00000	-0.00245
28	-0.01229	0.00000	-0.00266
29	-0.01017	0.00000	-0.00219

COMB. HIPOTESIS 05 01 1.50 02 1.60 06 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 5

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	108.304	29.542	-101.032	2	108.304	-2.497	-56.637
2	2	98.459	-2.497	-56.637	3	98.459	-24.482	-106.783
3	3	24.482	98.459	-106.783	4	24.482	49.230	73.213
4	4	24.482	49.230	73.213	5	24.482	-0.000	133.212
5	5	24.482	0.000	133.212	6	24.482	-49.230	73.213
6	6	24.482	-49.230	73.213	9	24.482	-98.459	-106.783
7	7	108.304	-29.542	101.032	8	108.304	2.497	56.637
8	8	98.459	2.497	56.637	9	98.459	24.482	106.783
9	1	29.542	-96.719	101.032	10	29.542	-96.719	6.731
10	10	29.542	-62.490	6.730	11	29.542	-62.490	-54.198
11	11	29.542	-37.122	-54.198	12	29.542	-37.122	-90.391
12	12	29.542	-19.089	-90.391	13	29.542	-19.089	-109.003
13	13	29.542	-5.816	-109.003	14	29.542	-5.816	-114.673
14	14	29.542	5.816	-114.673	15	29.542	5.816	-109.003
15	15	29.542	19.089	-109.003	16	29.542	19.089	-90.391
16	16	29.542	37.122	-90.391	17	29.542	37.122	-54.198
17	17	29.542	62.490	-54.198	18	29.542	62.490	6.730
18	7	29.542	96.719	-101.032	18	29.542	96.719	-6.731

COMB. HIPOTESIS 05 01 1.50 02 1.60 06 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 5

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	21.429	0.000	0.000	19	21.429	0.000	-0.000
20	10	34.229	-0.000	0.000	20	34.229	-0.000	-0.000
21	11	25.368	-0.000	0.000	21	25.368	-0.000	-0.000
22	12	18.033	-0.000	0.000	22	18.033	-0.000	-0.000
23	13	13.273	-0.000	0.000	23	13.273	-0.000	-0.000
24	14	11.632	-0.000	0.000	24	11.632	-0.000	-0.000
25	15	13.273	0.000	-0.000	25	13.273	0.000	0.000
26	16	18.033	0.000	-0.000	26	18.033	0.000	0.000
27	17	25.368	0.000	-0.000	27	25.368	0.000	0.000
28	18	34.229	0.000	-0.000	28	34.229	0.000	0.000
29	7	21.429	-0.000	-0.000	29	21.429	-0.000	0.000

COMB. HIPOTESIS 05 01 1.50 02 1.60 06 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 5

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	21.429	-0.000
20	0.000	34.229	-0.000
21	0.000	25.368	-0.000
22	0.000	18.033	-0.000
23	0.000	13.273	-0.000
24	0.000	11.632	-0.000
25	-0.000	13.273	0.000
26	-0.000	18.033	0.000
27	-0.000	25.368	0.000
28	-0.000	34.229	0.000
29	0.000	21.429	0.000

COMB. HIPOTESIS 06 01 1.50 02 1.60 07 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 6

NUDO	@X	@Y	OZ
1	0.00000	-0.01256	0.00219
2	-0.00346	-0.01271	0.00004
3	-0.00001	-0.01286	-0.00230
4	-0.00004	-0.01961	-0.00245
5	-0.00006	-0.02292	-0.00000
6	-0.00008	-0.01961	0.00245
7	-0.00012	-0.01256	-0.00219
8	0.00334	-0.01271	-0.00004
9	-0.00011	-0.01286	0.00230
10	-0.00001	-0.01003	0.00266
11	-0.00002	-0.00743	0.00245
12	-0.00004	-0.00528	0.00183
13	-0.00005	-0.00389	0.00097
14	-0.00006	-0.00341	-0.00000
15	-0.00007	-0.00389	-0.00097
16	-0.00008	-0.00528	-0.00183
17	-0.00010	-0.00743	-0.00245
18	-0.00011	-0.01003	-0.00266
19	0.01005	0.00000	0.00219
20	0.01217	0.00000	0.00266
21	0.01122	0.00000	0.00245
22	0.00834	0.00000	0.00183
23	0.00438	0.00000	0.00097
24	-0.00006	0.00000	-0.00000
25	-0.00450	0.00000	-0.00097
26	-0.00846	0.00000	-0.00183
27	-0.01134	0.00000	-0.00245
28	-0.01229	0.00000	-0.00266
29	-0.01017	0.00000	-0.00219

COMB. HIPOTESIS 06 01 1.50 02 1.60 07 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 6

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	108.304	29.542	-101.032	2	108.304	-2.497	-56.637
2	2	98.459	-2.497	-56.637	3	98.459	-24.482	-106.783
3	3	24.482	98.459	-106.783	4	24.482	49.230	73.213
4	4	24.482	49.230	73.213	5	24.482	-0.000	133.212
5	5	24.482	0.000	133.212	6	24.482	-49.230	73.213
6	6	24.482	-49.230	73.213	9	24.482	-98.459	-106.783
7	7	108.304	-29.542	101.032	8	108.304	2.497	56.637
8	8	98.459	2.497	56.637	9	98.459	24.482	106.783
9	1	29.542	-96.719	101.032	10	29.542	-96.719	6.731
10	10	29.542	-62.490	6.730	11	29.542	-62.490	-54.198
11	11	29.542	-37.122	-54.198	12	29.542	-37.122	-90.391
12	12	29.542	-19.089	-90.391	13	29.542	-19.089	-109.003
13	13	29.542	-5.816	-109.003	14	29.542	-5.816	-114.673
14	14	29.542	5.816	-114.673	15	29.542	5.816	-109.003
15	15	29.542	19.089	-109.003	16	29.542	19.089	-90.391
16	16	29.542	37.122	-90.391	17	29.542	37.122	-54.198
17	17	29.542	62.490	-54.198	18	29.542	62.490	6.730
18	7	29.542	96.719	-101.032	18	29.542	96.719	-6.731

COMB. HIPOTESIS 06 01 1.50 02 1.60 07 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 6

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	21.429	0.000	0.000	19	21.429	0.000	-0.000
20	10	34.229	-0.000	0.000	20	34.229	-0.000	-0.000
21	11	25.368	-0.000	0.000	21	25.368	-0.000	-0.000
22	12	18.033	-0.000	0.000	22	18.033	-0.000	-0.000
23	13	13.273	-0.000	0.000	23	13.273	-0.000	-0.000
24	14	11.632	-0.000	0.000	24	11.632	-0.000	-0.000
25	15	13.273	0.000	-0.000	25	13.273	0.000	0.000
26	16	18.033	0.000	-0.000	26	18.033	0.000	0.000
27	17	25.368	0.000	-0.000	27	25.368	0.000	0.000
28	18	34.229	0.000	-0.000	28	34.229	0.000	0.000
29	7	21.429	-0.000	-0.000	29	21.429	-0.000	0.000

COMB. HIPOTESIS 06 01 1.50 02 1.60 07 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 6

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	21.429	-0.000
20	0.000	34.229	-0.000
21	0.000	25.368	-0.000
22	0.000	18.033	-0.000
23	0.000	13.273	-0.000
24	0.000	11.632	-0.000
25	-0.000	13.273	0.000
26	-0.000	18.033	0.000
27	-0.000	25.368	0.000
28	-0.000	34.229	0.000
29	0.000	21.429	0.000

COMB. HIPOTESIS 07 01 1.50 02 1.60 11 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 7

NUDO	@X	@Y	@Z
1	0.00000	-0.01238	0.00216
2	-0.00339	-0.01253	0.00004
3	-0.00001	-0.01267	-0.00226
4	-0.00004	-0.01931	-0.00240
5	-0.00006	-0.02256	-0.00000
6	-0.00008	-0.01931	0.00240
7	-0.00012	-0.01238	-0.00216
8	0.00327	-0.01253	-0.00004
9	-0.00011	-0.01267	0.00226
10	-0.00001	-0.00989	0.00262
11	-0.00002	-0.00734	0.00242
12	-0.00004	-0.00522	0.00180
13	-0.00005	-0.00384	0.00095
14	-0.00006	-0.00337	-0.00000
15	-0.00007	-0.00384	-0.00095
16	-0.00008	-0.00522	-0.00180
17	-0.00010	-0.00734	-0.00242
18	-0.00011	-0.00989	-0.00262
19	0.00988	0.00000	0.00216
20	0.01198	0.00000	0.00262
21	0.01105	0.00000	0.00242
22	0.00822	0.00000	0.00180
23	0.00432	0.00000	0.00095
24	-0.00006	0.00000	-0.00000
25	-0.00444	0.00000	-0.00095
26	-0.00834	0.00000	-0.00180
27	-0.01117	0.00000	-0.00242
28	-0.01210	0.00000	-0.00262
29	-0.01000	0.00000	-0.00216

COMB. HIPOTESIS 07 01 1.50 02 1.60 11 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 7

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	106.736	29.611	-99.969	2	106.736	-2.428	-55.331
2	2	96.892	-2.428	-55.331	3	96.892	-24.412	-105.234
3	3	24.412	96.892	-105.234	4	24.412	48.446	71.896
4	4	24.412	48.446	71.896	5	24.412	-0.000	130.940
5	5	24.412	0.000	130.940	6	24.412	-48.446	71.896
6	6	24.412	-48.446	71.896	9	24.412	-96.892	-105.234
7	7	106.736	-29.611	99.969	8	106.736	2.428	55.331
8	8	96.892	2.428	55.331	9	96.892	24.412	105.234
9	1	29.611	-95.458	99.969	10	29.611	-95.458	6.898
10	10	29.611	-61.701	6.898	11	29.611	-61.701	-53.260
11	11	29.611	-36.669	-53.260	12	29.611	-36.669	-89.012
12	12	29.611	-18.864	-89.012	13	29.611	-18.864	-107.404
13	13	29.611	-5.749	-107.404	14	29.611	-5.749	-113.009
14	14	29.611	5.749	-113.009	15	29.611	5.749	-107.404
15	15	29.611	18.864	-107.404	16	29.611	18.864	-89.012
16	16	29.611	36.669	-89.012	17	29.611	36.669	-53.260
17	17	29.611	61.701	-53.260	18	29.611	61.701	6.898
18	7	29.611	95.458	-99.969	18	29.611	95.458	-6.898

COMB. HIPOTESIS 07 01 1.50 02 1.60 11 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 7

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	21.123	0.000	0.000	19	21.123	0.000	-0.000
20	10	33.757	-0.000	0.000	20	33.757	-0.000	-0.000
21	11	25.032	-0.000	0.000	21	25.032	-0.000	-0.000
22	12	17.805	-0.000	0.000	22	17.805	-0.000	-0.000
23	13	13.115	-0.000	0.000	23	13.115	-0.000	-0.000
24	14	11.497	-0.000	0.000	24	11.497	-0.000	-0.000
25	15	13.115	0.000	-0.000	25	13.115	0.000	0.000
26	16	17.805	0.000	-0.000	26	17.805	0.000	0.000
27	17	25.032	0.000	-0.000	27	25.032	0.000	0.000
28	18	33.757	0.000	-0.000	28	33.757	0.000	0.000
29	7	21.123	-0.000	-0.000	29	21.123	-0.000	0.000

COMB. HIPOTESIS 07 01 1.50 02 1.60 11 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 7

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	21.123	-0.000
20	0.000	33.757	-0.000
21	0.000	25.032	-0.000
22	0.000	17.805	-0.000
23	0.000	13.115	-0.000
24	0.000	11.497	-0.000
25	-0.000	13.115	0.000
26	-0.000	17.805	0.000
27	-0.000	25.032	0.000
28	-0.000	33.757	0.000
29	0.000	21.123	0.000

COMB. HIPOTESIS 08 01 1.50 02 1.60 12 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 8

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01238	0.00216
2	-0.00339	-0.01253	0.00004
3	-0.00001	-0.01267	-0.00226
4	-0.00004	-0.01931	-0.00240
5	-0.00006	-0.02256	-0.00000
6	-0.00008	-0.01931	0.00240
7	-0.00012	-0.01238	-0.00216
8	0.00327	-0.01253	-0.00004
9	-0.00011	-0.01267	0.00226
10	-0.00001	-0.00989	0.00262
11	-0.00002	-0.00734	0.00242
12	-0.00004	-0.00522	0.00180
13	-0.00005	-0.00384	0.00095
14	-0.00006	-0.00337	-0.00000
15	-0.00007	-0.00384	-0.00095
16	-0.00008	-0.00522	-0.00180
17	-0.00010	-0.00734	-0.00242
18	-0.00011	-0.00989	-0.00262
19	0.00988	0.00000	0.00216
20	0.01198	0.00000	0.00262
21	0.01105	0.00000	0.00242
22	0.00822	0.00000	0.00180
23	0.00432	0.00000	0.00095
24	-0.00006	0.00000	-0.00000
25	-0.00444	0.00000	-0.00095
26	-0.00834	0.00000	-0.00180
27	-0.01117	0.00000	-0.00242
28	-0.01210	0.00000	-0.00262
29	-0.01000	0.00000	-0.00216

COMB. HIPOTESIS 08 01 1.50 02 1.60 12 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 8

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	106.736	29.611	-99.969	2	106.736	-2.428	-55.331
2	2	96.892	-2.428	-55.331	3	96.892	-24.412	-105.234
3	3	24.412	96.892	-105.234	4	24.412	48.446	71.896
4	4	24.412	48.446	71.896	5	24.412	-0.000	130.940
5	5	24.412	0.000	130.940	6	24.412	-48.446	71.896
6	6	24.412	-48.446	71.896	9	24.412	-96.892	-105.234
7	7	106.736	-29.611	99.969	8	106.736	2.428	55.331
8	8	96.892	2.428	55.331	9	96.892	24.412	105.234
9	1	29.611	-95.458	99.969	10	29.611	-95.458	6.898
10	10	29.611	-61.701	6.898	11	29.611	-61.701	-53.260
11	11	29.611	-36.669	-53.260	12	29.611	-36.669	-89.012
12	12	29.611	-18.864	-89.012	13	29.611	-18.864	-107.404
13	13	29.611	-5.749	-107.404	14	29.611	-5.749	-113.009
14	14	29.611	5.749	-113.009	15	29.611	5.749	-107.404
15	15	29.611	18.864	-107.404	16	29.611	18.864	-89.012
16	16	29.611	36.669	-89.012	17	29.611	36.669	-53.260
17	17	29.611	61.701	-53.260	18	29.611	61.701	6.898
18	7	29.611	95.458	-99.969	18	29.611	95.458	-6.898

COMB. HIPOTESIS 08 01 1.50 02 1.60 12 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 8

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	21.123	0.000	0.000	19	21.123	0.000	-0.000
20	10	33.757	-0.000	0.000	20	33.757	-0.000	-0.000
21	11	25.032	-0.000	0.000	21	25.032	-0.000	-0.000
22	12	17.805	-0.000	0.000	22	17.805	-0.000	-0.000
23	13	13.115	-0.000	0.000	23	13.115	-0.000	-0.000
24	14	11.497	-0.000	0.000	24	11.497	-0.000	-0.000
25	15	13.115	0.000	-0.000	25	13.115	0.000	0.000
26	16	17.805	0.000	-0.000	26	17.805	0.000	0.000
27	17	25.032	0.000	-0.000	27	25.032	0.000	0.000
28	18	33.757	0.000	-0.000	28	33.757	0.000	0.000
29	7	21.123	-0.000	-0.000	29	21.123	-0.000	0.000

COMB. HIPOTESIS 08 01 1.50 02 1.60 12 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 8

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	21.123	-0.000
20	0.000	33.757	-0.000
21	0.000	25.032	-0.000
22	0.000	17.805	-0.000
23	0.000	13.115	-0.000
24	0.000	11.497	-0.000
25	-0.000	13.115	0.000
26	-0.000	17.805	0.000
27	-0.000	25.032	0.000
28	-0.000	33.757	0.000
29	0.000	21.123	0.000

COMB. HIPOTESIS 09 01 1.50 02 1.60 13 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 9

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01238	0.00216
2	-0.00339	-0.01253	0.00004
3	-0.00001	-0.01267	-0.00226
4	-0.00004	-0.01931	-0.00240
5	-0.00006	-0.02256	-0.00000
6	-0.00008	-0.01931	0.00240
7	-0.00012	-0.01238	-0.00216
8	0.00327	-0.01253	-0.00004
9	-0.00011	-0.01267	0.00226
10	-0.00001	-0.00989	0.00262
11	-0.00002	-0.00734	0.00242
12	-0.00004	-0.00522	0.00180
13	-0.00005	-0.00384	0.00095
14	-0.00006	-0.00337	-0.00000
15	-0.00007	-0.00384	-0.00095
16	-0.00008	-0.00522	-0.00180
17	-0.00010	-0.00734	-0.00242
18	-0.00011	-0.00989	-0.00262
19	0.00988	0.00000	0.00216
20	0.01198	0.00000	0.00262
21	0.01105	0.00000	0.00242
22	0.00822	0.00000	0.00180
23	0.00432	0.00000	0.00095
24	-0.00006	0.00000	-0.00000
25	-0.00444	0.00000	-0.00095
26	-0.00834	0.00000	-0.00180
27	-0.01117	0.00000	-0.00242
28	-0.01210	0.00000	-0.00262
29	-0.01000	0.00000	-0.00216

COMB. HIPOTESIS 09 01 1.50 02 1.60 13 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 9

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	106.736	29.611	-99.969	2	106.736	-2.428	-55.331
2	2	96.892	-2.428	-55.331	3	96.892	-24.412	-105.234
3	3	24.412	96.892	-105.234	4	24.412	48.446	71.896
4	4	24.412	48.446	71.896	5	24.412	-0.000	130.940
5	5	24.412	0.000	130.940	6	24.412	-48.446	71.896
6	6	24.412	-48.446	71.896	9	24.412	-96.892	-105.234
7	7	106.736	-29.611	99.969	8	106.736	2.428	55.331
8	8	96.892	2.428	55.331	9	96.892	24.412	105.234
9	1	29.611	-95.458	99.969	10	29.611	-95.458	6.898
10	10	29.611	-61.701	6.898	11	29.611	-61.701	-53.260
11	11	29.611	-36.669	-53.260	12	29.611	-36.669	-89.012
12	12	29.611	-18.864	-89.012	13	29.611	-18.864	-107.404
13	13	29.611	-5.749	-107.404	14	29.611	-5.749	-113.009
14	14	29.611	5.749	-113.009	15	29.611	5.749	-107.404
15	15	29.611	18.864	-107.404	16	29.611	18.864	-89.012
16	16	29.611	36.669	-89.012	17	29.611	36.669	-53.260
17	17	29.611	61.701	-53.260	18	29.611	61.701	6.898
18	7	29.611	95.458	-99.969	18	29.611	95.458	-6.898

COMB. HIPOTESIS 09 01 1.50 02 1.60 13 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 9

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	21.123	0.000	0.000	19	21.123	0.000	-0.000
20	10	33.757	-0.000	0.000	20	33.757	-0.000	-0.000
21	11	25.032	-0.000	0.000	21	25.032	-0.000	-0.000
22	12	17.805	-0.000	0.000	22	17.805	-0.000	-0.000
23	13	13.115	-0.000	0.000	23	13.115	-0.000	-0.000
24	14	11.497	-0.000	0.000	24	11.497	-0.000	-0.000
25	15	13.115	0.000	-0.000	25	13.115	0.000	0.000
26	16	17.805	0.000	-0.000	26	17.805	0.000	0.000
27	17	25.032	0.000	-0.000	27	25.032	0.000	0.000
28	18	33.757	0.000	-0.000	28	33.757	0.000	0.000
29	7	21.123	-0.000	-0.000	29	21.123	-0.000	0.000

COMB. HIPOTESIS 09 01 1.50 02 1.60 13 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 9

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	21.123	-0.000
20	0.000	33.757	-0.000
21	0.000	25.032	-0.000
22	0.000	17.805	-0.000
23	0.000	13.115	-0.000
24	0.000	11.497	-0.000
25	-0.000	13.115	0.000
26	-0.000	17.805	0.000
27	-0.000	25.032	0.000
28	-0.000	33.757	0.000
29	0.000	21.123	0.000

COMB. HIPOTESIS 10 01 1.50 02 1.60 14 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 10

NUDO	@X	@Y	0Z
1	0.00000	-0.01299	0.00228
2	-0.00363	-0.01315	0.00004
3	-0.00001	-0.01330	-0.00240
4	-0.00003	-0.02034	-0.00255
5	-0.00006	-0.02378	-0.00000
6	-0.00008	-0.02034	0.00255
7	-0.00012	-0.01299	-0.00228
8	0.00351	-0.01315	-0.00004
9	-0.00011	-0.01330	0.00240
10	-0.00001	-0.01036	0.00276
11	-0.00002	-0.00767	0.00254
12	-0.00004	-0.00544	0.00189
13	-0.00005	-0.00400	0.00100
14	-0.00006	-0.00350	-0.00000
15	-0.00007	-0.00400	-0.00100
16	-0.00008	-0.00544	-0.00189
17	-0.00010	-0.00767	-0.00254
18	-0.00011	-0.01036	-0.00276
19	0.01047	0.00000	0.00228
20	0.01263	0.00000	0.00276
21	0.01163	0.00000	0.00254
22	0.00864	0.00000	0.00189
23	0.00454	0.00000	0.00100
24	-0.00006	0.00000	-0.00000
25	-0.00466	0.00000	-0.00100
26	-0.00876	0.00000	-0.00189
27	-0.01175	0.00000	-0.00254
28	-0.01275	0.00000	-0.00276
29	-0.01059	0.00000	-0.00228

COMB. HIPOTESIS 10 01 1.50 02 1.60 14 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 10

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	112.064	29.375	-103.580	2	112.064	-2.664	-59.769
2	2	102.219	-2.664	-59.769	3	102.219	-24.648	-110.498
3	3	24.648	102.219	-110.498	4	24.648	51.109	76.371
4	4	24.648	51.109	76.371	5	24.648	-0.000	138.661
5	5	24.648	0.000	138.661	6	24.648	-51.109	76.371
6	6	24.648	-51.109	76.371	9	24.648	-102.219	-110.498
7	7	112.064	-29.375	103.580	8	112.064	2.664	59.769
8	8	102.219	2.664	59.769	9	102.219	24.648	110.498
9	1	29.375	-99.745	103.580	10	29.375	-99.745	6.328
10	10	29.375	-64.384	6.328	11	29.375	-64.384	-56.446
11	11	29.375	-38.208	-56.446	12	29.375	-38.208	-93.698
12	12	29.375	-19.629	-93.699	13	29.375	-19.629	-112.837
13	13	29.375	-5.977	-112.837	14	29.375	-5.977	-118.664
14	14	29.375	5.977	-118.664	15	29.375	5.977	-112.837
15	15	29.375	19.629	-112.837	16	29.375	19.629	-93.699
16	16	29.375	38.208	-93.698	17	29.375	38.208	-56.446
17	17	29.375	64.384	-56.446	18	29.375	64.384	6.328
18	7	29.375	99.745	-103.580	18	29.375	99.745	-6.328

COMB. HIPOTESIS 10 01 1.50 02 1.60 14 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 10

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	22.163	0.000	0.000	19	22.163	0.000	-0.000
20	10	35.361	-0.000	0.000	20	35.361	-0.000	-0.000
21	11	26.176	-0.000	0.000	21	26.176	-0.000	-0.000
22	12	18.579	-0.000	0.000	22	18.579	-0.000	-0.000
23	13	13.652	-0.000	0.000	23	13.652	-0.000	-0.000
24	14	11.953	-0.000	0.000	24	11.953	-0.000	-0.000
25	15	13.652	0.000	-0.000	25	13.652	0.000	0.000
26	16	18.579	0.000	-0.000	26	18.579	0.000	0.000
27	17	26.176	0.000	-0.000	27	26.176	0.000	0.000
28	18	35.361	0.000	-0.000	28	35.361	0.000	0.000
29	7	22.163	-0.000	-0.000	29	22.163	-0.000	0.000

COMB. HIPOTESIS 10 01 1.50 02 1.60 14 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 10

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	0.000	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.000	-0.000	0.000
4	0.000	0.000	0.000
5	-0.000	0.000	0.000
6	0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	22.163	-0.000
20	0.000	35.361	-0.000
21	0.000	26.176	-0.000
22	0.000	18.579	-0.000
23	0.000	13.652	-0.000
24	0.000	11.953	-0.000
25	-0.000	13.652	0.000
26	-0.000	18.579	0.000
27	-0.000	26.176	0.000
28	-0.000	35.361	0.000
29	0.000	22.163	0.000

COMB. HIPOTESIS 11 01 1.50 03 1.60 04 1.60 05 1.60 09 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 11

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01068	0.00123
2	0.00006	-0.01084	-0.00070
3	0.00466	-0.01098	-0.00237
4	0.00462	-0.01785	-0.00251
5	0.00457	-0.02143	-0.00019
6	0.00453	-0.01886	0.00200
7	-0.00018	-0.01332	-0.00239
8	0.00477	-0.01349	-0.00078
9	0.00449	-0.01363	0.00146
10	-0.00002	-0.00897	0.00195
11	-0.00004	-0.00696	0.00196
12	-0.00005	-0.00519	0.00152
13	-0.00007	-0.00402	0.00079
14	-0.00009	-0.00366	-0.00010
15	-0.00011	-0.00422	-0.00104
16	-0.00012	-0.00568	-0.00190
17	-0.00014	-0.00791	-0.00256
18	-0.00016	-0.01063	-0.00281
19	0.00566	0.00000	0.00123
20	0.00890	0.00000	0.00195
21	0.00896	0.00000	0.00196
22	0.00691	0.00000	0.00152
23	0.00354	0.00000	0.00079
24	-0.00055	0.00000	-0.00010
25	-0.00485	0.00000	-0.00104
26	-0.00884	0.00000	-0.00190
27	-0.01187	0.00000	-0.00256
28	-0.01303	0.00000	-0.00281
29	-0.01111	0.00000	-0.00239

COMB. HIPOTESIS 11 01 1.50 03 1.60 04 1.60 05 1.60 09 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 11

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	105.804	59.325	-129.707	2	105.804	1.073	-28.682
2	2	95.959	1.073	-28.682	3	95.959	-41.167	-103.517
3	3	42.160	95.959	-103.517	4	42.160	46.730	70.385
4	4	42.160	46.730	70.385	5	42.160	-2.500	124.290
5	5	42.160	-2.500	124.290	6	42.160	-51.730	58.197
6	6	42.160	-51.730	58.197	9	42.160	-100.959	-127.893
7	7	110.804	-43.884	96.560	8	110.804	7.145	36.938
8	8	100.960	7.145	36.938	9	100.960	42.160	127.893
9	1	43.884	-97.415	129.707	10	43.884	-97.415	34.728
10	10	43.884	-66.797	34.728	11	43.884	-66.797	-30.399
11	11	43.884	-43.061	-30.399	12	43.884	-43.061	-72.383
12	12	43.884	-25.366	-72.383	13	43.884	-25.366	-97.115
13	13	43.884	-11.653	-97.115	14	43.884	-11.653	-108.476
14	14	43.884	0.854	-108.476	15	43.884	0.854	-107.643
15	15	43.884	15.259	-107.643	16	43.884	15.259	-92.766
16	16	43.884	34.638	-92.766	17	43.884	34.638	-58.994
17	17	43.884	61.634	-58.994	18	43.884	61.634	1.100
18	7	43.884	97.908	-96.560	18	43.884	97.908	-1.100

COMB. HIPOTESIS 11 01 1.50 03 1.60 04 1.60 05 1.60 09 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 11

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	18.234	0.000	0.000	19	18.234	0.000	-0.000
20	10	30.618	-0.000	0.000	20	30.618	-0.000	-0.000
21	11	23.735	-0.000	0.000	21	23.735	-0.000	-0.000
22	12	17.695	-0.000	0.000	22	17.695	-0.000	-0.000
23	13	13.713	-0.000	0.000	23	13.713	-0.000	-0.000
24	14	12.507	0.000	-0.000	24	12.507	0.000	0.000
25	15	14.404	0.000	-0.000	25	14.404	0.000	0.000
26	16	19.379	0.000	-0.000	26	19.379	0.000	0.000
27	17	26.996	0.000	-0.000	27	26.996	0.000	0.000
28	18	36.274	0.000	-0.000	28	36.274	0.000	0.000
29	7	22.740	-0.000	-0.000	29	22.740	-0.000	0.000

COMB. HIPOTESIS 11 01 1.50 03 1.60 04 1.60 05 1.60 09 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 11

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-15.442	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.994	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	18.234	-0.000
20	0.000	30.618	-0.000
21	0.000	23.735	-0.000
22	0.000	17.695	-0.000
23	0.000	13.713	-0.000
24	-0.000	12.507	0.000
25	-0.000	14.404	0.000
26	-0.000	19.379	0.000
27	-0.000	26.996	0.000
28	-0.000	36.274	0.000
29	0.000	22.740	0.000

COMB. HIPOTESIS 12 01 1.50 03 1.60 04 1.60 06 1.60 09 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 12

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01068	0.00123
2	0.00006	-0.01084	-0.00070
3	0.00466	-0.01098	-0.00237
4	0.00462	-0.01785	-0.00251
5	0.00457	-0.02143	-0.00019
6	0.00453	-0.01886	0.00200
7	-0.00018	-0.01332	-0.00239
8	0.00477	-0.01349	-0.00078
9	0.00449	-0.01363	0.00146
10	-0.00002	-0.00897	0.00195
11	-0.00004	-0.00696	0.00196
12	-0.00005	-0.00519	0.00152
13	-0.00007	-0.00402	0.00079
14	-0.00009	-0.00366	-0.00010
15	-0.00011	-0.00422	-0.00104
16	-0.00012	-0.00568	-0.00190
17	-0.00014	-0.00791	-0.00256
18	-0.00016	-0.01063	-0.00281
19	0.00566	0.00000	0.00123
20	0.00890	0.00000	0.00195
21	0.00896	0.00000	0.00196
22	0.00691	0.00000	0.00152
23	0.00354	0.00000	0.00079
24	-0.00055	0.00000	-0.00010
25	-0.00485	0.00000	-0.00104
26	-0.00884	0.00000	-0.00190
27	-0.01187	0.00000	-0.00256
28	-0.01303	0.00000	-0.00281
29	-0.01111	0.00000	-0.00239

COMB. HIPOTESIS 12 01 1.50 03 1.60 04 1.60 06 1.60 09 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 12

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	105.804	59.325	-129.707	2	105.804	1.073	-28.682
2	2	95.959	1.073	-28.682	3	95.959	-41.167	-103.517
3	3	42.160	95.959	-103.517	4	42.160	46.730	70.385
4	4	42.160	46.730	70.385	5	42.160	-2.500	124.290
5	5	42.160	-2.500	124.290	6	42.160	-51.730	58.197
6	6	42.160	-51.730	58.197	9	42.160	-100.959	-127.893
7	7	110.804	-43.884	96.560	8	110.804	7.145	36.938
8	8	100.960	7.145	36.938	9	100.960	42.160	127.893
9	1	43.884	-97.415	129.707	10	43.884	-97.415	34.728
10	10	43.884	-66.797	34.728	11	43.884	-66.797	-30.399
11	11	43.884	-43.061	-30.399	12	43.884	-43.061	-72.383
12	12	43.884	-25.366	-72.383	13	43.884	-25.366	-97.115
13	13	43.884	-11.653	-97.115	14	43.884	-11.653	-108.476
14	14	43.884	0.854	-108.476	15	43.884	0.854	-107.643
15	15	43.884	15.259	-107.643	16	43.884	15.259	-92.766
16	16	43.884	34.638	-92.766	17	43.884	34.638	-58.994
17	17	43.884	61.634	-58.994	18	43.884	61.634	1.100
18	7	43.884	97.908	-96.560	18	43.884	97.908	-1.100

COMB. HIPOTESIS 12 01 1.50 03 1.60 04 1.60 06 1.60 09 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 12

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	18.234	0.000	0.000	19	18.234	0.000	-0.000
20	10	30.618	-0.000	0.000	20	30.618	-0.000	-0.000
21	11	23.735	-0.000	0.000	21	23.735	-0.000	-0.000
22	12	17.695	-0.000	0.000	22	17.695	-0.000	-0.000
23	13	13.713	-0.000	0.000	23	13.713	-0.000	-0.000
24	14	12.507	0.000	-0.000	24	12.507	0.000	0.000
25	15	14.404	0.000	-0.000	25	14.404	0.000	0.000
26	16	19.379	0.000	-0.000	26	19.379	0.000	0.000
27	17	26.996	0.000	-0.000	27	26.996	0.000	0.000
28	18	36.274	0.000	-0.000	28	36.274	0.000	0.000
29	7	22.740	-0.000	-0.000	29	22.740	-0.000	0.000

COMB. HIPOTESIS 12 01 1.50 03 1.60 04 1.60 06 1.60 09 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 12

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-15.442	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.994	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	18.234	-0.000
20	0.000	30.618	-0.000
21	0.000	23.735	-0.000
22	0.000	17.695	-0.000
23	0.000	13.713	-0.000
24	-0.000	12.507	0.000
25	-0.000	14.404	0.000
26	-0.000	19.379	0.000
27	-0.000	26.996	0.000
28	-0.000	36.274	0.000
29	0.000	22.740	0.000

COMB. HIPOTESIS 13 01 1.50 03 1.60 04 1.60 07 1.60 09 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 13

NUDO	@X	@Y	@Z
1	0.00000	-0.01068	0.00123
2	0.00006	-0.01084	-0.00070
3	0.00466	-0.01098	-0.00237
4	0.00462	-0.01785	-0.00251
5	0.00457	-0.02143	-0.00019
6	0.00453	-0.01886	0.00200
7	-0.00018	-0.01332	-0.00239
8	0.00477	-0.01349	-0.00078
9	0.00449	-0.01363	0.00146
10	-0.00002	-0.00897	0.00195
11	-0.00004	-0.00696	0.00196
12	-0.00005	-0.00519	0.00152
13	-0.00007	-0.00402	0.00079
14	-0.00009	-0.00366	-0.00010
15	-0.00011	-0.00422	-0.00104
16	-0.00012	-0.00568	-0.00190
17	-0.00014	-0.00791	-0.00256
18	-0.00016	-0.01063	-0.00281
19	0.00566	0.00000	0.00123
20	0.00890	0.00000	0.00195
21	0.00896	0.00000	0.00196
22	0.00691	0.00000	0.00152
23	0.00354	0.00000	0.00079
24	-0.00055	0.00000	-0.00010
25	-0.00485	0.00000	-0.00104
26	-0.00884	0.00000	-0.00190
27	-0.01187	0.00000	-0.00256
28	-0.01303	0.00000	-0.00281
29	-0.01111	0.00000	-0.00239

COMB. HIPOTESIS 13 01 1.50 03 1.60 04 1.60 07 1.60 09 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 13

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	105.804	59.325	-129.707	2	105.804	1.073	-28.682
2	2	95.959	1.073	-28.682	3	95.959	-41.167	-103.517
3	3	42.160	95.959	-103.517	4	42.160	46.730	70.385
4	4	42.160	46.730	70.385	5	42.160	-2.500	124.290
5	5	42.160	-2.500	124.290	6	42.160	-51.730	58.197
6	6	42.160	-51.730	58.197	9	42.160	-100.959	-127.893
7	7	110.804	-43.884	96.560	8	110.804	7.145	36.938
8	8	100.960	7.145	36.938	9	100.960	42.160	127.893
9	1	43.884	-97.415	129.707	10	43.884	-97.415	34.728
10	10	43.884	-66.797	34.728	11	43.884	-66.797	-30.399
11	11	43.884	-43.061	-30.399	12	43.884	-43.061	-72.383
12	12	43.884	-25.366	-72.383	13	43.884	-25.366	-97.115
13	13	43.884	-11.653	-97.115	14	43.884	-11.653	-108.476
14	14	43.884	0.854	-108.476	15	43.884	0.854	-107.643
15	15	43.884	15.259	-107.643	16	43.884	15.259	-92.766
16	16	43.884	34.638	-92.766	17	43.884	34.638	-58.994
17	17	43.884	61.634	-58.994	18	43.884	61.634	1.100
18	7	43.884	97.908	-96.560	18	43.884	97.908	-1.100

COMB. HIPOTESIS 13 01 1.50 03 1.60 04 1.60 07 1.60 09 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 13

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	18.234	0.000	0.000	19	18.234	0.000	-0.000
20	10	30.618	-0.000	0.000	20	30.618	-0.000	-0.000
21	11	23.735	-0.000	0.000	21	23.735	-0.000	-0.000
22	12	17.695	-0.000	0.000	22	17.695	-0.000	-0.000
23	13	13.713	-0.000	0.000	23	13.713	-0.000	-0.000
24	14	12.507	0.000	-0.000	24	12.507	0.000	0.000
25	15	14.404	0.000	-0.000	25	14.404	0.000	0.000
26	16	19.379	0.000	-0.000	26	19.379	0.000	0.000
27	17	26.996	0.000	-0.000	27	26.996	0.000	0.000
28	18	36.274	0.000	-0.000	28	36.274	0.000	0.000
29	7	22.740	-0.000	-0.000	29	22.740	-0.000	0.000

COMB. HIPOTESIS 13 01 1.50 03 1.60 04 1.60 07 1.60 09 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 13

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-15.442	-9.845	0.000
2	-0.000	-9.845	-0.000
3	0.994	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	18.234	-0.000
20	0.000	30.618	-0.000
21	0.000	23.735	-0.000
22	0.000	17.695	-0.000
23	0.000	13.713	-0.000
24	-0.000	12.507	0.000
25	-0.000	14.404	0.000
26	-0.000	19.379	0.000
27	-0.000	26.996	0.000
28	-0.000	36.274	0.000
29	0.000	22.740	0.000

COMB. HIPOTESIS 14 01 1.50 03 1.60 04 1.60 08 1.60 10 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 14

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01108	0.00131
2	-0.00000	-0.01124	-0.00073
3	0.00488	-0.01139	-0.00250
4	0.00484	-0.01861	-0.00263
5	0.00480	-0.02235	-0.00019
6	0.00476	-0.01966	0.00210
7	-0.00018	-0.01385	-0.00251
8	0.00506	-0.01401	-0.00081
9	0.00471	-0.01417	0.00155
10	-0.00002	-0.00929	0.00203
11	-0.00004	-0.00718	0.00205
12	-0.00005	-0.00534	0.00158
13	-0.00007	-0.00413	0.00082
14	-0.00009	-0.00377	-0.00011
15	-0.00011	-0.00435	-0.00108
16	-0.00012	-0.00586	-0.00198
17	-0.00014	-0.00819	-0.00267
18	-0.00016	-0.01102	-0.00294
19	0.00598	0.00000	0.00131
20	0.00930	0.00000	0.00203
21	0.00934	0.00000	0.00205
22	0.00719	0.00000	0.00158
23	0.00367	0.00000	0.00082
24	-0.00058	0.00000	-0.00011
25	-0.00505	0.00000	-0.00108
26	-0.00920	0.00000	-0.00198
27	-0.01236	0.00000	-0.00267
28	-0.01361	0.00000	-0.00294
29	-0.01167	0.00000	-0.00251

COMB. HIPOTESIS 14 01 1.50 03 1.60 04 1.60 08 1.60 10 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 14

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	109.671	59.347	-133.096	2	109.671	1.094	-31.995
2	2	99.826	1.094	-31.995	3	99.826	-41.145	-106.754
3	3	42.537	99.826	-106.754	4	42.537	48.588	74.126
4	4	42.537	48.588	74.126	5	42.537	-2.650	130.114
5	5	42.537	-2.650	130.114	6	42.537	-53.888	61.208
6	6	42.537	-53.888	61.208	9	42.537	-105.126	-132.591
7	7	114.971	-43.507	98.621	8	114.971	7.522	40.318
8	8	105.126	7.522	40.318	9	105.126	42.537	132.591
9	1	43.507	-100.604	133.096	10	43.507	-100.604	35.007
10	10	43.507	-68.914	35.007	11	43.507	-68.914	-32.183
11	11	43.507	-44.397	-32.184	12	43.507	-44.397	-75.471
12	12	43.507	-26.162	-75.471	13	43.507	-26.162	-100.978
13	13	43.507	-12.062	-100.978	14	43.507	-12.062	-112.739
14	14	43.507	0.789	-112.739	15	43.507	0.789	-111.969
15	15	43.507	15.617	-111.969	16	43.507	15.617	-96.742
16	16	43.507	35.624	-96.742	17	43.507	35.624	-62.009
17	17	43.507	63.564	-62.009	18	43.507	63.564	-0.034
18	7	43.507	101.185	-98.621	18	43.507	101.185	0.034

COMB. HIPOTESIS 14 01 1.50 03 1.60 04 1.60 08 1.60 10 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 14

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	18.911	0.000	0.000	19	18.911	0.000	-0.000
20	10	31.691	-0.000	0.000	20	31.691	-0.000	-0.000
21	11	24.517	-0.000	0.000	21	24.517	-0.000	-0.000
22	12	18.235	-0.000	0.000	22	18.235	-0.000	-0.000
23	13	14.100	-0.000	0.000	23	14.100	-0.000	-0.000
24	14	12.851	0.000	-0.000	24	12.851	0.000	0.000
25	15	14.828	0.000	-0.000	25	14.828	0.000	0.000
26	16	20.006	0.000	-0.000	26	20.006	0.000	0.000
27	17	27.940	0.000	-0.000	27	27.940	0.000	0.000
28	18	37.621	0.000	-0.000	28	37.621	0.000	0.000
29	7	23.630	-0.000	-0.000	29	23.630	-0.000	0.000

COMB. HIPOTESIS 14 01 1.50 03 1.60 04 1.60 08 1.60 10 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 14

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-15.840	-9.845	0.000
2	-0.000	-9.845	-0.000
3	1.392	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	-0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	18.911	-0.000
20	0.000	31.691	-0.000
21	0.000	24.517	-0.000
22	0.000	18.235	-0.000
23	0.000	14.100	-0.000
24	-0.000	12.851	0.000
25	-0.000	14.828	0.000
26	-0.000	20.006	0.000
27	-0.000	27.940	0.000
28	-0.000	37.621	0.000
29	0.000	23.630	0.000

COMB. HIPOTESIS 15 01 1.50 03 1.60 04 1.60 11 1.60 15 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 15

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01013	0.00104
2	0.00081	-0.01028	-0.00091
3	0.00599	-0.01042	-0.00246
4	0.00595	-0.01742	-0.00253
5	0.00590	-0.02107	-0.00023
6	0.00586	-0.01869	0.00189
7	-0.00017	-0.01351	-0.00250
8	0.00537	-0.01367	-0.00098
9	0.00582	-0.01382	0.00128
10	-0.00002	-0.00860	0.00179
11	-0.00003	-0.00671	0.00184
12	-0.00005	-0.00504	0.00144
13	-0.00007	-0.00394	0.00073
14	-0.00009	-0.00363	-0.00013
15	-0.00010	-0.00421	-0.00106
16	-0.00012	-0.00569	-0.00193
17	-0.00014	-0.00795	-0.00260
18	-0.00016	-0.01073	-0.00288
19	0.00479	0.00000	0.00104
20	0.00817	0.00000	0.00179
21	0.00842	0.00000	0.00184
22	0.00653	0.00000	0.00144
23	0.00330	0.00000	0.00073
24	-0.00070	0.00000	-0.00013
25	-0.00496	0.00000	-0.00106
26	-0.00897	0.00000	-0.00193
27	-0.01207	0.00000	-0.00260
28	-0.01337	0.00000	-0.00288
29	-0.01163	0.00000	-0.00250

COMB. HIPOTESIS 15 01 1.50 03 1.60 04 1.60 11 1.60 15 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 15

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	103.347	60.580	-132.599	2	103.347	2.328	-27.180
2	2	93.503	2.328	-27.180	3	93.503	-39.912	-97.622
3	3	43.268	93.503	-97.622	4	43.268	45.057	71.248
4	4	43.268	45.057	71.248	5	43.268	-3.389	122.031
5	5	43.268	-3.389	122.031	6	43.268	-51.835	54.727
6	6	43.268	-51.835	54.727	9	43.268	-100.280	-130.664
7	7	110.125	-42.776	91.575	8	110.125	8.253	35.831
8	8	100.281	8.253	35.831	9	100.281	43.268	130.664
9	1	42.776	-95.896	132.599	10	42.776	-95.896	39.100
10	10	42.776	-66.564	39.100	11	42.776	-66.564	-25.800
11	11	42.776	-43.649	-25.800	12	42.776	-43.649	-68.357
12	12	42.776	-26.440	-68.357	13	42.776	-26.440	-94.136
13	13	42.776	-12.993	-94.136	14	42.776	-12.993	-106.804
14	14	42.776	-0.619	-106.804	15	42.776	-0.619	-107.408
15	15	42.776	13.738	-107.408	16	42.776	13.738	-94.013
16	16	42.776	33.149	-94.013	17	42.776	33.149	-61.693
17	17	42.776	60.292	-61.693	18	42.776	60.292	-2.908
18	7	42.776	96.906	-91.575	18	42.776	96.906	2.908

COMB. HIPOTESIS 15 01 1.50 03 1.60 04 1.60 11 1.60 15 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 15

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	17.296	0.000	0.000	19	17.296	0.000	-0.000
20	10	29.332	-0.000	0.000	20	29.332	-0.000	-0.000
21	11	22.915	-0.000	0.000	21	22.915	-0.000	-0.000
22	12	17.209	-0.000	0.000	22	17.209	-0.000	-0.000
23	13	13.447	-0.000	0.000	23	13.447	-0.000	-0.000
24	14	12.374	0.000	-0.000	24	12.374	0.000	0.000
25	15	14.357	0.000	-0.000	25	14.357	0.000	0.000
26	16	19.411	0.000	-0.000	26	19.411	0.000	0.000
27	17	27.143	0.000	-0.000	27	27.143	0.000	0.000
28	18	36.614	0.000	-0.000	28	36.614	0.000	0.000
29	7	23.064	-0.000	-0.000	29	23.064	-0.000	0.000

COMB. HIPOTESIS 15 01 1.50 03 1.60 04 1.60 11 1.60 15 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 15

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-17.805	-9.845	0.000
2	-0.000	-9.845	-0.000
3	3.357	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	17.296	-0.000
20	0.000	29.332	-0.000
21	0.000	22.915	-0.000
22	0.000	17.209	-0.000
23	0.000	13.447	-0.000
24	-0.000	12.374	0.000
25	-0.000	14.357	0.000
26	-0.000	19.411	0.000
27	-0.000	27.143	0.000
28	-0.000	36.614	0.000
29	0.000	23.064	0.000

COMB. HIPOTESIS 16 01 1.50 03 1.60 04 1.60 12 1.60 15 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 16

NUDO	@X	@Y	@Z
1	0.00000	-0.01013	0.00104
2	0.00081	-0.01028	-0.00091
3	0.00599	-0.01042	-0.00246
4	0.00595	-0.01742	-0.00253
5	0.00590	-0.02107	-0.00023
6	0.00586	-0.01869	0.00189
7	-0.00017	-0.01351	-0.00250
8	0.00537	-0.01367	-0.00098
9	0.00582	-0.01382	0.00128
10	-0.00002	-0.00860	0.00179
11	-0.00003	-0.00671	0.00184
12	-0.00005	-0.00504	0.00144
13	-0.00007	-0.00394	0.00073
14	-0.00009	-0.00363	-0.00013
15	-0.00010	-0.00421	-0.00106
16	-0.00012	-0.00569	-0.00193
17	-0.00014	-0.00795	-0.00260
18	-0.00016	-0.01073	-0.00288
19	0.00479	0.00000	0.00104
20	0.00817	0.00000	0.00179
21	0.00842	0.00000	0.00184
22	0.00653	0.00000	0.00144
23	0.00330	0.00000	0.00073
24	-0.00070	0.00000	-0.00013
25	-0.00496	0.00000	-0.00106
26	-0.00897	0.00000	-0.00193
27	-0.01207	0.00000	-0.00260
28	-0.01337	0.00000	-0.00288
29	-0.01163	0.00000	-0.00250

COMB. HIPOTESIS 16 01 1.50 03 1.60 04 1.60 12 1.60 15 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 16

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	103.347	60.580	-132.599	2	103.347	2.328	-27.180
2	2	93.503	2.328	-27.180	3	93.503	-39.912	-97.622
3	3	43.268	93.503	-97.622	4	43.268	45.057	71.248
4	4	43.268	45.057	71.248	5	43.268	-3.389	122.031
5	5	43.268	-3.389	122.031	6	43.268	-51.835	54.727
6	6	43.268	-51.835	54.727	9	43.268	-100.280	-130.664
7	7	110.125	-42.776	91.575	8	110.125	8.253	35.831
8	8	100.281	8.253	35.831	9	100.281	43.268	130.664
9	1	42.776	-95.896	132.599	10	42.776	-95.896	39.100
10	10	42.776	-66.564	39.100	11	42.776	-66.564	-25.800
11	11	42.776	-43.649	-25.800	12	42.776	-43.649	-68.357
12	12	42.776	-26.440	-68.357	13	42.776	-26.440	-94.136
13	13	42.776	-12.993	-94.136	14	42.776	-12.993	-106.804
14	14	42.776	-0.619	-106.804	15	42.776	-0.619	-107.408
15	15	42.776	13.738	-107.408	16	42.776	13.738	-94.013
16	16	42.776	33.149	-94.013	17	42.776	33.149	-61.693
17	17	42.776	60.292	-61.693	18	42.776	60.292	-2.908
18	7	42.776	96.906	-91.575	18	42.776	96.906	2.908

COMB. HIPOTESIS 16 01 1.50 03 1.60 04 1.60 12 1.60 15 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 16

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	17.296	0.000	0.000	19	17.296	0.000	-0.000
20	10	29.332	-0.000	0.000	20	29.332	-0.000	-0.000
21	11	22.915	-0.000	0.000	21	22.915	-0.000	-0.000
22	12	17.209	-0.000	0.000	22	17.209	-0.000	-0.000
23	13	13.447	-0.000	0.000	23	13.447	-0.000	-0.000
24	14	12.374	0.000	-0.000	24	12.374	0.000	0.000
25	15	14.357	0.000	-0.000	25	14.357	0.000	0.000
26	16	19.411	0.000	-0.000	26	19.411	0.000	0.000
27	17	27.143	0.000	-0.000	27	27.143	0.000	0.000
28	18	36.614	0.000	-0.000	28	36.614	0.000	0.000
29	7	23.064	-0.000	-0.000	29	23.064	-0.000	0.000

COMB. HIPOTESIS 16 01 1.50 03 1.60 04 1.60 12 1.60 15 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 16

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-17.805	-9.845	0.000
2	-0.000	-9.845	-0.000
3	3.357	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	17.296	-0.000
20	0.000	29.332	-0.000
21	0.000	22.915	-0.000
22	0.000	17.209	-0.000
23	0.000	13.447	-0.000
24	-0.000	12.374	0.000
25	-0.000	14.357	0.000
26	-0.000	19.411	0.000
27	-0.000	27.143	0.000
28	-0.000	36.614	0.000
29	0.000	23.064	0.000

COMB. HIPOTESIS 17 01 1.50 03 1.60 04 1.60 13 1.60 15 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 17

NUDO	∂X	∂Y	∂Z
1	0.00000	-0.01013	0.00104
2	0.00081	-0.01028	-0.00091
3	0.00599	-0.01042	-0.00246
4	0.00595	-0.01742	-0.00253
5	0.00590	-0.02107	-0.00023
6	0.00586	-0.01869	0.00189
7	-0.00017	-0.01351	-0.00250
8	0.00537	-0.01367	-0.00098
9	0.00582	-0.01382	0.00128
10	-0.00002	-0.00860	0.00179
11	-0.00003	-0.00671	0.00184
12	-0.00005	-0.00504	0.00144
13	-0.00007	-0.00394	0.00073
14	-0.00009	-0.00363	-0.00013
15	-0.00010	-0.00421	-0.00106
16	-0.00012	-0.00569	-0.00193
17	-0.00014	-0.00795	-0.00260
18	-0.00016	-0.01073	-0.00288
19	0.00479	0.00000	0.00104
20	0.00817	0.00000	0.00179
21	0.00842	0.00000	0.00184
22	0.00653	0.00000	0.00144
23	0.00330	0.00000	0.00073
24	-0.00070	0.00000	-0.00013
25	-0.00496	0.00000	-0.00106
26	-0.00897	0.00000	-0.00193
27	-0.01207	0.00000	-0.00260
28	-0.01337	0.00000	-0.00288
29	-0.01163	0.00000	-0.00250

COMB. HIPOTESIS 17 01 1.50 03 1.60 04 1.60 13 1.60 15 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 17

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	103.347	60.580	-132.599	2	103.347	2.328	-27.180
2	2	93.503	2.328	-27.180	3	93.503	-39.912	-97.622
3	3	43.268	93.503	-97.622	4	43.268	45.057	71.248
4	4	43.268	45.057	71.248	5	43.268	-3.389	122.031
5	5	43.268	-3.389	122.031	6	43.268	-51.835	54.727
6	6	43.268	-51.835	54.727	9	43.268	-100.280	-130.664
7	7	110.125	-42.776	91.575	8	110.125	8.253	35.831
8	8	100.281	8.253	35.831	9	100.281	43.268	130.664
9	1	42.776	-95.896	132.599	10	42.776	-95.896	39.100
10	10	42.776	-66.564	39.100	11	42.776	-66.564	-25.800
11	11	42.776	-43.649	-25.800	12	42.776	-43.649	-68.357
12	12	42.776	-26.440	-68.357	13	42.776	-26.440	-94.136
13	13	42.776	-12.993	-94.136	14	42.776	-12.993	-106.804
14	14	42.776	-0.619	-106.804	15	42.776	-0.619	-107.408
15	15	42.776	13.738	-107.408	16	42.776	13.738	-94.013
16	16	42.776	33.149	-94.013	17	42.776	33.149	-61.693
17	17	42.776	60.292	-61.693	18	42.776	60.292	-2.908
18	7	42.776	96.906	-91.575	18	42.776	96.906	2.908

COMB. HIPOTESIS 17 01 1.50 03 1.60 04 1.60 13 1.60 15 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 17

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	17.296	0.000	0.000	19	17.296	0.000	-0.000
20	10	29.332	-0.000	0.000	20	29.332	-0.000	-0.000
21	11	22.915	-0.000	0.000	21	22.915	-0.000	-0.000
22	12	17.209	-0.000	0.000	22	17.209	-0.000	-0.000
23	13	13.447	-0.000	0.000	23	13.447	-0.000	-0.000
24	14	12.374	0.000	-0.000	24	12.374	0.000	0.000
25	15	14.357	0.000	-0.000	25	14.357	0.000	0.000
26	16	19.411	0.000	-0.000	26	19.411	0.000	0.000
27	17	27.143	0.000	-0.000	27	27.143	0.000	0.000
28	18	36.614	0.000	-0.000	28	36.614	0.000	0.000
29	7	23.064	-0.000	-0.000	29	23.064	-0.000	0.000

COMB. HIPOTESIS 17 01 1.50 03 1.60 04 1.60 13 1.60 15 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 17

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-17.805	-9.845	0.000
2	-0.000	-9.845	-0.000
3	3.357	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	17.296	-0.000
20	0.000	29.332	-0.000
21	0.000	22.915	-0.000
22	0.000	17.209	-0.000
23	0.000	13.447	-0.000
24	-0.000	12.374	0.000
25	-0.000	14.357	0.000
26	-0.000	19.411	0.000
27	-0.000	27.143	0.000
28	-0.000	36.614	0.000
29	0.000	23.064	0.000

COMB. HIPOTESIS 18 01 1.50 03 1.60 04 1.60 14 1.60 16 1.60

DESPLAZAMIENTO DE NUDOS. COMBINACION 18

NUDO	@X	@Y	@Z
1	0.00000	-0.01070	0.00115
2	0.00066	-0.01085	-0.00093
3	0.00617	-0.01100	-0.00263
4	0.00612	-0.01844	-0.00269
5	0.00608	-0.02229	-0.00024
6	0.00603	-0.01973	0.00202
7	-0.00017	-0.01417	-0.00265
8	0.00570	-0.01434	-0.00102
9	0.00599	-0.01449	0.00141
10	-0.00002	-0.00903	0.00191
11	-0.00003	-0.00703	0.00196
12	-0.00005	-0.00526	0.00152
13	-0.00007	-0.00409	0.00078
14	-0.00009	-0.00376	-0.00014
15	-0.00010	-0.00437	-0.00111
16	-0.00012	-0.00592	-0.00203
17	-0.00014	-0.00831	-0.00274
18	-0.00015	-0.01123	-0.00304
19	0.00529	0.00000	0.00115
20	0.00875	0.00000	0.00191
21	0.00894	0.00000	0.00196
22	0.00692	0.00000	0.00152
23	0.00349	0.00000	0.00078
24	-0.00072	0.00000	-0.00014
25	-0.00520	0.00000	-0.00111
26	-0.00942	0.00000	-0.00203
27	-0.01269	0.00000	-0.00274
28	-0.01409	0.00000	-0.00304
29	-0.01231	0.00000	-0.00265

COMB. HIPOTESIS 18 01 1.50 03 1.60 04 1.60 14 1.60 16 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 18

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
1	1	108.560	60.497	-136.720	2	108.560	2.245	-31.592
2	2	98.715	2.245	-31.592	3	98.715	-39.995	-102.324
3	3	43.657	98.715	-102.324	4	43.657	47.606	76.004
4	4	43.657	47.606	76.004	5	43.657	-3.504	129.753
5	5	43.657	-3.504	129.753	6	43.657	-54.613	58.923
6	6	43.657	-54.613	58.923	9	43.657	-105.723	-136.487
7	7	115.567	-42.387	94.678	8	115.567	8.642	40.294
8	8	105.723	8.642	40.294	9	105.723	43.657	136.487
9	1	42.387	-100.150	136.720	10	42.387	-100.150	39.074
10	10	42.387	-69.319	39.074	11	42.387	-69.319	-28.512
11	11	42.387	-45.322	-28.512	12	42.387	-45.322	-72.701
12	12	42.387	-27.373	-72.701	13	42.387	-27.373	-99.390
13	13	42.387	-13.403	-99.390	14	42.387	-13.403	-112.458
14	14	42.387	-0.573	-112.458	15	42.387	-0.573	-113.017
15	15	42.387	14.336	-113.017	16	42.387	14.336	-99.039
16	16	42.387	34.554	-99.039	17	42.387	34.554	-65.349
17	17	42.387	62.904	-65.349	18	42.387	62.904	-4.018
18	7	42.387	101.227	-94.678	18	42.387	101.227	4.018

COMB. HIPOTESIS 18 01 1.50 03 1.60 04 1.60 14 1.60 16 1.60

ESFUERZOS EN BARRAS (EJES LOCALES) COMBINACION 18

BARRA	NUDO	FX	FY	MZ	NUDO	FX	FY	MZ
19	1	18.254	0.000	0.000	19	18.254	0.000	-0.000
20	10	30.831	-0.000	0.000	20	30.831	-0.000	-0.000
21	11	23.997	-0.000	0.000	21	23.997	-0.000	-0.000
22	12	17.949	-0.000	0.000	22	17.949	-0.000	-0.000
23	13	13.970	-0.000	0.000	23	13.970	-0.000	-0.000
24	14	12.830	0.000	-0.000	24	12.830	0.000	0.000
25	15	14.909	0.000	-0.000	25	14.909	0.000	0.000
26	16	20.218	0.000	-0.000	26	20.218	0.000	0.000
27	17	28.350	0.000	-0.000	27	28.350	0.000	0.000
28	18	38.323	0.000	-0.000	28	38.323	0.000	0.000
29	7	24.185	-0.000	-0.000	29	24.185	-0.000	0.000

COMB. HIPOTESIS 18 01 1.50 03 1.60 04 1.60 14 1.60 16 1.60

REACCIONES EN NUDOS (EJES GENERALES) COMBINACION 18

NUDO	FUERZA X	FUERZA Y	MOMENTO Z
1	-18.110	-9.845	0.000
2	-0.000	-9.845	-0.000
3	3.662	-0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	-0.000	0.000	-0.000
7	-0.000	-9.845	-0.000
8	0.000	-9.845	-0.000
9	0.000	-0.000	-0.000
10	-0.000	-0.000	0.000
11	-0.000	0.000	0.000
12	-0.000	0.000	0.000
13	-0.000	0.000	0.000
14	0.000	0.000	-0.000
15	0.000	0.000	-0.000
16	0.000	0.000	-0.000
17	0.000	0.000	-0.000
18	0.000	-0.000	-0.000
19	-0.000	18.254	-0.000
20	0.000	30.831	-0.000
21	0.000	23.997	-0.000
22	0.000	17.949	-0.000
23	0.000	13.970	-0.000
24	-0.000	12.830	0.000
25	-0.000	14.909	0.000
26	-0.000	20.218	0.000
27	-0.000	28.350	0.000
28	-0.000	38.323	0.000
29	0.000	24.185	0.000

TOTALES DE LAS COMBINACIONES ESTUDIADAS

DESPLAZAMIENTO DE NUDOS. P.I. ESTRUCTURA E-11 ZONAS LATER

NUDO	@X SUMA(+)	@X SUMA(-)	@X TOTAL	@Y SUMA(+)	@Y SUMA(-)	@Y TOTAL	@Z SUMA(+)	@Z SUMA(-)	@Z TOTAL
1	0.000	0.000	0.000	0.000	-0.205	-0.205	0.029	0.000	0.029
2	0.003	-0.030	-0.026	0.000	-0.208	-0.208	0.000	-0.007	-0.007
3	0.047	-0.000	0.047	0.000	-0.210	-0.210	0.000	-0.042	-0.042
4	0.047	-0.000	0.046	0.000	-0.332	-0.332	0.000	-0.044	-0.044
5	0.046	-0.001	0.046	0.000	-0.393	-0.393	0.000	-0.002	-0.002
6	0.046	-0.001	0.045	0.000	-0.342	-0.342	0.039	0.000	0.039
7	0.000	-0.003	-0.003	0.000	-0.232	-0.232	0.000	-0.041	-0.041
8	0.074	0.000	0.074	0.000	-0.234	-0.234	0.000	-0.008	-0.008
9	0.046	-0.001	0.044	0.000	-0.237	-0.237	0.032	0.000	0.032
10	0.000	-0.000	-0.000	0.000	-0.168	-0.168	0.040	0.000	0.040
11	0.000	-0.001	-0.001	0.000	-0.128	-0.128	0.039	0.000	0.039
12	0.000	-0.001	-0.001	0.000	-0.093	-0.093	0.029	0.000	0.029
13	0.000	-0.001	-0.001	0.000	-0.071	-0.071	0.015	0.000	0.015
14	0.000	-0.001	-0.001	0.000	-0.063	-0.063	0.000	-0.001	-0.001
15	0.000	-0.002	-0.002	0.000	-0.073	-0.073	0.000	-0.018	-0.018
16	0.000	-0.002	-0.002	0.000	-0.098	-0.098	0.000	-0.033	-0.033
17	0.000	-0.002	-0.002	0.000	-0.137	-0.137	0.000	-0.045	-0.045
18	0.000	-0.002	-0.002	0.000	-0.185	-0.185	0.000	-0.049	-0.049
19	0.135	0.000	0.135	0.000	0.000	0.000	0.029	0.000	0.029
20	0.184	0.000	0.184	0.000	0.000	0.000	0.040	0.000	0.040
21	0.177	0.000	0.177	0.000	0.000	0.000	0.039	0.000	0.039
22	0.134	0.000	0.134	0.000	0.000	0.000	0.029	0.000	0.029
23	0.069	0.000	0.069	0.000	0.000	0.000	0.015	0.000	0.015
24	0.000	-0.006	-0.006	0.000	0.000	0.000	0.000	-0.001	-0.001
25	0.000	-0.084	-0.084	0.000	0.000	0.000	0.000	-0.018	-0.018
26	0.000	-0.155	-0.155	0.000	0.000	0.000	0.000	-0.033	-0.033
27	0.000	-0.207	-0.207	0.000	0.000	0.000	0.000	-0.045	-0.045
28	0.000	-0.226	-0.226	0.000	0.000	0.000	0.000	-0.049	-0.049
29	0.000	-0.191	-0.191	0.000	0.000	0.000	0.000	-0.041	-0.041

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 1 BARRA 1

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	100.6	100.6	98.5	108.3	108.3	108.3	106.7	106.7	106.7	112.1			
FX	105.8	105.8	105.8	109.7	103.3	103.3	103.3	108.6	1902.7	0.0	1902.7	10	3
FY	29.9	48.3	59.2	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FY	59.3	59.3	59.3	59.3	60.6	60.6	60.6	60.5	823.7	0.0	823.7	15	10
MZ	-95.8	-105.7	-122.8	-101.0	-101.0	-101.0	-100.0	-100.0	-100.0	-103.6			
MZ	-129.7	-129.7	-129.7	-133.1	-132.6	-132.6	-132.6	-136.7	0.0	-2087.7	-2087.7	1	18

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 1 BARRA 9

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	-90.5	-91.3	-91.4	-96.7	-96.7	-96.7	-95.5	-95.5	-95.5	-99.7			
FY	-97.4	-97.4	-97.4	-100.6	-95.9	-95.9	-95.9	-100.2	0.0	-1730.2	-1730.2	1	14
MZ	95.8	105.7	122.8	101.0	101.0	101.0	100.0	100.0	100.0	103.6			
MZ	129.7	129.7	129.7	133.1	132.6	132.6	132.6	136.7	2087.7	0.0	2087.7	18	1

NUDO 1 BARRA 19

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
	19.9	19.2	17.0	21.4	21.4	21.4	21.1	21.1	21.1	22.2			
	18.2	18.2	18.2	18.9	17.3	17.3	17.3	18.3	349.7	0.0	349.7	10	3
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	15
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	15

NUDO 2 BARRA 1

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	100.6	100.6	98.5	108.3	108.3	108.3	106.7	106.7	106.7	112.1			
FX	105.8	105.8	105.8	109.7	103.3	103.3	103.3	108.6	1902.7	0.0	1902.7	10	3
FY	-2.2	-2.8	0.9	-2.5	-2.5	-2.5	-2.4	-2.4	-2.4	-2.7			
FY	1.1	1.1	1.1	1.1	2.3	2.3	2.3	2.2	14.5	-22.4	-7.9	15	2
MZ	-50.3	-30.8	-22.4	-56.6	-56.6	-56.6	-55.3	-55.3	-55.3	-59.8			
MZ	-28.7	-28.7	-28.7	-32.0	-27.2	-27.2	-27.2	-31.6	0.0	-730.3	-730.3	3	10

NUDO 2 BARRA 2

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	90.8	90.8	88.7	98.5	98.5	98.5	96.9	96.9	96.9	102.2			
FX	96.0	96.0	96.0	99.8	93.5	93.5	93.5	98.7	1725.4	0.0	1725.4	10	3
FY	-2.2	-2.8	0.9	-2.5	-2.5	-2.5	-2.4	-2.4	-2.4	-2.7			
FY	1.1	1.1	1.1	1.1	2.3	2.3	2.3	2.2	14.5	-22.4	-7.9	15	2
MZ	-50.3	-30.8	-22.4	-56.6	-56.6	-56.6	-55.3	-55.3	-55.3	-59.8			
MZ	-28.7	-28.7	-28.7	-32.0	-27.2	-27.2	-27.2	-31.6	0.0	-730.3	-730.3	3	10

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 3 BARRA 2

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	90.8	90.8	88.7	98.5	98.5	98.5	96.9	96.9	96.9	102.2			
FX	96.0	96.0	96.0	99.8	93.5	93.5	93.5	98.7	1725.4	0.0	1725.4	10	3
FY	-24.1	-37.8	-41.3	-24.5	-24.5	-24.5	-24.4	-24.4	-24.4	-24.6			
FY	-41.2	-41.2	-41.2	-41.1	-39.9	-39.9	-39.9	-40.0	0.0	-599.0	-599.0	1	3
MZ	-99.2	-106.5	-97.8	-106.8	-106.8	-106.8	-105.2	-105.2	-105.2	-110.5			
MZ	-103.5	-103.5	-103.5	-106.8	-97.6	-97.6	-97.6	-102.3	0.0	-1862.5	-1862.5	15	10

NUDO 3 BARRA 3

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.5	24.5	24.5	24.4	24.4	24.4	24.6			
FX	42.2	42.2	42.2	42.5	43.3	43.3	43.3	43.7	617.1	0.0	617.1	18	1
FY	90.8	90.8	88.7	98.5	98.5	98.5	96.9	96.9	96.9	102.2			
FY	96.0	96.0	96.0	99.8	93.5	93.5	93.5	98.7	1725.4	0.0	1725.4	10	3
MZ	-99.2	-106.5	-97.8	-106.8	-106.8	-106.8	-105.2	-105.2	-105.2	-110.5			
MZ	-103.5	-103.5	-103.5	-106.8	-97.6	-97.6	-97.6	-102.3	0.0	-1862.5	-1862.5	15	10

NUDO 4 BARRA 3

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.5	24.5	24.5	24.4	24.4	24.4	24.6			
FX	42.2	42.2	42.2	42.5	43.3	43.3	43.3	43.7	617.1	0.0	617.1	18	1
FY	45.4	45.4	43.3	49.2	49.2	49.2	48.4	48.4	48.4	51.1			
FY	46.7	46.7	46.7	48.6	45.1	45.1	45.1	47.6	849.8	0.0	849.8	10	3
MZ	66.8	59.5	63.0	73.2	73.2	73.2	71.9	71.9	71.9	76.4			
MZ	70.4	70.4	70.4	74.1	71.2	71.2	71.2	76.0	1276.0	0.0	1276.0	10	2

NUDO 4 BARRA 4

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.5	24.5	24.5	24.4	24.4	24.4	24.6			
FX	42.2	42.2	42.2	42.5	43.3	43.3	43.3	43.7	617.1	0.0	617.1	18	1
FY	45.4	45.4	43.3	49.2	49.2	49.2	48.4	48.4	48.4	51.1			
FY	46.7	46.7	46.7	48.6	45.1	45.1	45.1	47.6	849.8	0.0	849.8	10	3
MZ	66.8	59.5	63.0	73.2	73.2	73.2	71.9	71.9	71.9	76.4			
MZ	70.4	70.4	70.4	74.1	71.2	71.2	71.2	76.0	1276.0	0.0	1276.0	10	2

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 5 BARRA 4

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.5	24.5	24.5	24.4	24.4	24.4	24.6			
FX	42.2	42.2	42.2	42.5	43.3	43.3	43.3	43.7	617.1	0.0	617.1	18	1
FY	-0.0	-0.0	-2.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-2.5	-2.5	-2.5	-2.6	-3.4	-3.4	-3.4	-3.5	0.0	-25.9	-25.9	2	18
MZ	122.1	114.8	113.2	133.2	133.2	133.2	130.9	130.9	130.9	138.7			
MZ	124.3	124.3	124.3	130.1	122.0	122.0	122.0	129.8	2280.0	0.0	2280.0	10	3

NUDO 5 BARRA 5

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.5	24.5	24.5	24.4	24.4	24.4	24.6			
FX	42.2	42.2	42.2	42.5	43.3	43.3	43.3	43.7	617.1	0.0	617.1	18	1
FY	0.0	0.0	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	-2.5	-2.5	-2.5	-2.6	-3.4	-3.4	-3.4	-3.5	0.0	-25.9	-25.9	10	18
MZ	122.1	114.8	113.2	133.2	133.2	133.2	130.9	130.9	130.9	138.7			
MZ	124.3	124.3	124.3	130.1	122.0	122.0	122.0	129.8	2280.0	0.0	2280.0	10	3

NUDO 6 BARRA 5

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.5	24.5	24.5	24.4	24.4	24.4	24.6			
FX	42.2	42.2	42.2	42.5	43.3	43.3	43.3	43.7	617.1	0.0	617.1	18	1
FY	-45.4	-45.4	-47.5	-49.2	-49.2	-49.2	-48.4	-48.4	-48.4	-51.1			
FY	-51.7	-51.7	-51.7	-53.9	-51.8	-51.8	-51.8	-54.6	0.0	-901.6	-901.6	1	18
MZ	66.8	59.5	52.7	73.2	73.2	73.2	71.9	71.9	71.9	76.4			
MZ	58.2	58.2	58.2	61.2	54.7	54.7	54.7	58.9	1149.5	0.0	1149.5	10	3

NUDO 6 BARRA 6

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	24.1	37.8	41.3	24.5	24.5	24.5	24.4	24.4	24.4	24.6			
FX	42.2	42.2	42.2	42.5	43.3	43.3	43.3	43.7	617.1	0.0	617.1	18	1
FY	-45.4	-45.4	-47.5	-49.2	-49.2	-49.2	-48.4	-48.4	-48.4	-51.1			
FY	-51.7	-51.7	-51.7	-53.9	-51.8	-51.8	-51.8	-54.6	0.0	-901.6	-901.6	1	18
MZ	66.8	59.5	52.7	73.2	73.2	73.2	71.9	71.9	71.9	76.4			
MZ	58.2	58.2	58.2	61.2	54.7	54.7	54.7	58.9	1149.5	0.0	1149.5	10	3

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 7 BARRA 7

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	100.6	100.6	102.8	108.3	108.3	108.3	106.7	106.7	106.7	112.1			
FX	110.8	110.8	110.8	115.0	110.1	110.1	110.1	115.6	1954.5	0.0	1954.5	18	1
FY	-29.9	-48.3	-44.7	-29.5	-29.5	-29.5	-29.6	-29.6	-29.6	-29.4			
FY	-43.9	-43.9	-43.9	-43.5	-42.8	-42.8	-42.8	-42.4	0.0	-675.6	-675.6	10	2
MZ	95.8	105.7	93.0	101.0	101.0	101.0	100.0	100.0	100.0	103.6			
MZ	96.6	96.6	96.6	98.6	91.6	91.6	91.6	94.7	1758.9	0.0	1758.9	2	15

NUDO 7 BARRA 18

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	90.5	91.3	91.6	96.7	96.7	96.7	95.5	95.5	95.5	99.7			
FY	97.9	97.9	97.9	101.2	96.9	96.9	96.9	101.2	1736.6	0.0	1736.6	18	1
MZ	-95.8	-105.7	-93.0	-101.0	-101.0	-101.0	-100.0	-100.0	-100.0	-103.6			
MZ	-96.6	-96.6	-96.6	-98.6	-91.6	-91.6	-91.6	-94.7	0.0	-1758.9	-1758.9	15	2

NUDO 7 BARRA 29

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	19.9	19.2	21.0	21.4	21.4	21.4	21.1	21.1	21.1	22.2			
FX	22.7	22.7	22.7	23.6	23.1	23.1	23.1	24.2	395.1	0.0	395.1	18	2
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18

NUDO 8 BARRA 7

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	100.6	100.6	102.8	108.3	108.3	108.3	106.7	106.7	106.7	112.1			
FX	110.8	110.8	110.8	115.0	110.1	110.1	110.1	115.6	1954.5	0.0	1954.5	18	1
FY	2.2	2.8	6.3	2.5	2.5	2.5	2.4	2.4	2.4	2.7			
FY	7.1	7.1	7.1	7.5	8.3	8.3	8.3	8.6	91.0	0.0	91.0	18	1
MZ	50.3	30.8	30.5	56.6	56.6	56.6	55.3	55.3	55.3	59.8			
MZ	36.9	36.9	36.9	40.3	35.8	35.8	35.8	40.3	806.1	0.0	806.1	10	3

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 8 BARRA 8

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	90.8	90.8	92.9	98.5	98.5	98.5	96.9	96.9	96.9	102.2			
FX	101.0	101.0	101.0	105.1	100.3	100.3	100.3	105.7	1777.3	0.0	1777.3	18	2
FY	2.2	2.8	6.3	2.5	2.5	2.5	2.4	2.4	2.4	2.7			
FY	7.1	7.1	7.1	7.5	8.3	8.3	8.3	8.6	91.0	0.0	91.0	18	1
MZ	50.3	30.8	30.5	56.6	56.6	56.6	55.3	55.3	55.3	59.8			
MZ	36.9	36.9	36.9	40.3	35.8	35.8	35.8	40.3	806.1	0.0	806.1	10	3

NUDO 9 BARRA 6

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
	24.1	37.8	41.3	24.5	24.5	24.5	24.4	24.4	24.4	24.6			
FX	42.2	42.2	42.2	42.5	43.3	43.3	43.3	43.7	617.1	0.0	617.1	18	1
FY	-90.8	-90.8	-92.9	-98.5	-98.5	-98.5	-96.9	-96.9	-96.9	-102.2			
FY	-101.0	-101.0	-101.0	-105.1	-100.3	-100.3	-100.3	-105.7	0.0	-1777.3	-1777.3	1	18
MZ	-99.2	-106.5	-118.5	-106.8	-106.8	-106.8	-105.2	-105.2	-105.2	-110.5			
MZ	-127.9	-127.9	-127.9	-132.6	-130.7	-130.7	-130.7	-136.5	0.0	-2115.5	-2115.5	1	18

NUDO 9 BARRA 8

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	90.8	90.8	92.9	98.5	98.5	98.5	96.9	96.9	96.9	102.2			
FX	101.0	101.0	101.0	105.1	100.3	100.3	100.3	105.7	1777.3	0.0	1777.3	18	2
FY	24.1	37.8	41.3	24.5	24.5	24.5	24.4	24.4	24.4	24.6			
FY	42.2	42.2	42.2	42.5	43.3	43.3	43.3	43.7	617.1	0.0	617.1	18	1
MZ	99.2	106.5	118.5	106.8	106.8	106.8	105.2	105.2	105.2	110.5			
MZ	127.9	127.9	127.9	132.6	130.7	130.7	130.7	136.5	2115.5	0.0	2115.5	18	1

NUDO 10 BARRA 9

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	-90.5	-91.3	-91.4	-96.7	-96.7	-96.7	-95.5	-95.5	-95.5	-99.7			
FY	-97.4	-97.4	-97.4	-100.6	-95.9	-95.9	-95.9	-100.2	0.0	-1730.2	-1730.2	1	14
MZ	7.6	16.7	33.8	6.7	6.7	6.7	6.9	6.9	6.9	6.3			
MZ	34.7	34.7	34.7	35.0	39.1	39.1	39.1	39.1	400.8	0.0	400.8	15	10

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 10 BARRA 10

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	-58.6	-60.0	-62.7	-62.5	-62.5	-62.5	-61.7	-61.7	-61.7	-64.4			
FY	-66.8	-66.8	-66.8	-68.9	-66.6	-66.6	-66.6	-69.3	0.0	-1156.6	-1156.6	1	18
MZ	7.6	16.7	33.8	6.7	6.7	6.7	6.9	6.9	6.9	6.3			
MZ	34.7	34.7	34.7	35.0	39.1	39.1	39.1	39.1	400.8	0.0	400.8	15	10

NUDO 10 BARRA 20

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	31.9	31.3	28.7	34.2	34.2	34.2	33.8	33.8	33.8	35.4			
FX	30.6	30.6	30.6	31.7	29.3	29.3	29.3	30.8	573.5	0.0	573.5	10	3
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	15	10
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	15

NUDO 11 BARRA 10

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	-58.6	-60.0	-62.7	-62.5	-62.5	-62.5	-61.7	-61.7	-61.7	-64.4			
FY	-66.8	-66.8	-66.8	-68.9	-66.6	-66.6	-66.6	-69.3	0.0	-1156.6	-1156.6	1	18
MZ	-49.6	-41.9	-27.4	-54.2	-54.2	-54.2	-53.3	-53.3	-53.3	-56.4			
MZ	-30.4	-30.4	-30.4	-32.2	-25.8	-25.8	-25.8	-28.5	0.0	-726.9	-726.9	15	10

NUDO 11 BARRA 11

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	-34.9	-36.3	-40.4	-37.1	-37.1	-37.1	-36.7	-36.7	-36.7	-38.2			
FY	-43.1	-43.1	-43.1	-44.4	-43.6	-43.6	-43.6	-45.3	0.0	-721.1	-721.1	1	18
MZ	-49.6	-41.9	-27.4	-54.2	-54.2	-54.2	-53.3	-53.3	-53.3	-56.4			
MZ	-30.4	-30.4	-30.4	-32.2	-25.8	-25.8	-25.8	-28.5	0.0	-726.9	-726.9	15	10

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 11 BARRA 21

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	23.7	23.7	22.3	25.4	25.4	25.4	25.0	25.0	25.0	26.2			
FX	23.7	23.7	23.7	24.5	22.9	22.9	22.9	24.0	435.6	0.0	435.6	10	3
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	3

NUDO 12 BARRA 11

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	-34.9	-36.3	-40.4	-37.1	-37.1	-37.1	-36.7	-36.7	-36.7	-38.2			
FY	-43.1	-43.1	-43.1	-44.4	-43.6	-43.6	-43.6	-45.3	0.0	-721.1	-721.1	1	18
MZ	-83.6	-77.3	-66.8	-90.4	-90.4	-90.4	-89.0	-89.0	-89.0	-93.7			
MZ	-72.4	-72.4	-72.4	-75.5	-68.4	-68.4	-68.4	-72.7	0.0	-1430.0	-1430.0	3	10

NUDO 12 BARRA 12

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	-18.0	-19.0	-23.7	-19.1	-19.1	-19.1	-18.9	-18.9	-18.9	-19.6			
FY	-25.4	-25.4	-25.4	-26.2	-26.4	-26.4	-26.4	-27.4	0.0	-403.1	-403.1	1	18
MZ	-83.6	-77.3	-66.8	-90.4	-90.4	-90.4	-89.0	-89.0	-89.0	-93.7			
MZ	-72.4	-72.4	-72.4	-75.5	-68.4	-68.4	-68.4	-72.7	0.0	-1430.0	-1430.0	3	10

NUDO 12 BARRA 22

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	16.9	17.3	16.7	18.0	18.0	18.0	17.8	17.8	17.8	18.6			
FX	17.7	17.7	17.7	18.2	17.2	17.2	17.2	17.9	317.9	0.0	317.9	10	3
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	3

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 13 BARRA 12

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	-18.0	-19.0	-23.7	-19.1	-19.1	-19.1	-18.9	-18.9	-18.9	-19.6			
FY	-25.4	-25.4	-25.4	-26.2	-26.4	-26.4	-26.4	-27.4	0.0	-403.1	-403.1	1	18
MZ	-101.2	-95.8	-89.9	-109.0	-109.0	-109.0	-107.4	-107.4	-107.4	-112.8			
MZ	-97.1	-97.1	-97.1	-101.0	-94.1	-94.1	-94.1	-99.4	0.0	-1823.0	-1823.0	3	10

NUDO 13 BARRA 13

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	-5.5	-5.8	-10.7	-5.8	-5.8	-5.8	-5.7	-5.7	-5.7	-6.0			
FY	-11.7	-11.7	-11.7	-12.1	-13.0	-13.0	-13.0	-13.4	0.0	-162.1	-162.1	1	18
MZ	-101.2	-95.8	-89.9	-109.0	-109.0	-109.0	-107.4	-107.4	-107.4	-112.8			
MZ	-97.1	-97.1	-97.1	-101.0	-94.1	-94.1	-94.1	-99.4	0.0	-1823.0	-1823.0	3	10

NUDO 13 BARRA 23

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	12.5	13.1	13.0	13.3	13.3	13.3	13.1	13.1	13.1	13.7			
FX	13.7	13.7	13.7	14.1	13.4	13.4	13.4	14.0	241.0	0.0	241.0	14	1
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	3	10
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	3

NUDO 14 BARRA 13

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	-5.5	-5.8	-10.7	-5.8	-5.8	-5.8	-5.7	-5.7	-5.7	-6.0			
FY	-11.7	-11.7	-11.7	-12.1	-13.0	-13.0	-13.0	-13.4	0.0	-162.1	-162.1	1	18
MZ	-106.5	-101.5	-100.3	-114.7	-114.7	-114.7	-113.0	-113.0	-113.0	-118.7			
MZ	-108.5	-108.5	-108.5	-112.7	-106.8	-106.8	-106.8	-112.5	0.0	-1981.1	-1981.1	3	10

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 14 BARRA 14

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	5.5	5.8	1.1	5.8	5.8	5.8	5.7	5.7	5.7	6.0			
FY	0.9	0.9	0.9	0.8	-0.6	-0.6	-0.6	-0.6	56.5	-2.4	54.0	10	15
MZ	-106.5	-101.5	-100.3	-114.7	-114.7	-114.7	-113.0	-113.0	-113.0	-118.7			
MZ	-108.5	-108.5	-108.5	-112.7	-106.8	-106.8	-106.8	-112.5	0.0	-1981.1	-1981.1	3	10

NUDO 14 BARRA 24

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
	11.0	11.7	11.9	11.6	11.6	11.6	11.5	11.5	11.5	12.0			
	12.5	12.5	12.5	12.9	12.4	12.4	12.4	12.8	216.2	0.0	216.2	14	1
FY	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	18	2
MZ	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18

NUDO 15 BARRA 14

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.8	42.4	675.6	675.6	2	10
FY	5.5	5.8	1.1	5.8	5.8	5.8	5.7	5.7	5.7	6.0			
FY	0.9	0.9	0.9	0.8	-0.6	-0.6	-0.6	-0.6	56.5	-2.4	54.0	10	15
MZ	-101.2	-95.8	-99.3	-109.0	-109.0	-109.0	-107.4	-107.4	-107.4	-112.8			
MZ	-107.6	-107.6	-107.6	-112.0	-107.4	-107.4	-107.4	-113.0	0.0	-1928.4	-1928.4	2	18

NUDO 15 BARRA 15

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	18.0	19.0	14.7	19.1	19.1	19.1	18.9	18.9	18.9	19.6			
FY	15.3	15.3	15.3	15.6	13.7	13.7	13.7	14.3	302.1	0.0	302.1	10	15
MZ	-101.2	-95.8	-99.3	-109.0	-109.0	-109.0	-107.4	-107.4	-107.4	-112.8			
MZ	-107.6	-107.6	-107.6	-112.0	-107.4	-107.4	-107.4	-113.0	0.0	-1928.4	-1928.4	2	18

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 15 BARRA 25

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	12.5	13.1	13.6	13.3	13.3	13.3	13.1	13.1	13.1	13.7			
FX	14.4	14.4	14.4	14.8	14.4	14.4	14.4	14.9	248.1	0.0	248.1	18	1
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18

NUDO 16 BARRA 15

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
X	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
X	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	18.0	19.0	14.7	19.1	19.1	19.1	18.9	18.9	18.9	19.6			
FY	15.3	15.3	15.3	15.6	13.7	13.7	13.7	14.3	302.1	0.0	302.1	10	15
MZ	-83.6	-77.3	-84.9	-90.4	-90.4	-90.4	-89.0	-89.0	-89.0	-93.7			
MZ	-92.8	-92.8	-92.8	-96.7	-94.0	-94.0	-94.0	-99.0	0.0	-1633.9	-1633.9	2	18

NUDO 16 BARRA 16

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	34.9	36.3	32.9	37.1	37.1	37.1	36.7	36.7	36.7	38.2			
FY	34.6	34.6	34.6	35.6	33.1	33.1	33.1	34.6	637.2	0.0	637.2	10	3
MZ	-83.6	-77.3	-84.9	-90.4	-90.4	-90.4	-89.0	-89.0	-89.0	-93.7			
MZ	-92.8	-92.8	-92.8	-96.7	-94.0	-94.0	-94.0	-99.0	0.0	-1633.9	-1633.9	2	18

NUDO 16 BARRA 26

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	16.9	17.3	18.2	18.0	18.0	18.0	17.8	17.8	17.8	18.6			
FX	19.4	19.4	19.4	20.0	19.4	19.4	19.4	20.2	335.1	0.0	335.1	18	1
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 17 BARRA 16

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	34.9	36.3	32.9	37.1	37.1	37.1	36.7	36.7	36.7	38.2			
FY	34.6	34.6	34.6	35.6	33.1	33.1	33.1	34.6	637.2	0.0	637.2	10	3
MZ	-49.6	-41.9	-52.9	-54.2	-54.2	-54.2	-53.3	-53.3	-53.3	-56.4			
MZ	-59.0	-59.0	-59.0	-62.0	-61.7	-61.7	-61.7	-65.3	0.0	-1012.6	-1012.6	2	18

NUDO 17 BARRA 17

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
X	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	58.6	60.0	58.0	62.5	62.5	62.5	61.7	61.7	61.7	64.4			
FY	61.6	61.6	61.6	63.6	60.3	60.3	60.3	62.9	1105.9	0.0	1105.9	10	3
MZ	-49.6	-41.9	-52.9	-54.2	-54.2	-54.2	-53.3	-53.3	-53.3	-56.4			
MZ	-59.0	-59.0	-59.0	-62.0	-61.7	-61.7	-61.7	-65.3	0.0	-1012.6	-1012.6	2	18

NUDO 17 BARRA 27

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	23.7	23.7	25.1	25.4	25.4	25.4	25.0	25.0	25.0	26.2			
FX	27.0	27.0	27.0	27.9	27.1	27.1	27.1	28.3	468.7	0.0	468.7	18	2
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
MZ	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18

NUDO 18 BARRA 17

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10			
	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	SUMA(+)	SUMA(-)	TOTAL	MX	MN
FX	29.9	48.3	44.7	29.5	29.5	29.5	29.6	29.6	29.6	29.4			
FX	43.9	43.9	43.9	43.5	42.8	42.8	42.8	42.4	675.6	0.0	675.6	2	10
FY	58.6	60.0	58.0	62.5	62.5	62.5	61.7	61.7	61.7	64.4			
FY	61.6	61.6	61.6	63.6	60.3	60.3	60.3	62.9	1105.9	0.0	1105.9	10	3
MZ	7.6	16.7	3.7	6.7	6.7	6.7	6.9	6.9	6.9	6.3			
MZ	1.1	1.1	1.1	-0.0	-2.9	-2.9	-2.9	-4.0	78.4	-12.8	65.6	2	18

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 25 BARRA 25

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
FX	12.5	13.1	13.6	13.3	13.3	13.3	13.1	13.1	13.1	13.7			
FX	14.4	14.4	14.4	14.8	14.4	14.4	14.4	14.9	248.1	0.0	248.1	18	1
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2

NUDO 26 BARRA 26

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
	16.9	17.3	18.2	18.0	18.0	18.0	17.8	17.8	17.8	18.6			
	19.4	19.4	19.4	20.0	19.4	19.4	19.4	20.2	335.1	0.0	335.1	18	1
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2

NUDO 27 BARRA 27

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
FX	23.7	23.7	25.1	25.4	25.4	25.4	25.0	25.0	25.0	26.2			
FX	27.0	27.0	27.0	27.9	27.1	27.1	27.1	28.3	468.7	0.0	468.7	18	2
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2

NUDO 28 BARRA 28

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
FX	31.9	31.3	33.6	34.2	34.2	34.2	33.8	33.8	33.8	35.4			
FX	36.3	36.3	36.3	37.6	36.6	36.6	36.6	38.3	630.7	0.0	630.7	18	2
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
FY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2

TOTALES DE LAS COMBINACIONES ESTUDIADAS (POR NUDOS)

ESFUERZOS EN BARRAS (EJES LOCALES)

NUDO 29 BARRA 29

	C 1 / C 11	C 2 / C 12	C 3 / C 13	C 4 / C 14	C 5 / C 15	C 6 / C 16	C 7 / C 17	C 8 / C 18	C 9 SUMA(+)	C 10 SUMA(-)	TOTAL	MX	MN
FX	19.9	19.2	21.0	21.4	21.4	21.4	21.1	21.1	21.1	22.2			
FX	22.7	22.7	22.7	23.6	23.1	23.1	23.1	24.2	395.1	0.0	395.1	18	2
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0			
FY	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	2	18
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	2

DIMENSIONAMIENTO A FLEXIÓN Y CORTANTE

A partir de los esfuerzos obtenidos, se dimensionan las armaduras de las diferentes secciones mediante la aplicación de las fórmulas en sección compuesta.

1. ESFUERZOS MÁXIMOS.

a. Hastiales. Inferior. Barra 1 – Nudo 1 – Comb. 18

N_d = 108,560 t/m V_d = 60,580 t/m M_d = 136,720 mt/m (−)

Superior. Barra 8 – Nudo 9 – Comb. 18

N_d = 105,723 t/m V_d = 43,657 t/m. M_d = 136,487 mt/m (−)

Comb.

N_d = 0 N_d = 0 (+)

b. Losa Superior. Cara Superior. Barra 6 – Nudo 9 – Comb. 18

N_d = 43,657 t/m V_d = 105,723 t/m M_d = 136,487 mt/m (−)

Cara Inferior Barra 4 – Nudos. Comb. 10

N_d = 24,648 t/m M_d = 138,661 mt/m (+)

c. Losa Inferior. Cara Inferior. Barra 9 – Nudo 1 – Comb. 18

N_d = 42,387 t/m V_d = 101,227 t/m M_d = 136,720 mt/m (−)

Cara Superior. Barra 13 – Nudo 14 – Comb. 10

N_d = 29,375 t/m M_d = 118,664 mt/m (+)

2. ARMADURAS.

a – HASTIALES.

– Armadura Exterior Inferior. V_R = 1,10 × 0,71 × 0,9 × 2500 / 1.5 = 1.065 t/m

Momento de cálculo M_d = 136,720 + 108,560 (0,75/2 − 0,04 − 0,025/2) = 171,73

Axil de cálculo N_d = 108,560 × 0,9 / 1.6 = 61,07 t/m

μ = 0,227 „ ν = 0,057 „ ω = 0,222 „ V_f = 236 t/m

Disponemos 4Φ32 + 6Φ25 mm² Reparto Φ16 a 20 cm

– Armadura Exterior Superior V_R = 1.065 t/m

Momento de cálculo M_d = 136,487 + 105,723 (0,75/2 − 0,04 − 0,025/2) = 170,58

Axil de cálculo N_d = 105723 × 0,9 / 1.6 = 59,47 t/m

μ = 0,226 „ ν = 0,056 „ ω = 0,221 „ V_f = 235 t/m

Disponemos 4Φ32 + 6Φ25 mm² Reparto Φ16 a 20 cm

– Armadura Interior V_R = 1065 t/m

Momento de cálculo M_d = 0

Axil de cálculo N_d = 0

μ = 0,00 „ ν = 0,00 „ ω = 0,00 V_f = 0 t/m

Armadura mínima $V_{f\,mín}$ = 0,04 × 1065 = 43 t/m

Disponemos 5Φ16 mm² Reparto Φ12 a 20 cm

Comprobación a cortante

$V_{cu} = \frac{1}{10.000} \times 1000 \times 710 \times \left(1 + \sqrt{\frac{200}{710}}\right) (100 \times 0{,}02 \times 25 \times 0{,}9)^{1/3}$ = 38,66 t/m

V_f = 60,580 − 38,66 = 21,92 t/m

Disponemos cercos de Φ10 a 20 cm / cada 40 cm.

$0{,}9 \cdot \frac{0{,}71}{0{,}20} \times 2{,}5 \times 0{,}72 \times 4{,}0$ = 25,24 t/m

b - LOSA SUPERIOR.

- Armadura Exterior. $V_E = 1,00 \times 0,71 \times 2500/1,5 = 1.183$ t/m

Momento de cálculo $M_d = 136,487 + 43,657\left(\frac{0,75}{2} - 0,04 - \frac{0,025}{2}\right) = 150,57$

Axil de cálculo $N_d = 43,657 \times 0,9/1,5 = 24,56$ t/m

$\mu = 0,179$ $\nu = 0,021$ $w = 0,190$ $V_f = 225$ t/m

Disponemos 4 Φ32 + 6 Φ25 mm² Reparto Φ16 a 20 cm

- Armadura Interior $V_E = 1.183$ t/m

Momento de cálculo $M_d = 138,661 + 24,648\left(\frac{0,75}{2} - 0,04 - \frac{0,025}{2}\right) = 146,61$ mt/m

Axil de cálculo $N_d = 24,648 \times 0,9/1,6 = 13,86$ t/m

$\mu = 0,175$ $\nu = 0,012$ $w = 0,194$ $V_f = 229$ t/m

Disponemos 4 Φ32 + 6 Φ25 mm² Reparto Φ16 a 20 cm

Comprobación a cortante.

$V_{cu} = \frac{1}{10.000} \times 1000 \times 710 \times \left(1 + \sqrt{\frac{200}{710}}\right) \times (100 \times 0,02 \times 25)^{1/3} = 90,04$ t/m

$V_f = 105,723 - 90,04 = 65,68$ t/m

Disponemos cerco de Φ12 a 20 cm / cada 20 cm

$0,9 \times \frac{0,71}{0,20} \times 1,13 \times 4,0 = 72,21$ t/m.

c - LOSA INFERIOR.

- Armadura Inferior $V_E = 1,00 \times 0,71 \times 2500/1,5 = 1.183$ t/m

Momento de cálculo $M_d = 136,720 + 42,387\left(\frac{0,75}{2} - 0,04 - \frac{0,025}{2}\right) = 150,39$

Axil de cálculo $N_d = 42,387 \times 0,9/1,60 = 23,84$ t/m

$\mu = 0,179$ $\nu = 0,020$ $w = 0,191$ $V_f = 226$

Disponemos 4 Φ32 + 6 Φ25 mm² Reparto Φ16 a 20 cm

- Armadura Superior $V_E = 1.183$ t/m

Momento de cálculo $M_d = 118,664 + 29,375\left(\frac{0,75}{2} - 0,04 - \frac{0,025}{2}\right) = 128,14$ mt/m

Axil de cálculo $N_d = 29,375 \times 0,9/1,6 = 16,52$ t/m

$\mu = 0,153$ $\nu = 0,016$ $w = 0,161$ $V_f = 192$ t/m

Disponemos 4 Φ32 + 6 Φ25 mm² Reparto Φ16 a 20 cm

Comprobación a cortante

$V_{cu} = \frac{1}{10.000} \times 1000 \times 710 \times \left(1 + \sqrt{\frac{200}{710}}\right) \times (100 \times 0,02 \times 25)^{1/3} = 90,04$ t/m

$V_f = 101,727 - 40,04 = 61,19$ t/m

Disponemos cerco de Φ12 a 20 cm / cada 20 cm

3. CUMPLIMIENTO DEL ESTADO LIMITE ULTIMO

3.1 - TENSIONES.

Las tensiones máximas que se transmiten al terreno son:

Axil máximo en el nudo 7 - hasta 29 - Comb. 18

$N_d = 24,2$ t/m.

$\sigma = 24,2 \times 2/1,6 \times 0,975 = 31,026$ t/m²

Peso propio de la losa inferior $= 0,75 \times 2,5 = 1,875$ t/m²

Tensión máxima transmitida al terreno.

$\sigma = (31,026 + 1,875)/1,2 = 25,31$ t/m²

3.2 - FISURACION.

Comprobamos la fisuración en la sección más comprometida para Ambiente IIb.

La sección más desfavorable es la correspondiente a la zona

Inferior de bastidor.

$\phi = 32$ mm $c = 40$ mm $f = 6 \times 4{,}91 + 4 \times 8{,}04 / 100 \times 75 = 0{,}008216$

Tensión de servicio máx. $\sigma_t = 0{,}75 \dfrac{5.100}{1{,}6 \times 1{,}15} \times \dfrac{236}{273} = 1.797$ kp/cm²

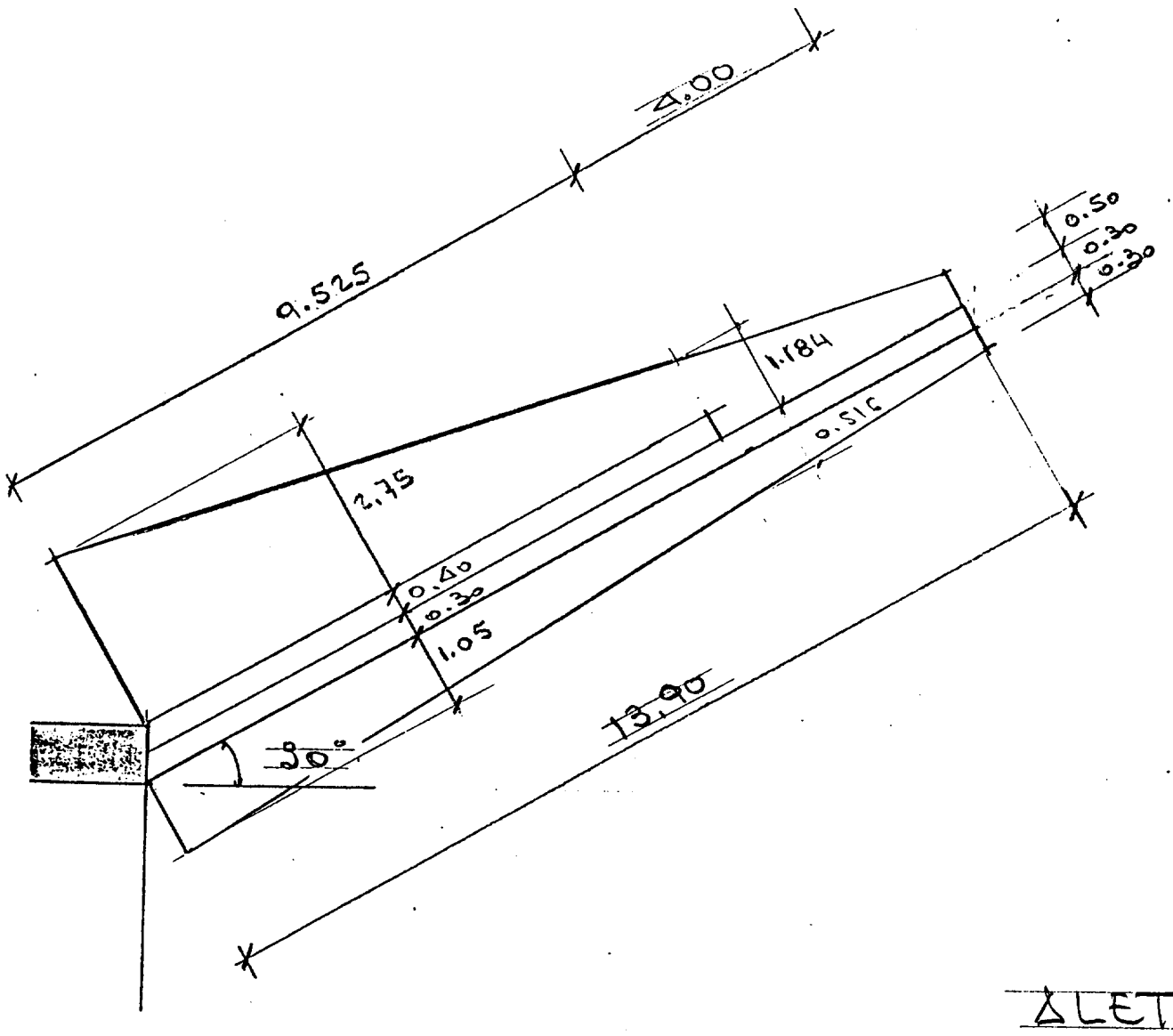
Tensión de trabajo máx. $\sigma_t = (200 \times 0{,}008216 + 2) \sqrt{10/32} \times 1000 = 2.037 > 55$

3.3 - DEFORMACIONES.

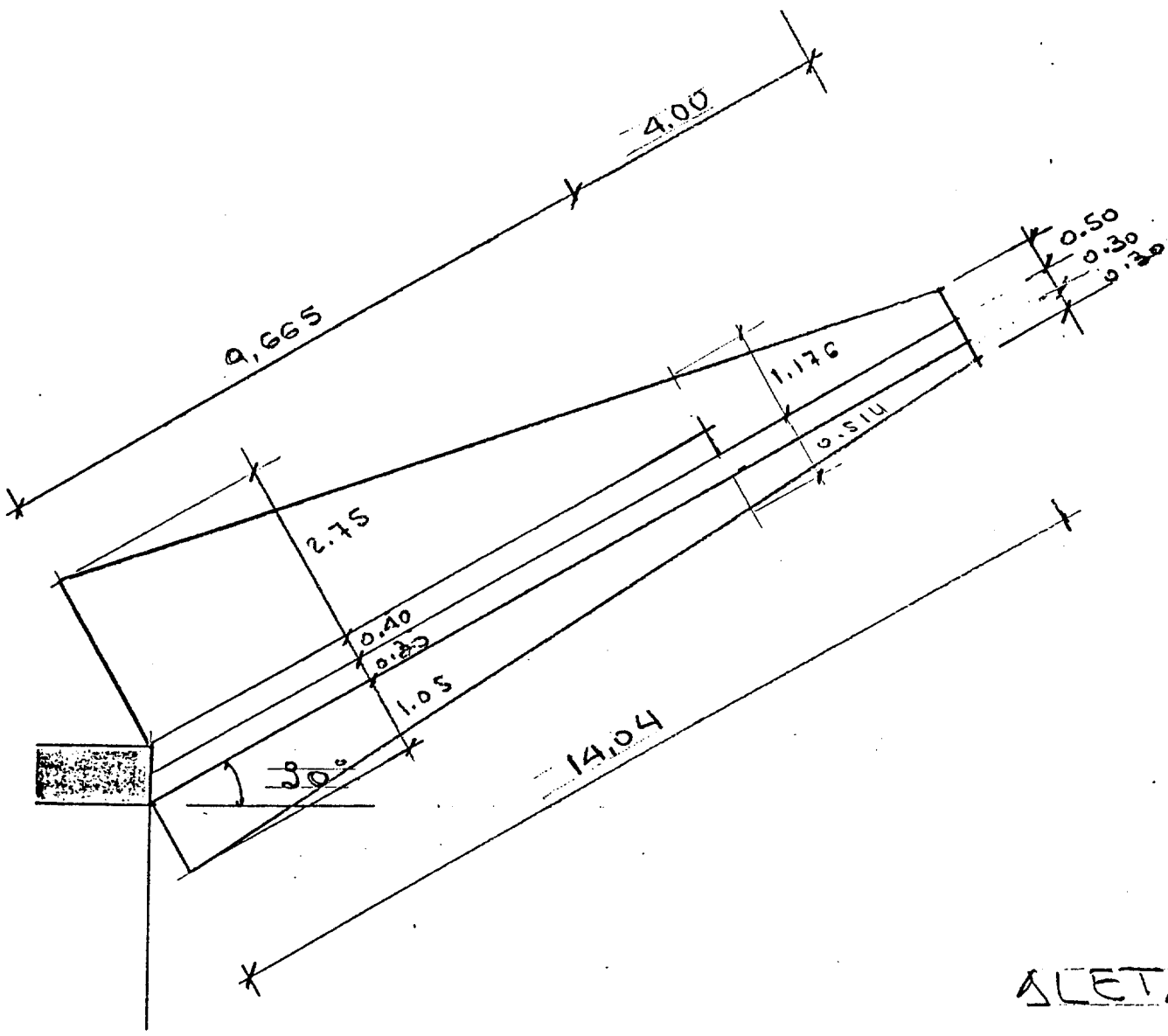
La flexión máxima se produce en el nudo 5 - barra 4 y corresponde a la combinación nº 10, siendo su valor de 0,02430 m. de modo que en el estado último, será de $0{,}02143 / 1{,}6 = 0{,}13394$ m. que equivale a $L/728 < L/500$

.1.3.7.- Aletas

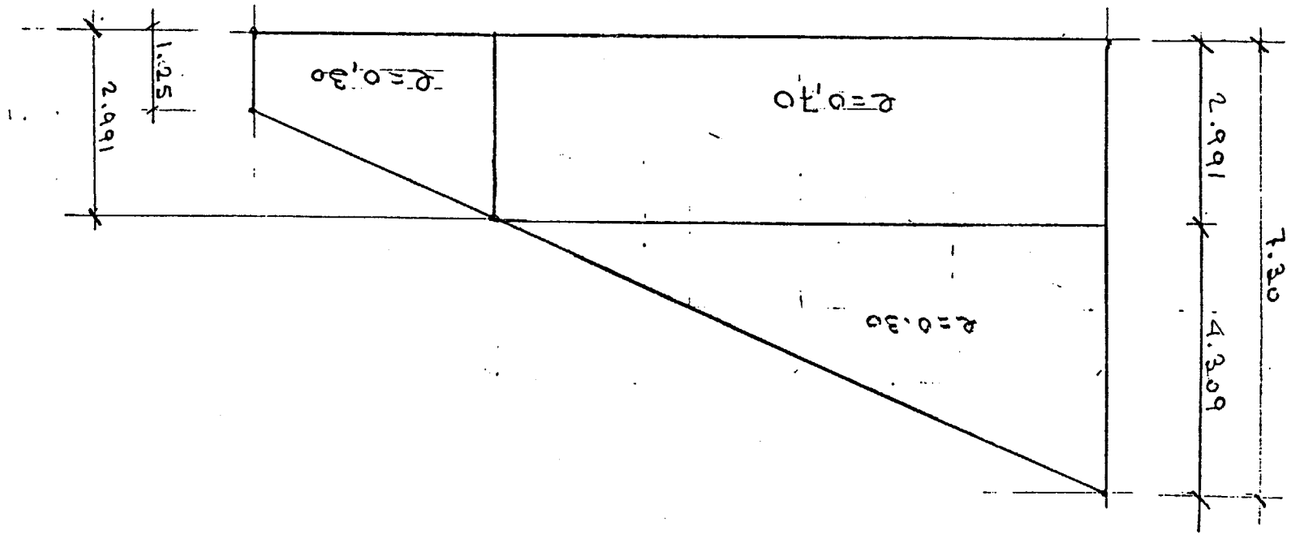
ALETAS



ALETAS 1 y 3



ALETAS 2 y 4


7.300
2.991
4.309
e=0.70
e=0.30
1.25
1.66
2.991
(1-3) 9.900 4.000
(2-4) 10.000 4.040
(1-3) 13.90
(2-4) 14.04

Δ12Δbo

ALETAS.

De las cuatro aletas que rematan lateralmente el paso inferior, dos (1 y 3) tienen una longitud de 13,90 m. y las otras dos (2 y 4) tienen 14,04 m. Sus alturas son idénticas y variables de 1,25 a 7,30 m de alzado, desde la zapata.

Tomando las mismas características, para el terreno, que las admitidas en el cálculo del paso inferior, resulta:

$\gamma_t = 1,9$ t/m³ ; $\varphi = 35°$; $\delta = 0°$; $\beta = 8,855°$; $b:h = 0$

y por lo tanto el coeficiente horizontal de empuje activo = 0,30

De la longitud total de las aletas, los 4,00 (4,04) primeros m, que se corresponden con una altura de trasdós de 1,25 a 2,991 m, tienen un espesor de 0,30 m y el resto tiene 0,70 m. de espesor en una altura de 2,991 m y de 0,30 m. hasta coronación que se corresponde con una altura variable de 0 a 4,309 m

El ancho de la zapata varía:

Puntera	0,30 a 1,05 m
Talón	0,50 a 2,75 m.

ZONA BAJA.

Longitud de 4,00 m en aletas 1 y 3, 4,04 en aletas 2 y 4

Altura trasdós de 1,25 a 2,991 m. ($H_c = 2,556$ m)

Puntera de 0,30 a 0,514 m ($P_c = 0,461$ m)

Talón de 0,50 a 1,176 m. ($T_c = 1,001$ m)

Espesor de trasdós 0,30 m.

Canto de zapata . 0,75 m.

$E_T = \frac{1}{2} \times 1,9 \times 3,306^2 \times 0,30 = 3,115$ t/m

$M_V = 3,115 \times 3,306/3 = 3,433$ mt/m

Peso = 10,230 t/m

M_E = 10,425 mt/m

Coef. Estabilidad al vuelco $C_V = 10,425/3,433 = 3,04 > 1.8$

Coef. Estabilidad deslizamiento $C_d = 10,230 \times 0,5/3,115 = 1,64 > 1.5$

Tensiones. $e_b = 0,683$ m. $> 1,762/3$ → $e_0 = 0,198$ m.

$$\sigma = \frac{10,230}{1,762}\left(1 \pm \frac{6 \times 0,198}{1,762}\right) = \begin{matrix} 9,72 \text{ t/m}^2 \\ 1,89 \text{ t/m}^2 \end{matrix}$$

ZONA ALTA.

Longitud de 9,90 m aletas 1 y 3, 10,00 m. en aletas 2 y 4

Altura trasdós de 2,991 a 7,30 m ($H_c = 2,991 + 3,282 = 6,223$ m)

Puntera de 0,514 a 1,05 m ($P_c = 0,916$ m)

Talón de 0,776 a 2,75 m ($T_c = 2,257$ m)

Espesor de trasdós de 0,70 m en los 2,991 m inferiores

Canto de zapata . 0,75 m.

$E_T = \frac{1}{2} \times 1,9 \times 6,973^2 \times 0,30 = 13,857$ t/m

$M_V = 13,857 \times 6,973/3 = 32,209$ mt/m

Peso = 45,108 t/m

M_E = 103,112 mt/m

Coef. Estabilidad al vuelco $C_V = 103,112/32,209 = 3,20 > 1.8$

Coef. Estabilidad deslizamiento $C_d = 45,108 \times 0,5/13,857 = 1,63 > 1.$

Tensiones. $e_b = 1,572$ m. $> 3,873/3$ → $e_0 = 0,365$ m

$$\sigma = \frac{45,108}{3,873}\left(1 \pm \frac{6 \times 0,365}{3,873}\right) = \begin{matrix} 18,22 \text{ t/m}^2 \\ 5,06 \text{ t/m}^2 \end{matrix}$$

ARMADURAS

Recubrimiento 40 mm

ZONA BAJA.

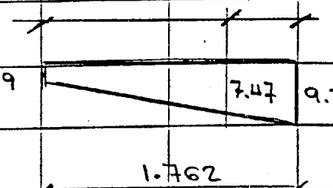
HASTIAL. $M_d = 1.6\left(\frac{1}{2} \times 1.9 \times 2{,}55^2 \times 0{,}30 \times 2{,}55/3\right) = 2{,}538$ mt/m

$V_c = 1.00 \times 0{,}26 \times 0{,}9 \times 2500 / 1.5 = 390$ t/m $V_f = 10$ t/m

$V_{rmin} = 0{,}04 \times 390 = 15{,}60$ t/m

cara tierra	vertical	5 ϕ 12 p/m
	horizontal	ϕ 10 a 20 cm
cara libre	vertical	5 ϕ 10 p/m
	horizontal	ϕ 10 a 20 cm

PUNTERA ZAPATA.



$M_d = 1.6\left(7.47 \times 0{,}506^2/2 + \frac{1}{2} \times 2{,}25 \times 0{,}506^2 \times 2/3\right) = 1{,}84$ mt

$V_c = 1.00 \times 0{,}71 \times 2500 / 1.5 = 1.183$ t/m

$V_f = 3$ t/m $V_{rmin} = 0{,}04 \times 1.183 = 47$ t/m

cara superior zapata.	principal	5 ϕ 16 p/m
	reparto	ϕ 10 a 20 cm

TALON ZAPATA.

$M_d = 1.6\left[(0{,}75 \times 2{,}5 + 2{,}555 \times 1.9) \times 1.046^2/2 + \frac{1}{2} \times 1.001^2 \times 0{,}155 \times 2/3 \times 1.9\right] = 6{,}049$ mt/m

$V_c = 1.00 \times 0{,}71 \times 2000 / 1.5 = 1.183$ t/m

$V_f = 8$ t/m $V_{rmin} = 0{,}04 \times 1.183 = 47$ t/m

cara inferior zapata.	principal	5 ϕ 16 p/m
	reparto	ϕ 10 a 20 cm

ZONA ALTA.

HASTIAL SUPERIOR. $M_d = 1.6 \times \frac{1}{2} \times 1.9 \times 3{,}232^2 \times 0{,}30 \times 3{,}232/3 = 5{,}132$ mt/m

$V_c = 1.00 \times 0{,}26 \times 0{,}9 \times 2500 / 1.5 = 390$ t/m $V_f = 20$ t/m

$V_{rmin} = 0{,}04 \times 390 = 15{,}60$ t/m

cara tierra	vertical	5 ϕ 12 p/m
	horizontal	ϕ 10 a 20 cm
cara libre	vertical	5 ϕ 10 p/m
	horizontal	ϕ 10 a 20 cm.

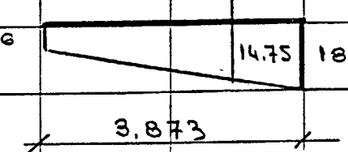
HASTIAL INFERIOR. $M_d = 1.6 \times \frac{1}{2} \times 1{,}9 \times 6{,}223^2 \times 0{,}30 \times 6{,}223/3 = 36{,}631$ mt/m

$V_c = 1.00 \times 0{,}66 \times 0{,}9 \times 2500 / 1.5 = 990$ t/m $V_f = 57$ t/m

$V_{rmin} = 0{,}04 \times 990 = 39{,}60$ t/m

cara tierra	vertical	5 ϕ 20 p/m
	horizontal	ϕ 10 a 20 cm
cara libre	vertical	5 ϕ 10 p/m
	horizontal	ϕ 10 a 20 cm

PUNTERA ZAPATA.



$M_d = 1.6\left(14{,}75 \times 1.021^2/2 + \frac{1}{2} \times 3{,}47 \times 1.021^2 \times 2/3\right) = 14{,}23$ mt/m

$V_c = 1.00 \times 0{,}71 \times 2500 / 1.5 = 1.183$ t/m

$V_f = 20$ t/m $V_{rmin} = 0{,}04 \times 1183 = 47$ t/m

cara superior zapata.	principal	5 ϕ 16 p/m
	reparto	ϕ 10 a 20 cm

TALON ZAPATA.

$M_d = 1.6\left[(0{,}75 \times 2{,}5 + 6{,}223 \times 1.9) \times 2{,}362^2/2 + \frac{1}{2} \times 2{,}362^2 \times 0{,}368 \times 2/3 \times 1.9\right] = 63{,}22$ mt/m

$V_c = 1.183$ t/m $V_f = 93$ t/m $V_{rmin} = 47$ t/m

Principal - 5 ϕ 25 p/m Reparto - ϕ 10 a 20 ~~cm~~

5. Proceso Constructivo

5. PROCESO CONSTRUCTIVO

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DOCUMENTACIÓN COMPLEMENTARIA: PLIEGO DE PRESCRIPCIONES TÉCNICAS

1.- MODIFICACIÓN ESTRUCTURA E-1 "VIADUCTO DE ANDOMÁ"

Método constructivo

Se trata de una estructura de 204 m de longitud, constituida por ocho vanos de 28,00 m, los seis centrales, y de 18,00 m los de ambos extremos.

Se resuelve mediante una losa aligerada postensada cuya sección transversal tiene forma de "ala de gaviota" de 1,90 m de canto, sendos voladizos de 2,95 m y ancho de plataforma de 14,00 m.

Las alturas de las pilas son muy variables: desde 9,28 m en pila 1, hasta 20,75 m en pila 4. Las pilas son de fuste único y coronadas por un capitel en forma de Y.

La cimentación es directa en el caso de las pilas 1, 2, 5, 6 y 7 y profunda con pilotes de 10 m de longitud en las pilas 3 y 4 debido a la baja capacidad portante del material del fondo del barranco.

El sistema constructivo previsto en Proyecto es mediante hormigonado y pretensado sucesivo de vanos y cimbrado desde el fondo del Barranco de Andomá. En los vanos 3, 4 y 5 la cimbra se cimienta sobre el propio cauce fluvial.

Dada la importancia de las cargas durante el hormigonado del tablero, existe riesgo de colapso de la cimbra si ésta se cimienta sobre el relleno fluvial.

Como solución, se realizó una cimbra porticada con apoyo intermedio cimentado en terreno competente mediante pilotes de diámetro 600 mm de longitud similares a los de las pilas adyacentes.

Cimentación pilas 6 y 7

Durante la excavación de las cimentaciones de las pilas 6 y 7 del Viaducto se observó que el sustrato rocoso se encontraba a las cotas 451,84 y 454,88 respectivamente, es decir 2,96 y 1,62 metros por debajo de la cota teórica de Proyecto. Del cálculo original de dichas zapatas se puede deducir que no se ven modificados ni las dimensiones ni el armado de las mismas.

La altura de las pilas ha pasado a ser de 19,145 metros en el caso de la pila 6 y de 16,704 metros en el caso de la pila7. No se ve modificado el armado de las pilas pues éstas están dimensionadas para el caso de la pila 4, de 20,745 metros de altura, que resulta ser la más desfavorable.

2.- MODIFICACIÓN ESTRUCTURA E-2 "PERGOLA SOBRE AUTOPISTA A-2"

A consecuencia de la realización del Viaducto de Vinaixa entre el P.K. 305+793 y el P.K. 306+837 dicha estructura no se realiza.

3.- MODIFICACIÓN ESTRUCTURA E-3 "PERGOLA SOBRE FF.CC."

A consecuencia de la realización del Viaducto de Vinaixa entre el P.K. 305+793 y el P.K. 306+837 dicha estructura no se realiza.

4.- MODIFICACIÓN PASOS SUPERIORES

Sección transversal

Se ha modificado la sección transversal de los pasos superiores, tanto de reposición de caminos como de carreteras, con objeto de eliminar el vuelo de la imposta sobre el tablero, manteniendo el mismo ancho de plataforma.

Las armaduras existentes en el Proyecto original son válidas, puesto que la armadura que podría verse afectada, que es la armadura transversal - superior del ala, va bastante sobrada, como se puede deducir del cálculo adjunto.

4.1.- Estructura E-7 P.K. 304+615

Trazado en alzado

Se ha disminuido la altura de los estribos y de las pilas de la estructura en unos 55 centímetros. El gálibo resulta ser de 7,25 metros.

Listado de vértices

Listado de Vértices

N§	P.K. Cota	TE TS	Cota TE Cota TS	pE(%) pS(%)	Longi. Flecha	Kv Theta(%)
1	0.000					
	526.560	0.000	526.560	2.3959		
2	24.000	1.487	526.596	2.3959	45.025	400
	527.135	46.513	530.208	13.6514	0.633	11.2555
3	133.000	49.649	530.636	13.6514	166.702	-800
	542.015	216.351	536.025	-7.1865	-4.342	-20.8379
4	251.000	226.139	535.322	-7.1865	49.722	500
	533.535	275.861	534.221	2.7588	0.618	9.9453
5	280.000	280.000	534.335	2.7588		
	534.335					

Puntos fijos cada 10 metros

	P.K.	Cota	p(%)	Cv	L	Kv	Flecha	Theta(%)
	0.000	526.560	2.3959					
TE	1.487	526.596	2.3959					
	10.000	526.890	4.5239					
	20.000	527.468	7.0237					
V	24.000	527.768	8.0236	527.135	45.025	400	0.633	11.2555
	30.000	528.295	9.5235					
	40.000	529.372	12.0234					
TS	46.513	530.208	13.6514					
TE	49.649	530.636	13.6514					
	50.000	530.684	13.6075					
	60.000	531.983	12.3575					
	70.000	533.156	11.1075					
	80.000	534.204	9.8575					
	90.000	535.127	8.6075					
	100.000	535.926	7.3575					
	110.000	536.599	6.1075					
	120.000	537.147	4.8575					
	130.000	537.570	3.6075					
V	133.000	537.673	3.2325	542.015	166.702	-800	-4.342	-20.8379
	140.000	537.869	2.3574					
	150.000	538.042	1.1074					
	160.000	538.090	-0.1426					
	170.000	538.013	-1.3926					
	180.000	537.812	-2.6426					
	190.000	537.485	-3.8926					
	200.000	537.033	-5.1426					
	210.000	536.456	-6.3926					
TS	216.351	536.025	-7.1865					
	220.000	535.763						
TE	226.139	535.322	-7.1865					
	230.000	535.059	-6.4142					
	240.000	534.518	-4.4140					

	250.000	534.176	-2.4139					
V	251.000	534.153	-2.2138	533.535	49.722	500	0.618	9.9453
	260.000	534.035	-0.4137					
	270.000	534.094	1.5865					
TS	275.861	534.221	2.7588					
	280.000	534.335	2.7588					

4.2.- Estructura E-8 P.K. 307+860

Antecedentes

Con objeto de reponer el camino de la Coma d'en Segarra afectado por la realización de las obras en el P.K. 307+860 se proyectó el paso superior E-8 que resuelve perfectamente el cruce de dicho camino sobre la Línea de Alta Velocidad.

La estructura E-8 se resuelve mediante una losa maciza armada cuya sección transversal tiene forma de "ala de gaviota" de 0,90 m de canto y 7,70 m de plataforma. El vano central es de 17,00 metros y los dos extremos de 13,00 m. El sistema constructivo previsto en proyecto es mediante cimbrado y hormigonado "in situ" del tablero. El gálibo bajo dicha estructura resulta ser de 8,9 metros

A consecuencia de la modificación de la rasante, la cota en el P.K. 307+860 pasaba a ser la 555,21 en lugar de la 549,38, es decir la rasante en dicho punto aumentaba en casi 6 metros, por lo que la estructura proyectada pasaba a no cumplir las características en cuánto a gálibo prescrito por el G.I.F. (gálibo mínimo de 7 metros).

Debido a esto fue necesario rediseñar dicha estructura para lo cual se contemplaron varias alternativas:

- Mantener la estructura en su posición inicial considerando un gálibo de 7 metros bajo la estructura, lo cual implicaba aumentar hasta un 7,3 % la pendiente del terraplén de acceso a la estructura puesto que el trazado de la reposición queda condicionado por el paso inferior existente bajo la autopista A-2.

- Realizar en la posición actual un paso inferior de características similares a los proyectados. El inconveniente principal de dicha solución era la imposibilidad de tener un drenaje natural de las aguas puesto que el punto más bajo que se creaba, debido a la orografía del terreno, estaba situado a la entrada de la estructura proyectada.

 Desplazar la estructura existente hasta el P.K. 307+800. Solución adoptada finalmente.

Descripción de la obra

Se trata de una estructura para el paso del Camino d'en Segarra sobre la L.A.V. que sustituye a la proyectada en un principio en el P.K. 307+860, y que, al variar el trazado en alzado del tronco, fue necesario cambiarla de ubicación para llegar a unos parámetros análogos a los previstos.

La estructura se diseñó teniendo en cuenta los gálibos mínimos prescritos por el G.I.F. para el vano central, para los vanos laterales la longitud se determina en función del desmonte (3:2) y bermas de 4 m cada 10 m de altura. De este modo las luces resultantes son de 13,00, 17,00 Y 13,00 m respectivamente.

La sección transversal presenta una calzada de 6,00 m y aceras de 1,35 m, con un total de 8,70 m.

El tablero se resuelve mediante losa maciza armada de canto 0,90 m, sobre la cual se extiende una capa de aglomerado asfáltico en caliente de 4 cm. La sección transversal es un núcleo central de base superior 4,70 m, base inferior de 3,70 m y dos alas voladas de 1,50 m.

Dichos tableros se empotran en pilas centrales únicas de sección circular de 1,00 m de diámetro, que se cimientan en zapatas de 3,00 x 3,00 m.

Al principio y final de la estructura se disponen estribos de hormigón armado.

Cálculos estructurales

Los cálculos de la estructura son los mismos que aparecen en el Proyecto inicial, puesto que no se varían las características resistentes de la misma, únicamente sufre variación la definición de las cotas absolutas respecto al nuevo terreno donde se ubica y por lo tanto la definición y cálculo de los estribos a partir de las cargas que les transmite el tablero.

Para ello se han considerado las mismas características del terreno que aparecen en el Proyecto de referencia y se han analizado las mismas hipótesis de carga.

4.3.- Estructura E-5A P.K. 303+958,627

Descripción de la obra

Se trata de una estructura que tiene por objeto reponer un camino existente que queda cortado por la L.A.V. y que aparece como nueva ante la necesidad de aumentar la permeabilidad de la traza, al tratarse de una zona con fuertes desmontes, que originan una trinchera de grandes dimensiones.

La estructura se diseñó teniendo en cuenta los gálibos mínimos prescritos por el G.I.F. para el vano central; la longitud de los vanos laterales se determina en función del desmonte (3:2) y de las bermas de 4,00 m cada 10,00 m de altura. De este modo las luces resultantes son de 13,00 - 17,00 - 13,00 m, respectivamente para los tres vanos.

La sección transversal de la estructura presenta una calzada de 6,00 m y dos aceras de 1,35 m, con un total de 8,70 m.

El tablero se resuelve mediante una losa maciza armada, de canto 0,90 m, encima de la cual se extiende una capa de aglomerado asfáltico en caliente de 4 cm. Su sección transversal presenta un núcleo central de base superior 4,70 m, base inferior 3,70 m y dos alas voladas de 1,50 m.

Dicho tablero se empotra en pilas centrales únicas de sección circular de 1,00 m de diámetro, que se cimientan en zapatas de 3,00 x 3,00 m.
La estructura apoya, en sus extremos, en dos estribos de hormigón armado que transmite las cargas al terreno.

Cálculos estructurales

Los cálculos de la estructura son los mismos que aparecen en el Proyecto Original para la estructura E-8, puesto que presenta la misma geometría y no varían las características resistentes de la misma únicamente sufre variación en las cotas absolutas de sus elementos, en la ligera variación de la altura de las pilas y en la geometría de los estribos.

El desarrollo de los cálculos correspondientes al Paso Superior del P .K. 303+958,627, que se proyectó como nueva Estructura para aumentar la permeabilidad de la traza del ferrocarril de Alta Velocidad, conserva el mismo índice y contenido que el Paso Superior del P .K. 307+860 del Proyecto Original, y que transcribimos a continuación:

- Características Mecánicas de la Sección
- Cargas y Modelo de Cálculo de Tablero
- Datos de Entrada SAP-90
- Sección Transversal
- Armado Longitudinal
- Cortante
- Torsión
- Armado Transversal
- Viga de Estribo
- Comprobación Anchura Fisura
- Reacciones para Cálculo de estribos
- Cálculo de Estribos
- Salida Resultados SAP-90

Al tratarse de una estructura idéntica a la proyectada, salvo una ligera variación en la altura de las pilas, se considera que todos los cálculos que aparecen en el Proyecto Original, son válidos, a excepción de los estribos que tienen otra geometría.

Por lo tanto, únicamente se realiza el nuevo cálculo de estos elementos, a partir de las reacciones sobre los mismos, dadas en el Proyecto Original, al que nos remitimos para el resto de la estructura.

5.- MODIFICACIÓN PASOS INFERIORES

5.1.-Estructura E-11 P.K. 305+529

Antecedentes

La obra proyectada que configura la estructura para el Paso Inferior en el P.K. 305+529, consiste en un pórtico abierto de 28,40 m de longitud, luz libre de 9,00 m y altura de hastíales de 9,50 m.

La elevación de la cota de rasante de la vía en este punto kilométrico de la traza de 1,24 m dio lugar a un nuevo dimensionamiento de la estructura, que al estar más cargada transmitirá al terreno mayor tensión que en el Proyecto, a igualdad de otros parámetros.

La cimentación de la estructura se realizaba en una zona de transición de desmonte a terraplén y por ello había que buscar la cimentación en cotas más profundas que permitiesen una transmisión uniforme de las tensiones en ambas zapatas independientes.

La incertidumbre que dicha cimentación podía suponer en cuanto a esta transmisión uniforme y el incremento de tensiones que se produciría por la mayor carga de tierras, parecía recomendar un cambio en la tipología de la estructura pasando de pórtico abierto a pórtico cerrado.

Ello permitía asegurar un reparto uniforme de las tensiones sobre el terreno, bajar los valores de las mismas y reducir la altura de los hastíales a los valores estrictamente necesarios; es decir, tener la certeza de que el funcionamiento de la obra de fábrica durante su vida útil, sería el que se plantea y desarrolla en los cálculos.

Por otra parte permite también una ejecución más razonable sin excavaciones innecesarias, una obra de menores dimensiones a la proyectada y con toda seguridad un ahorro de tiempo importante.

Se propuso, por tanto, la ejecución de un pórtico cerrado unicelular de 34,40 m de longitud, 9,00 m de ancho libre y 6,25 m de altura, de modo que el gálibo resultante es de 5,30 m, mayor que el de Proyecto y todos los espesores de 0,75 m.

Descripción de la obra

El paso inferior que se proyectó consiste en un pórtico cerrado unicelular normal a la traza, que la corta en su P.K. 305+529, de 34,40 m de longitud, 9,00 m de ancho libre y 6,25 m de altura libre, por donde cruzará a la L.A.V. el vial correspondiente a la Reposición n° 7 consistente en un camino de 5,00 m de ancho. Dicha obra de fábrica se completa con aletas laterales a 30º para contener los derrames del terraplén de la traza.

Los espesores de todos los elementos del pórtico son de 0,75 m.

Para evitar que algunas zonas o elementos de la obra tengan unas dimensiones excesivas, en caso de ser cimentadas en el terreno natural y conseguir un apoyo uniforme, se ha realizado el relleno de la zona afectada hasta la cota 507, donde se cimentó toda la obra de fábrica.

Cálculos estructurales

Los presentes cálculos tienen por finalidad última el dimensionamiento de las diferentes secciones que componen el Paso Inferior al ferrocarril a ejecutar en el P .K. 305 + 529 de la Línea de Alta Velocidad Madrid – Zaragoza – Barcelona – Frontera Francesa. Tramo Lleida - Martorell. Subtramo III-A, a partir de la definición geométrica diseñada como variante a la que aparece en el Proyecto Original y de las Bases de Cálculo correspondiente según las diferentes Normas e Instrucciones vigentes en la actualidad y exigidas por el G.I.F.

Hipótesis de cálculo

Para el cálculo de los diferentes elemento que componen la estructura, se han considerado los siguientes parámetros:

CARACTERISTICAS MECANICAS DEL TERRENO

Peso Específico de las Tierras □t = 1,9 t/m3
Angulo de Rozamiento interno □ = 35º
Angulo de Rozamiento Terreno-Hastial □ = 0º
Angulo Talud del Terreno □ = 0º
Inclinación de Hastiales (b : h) = cot □ = 0
Coeficiente Empuje Activo Horizontal □a = 0,27
Coeficiente Empuje Reposo Horizontal □r = 0,43
Coeficiente o Módulo de Balasto Vertical C = 3.500 t/m3
Tensión Admisible del Terreno □ = 2,5 kp/cm2

CARACTERISTICAS MECANICAS DEL HORMIGON

Densidad del Hormigón Armado □h= 2,5 t/m3
Resistencia Característica HA-25/P/20/IIb/H fck= 250 kp/cm2
Nivel de Control Normal

CARACTERISTICAS MECANICAS DEL ACERO PARA ARMAR

Resistencia Característica B-500 S fyk= 5.100 kp/cm2
Recubrimientos c = 40 mm
Nivel de Control Normal

SOBRECARGAS CONSIDERADAS

Tren de Cargas RENFE
Tren de Cargas U.I.C.
Uniformemente Repartida en el Espaldón de 3 t/m2

EJECUCION

Nivel de Control Normal

Respecto del proceso constructivo del “Viaducto de Vinaixa” así como del resto de las estructuras no especificadas en los apartados anteriores, la Asistencia Técnica no presento información al respecto.

Documentación complementaria

PROCESO CONSTRUCTIVO

G301 PERFORACIÓN Y HORMIGONADO DE PILOTES

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

Se definen como cimentaciones por pilotes de hormigón armado moldeados "in situ", las realizadas mediante pilotes de hormigón armado cuya ejecución se efectúa perforando previamente el terreno y rellenando la excavación con hormigón fresco y las correspondientes armaduras.

Se define como diámetro del pilote construido "in situ", el diámetro interior de la excavación o, en su caso, de la entubación recuperable. El posible ensanchamiento del fuste del pilote, por apisonado o compresión del hormigonado, no se tendrá en cuenta para admitir un aumento de la carga admisible del mismo, considerado como elemento estructural.

La unidad de obra comprende, en el caso más general, las siguientes operaciones:

- Perforación del terreno.
- Entubación, si procede.
- Sostenimiento con lodos.
- Fabricación, manipulación y regeneración de los lodos.
- Suministro de hormigón.
- Suministro y colocación de armaduras.
- Hormigonado del pilote y extracción de los lodos.
- Descabezado del pilote.
- Retirada de las tierras de la excavación.

Eventualmente, también las operaciones siguientes:

- Ensayo sónico en pilotes.
- Junta de grava en punta de pilotes.
- Perforación en punta de pilotes.

CONDICIONES GENERALES

Equipo necesario

El equipo necesario para la fabricación, colocación del hormigón y ejecución de los pilotes, será el adecuado para el número, diámetro y longitud de pilotes que señalen los planos del Proyecto, y ofrecerá garantías suficientes en relación a la calidad del hormigón, precisión en la hinca de la entubación, mínima perturbación del terreno y, sobre todo, continuidad de los pilotes.

El Contratista someterá a la aprobación de la Dirección de Obra, con la antelación suficiente, el tipo de pilotaje, equipo y plan de trabajo que tenga previsto aplicar, modificando lo que la Dirección de Obra ordene hasta conseguir su aceptación, lo cual no exime al Contratista de su responsabilidad.

Características del hormigón

El hormigón tendrá la resistencia característica indicada en los planos. En el caso de hormigonado bajo el agua, la mezcla deberá contener no menos de cuatrocientos kilogramos de cemento por cada metro cúbico (400 kg/m^3) de hormigón.

El cemento será del tipo I-32,5, con características sulforresistentes SR.

La consistencia del hormigón será de dieciséis a veinte centímetros (16 a 20 cm) para pilotes hormigonados en agua o lodos, y de diez a quince centímetros (10 a 15 cm) para el resto de los pilotes.

El recubrimiento mínimo de armaduras será de 4 cm, colocándose espaciadores que tengan una resistencia a la corrosión, al menos, igual a la del hormigón empleado.

Características de los lodos tixotrópicos

Tipo de suspensión	Homogénea y estable:
Dosificación	< 10%
Densidad	> 1,02 g/cm^3
	< 1,10 g/cm^3
Viscosidad normal (medida en cono de Marsh)	32 s <= V <= 45 s (antes de hormigonar)
pH	8 <= pH <= 11
Formación de cake mediante filtro prensa	2 - 8 mm
Contenido de arena en lodo viejo	<= 1% (antes de hormigonar)
	<= 2% (en gravas)
	<= 5% (arenas o terrenos más finos durante

perforación)

Tolerancias geométricas:

- Replanteo de los ejes . 10% D
- Profundidad de la perforación - 0
  + 1% L
- Aplomado . 2% L
- Posición de las armaduras Nula
- Recubrimiento de las armaduras Nula
- Nivel de la cabeza del pilote . 10 mm

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Todos los días antes de empezar los trabajos se han de revisar los aparatos de elevación, los dispositivos de manejo y de perforación.

Se han de tomar las medidas necesarias para no producir daños a las construcciones, instalaciones o otros elementos existentes en la zona.

Para la construcción del pilote se ha de disponer una superficie de trabajo sensiblemente horizontal, libre de obstáculos y de anchura suficiente para el trabajo de la maquinaria.

No se permite apilar, en las proximidades del pilote, materiales el peso de los cuales ponga en peligro la estabilidad del terreno.

El material procedente de la perforación se ha de cargar y transportar a vertedero a medida que se extraiga, no estando permitida su colocación sobre la plataforma de trabajo.

En el caso de utilizar lodos tixotrópicos queda prohibido el vertido de los mismos a las cloacas y colectores.

Para la construcción de la pantalla se dispondrá una superficie de trabajo sensiblemente horizontal, libre de obstáculos y de anchura suficiente para el trabajo de la maquinaria. El nivel freático deberá quedar a una profundidad del orden de un metro y medio (1,5 m) por debajo de la superficie del terreno. Si esta condición no se cumple, se construirá un terraplén, con un grado de compactación no inferior al del terreno natural. La superficie de trabajo estará convenientemente drenada para evitar encharcamientos en períodos lluviosos.

Antes de proceder a la perforación de la pantalla, deberán ser desviadas todas las conducciones aéreas que afecten al área de trabajo. Igualmente, deberán ser eliminados o modificados todos los elementos enterrados, tales como canalizaciones, raíces, restos de cimentaciones, etc., que interfieran directamente los trabajos, y también aquéllos que, por su proximidad, puedan afectar a la estabilidad del terreno durante la perforación de la pantalla. Asimismo, cuando dicha perforación pueda comprometer la estabilidad de estructuras contiguas, se efectuarán los oportunos apuntalamientos o recalces.

El material procedente de la perforación se ha de cargar y transportar a vertedero a medida que se extraiga, no estando permitida su colocación sobre la plataforma de trabajo.

En el caso de utilizar lodos tixotrópicos queda prohibido el vertido de los mismos a las cloacas y colectores.

El sistema de transporte que se utilice será el adecuado para no producir pérdidas ni suciedad en los viales del trayecto.

Si algún pilote perforado es desechado, deberá ser rellenado siempre con hormigón.

El pilote se empotrará en el terreno competente en la longitud indicada en los planos, medida a partir de la cota real de aparición de dicho sustrato portante.

Según la agresividad del terreno, la D.O. puede exigir la utilización de cementos puzolánicos o cementos portland con características especiales para la elaboración del hormigón.

El proceso de hormigonado no se puede suspender en ningún momento ni en ninguna circunstancia.

- Limpieza y tratamientos de fondo

  Una vez terminada la excavación se procederá a la extracción del detritus que haya podido almacenarse en el fondo de la cavidad. En pilotes en seco de gran diámetro será conveniente el descenso de un operario para comprobar dicha limpieza.

  Cuando no pueda garantizarse la eliminación de los detritus se preverán dispositivos para inyectar la punta del pilote, una vez terminado, eventualmente con lavado previo a presión.

  En los casos de apoyo sobre terreno potencialmente karstificado se dejarán tubos en el pilote para sondear por debajo de la punta o, en caso contrario, se sondeará todo el pilote penetrando en el terreno un mínimo de 5 diámetros. Si se apreciaran indicios claros de karstificación se procederá a inyectar el terreno en la longitud indicada y se revisará el diseño de los pilotes adyacentes para atravesar dicha zona.

- Colocación de armaduras

  La colocación de la armadura debe efectuarse inmediatamente después de haber limpiado el fondo.

  La armadura llevará los elementos necesarios para su izado y colocación, así como para evitar su movimiento durante el hormigonado.

  Para pilotes profundos se podrá dividir la armadura vertical en dos o más partes que se introducirán en la perforación manteniéndolas suspendidas y centradas durante las operaciones de soldadura de todas las barras.

  Las barras formarán una jaula de armadura, que se introducirá en la perforación de tal forma, que no se pueda mover durante el hormigonado ni podrá ser extraída al levantar la entubación. Las armaduras deberán quedar suspendidas durante todo el proceso de hormigonado, de forma que no se produzca pandeo de las barras ni abombamientos del conjunto de la jaula. Para ello, se fijarán de forma sólida a la coronación de la excavación.

  La armadura se ajustará al tipo de acero y diámetro de barras indicados en los planos del Proyecto.

  La armadura quedará a una distancia mínima de veinte centímetros (20 cm) en fondo de perforación y máxima de cincuenta centímetros (50 cm).

  La longitud será tal que, después del descabezado, sobresalga la longitud de anclaje que figure en los planos, que como mínimo será de un (1) diámetro del pilote construido.

- Hormigonado

  Antes de comenzar la excavación se verificará que el movimiento de tierras efectuado para la plataforma de trabajo no altera las hipótesis de cálculo del pilote.

  No se permitirá la perforación de un pilote a menos de tres diámetros (3 ø) de distancia del centro de otro pilote que lleve menos de cuarenta y ocho horas (48 h) hormigonado.

  El tiempo transcurrido entre el inicio de colocación de armaduras y vertido de hormigón será el menor posible.

  El hormigonado se realizará sin interrupción, mediante tubería cuyo diámetro estará comprendido entre quince y treinta centímetros (15 y 30

cm.) y que estará centrada en el pilote e introducida hasta el fondo de la perforación, de forma que no se produzcan disgregaciones ni huecos en su masa.

En el hormigonado de los pilotes se pondrá el mayor cuidado en conseguir que el pilote quede en toda su longitud con su sección completa, sin vacíos, bolsadas de aire o agua, coqueras ni cortes o estrangulamientos. Tampoco se olvidará reducir al máximo el deslavado por segregación de los áridos. En ningún caso se admitirá la caída libre del hormigón.

Las armaduras, así como la fabricación, transporte y puesta en obra del hormigón, se ajustarán a lo prescrito en los Artículos correspondientes, del presente Pliego.

Se hormigonarán las cabezas hasta una altura superior a la teórica de Proyecto en 0,5 D (si es bajo el nivel freático 1,5 D) que se demolerán después. El Contratista no percibirá ninguna compensación por este exceso del hormigonado ni por su demolición posterior.

Si al efectuar la demolición se observa que el descabezado no ha sido suficiente para eliminar todo el hormigón deslavado y de mala calidad, se proseguirá la demolición reemplazando el hormigón demolido por hormigón nuevo bien adherido al anterior. Todas estas operaciones serán por cuenta del Contratista.

El hormigonado de un pilote se hará, en todo caso, sin interrupción, de modo que entre la introducción de dos masas sucesivas no pase tiempo suficiente para la iniciación del fraguado; si por alguna avería o accidente esta prescripción no se cumpliera, la Dirección de Obra decidirá si el pilote puede terminarse y considerarse válido o no. El pilote que haya sido rechazado por el motivo indicado habrá de ser rellenado, sin embargo, en toda su longitud abierta en el terreno, sin que el Contratista perciba pago alguno por ello. La parte de relleno, después de rechazado el pilote, podrá ejecutarse con hormigón pobre, pero su ejecución se hará con los mismos cuidados que si se tratara de un pilote que hubiera de ser sometido a cargas.

La posición de los pilotes en planta, después de construidos, no deberá diferir en más del 10% del diámetro del pilote. La desviación respecto a la vertical no será superior al 2% de la longitud del pilote indicada en los Planos.

Perforación con entubación recuperable

Se tratará de conseguir una bajada de la entubación tan continua como sea posible y llevada a la par con la extracción de la tierra; en ningún caso, la extracción debe adelantarse sobre la bajada del tubo.

En caso de penetrar por debajo de la capa freática, no se admitirá bombeo durante la ejecución del pilote.

En caso de encontrar afluencias de agua, se puede admitir un bombeo previo para limpiar el tubo, siempre que la afluencia de agua sea menor que una décima de litro por segundo (0,1 l/s); en caso contrario, se proscribe la aplicación de bombeo durante la ejecución del pilote.

En los casos en que exista riesgo importante de deslavado del hormigón (por ejemplo, gravas con flujo de agua) se colocará dentro de la entubación una camisa metálica que quedará perdida.

La entubación debe llegar hasta el final del pilote o hasta la profundidad en que las paredes sean estables. La superficie interior de los tubos debe ser completamente lisa. Las juntas serán roscadas o soldadas y habrán de ser impermeables.

El avance de la entubación se llevará a cabo de tal forma que el suelo por el que ésta atraviesa vaya desplazándose hacia los lados, compactándolo al mismo tiempo, sin que se produzca ninguna extracción de material. Si se encontraran obstáculos durante la hinca o perforación se podrá utilizar trépano guiado o técnicas especiales de excavación.

La entubación será de acero, recta. La superficie interior de los tubos será completamente lisa. Las juntas serán roscadas o soldadas y serán impermeables.

Tanto el tubo como las juntas han de poder resistir los esfuerzos que se producen al clavar el tubo, sin sufrir deformaciones.

Durante el hormigonado de los pilotes de entubación recuperable, se ha de ir elevando la citada entubación de forma que quede siempre un tapón de hormigón en el fondo de la misma, que impida la entrada del terreno circundante. Este tapón no será demasiado alto, ya que podría adherirse a la entubación, ocasionando el corte del pilote, por lo que su altura ha de estar comprendida entre dos veces y tres veces y media el diámetro del mismo.

La citada altura se habrá de comprobar continuamente, por medida directa y por comparación entre el volumen del hormigón colocado y el calculado para la altura hormigonada.

El hormigonado se hará en seco o bien con el tubo lleno de agua hasta el nivel freático debiendo elegirse uno u otro procedimiento según la naturaleza del terreno. Será preferible el hormigonado con tubo lleno de agua en cuanto haya capas de terrenos socavables, siendo necesario en este caso colocar el hormigón en obra por medio de una cuchara, tubo, bomba o cualquier artificio que dificulte su deslavado. Cuando no haya terrenos socavables será aconsejable el hormigonado en seco, que podrá conseguirse, aún en terrenos de cierta permeabilidad, sellando inicialmente el fondo de la excavación con un hormigón muy seco.

En terrenos muy blandos o susceptibles de sifonamiento, durante la excavación, se ha de mantener el nivel de agua en el interior de entubación.

En los pilotes con camisa perdida, realizada la excavación y antes del hormigonado, se ha de introducir la camisa en la entubación.

Se ha de mantener suspendida desde la boca de la perforación, hasta la finalización de las operaciones de hormigonado.

Perforación con lodos tixotrópicos:

En el caso de utilizar lodos tixotrópicos, se ha de sustituir el lodo y se ha de regenerar cuando su contenido en arena o cuando la viscosidad superen los valores especificados.

La tubería que coloca el hormigón ha de ir introducida siempre 5 m., como mínimo, dentro del hormigón anteriormente vertido.

A medida que se inyecta el hormigón se han de recuperar los lodos sobrantes.

El hormigonado se ha de realizar por sistema ascendente, es decir, de abajo hacia arriba desalojando el lodo a medida que penetre el hormigón.

Control de ejecución de los pilotes

El Contratista confeccionará un parte de trabajo de cada pilote en el que figurará, al menos: la fecha y la hora de comienzo y fin de la introducción de la tubería; la profundidad total alcanzada por la entubación, la descripción de los terrenos atravesados y el espesor de las distintas capas; la profundidad hasta la que se ha introducido la armadura y la longitud y constitución de la misma; la profundidad del nivel de la superficie del agua al comienzo del hormigonado; y la fecha y la hora del comienzo y terminación del hormigonado. Los datos de las distintas capas de terrenos atravesados deberán contrastarse con los que sirvieron para el dimensionamiento de la cimentación.

Por cada cincuenta metros cúbicos (50 m^3) de hormigón, se tomarán dos (2) probetas que se curarán en cámara y se determinará su resistencia característica a siete (7) días, estimando la resistencia a los veintiocho (28) días para poder tomar las medidas necesarias en caso de que no se prevea alcanzar las resistencias de diseño.

Transcurridos siete (7) días después del hormigonado se realizarán, en aquellos casos que indique la D.O. las pruebas de integridad del pilote a través de los tubos dejados a tal efecto.

En cada pilote se habrán instalado cuatro tubos metálicos, de 75 mm. de diámetro interior, en toda la longitud de la perforación hasta 20 cm. por encima del fondo de la misma, con el fin de controlar la punta del pilote. Se sujetarán con puntos de soldadura y estarán dispuestos según los vértices de un cuadrado inscrito en la armadura. Estarán obturados en su parte inferior.

Una vez fraguado el hormigón, se efectuarán, en aquellos pilotes que designe el proyecto o la D.O. a través de algunos de los tubos mencionados, perforaciones verticales en el sustrato, bajo el extremo inferior del pilote, con una longitud mínima tal que cada perforación alcance los cinco (5) metros por debajo del pilote. Si entre 4 y 5 metros, las referidas perforaciones detectaran intercalaciones blandas en el substrato, se prolongarán de modo que, el espesor de tierra firme atravesado bajo la última intercalación blanda no sea inferior a un (1) metro.

Al objeto de eliminar parcialmente el material blando intercalado entre estratos de consistencia firme y sustituirlo por la inyección de mortero que ha de formar el puente resistente o de rellenar una zona karstificada, se seleccionarán dos perforaciones diagonalmente opuestas. Sucesiva o simultáneamente se inyectará agua a presión (quedando, específicamente prohibida la inyección de aire) a través de dichas perforaciones, obturando a nivel del hormigón del pilote, hasta alcanzar un máximo de 5 atmósferas de presión de agua a nivel de extremo inferior de pilote y 3 atmósferas a nivel de rasante, salvo que antes de alcanzar dicha presión ascendiera el agua por los otros dos taladros. La circulación en este caso, deberá mantenerse hasta que el agua salga prácticamente limpia.

Esta operación deberá repetirse de igual forma en las otras dos perforaciones diagonalmente opuestas.

A continuación se comenzará la inyección de mortero por uno de los tubos (previamente obturados con tubos pasantes dotados de llave de paso). Si se produjera ascensión de mortero por alguno de los restantes taladros se cerrará la llave de los correspondientes al mismo, continuándose la inyección. Deberá alcanzarse una presión de 2 atmósferas en boca superior del tubo de inyección (nivel de rasante) y mantener dicha presión durante un tiempo mínimo de 15 minutos.

Seguidamente, y previo cierre de la llave de paso del tubo inyectado, se desplazará la inyección a un tubo en que no se hubiera producido comunicación de lechada.

El proceso se repetirá sucesivamente (cambiando la inyección, si ello fuera posible, a tubos diagonalmente opuestos) hasta asegurar que el tratamiento a presión de los cuatro taladros de pie de pilote hubiera sido completado.

Se empleará mortero 1,5-2:1 (arena: cemento), con una relación agua/cemento de 0,35 y adicionándole 4,5 gr. de expansivo por kilogramo de cemento.

Ensayo sónico en pilotes

El control de la continuidad y compacidad de los pilotes se efectuará, a juicio de la D.O., mediante el procedimiento de transparencia sónica (diagrafía) que consiste en obtener perfiles transversales sónicos (entre parejas de tubos) del estado y continuidad del hormigón. Para ello se utilizarán 4 tubos embebidos en el hormigón, diametralmente opuestos, que se hacen solidarios a la armadura según se va bajando ésta en la perforación.

Se obtienen seis perfiles 1-2, 1-3, 1-4, 2-3, 2-4, 3-4 (ver planos), que permiten observar el estado del pilote hormigonado, asegurando su continuidad y detectando posibles defectos, para poder tratarlos en su caso (huecos, cavidades, zonas lavadas, etc.).

Respecto a los cuatro tubos que deben instalarse, su diámetro se adoptará al del instrumento a utilizar para la diagrafía previendo que se puedan utilizar los taladros la consolidación en punta del terreno, mediante la inyección de lechada de cemento en la jaula de grava.

La interpretación de los ensayos será competencia de la D.O. que en los pilotes diagrafiados, si le ofrecieran dudas sobre la calidad portante de los pilotes, podrá ordenar las medidas de reparación de los pilotes defectuosos, pudiendo llegar incluso, al rechazo del pilote ejecutado.

Pruebas de carga

A efectos de ser ensayado independiente, se ejecutarán pilotes de prueba, si así lo decidiera la D.O. hasta la carga de servicio, o bien hasta su rotura o asentamiento.

En este caso, dicho pilote no podrá ejecutarse en la misma zona de cimentación, pero sí en sus proximidades, debiendo estar en iguales condiciones en lo que se refiere a características del suelo y de profundidad que los pilotes definitivos.

En todo caso, al efectuar los ensayos de carga sobre los pilotes de prueba y sobre los de trabajo, se seguirán las instrucciones de la Dirección de Obra, quién podrá variar el número y la forma de realizarlos.

Durante el tiempo que duren las pruebas de carga no podrá haber ninguna clase de trepidaciones, ni las producidas por tráfico, maquinaria o trabajos de hinca. No se realizará más de una prueba a la vez.

En la prueba habrá de tenerse muy en cuenta el que la sobrecarga coincida con el eje del pilote y que durante el asentamiento no oscile dicha carga para evitar que bascule.

Al tratarse de una prueba de carga con destino a comprobar hipótesis de proyecto, el programa de ensayo ha de adaptarse a las variaciones de carga previstas en servicio de la obra, tales como la reproducción de distintos ciclos de carga-descarga.

El sistema utilizado para conseguir la reacción necesaria, para la prueba de carga, debe ser tal que no influya en el pilote de prueba alterando su resultado.

Para la realización de pruebas de carga y el estudio de los resultados se podrá seguir la Norma DIN 1054.

En el caso de que las pruebas de carga sobre pilotes de trabajo produjesen asientos excesivos o cuando la ejecución de un pilote de trabajo fuese defectuosa por negligencia del Contratista, la Dirección de Obra podrá ordenar la ejecución de tres (3) pruebas de carga suplementarias sobre pilotes de trabajo por cada pilote defectuoso que se haya encontrado o se vaya encontrando, debiendo limitarse estas pruebas suplementarias a aplicar sobre el pilote una carga máxima del ciento treinta por ciento (130%) de la de trabajo. El coste de estas pruebas suplementarias, realizadas sobre pilotes de trabajo no será abonado al Contratista.

G302 VIGAS, MARCOS Y MUROS PREFABRICADOS

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

Esta unidad se refiere a los elementos de vigas, marcos y muros de hormigón, fabricados en instalaciones fijas, y transportados y suministrados posteriormente a pie de obra, para su colocación y montaje in situ.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Preparación y comprobación de las superficies de apoyo en obra.
- Suministro y transporte a la obra del elemento prefabricado.
- Montaje y perfecta nivelación.
- Relleno y sellado, de fraguado rápido, y alta adherencia tipo □grout□ o similar, para la unión de piezas prefabricadas, en su caso.

CONDICIONES GENERALES.

El fabricante ha de garantizar que los elementos cumplan las características exigidas en el Proyecto

Las formas, cuantías y detalles de los diferentes elementos prefabricados eran los indicados en los planos. No se admitirá, salvo decisión expresa por parte de la Dirección de Obra, ninguna modificación de las formas que afecte en la

apariencia externa de la obra tal y como se define en los planos. Cualquier otra modificación de las cuantías, resistencias de los materiales, detalles o proceso constructivo definidos en Proyecto podrá someterse por parte del Contratista a la aprobación de la Dirección de Obra, siempre que esté justificada técnicamente y no suponga menoscabo alguno en la calidad y durabilidad de la obra.

La justificación técnica y económica de estos elementos ha de ser aprobada por la D.O.

El contratista ha de someter a la aprobación de la D.O. el plan de montaje en el que se ha de indicar el método y los medios auxiliares previstos.

El director de las obras podrá ordenar la toma de muestras de materiales para su ensayo, y la inspección de los procesos de fabricación, realizándose las correspondientes visitas a las plantas de prefabricación, siempre que lo considere necesario.

Los elementos prefabricados se almacenarán en obra en su posición normal de trabajo, sobre apoyos de suficiente extensión y evitando el contacto con el terreno o con cualquier producto que las pueda manchar o deteriorar.

Los elementos prefabricados no deben presentar rebabas que sean indicio de pérdidas graves de lechada, ni más de tres coqueras en una zona de diez decímetros cuadrados (0,1 m^2) de paramento, ni coquera alguna que deje vistas las armaduras.

Tampoco presentarán superficies deslavadas o aristas descantilladas, señales de discontinuidad en el hormigonado, o armaduras visibles.

Salvo autorización del Director, no se aceptaran vigas con fisuras de más de una décima de milímetro (0,1 mm) de ancho, o con fisuras de retracción de más de dos centímetros (2 cm) de longitud.

La comba lateral máxima, medida en forma de flecha horizontal, no será superior al quinientosavo (1/500) de la longitud de la viga.

La contraflecha bajo la acción del peso propio, medida en la viga en condiciones normales de apoyo, no será superior al trescientosavo (1/300) de la luz para vigas de hasta diez metros (10 m), y al quinientosavo (1/500) para luces mayores.

El Director de Obra podrá ordenar la comprobación de las características mecánicas sobre un cierto número de elementos.

Los cálculos estáticos y los planos de construcción correspondientes, deberán ser presentados a la aprobación del Director de Obra con la suficiente antelación al comienzo de los trabajos de fabricación.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

a) Idoneidad de la empresa fabricadora

Los elementos prefabricados de hormigón armado o pretensado serán fabricados por una empresa especializada en suministrar productos y servicios normalmente asociados con la construcción prefabricada estructural pesada, dotada de instalaciones fijas con reconocida experiencia en este tipo de prefabricados.

El fabricante debe evidenciar la realización de trabajos similares y comparables, y demostrar la capacidad de sus equipos técnico, de fabricación y de servicios , para la realización de los trabajos de acuerdo con las presentes especificaciones.

b) Condiciones generales

Se prohibe el empleo de áridos que contengan piritas u otro tipo de sulfuros. Se emplearán áridos procedentes de roca caliza preferentemente.

Limitación de tamaño : El tamaño máximo del árido utilizado no excederá del menor de los dos límites siguientes:

- Un medio del espesor mínimo de la pieza que se hormigona.

- Los cinco sextos de la distancia horizontal libre entre armaduras independientes o entre éstas y los costeros del molde, si es que dichas aberturas tamizan el vertido del hormigón.

Se admite que el 10% en peso del árido utilizado sea de tamaño superior al anteriormente citado.

Almacenamiento: Con el fin de evitar el empleo de áridos excesivamente calientes durante el verano, o saturados de humedad en invierno o en época de lluvia, se recomienda almacenarlos bajo techado, en recintos convenientemente protegidos y aislados.

Empleo de áridos calientes : Cuando el hormigonado se realice en ambiente frío con riesgos de heladas, podrán utilizarse áridos previamente calentados. En estos casos se tendrá en cuenta lo establecido al hablar del empleo de agua caliente.

Información que debe suministrar el fabricante de las armaduras: para los aceros que posean un distintivo reconocido o un CC-EHE (Art. 1ı de la EHE), cada partida de acero acreditará que está en posesión del mismo e irá acompañada de un certificado de garantía con los valores límites de las características indicadas en los Artículos 32.3, 32.4 y 32.5.

En el caso de no poseer un distintivo reconocido o un CC-EHE, cada partida deberá ir acompañada por un certificado con los ensayos que haya realizado uno de los organismos citados en el artículo 1ı (EHE) y que justifiquen las características indicadas en los Artículos 32.3, 32.4 y 32.5.

c) Materiales a emplear

En particular los materiales empleados en los elementos prefabricados son de aplicación las siguientes especificaciones que recogen básicamente las indicaciones de la Instrucción EHE.

CEMENTO

Cementos utilizables : El conglomerante empleado en la fabricación de los elementos objeto de estas recomendaciones cumplirá las condiciones establecidas en el vigente "Pliego General de Condiciones para la Recepción de Conglomerantes Hidráulicos", y será necesariamente de la clase CEM I 42,52 UNE 80301:96. No se utilizarán mezclas de cemento de distintas procedencias ni, a ser posible, mezclas de distintas partidas, aunque sean de la misma procedencia.

Suministro y almacenamiento: El cemento no se empleará en fábrica a temperatura superior a setenta grados centígrados, salvo que se compruebe, mediante el ensayo correspondiente, que no tiene tendencia a experimentar el fenómeno de falso fraguado.

El almacenamiento se llevará a cabo en silos, debidamente acondicionados, que aíslen el cemento de la humedad. Si el suministro se realiza en sacos se recibirá el cemento en los mismos envases cerrados en que fue pedido a origen y se almacenará en sitio ventilado y defendido, tanto de la intemperie como de la humedad del suelo y de las paredes.

AGUA

Aguas utilizables: Como norma general, podrán ser utilizadas, tanto para el amasado, como para el curado del hormigón destinado a la fabricación en taller de todas las aguas que, empleadas en casos análogos, no hayan producido eflorescencias ni originado perturbaciones en el proceso de fraguado y endurecimiento de los hormigones con ellas fabricados.

Expresamente se prohibe el empleo de agua de mar.

Empleo de agua caliente: Cuando el hormigonado se realice en ambiente frío, con riesgo de heladas podrá utilizarse para el amasado, sin necesidad de adoptar precaución especial alguna, agua calentada hasta una temperatura de 40ı C.

Cuando, excepcionalmente, se utilice agua calentada a temperatura superior a la antes indicada, se cuidará que el cemento, durante el amasado, no entre en contacto con ella mientras su temperatura sea superior a los 40ı C.

ÁRIDOS

Normalmente se emplearán dos tipos de árido, arena y grava. Se entiende por "arena" o "árido fino", el árido o fracción del mismo que pasa por un tamiz de 5 mm. de luz de malla (tamiz 5 UNE 7 050) y por "grava" o "árido grueso" el que resulte retenido por dicho tamiz.

Condiciones generales: La naturaleza de los áridos y su preparación serán tales que permitan garantizar la adecuada resistencia y durabilidad del hormigón. En elementos estructurales se exige que los áridos provengan del machaqueo de rocas.

ADITIVOS

Podrá autorizarse el empleo de todo tipo de aditivos siempre que se justifique que la sustancia agregada en las proporciones previstas y disuelta en agua, produce el efecto deseado sin perturbar las demás características del hormigón.

En los hormigones destinados a la fabricación de elementos pretensados no podrán utilizarse, como aditivos, el cloruro cálcico, cualquier otro tipo de cloruro ni, en general, acelerantes en cuya composición intervengan dichos cloruros u otros compuestos químicos que puedan ocasionar o favorecer la corrosión de las armaduras.

ARMADURAS PASIVAS

Todas las armaduras pasivas de las piezas prefabricadas presentarán un límite elástico característico igual o superior a 5.000 kg/cm^2.

Cumplirán lo especificado para ellas en la "Instrucción de Hormigón Estructural (EHE), para el acero B-500S.

El fabricante de las armaduras pasivas enviará al de los elementos prefabricados las certificaciones del control realizado sobre aquellas partidas de su producción a la que pertenece el lote enviado. En dicho certificado se mencionarán todas las probetas ensayadas, con indicación del número de colada y rollo de proveniencia, y ser harán constar, para cada probeta, los resultados completos del ensayo.

Se emplearán exclusivamente armaduras pasivas cuyo fabricante esté en posesión de un distintivo reconocido, o un CC-EHE.

Las armaduras destinadas a ser soldadas a chapas serán de acero natural y sufrirán las pruebas de actitud para soldeo fijadas en las normas EHE.

Condiciones de transporte y almacenamiento: Los alambres o cables suministrados, ya sea en forma de rollos, carretes o cortados a medida, deberán ser convenientemente protegidos de la humedad durante el transporte. Los locales de almacenamiento de los mismos, deberán estar secos, bien ventilados y exentos de polvo y/o atmósferas corrosivas.

Se evitará en lo posible el contacto directo de las armaduras con el suelo.

Igual trato deberá darse a las partidas de armaduras pasivas.

ARMADURAS ACTIVAS

Se entiende por armadura activa la de acero de alta resistencia, mediante la cual se introduce la fuerza del pretensado. Sus elementos constituyentes pueden ser alambres, barras y cordones.

Los torones o cordones a emplear seguirán las especificaciones del artículo 32.5 de la EHE.

Se emplearán cordones con designación Y1860S7 de diámetro nominal 15,2 mm y carga unitaria máxima de 1.860 N/mm^2.

El límite elástico f_y estará comprendido entre el 0,88 y el 0,95 de la carga unitaria máxima $f_{máx}$. Esta limitación deberán cumplirla no sólo los valores mínimos garantizados, sino también cada uno de los elementos ensayados.

El alargamiento bajo carga máxima, medido sobre una base de longitud igual o superior a 500 mm, no será inferior al 3,5 por 100.

La estricción a la rotura será visible a simple vista.

El módulo de elasticidad tendrá el valor garantizado por el fabricante, con un tolerancia de± 7 por 100.

La relajación a las 1.000 horas a temperatura de 20± 1º C, y para una tensión inicial igual al 70 por 100 de la carga unitaria máxima garantizada, determinada según la UNE 36422-85, no será superior al 2 por 100.

Los cordones se suministrarán en rollos, bobinas o carretes que, salvo acuerdo en contrario, contendrán una sola longitud de fabricación de cordón; y el diámetro interior del rollo o del núcleo de la bobina o carrete no será inferior a 750 mm.

Los rollos no contendrán soldaduras realizadas después del tratamiento térmico anterior al trefilado.

Se realizarán ensayos de control de calidad del acero, tanto para productos certificados como no certificados, de acuerdo con los artículos 90.1, 90.3, 90.3.1, 90.3.2, 90.4 y 90.5 de la EHE.

d) Instalaciones de fabricación

LOCALES Y ALMACENES

Condiciones generales : El almacenamiento de materias primas se organizará de tal manera que no quepan confusiones entre partidas controladas y pendientes de control.

Almacén de cemento : Se deberá disponer de silos adecuados para almacenar el cemento a granel o locales cubiertos donde se almacene el cemento en las condiciones estipuladas en el apartado correspondiente del presente texto.

Almacén de áridos : Es conveniente almacenar los áridos bajo cobertizos que los defiendan de la intemperie, especialmente cuando no se corrija, diariamente, la dosificación del agua de amasado, con arreglo a los resultados obtenidos en el ensayo de determinación de la cantidad de agua contenida en los áridos.

Almacén de aceros : En el recinto de almacenamiento y en sus proximidades se prohibe la realización de operaciones de soldadura o análogas, que pudieran afectar por calentamiento, a las características de los aceros.

Naves de hormigonado y moldeo : Se exige que las instalaciones de hormigonado y moldeo se encuentren protegidas de la intemperie.

INSTALACIÓN DE DOSIFICACIÓN

Instalación de dosificación : La instalación de dosificación que debe existir siempre, para la preparación de las mezclas destinadas a la fabricación del hormigón, suministrará las cantidades necesarias de cada material con una tolerancia máxima en peso, del 2%.

Comprobación de los aparatos de medida : Al menos semanalmente se comprobará que no se han descorregido los aparatos de medida utilizados para dosificar los diversos componentes. Estas comprobaciones deberán intensificarse si se observan anomalías en las resistencias de los hormigones obtenidos.

APARATOS PARA EL AMASADO

Máquinas de amasado : El amasado se efectuará en máquinas adecuadas que proporcionen un mezclado íntimo de la masa, lo más homogéneo posible. La homogeneidad de la masa deberá mantenerse a lo largo de la descarga de la amasadora.

MOLDES

Condiciones generales : Los moldes serán metálicos, fijos o desplazables. Tendrán la rigidez necesaria para evitar que se deformen bajo el empuje del hormigón fresco o los efectos de los vibradores, y estarán perfectamente sujetos y arriostrados entre sí para impedir movimientos relativos durante el vibrado.

En ningún caso los moldes deberán impedir el movimiento longitudinal que se produce al acostarse el hormigón durante la maniobra de destesado de las armaduras activas.

Las juntas entre los diferentes elementos de cada molde serán lo suficientemente estancas para impedir fugas de mortero o papilla de cemento.

Separadores : No se permitirá el empleo de separadores rígidamente unidos entre si de forma permanente. Por el contrario, los dos separadores que forman el cierre de los extremos adyacentes de dos piezas sucesivas, deberán permitir un movimiento relativo entre ambos, para poder aflojar los alambres, en los espacios libres entre elementos, antes de proceder al destesado gradual, de tal modo que no produzcan variantes bruscas en las tensiones de los alambres.

Medida de los esfuerzos de tesado : Se medirá y limitará el esfuerzo de tesado, en todas y cada una de las sucesivas fases, mediante dispositivos dinamométricos que registren directamente o por comparación, la magnitud de la carga introducida. Paralelamente, se comprobará por medición directa, con precisión no inferior al 7% que los alargamientos obtenidos corresponden a las tensiones aplicadas.

INSTALACIONES DE CURADO

Condiciones que deben cumplir : Se deberá prever las instalaciones necesarias para el curado de los elementos, con objeto de que éstos alcancen, en los plazos previstos las oportunas características resistentes.

e) Proceso de fabricación

DIRECCIÓN TÉCNICA

Técnico de fabricación : En los talleres donde construyan los elementos resistentes de hormigón armado deberá existir, con carácter de permanencia y plena autoridad, un técnico especializado, con título expedido por una Escuela Técnica de Grado Superior o Medio, personalmente responsable del exacto cumplimiento, durante todo el proceso de fabricación, tanto de las disposiciones contenidas en estas especificaciones como de las prescripciones adicionales que la Dirección de Obra estime necesarias para la correcta ejecución de los elementos.

COLOCACIÓN DE LAS ARMADURAS ACTIVAS

Uniformidad : Se recomienda que todas las armaduras de acero especial colocadas en una misma línea de moldes sean de la misma procedencia, tipo, grado y diámetro. Esta recomendación adquiere carácter de obligatoriedad en el caso de tesado simultáneo de las armaduras.

Estado de la superficie de las armaduras : Las armaduras se colocarán limpias de grasa, óxido no adherido, o de cualquier otra sustancia que pueda perjudicar su adherencia con el hormigón, debiendo rechazarse todas aquellas en las que se aprecien síntomas de corrosión.

En particular se prohibe el uso de alambres que presenten jaboncillo de trefilación en su superficie, a menos que utilice un método eficaz de limpieza antes de su colocación.

No se colocarán armaduras en cuya superficie aparezcan defectos de trefilado, tales como rayas longitudinales o grietas transversales.

COLOCACIÓN DE ARMADURAS PASIVAS

Las armaduras pasivas, sin pretensar, se colocarán cumpliendo las prescripciones de la Instrucción EHE. Dejando, en las zonas a rellenar "in

situ", la armadura saliente necesaria para el solapado por soldaduras que habrá de realizarse "in situ" al disponer la correspondiente armadura.

TESADO DE LAS ARMADURAS ACTIVAS

Tensión de tesado : Para alcanzar esta tensión se someterán los alambres o cables a un esfuerzo gradualmente creciente de tracción, sin sacudidas ni tirones bruscos.

Con el fin de comprobar la calidad de las armaduras y disminuir las pérdidas de tensión por relajación y eventuales rozamientos del acero, se autoriza a someter al principio los alambres o cables transitoriamente, a una tensión de prueba comprendida entre el 110% y el 115% de la tensión de tesado definitivo, sin superar los valores fijados en la EHE.

Una vez efectuada esta primera maniobra, se reducirá el esfuerzo, fijándose los alambres en el clavijero cuando se recupere la tensión prescrita.

HORMIGONADO

Las distintas clases de hormigón a utilizar en los elementos prefabricados se especifican en los planos.

Métodos de dosificación : La dosificación de los distintos materiales que componen el hormigón se hará preferiblemente en peso, admitiéndose también procedimientos automáticos en volumen, siempre que se cumplan las condiciones prescritas en el apartado correspondiente de la norma EHE.

Precauciones que deben adoptarse para el amasado : Antes de iniciar el amasado con una nueva partida de conglomerante, y al finalizar la jornada, deberá limpiarse perfectamente la mezcladora.

Precauciones que deben adoptarse en el caso de temperaturas extremas : Se adoptarán las precauciones necesarias para evitar que la temperatura de los moldes, por soleamiento u otras causas, sea excesiva en el momento de proceder a su llenado.

Cuando el hormigonado se realice en ambiente frío, con riesgo de heladas, con objeto de favorecer el proceso de fraguado y endurecimiento del hormigón, podrá recurrirse al calentamiento del agua y/o de los áridos.

Defectos del hormigón fresco : No se permitirá la colocación de masas frescas que acusen un principio de fraguado o disgregación de sus componentes.

Antiadherentes para los moldes : Se recomienda, para facilitar el desmoldeo, pintar los moldes con barnices antiadherentes compuestos de siliconas o preparados a base de aceites solubles en el agua, o grasa diluida, evitando el uso del gasoil, grasa corriente o cualquier otro producto análogo.

VIBRADO

Obligatoriedad del vibrado : La consolidación del hormigón se hará utilizando vibradores. Entre ellos se consideran incluidas las mesas vibratorias y las baterías con vibración de todo el conjunto.

Condiciones de vibrado : Salvo aprobación expresa de la D. Facultativa la vibración será siempre externa aplicada sobre el molde metálico. La vibración interna o de superficie será siempre de complemento de la externa.

Vibradores internos : Cuando se utilicen vibradores internos deberán aplicarse introduciéndolos verticalmente en la masa, con movimiento lento, a una velocidad del orden de 8 cm/segundo y sin que la aguja sufra movimientos horizontales de traslación. En ningún caso deberán vibrarse espesores de hormigón superiores a la longitud de la aguja.

Vibradores de superficie : Cuando se emplean vibradores de superficie (bandeja o patín), éstos se aplicarán también con movimiento lento hasta conseguir, en toda la superficie, una humectación brillante.

Duración del vibrado : En todo caso, la duración e intensidad del vibrado será la suficiente para que, con su efecto, se consiga una humectación brillante de la superficie.

Con el fin de evitar la separación de los componentes del hormigón, o disgregación de la masa, la operación de vibrado no deberá prolongarse excesivamente.

CURADO

Curado inicial : Se recomienda que, a partir de las primeras horas después del hormigonado, se recubra la cara superior de las piezas con arpilleras humedecidas que no sean de esparto. Pasadas 24 horas se procederá a regar las piezas para impedir la evaporación.

Curado al vapor : Puede comenzarse este proceso a las dos horas de vibrada la masa, elevándose la temperatura, a partir de este momento, de forma gradual hasta alcanzar la temperatura límite. Esta temperatura límite podrá mantenerse constante durante cierto tiempo, finalizado el cual se hará descender la temperatura, de forma continua, hasta llegar a la temperatura ambiente.

La presión del vapor será lo más uniforme posible en todos los puntos, y los orificios para la salida de los chorros de vapor estarán suficientemente próximos unos a otros, con el fin de conseguir una temperatura constante a lo largo de la pieza. Es imprescindible que la atmósfera del recinto curado se mantenga, en todo momento, saturada de humedad.

Curado por calor : Se aconseja el curado por calor, si las temperaturas alcanzadas son aceptables y las piezas se mantienen recubiertas y en ambiente húmedo, con el fin de impedir la desecación de las mismas. Los procesos más indicados son a base de agua o aceite caliente.

f) Planos de taller y montaje

La realización en taller se llevará a cabo de conformidad con los cálculos, Planos y Pliego de Condiciones del Proyecto, según los cuales la Empresa fabricadora preparará los planos de taller precisos para la ejecución de las piezas.

Estos planos de taller se someterán a la Dirección de Obra para su aprobación definitiva, antes de dar comienzo a la fabricación en taller. La aprobación de los mismos no exime de la responsabilidad que pudieran contraer por errores existentes.

Contendrán de manera inequívoca:

Las dimensiones necesarias para definir exactamente todos los elementos de la estructura.

Las contraflechas de ejecución.

La forma y dimensiones de las uniones entre piezas prefabricadas y con el resto de la estructura.

Las tolerancias de fabricación.

La Empresa fabricadora suministrará asimismo los planos de montaje y ensamblaje en obra, junto a las marcas de identificación de cada una de las piezas, dispuestas en las zonas que queden no vistas una vez terminada la estructura.

Quedará perfectamente clara la forma y secuencia de cada una de las operaciones de montaje.

En aquellas superficies de los elementos prefabricados en las que posteriormente se coloquen hormigones in situ con los que debe garantizarse la adecuada transmisión de tensiones de cizallamiento, se garantizará la adecuada rugosidad del elemento prefabricado mediante el rascado con peine de púas u otro sistema análogo.

Posteriormente, en obra, el Contratista deberá proceder, antes del vertido del hormigón in situ a la adecuada limpieza de la superficie con chorro de agua, o de arena si fuera necesario.

g) Transporte y montaje

La Empresa fabricadora deberá definir los aparatos de sujeción de los elementos prefabricados, tanto durante la fabricación y apilado en taller como durante el transporte a obra y montaje de las piezas, realizando los planos correspondientes para su completa definición, que se someterán a la Dirección de Obra para su aprobación definitiva. Los elementos prefabricados se sujetarán, durante la fabricación, apilado, transporte y montaje, solamente de los aparatos de sujeción que estén señalados en estos planos.

El lanzamiento y la colocación de las vigas prefabricadas se ajustará a lo especificado en el Artículo 693 del P.G-3.

Las operaciones de manejo y transporte de piezas prefabricadas, bien sea en taller o en obra, deberán realizarse con el máximo cuidado posible, manteniendo el alma de las vigas en posición vertical. En ningún caso se producirán impactos ni solicitaciones de torsión.

En general, las vigas se transportarán y almacenarán de forma que los puntos de apoyo y la dirección de los esfuerzos sean aproximadamente los mismos que los que tales elementos tendrán en su posición final en la obra. Si el Contratista estimara necesario transportar o almacenar tales elementos en posiciones distintas a la descrita, deberá requerir la aprobación previa del Director de Obra.

Los vehículos de transporte y los dispositivos de lanzamiento elegidos por el Contratista deberán ser aprobados siempre por el Director de las Obras.

La superficie de apoyo de las vigas sobre los vehículos de transporte, deberá configurarse de tal forma (disponiendo, por ej., aparatos de apoyo de material elastomérico) que se excluya con toda seguridad cualquier daño de los elementos prefabricados durante la carga y descarga y durante el transporte.

En las operaciones de elevación y descenso de las vigas, para su transporte y colocación, éstas se sujetarán únicamente en los dispositivos previstos a tal fin.

Durante el transporte, almacenamiento, etc, las vigas prefabricadas solo deberán apoyarse en los puntos indicados en los Planos del Proyecto. Cuando vayan sobre vehículos de transporte se asegurarán de tal forma que no puedan volcar o estar expuestas a solicitaciones imprevistas por giro o golpes. Se acondicionarán adecuadamente las vías por donde vayan a circular los transportes para evitar estas circunstancias.

En el momento de colocar las vigas, los lechos de mortero de los aparatos de apoyo deberán haber alcanzado la resistencia a compresión exigida.

Se pondrá especial cuidado en la colocación correcta de las vigas sobre los aparatos de apoyo.

Si en el curso de estos trabajos quedase dañado algún aparato de apoyo, será sustituido inmediatamente por otro en perfectas condiciones, sin que para ello fuesen necesarias órdenes especiales del Director de Obra.

Tanto el transporte como la colocación de las vigas se realizarán solamente a las órdenes y bajo el control de un Ingeniero con experiencia en el lanzamiento de vigas prefabricadas.

El Contratista presentará a la aprobación del Director de las obras un programa detallado para el lanzamiento de las vigas, en el cual figurarán el desarrollo temporal de los trabajos así como el personal y la maquinaria que intervendrán en esta operación. Asimismo, habrá de comunicarse al Director de las obras con la suficiente antelación (como mínimo 24 horas) cualquier transporte o lanzamiento de vigas prefabricadas.

Si el montaje afectase al tráfico de peatones o vehículos, el Contratista presentará con la debida antelación, a la aprobación del Director, el programa de corte, restricción o desvío de tráfico.

En el caso de que sea preciso acopiar elementos en obra, el Contratista general deberá proporcionar los elementos accesorios para el perfecto apilado de las piezas siendo obligación del fabricante definir la forma en que ha de realizarse.

G303 HORMIGONADO DE ESTRUCTURAS Y OBRAS DE FÁBRICA

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN:

Ejecución del hormigonado en estructuras de hormigón en masa, armado o pretensado, comprendiendo las operaciones de vertido de hormigón para rellenar cualquier estructura, cimiento, muro, losa, etc., en la cual el hormigón quede contenido por el terreno y/o por encofrados.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Suministro del hormigón.
- Comprobación de la plasticidad del hormigón.
- Preparación de los juntas de hormigonado con los materiales que se hayan de utilizar.
- Vertido y compactación del hormigón.
- Curado del hormigón.

Se entiende por hormigón la mezcla de cemento, agua, árido grueso, árido fino y, eventualmente, productos de adición, que al fraguar y endurecer adquiere la resistencia deseada.

CONDICIONES GENERALES:

Materiales

- Cemento

En vigas y elementos pretensados se usará cemento tipo CEM I o CEM II/A-D de la clase 42,5 ó 42,5 R. En zapatas, pilotes, cimientos y, en general, elementos enterrados se utilizará cemento puzolánico CEM II/A-P con características sulforresistentes, SR. Los restantes hormigones se realizarán con cemento CEM I 32,5 ó 32,5 R.

- Agua

Si el hormigonado se realizara en ambiente frío, con riesgo de heladas, podrá utilizarse para el amasado, sin necesidad de adoptar precaución especial alguna, agua calentada hasta una temperatura de cuarenta grados centígrados (40ı C).

- Aditivos

Podrá autorizarse el empleo de todo tipo de aditivos siempre que se justifique, al Director de la Obra, que la sustancia agregada en las proporciones previstas produce el efecto deseado sin perturbar las demás características del hormigón, ni representar peligro para su durabilidad ni para la corrosión de armaduras.

En los hormigones destinados a la fabricación de elementos pretensados no podrán utilizarse, como aditivos, el cloruro cálcico, cualquier otro tipo de cloruro ni, en general, acelerantes en cuya composición intervengan dichos cloruros u otros compuestos químicos que puedan ocasionar o favorecer la corrosión de las armaduras.

Tipos de hormigón

De acuerdo con su resistencia característica y empleo se establecen los siguientes tipos de hormigones:

Resistencia

Tipo	Característica (N/mm^2)	Clase	Empleo
HM-15	15En masa	Rellenos.	Regularización y limpieza de cimientos.Capas de nivelación.
HM-20	20	En masa	Soleras, rellenos, encauzamientos, cimientos de pequeñas obras de fábrica, protección de tubos de hormigón y de taludes de estructuras, cunetas revestidas, arquetas, pozos, rasanteo de tableros, hitos y cimentación de señales, valla de cerramiento, aceras. Alzados y bóvedas de pequeñas obras de fábrica. Cimientos de barreras de seguridad. Bordillos prefabricados.
HA-25	25	Armado	Cimentaciones, pilotes, pantallas y encepados, vigas de atado, bóveda de túnel entre pantallas. Defensas rígidas. Marcos, estribos, embocaduras, aletas y muros. Losas de compresión y aceras de estructuras. Impostas y defensas rígidas.
HA-30	30	Armado	Alzados de pilas, cabeceros y riostras. Tableros armados.
HP-40	40	Pretensado	Tableros "in situ" para pretensar.
HP-45	45	Pretensado	Vigas prefabricadas canto 1,50 y 1,65 m.

Dosificación del hormigón

La dosificación de los diferentes materiales destinados a la fabricación del hormigón se hará siempre por peso.

Para establecer las dosificaciones se deberá recurrir a ensayos previos de laboratorio, con objeto de conseguir que el hormigón resultante satisfaga las condiciones exigidas.

Las operaciones a realizar para la determinación de estas cuantías serán las siguientes:

a) Áridos.- Con muestras representativas de los áridos que vayan a ser empleados en el hormigón se harán las siguientes operaciones:

1. Se determinará la curva granulométrica de las diferentes fracciones de áridos finos y gruesos.

2. Se mezclarán diversas proporciones de los distintos tipos de áridos que entran en cada tipo de hormigón, para obtener, por tanteos, las preparaciones de cada uno de ellos que den la máxima compacidad a la mezcla.

   Con el fin de facilitar los tanteos se puede empezar con las proporciones, cuya curva granulométrica resultante se ajuste mejor a la curva de Fuller.

3. Con los resultados obtenidos se fijarán las proporciones de los distintos tipos de áridos que deben entrar a formar parte de cada hormigón y se tomará la curva granulométrica empleada como curva "inicial".

b) Agua cemento.

Su proporción exacta se determinará mediante la ejecución de diversas masas de hormigón de prueba y se elegirá aquella que proporcione a éste la máxima resistencia especificada sin perjudicar su facilidad de puesta en obra. Se ejecutarán con ellas probetas de hormigón de las que se estudiarán las curvas de endurecimiento en función de la variación de sus componentes. Es aconsejable, dentro de los criterios señalados, reducir lo mas posible la cantidad de agua, lo cual puede obligar al uso de plastificantes para facilitar la puesta en obra del hormigón. Estos se ensayarán en las masas de prueba para asegurar que no alteren las demás condiciones del hormigón. Se prohibe la utilización de aditivos que contengan cloruro cálcico y en general aquéllos en cuya composición intervengan cloruros, sulfuros, sulfitos u otros productos químicos que pueden ocasionar o favorecer la corrosión de las armaduras.

Antes de hacer el hormigonado definitivo se deberán realizar ensayos adicionales que reproduzcan lo mas fielmente posible las condiciones de puesta en obra: empleo de aditivos, amasadas, condiciones de transporte y vertido.

Como resultado de los ensayos previos y característicos se elaborará un dossier que defina perfectamente las características fundamentales de cada hormigón. En particular, se deberán recoger los siguientes datos:

- Nombre del fabricante.
- Tipo y ubicación de la planta.
- Procedencia y tipo de cemento.
- Procedencia y tipo de los áridos.
- Tamaño máximo de áridos.
- Huso granulométrico de cada fracción de áridos y de la dosificación conjunta.
- Tipo y cantidad de los aditivos. En particular, caso de usarse fluidificante o superfluidificante, o cualquier otro producto similar, se definirán las cantidades a añadir en central y en obra, con su rango de tolerancias.
- Relación agua/cemento.
- Tiempo máximo de uso del hormigón fresco.

La central deberá disponer de control de humedad de los áridos, de forma que se compense para mantener la relación agua canto de la dosificación establecida.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Hormigonado

El contratista ha de presentar al inicio de los trabajos un plan de hormigonado para cada estructura, que ha de ser aprobado por la D.O.

El plan de hormigonado consiste en la explicitación de la forma, medios y proceso que el contratista ha de seguir para la buena colocación del hormigón.

En el plan ha de constar:

- Descomposición de la obra en unidades de hormigonado, indicando el volumen de hormigón a utilizar en cada unidad.
- Forma de tratamiento de las juntas de hormigonado.

Para cada unidad ha de constar:

- Sistema de hormigonado (mediante bomba, con grúa y cubilote, canaleta, vertido directo, ...).
- Características de los medios mecánicos.
- Personal.
- Vibradores (características y nombre de éstos, indicando los de recambio por posible avería).
- Secuencia de relleno de los moldes.
- Medios por evitar defectos de hormigonado por efecto del movimiento de las personas (pasarelas, andamios, tablones u otros).
- Medidas que garanticen la seguridad de los operarios y personal de control.
- Sistema de curado del hormigón.

No se ha de hormigonar sin la conformidad de la D.O., un vez haya revisado la posición de las armaduras y demás elementos ya colocados, el encofrado, la limpieza de fondos y costeros, y haya aprobado la dosificación, método de transporte y puesta en obra del hormigón.

La compactación se ha de hacer por vibrado.

El vibrado ha de hacerse más intenso en las zonas de alta densidad de armaduras, en las esquinas y en los paramentos.

Curado

Durante el fraguado y hasta conseguir el 70% de la resistencia prevista, se han de mantener húmedas las superficies del hormigón. Este proceso ha de ser como mínimo de:

- 7 días en tiempo húmedo y condiciones normales.
- 15 días en tiempo caluroso y seco, o cuando la superficie del elemento esté en contacto con aguas o filtraciones agresivas.

El curado con agua no se ha de ejecutar con riegos esporádicos del hormigón, sino que se ha de garantizar la constante humedad del elemento con recintos que mantengan una lámina de agua, materiales tipo arpillera o geotextil permanentemente empapados con agua, sistema de riego continuo o cubrición completa mediante plásticos.

En el caso de que se utilicen productos filmógenos, autorizados por la D.O., se han de cumplir las especificaciones de su pliego de condiciones.

Durante el fraguado se han de evitar sobrecargas y vibraciones que puedan provocar la fisuración del elemento.

En todas las unidades de obra donde se utilice cemento puzolánico se cuidará especialmente el curado de los hormigones, atendiendo a evitar la desecación de los mismos durante el período de endurecimiento, para lo cual se tomarán las medidas oportunas en cada caso.

Control de calidad

El control de la calidad de los hormigones se llevará a cabo de acuerdo con los criterios que establece la Instrucción EHE, en sus artículos n^{os} 82 a 89.

En cuanto al control de la ejecución, en los planos se indica el nivel de control que debe aplicarse a cada elemento de obra.

En cuanto a la toma de muestras y fabricación de probetas de hormigón fresco queda prohibido el uso de morteros de azufre para refrentado de las probetas.

Cuando la resistencia característica estimada sea inferior a la resistencia característica prescrita, se procederá conforme se prescribe en el Apartado 88.5 de la EHE.

En caso de resultados desfavorables en los ensayos de información, podrá el Director de las Obras ordenar pruebas de carga, por cuenta del Contratista, antes de decidir la demolición o aceptación.

Si decidiera la aceptación, quedará a juicio del Director de las Obras una penalización consistente en la reducción del precio de abono en porcentaje doble de la disminución de resistencia del hormigón.

Cualquier reparación necesaria del elemento será realizada sin percibir el Contratista ningún abono por ello.

G304 ENCOFRADOS EN ESTRUCTURAS Y OBRAS DE FÁBRICA

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN:

Elementos destinados al moldeo de los hormigones en las estructuras y obras de fábrica.

La ejecución de la unidad de obra comprende las operaciones siguientes:

- Montaje del encofrado, con preparación de superficie de apoyo, si es preciso
- Preparado de las superficies interiores del encofrado con desencofrante
- Tapado de juntas entre piezas
- Apuntalamiento del encofrado
- Desmontaje y retirada del encofrado y todo el material auxiliar, un vez la pieza estructural esté en disposición de soportar los esfuerzos previstos

CONDICIONES GENERALES:

Los elementos que forman el encofrado y sus uniones han de ser suficientemente rígidos y resistentes para soportar, sin deformaciones superiores a las admisibles, las acciones estáticas y dinámicas que comporta su hormigonado. Adoptarán las formas, planas o curvas, de los elementos a hormigonar, de acuerdo con lo indicado en los Planos.

Cuando el acabado superficial es para dejar el hormigón visto:

- Las superficies del encofrado en contacto con las caras que han de quedar vistas, han de ser lisas, sin rebabas ni irregularidades.
- Se debe conseguir, mediante la colocación de angulares en las aristas exteriores del encofrado o cualquier otro procedimiento eficaz, que las aristas vivas del hormigón resulten bien acabadas.

En general, las superficies interiores habrán de ser suficientemente uniformes y lisas para conseguir que los paramentos de hormigón no presenten defectos, abombamientos, resaltes o rebabas de más de 5 milímetros. No se aceptarán en los aplomos y alineaciones errores mayores de un centímetro (1 cm).

Los encofrados de madera estarán formados por tablas, bien montadas "in situ" o bien formando paneles, si éstos dan una calidad análoga a la tarima hecha "in situ". Deberán ser desecadas al aire, sin presentar signos de putrefacción, carcoma o ataque de hongos.

Antes de proceder al vertido del hormigón se regarán suficientemente para evitar la absorción de agua contenida en el hormigón, y se limpiarán, especialmente los fondos, dejándose aberturas provisionales para facilitar esta labor.

En los encofrados metálicos se deberá cuidar que estén suficientemente arriostrados para impedir movimientos relativos entre distintos paneles de un elemento, que puedan ocasionar variaciones en los recubrimientos de las

armaduras o desajustes en los espesores de paredes de las piezas a construir con los mismos.

Los enlaces entre los distintos elementos o paños de los moldes serán sólidos y sencillos, de modo que su montaje y desmontaje se realice con facilidad, sin requerir golpes ni tirones. Los moldes ya usados que hayan de servir para unidades repetidas serán cuidadosamente rectificados y limpiados antes de cada empleo.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Los encofrados, con sus ensambles, soportes o cimbras, tendrán la rigidez y resistencias necesarias para soportar el hormigonado sin movimientos de conjunto superiores a la milésima de la luz.

Los apoyos estarán dispuestos de modo que en ningún momento se produzcan sobre la parte de obra ya ejecutada esfuerzos superiores al tercio de su resistencia.

El Ingeniero Director podrá exigir del Constructor los croquis y cálculos de los encofrados y cimbras que aseguren el cumplimiento de estas condiciones.

El sistema de encofrado para pilas de viaductos y pasos superiores deberá ser previamente aprobado por la D.O.

Tanto las superficies de los encofrados, como los productos que a ellas se puedan aplicar, no deberán contener sustancias perjudiciales para el hormigón.

En el caso de hormigón pretensado, se pondrá especial cuidado en la rigidez de los encofrados junto a las zonas de anclaje, para que los ejes de los tendones sean exactamente normales a los anclajes.

Los encofrados de fondo de los elementos rectos o planos de más de seis metros (6 m) de luz libre, se dispondrán con la contraflecha necesaria para que, una vez desencofrado y cargado el elemento, éste conserve una ligera concavidad en el intradós.

Las juntas del encofrado no dejarán rendijas de más de dos milímetros (2 mm) para evitar la pérdida de lechada; pero deberán dejar el hueco necesario para evitar que por efecto de la humedad durante el hormigonado o durante el curado se compriman y deformen los tableros.

En el caso de las juntas verticales de construcción el cierre frontal de la misma se hará mediante un encofrado provisto de todos los taladros necesarios para el paso de las armaduras activas y pasivas.

El desencofrado deberá realizarse tan pronto como sea posible, sin peligro para el hormigón, y siempre informando al Director de las Obras.

Los productos utilizados para facilitar el desencofrado deberán estar aprobados por el Director de las Obras, sin que ello exima al Contratista de su responsabilidad.

Los dispositivos empleados para el anclaje del encofrado habrán de ser retirados inmediatamente después de efectuado el desencofrado.

Los alambres y anclajes del encofrado que no puedan quitarse fácilmente (será permitido únicamente en casos excepcionales y con la autorización del Director de las Obras) habrán de cortarse a golpe de cincel. No está permitido el empleo de soplete para cortar los salientes de los anclajes. Los agujeros de anclaje habrán de cincelarse limpiamente, o prever conos de material plástico o blando, que una vez efectuado el desencofrado, puedan quitarse fácilmente. Dichos agujeros se rellenarán con hormigón del mismo color que el empleado en la obra de fábrica. Es imprescindible, en todo caso, disponer los anclajes en líneas y equidistantes. Allí donde sea posible se emplearán apuntalamientos exteriores.

G305 ENCOFRADOS PERDIDOS PARA TABLEROS EN PUENTES DE VIGAS

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

Piezas prefabricadas de hormigón o fibrocemento, para encofrados perdidos en tableros de puentes de vigas prefabricadas.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Replanteo de los encofrados.
- Montaje del encofrado con limpieza y preparación de las superficies de apoyo, si es necesario.
- Tapado de juntas entre piezas.
- Nivelado del encofrado.
- Humectación del encofrado.
- Apuntalado del encofrado, si es preciso.
- Desmontaje y retirada de todos los materiales auxiliares, un vez la pieza estructural haya alcanzado la resistencia prevista.

CONDICIONES GENERALES:

El tipo de encofrado y sistema de sujeción deberá tener la aprobación previa de la D.O.

El encofrado ha de ser suficientemente rígido y autorresistente para soportar, sin deformaciones superiores a las admisibles, las acciones estáticas y dinámicas que comporta el hormigonado.

Ha de ser suficientemente estanco para impedir una pérdida apreciable de pasta entre las juntas.

El encofrado perdido ha de tener un apoyo suficiente sobre las cabezas de viga, no inferior a 15 cm.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

En caso de piezas prefabricadas se han de seguir las instrucciones del fabricante para su montaje.

La superficie de apoyo sobre las vigas ha de estar limpia en el momento de su colocación.

La superficie del encofrado ha de estar limpia antes del hormigonado y se ha de comprobar la situación relativa de las armaduras, su nivelación y la solidez del conjunto.

Si el tipo de encofrado utilizado pudiera absorber agua del hormigón, se ha de humedecer previamente al hormigonado.

Antes de empezar el hormigonado, el Contratista ha de obtener por escrito la aprobación del encofrado, por parte de la D.O., sin que esto le exima de sus responsabilidades.

No se han de transmitir al encofrado vibraciones distintas de las propias del hormigonado, reduciendo éstas lo mínimo posible.

G306 ENCOFRADOS PARA ALIGERAMIENTOS EN TABLEROS DE PUENTES

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN:

Piezas de poliestireno expandido utilizadas como encofrado perdido para aligeramiento en tableros de puentes de hormigón.

La ejecución de la unidad de obra comprende las operaciones siguientes:

- Replanteo de los encofrados.
- Limpieza y preparación de las superficies de apoyo.
- Montaje y colocación de los elementos de poliestireno.
- Tapado de juntas entre piezas.
- Nivelado del encofrado.
- Humectación del encofrado, en su caso.
- Apuntalado y/o sujeción del encofrado.
- Retirada de materiales auxiliares.

CONDICIONES GENERALES:

Las formas del encofrado, de acuerdo con las dimensiones del aligeramiento marcadas en los planos del Proyecto, han de ser aprobadas por la D.O. antes del hormigonado.

El encofrado ha de ser suficientemente rígido y resistente para soportar, sin deformaciones superiores a las admisibles, las acciones estáticas y dinámicas que comporta el hormigonado.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Los encofrados perdidos se han de sujetar adecuadamente a los encofrados exteriores o a otros puntos fijos, para que no se muevan durante el vertido y compactación del hormigón.

Se han de tomar las medidas adecuadas para que no floten en el interior de la masa de hormigón fresco.

La colocación de los encofrados se ha de realizar teniendo cuidado de que no reciban golpes u otras acciones que puedan dañarlos.

La superficie del encofrado ha de estar limpia antes del hormigonado y se ha de comprobar la situación relativa de las armaduras, su nivelación y la solidez del conjunto.

G307 CIMBRAS PARA ENCOFRADOS DE LOSAS Y TABLEROS EN PUENTES

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN:

Se define como cimbra la estructura provisional que tiene por objeto sustentar el peso propio de los encofrados y del hormigón fresco y las sobrecargas de

construcción, ajustándose a la forma principal de la estructura, hasta que el proceso de endurecimiento del hormigón se haya desarrollado de forma tal que la estructura descimbrada sea capaz de resistir por si misma las citadas acciones. También quedan incluidas en la definición las cimbras que actúen directamente de encofrados.

La ejecución de la unidad de obra comprende las operaciones siguientes:

- Proyecto de la cimbra y cálculos de su capacidad portante.
- Preparación y ejecución del cimiento de la cimbra.
- Montaje de apuntalamientos y cimbras.
- Pintado de las superficies interiores del encofrado, con un producto desencofrante, cuando la cimbra actúe de encofrado.
- Tapado de las juntas entre piezas, en su caso.
- Nivelación de la cimbra.
- Pruebas de carga de apuntalamientos y cimbras, cuando proceda.
- Descimbrado y retirada de todos los elementos de la cimbra y de los elementos de cimiento que puedan perjudicar al resto de la obra.

CONDICIONES GENERALES:

El proyecto de la cimbra ha de especificar la naturaleza, características, dimensiones y capacidad resistente de cada un de sus elementos y del conjunto.

La D.O. ha de aprobar el proyecto de la cimbra.

Los elementos que forman la cimbra han de ser suficientemente rígidos y resistentes para soportar, sin deformaciones superioras a las admisibles, las acciones estáticas y dinámicas que comporta el hormigonado.

En las obras de hormigón pretensado, la disposición de la cimbra ha de permitir las deformaciones que se derivan del tesado de las armaduras activas y ha de resistir la subsiguiente redistribución del peso propio del elemento hormigonado.

Cuando la estructura de la cimbra sea metálica, sus diferentes elementos han de estar sujetos con tornillos o bien soldados.

Las presiones transmitidas al terreno no han de producir asentamientos perjudiciales para el sistema de hormigonado previsto.

Los arriostrados han de tener la menor rigidez posible, compatible con la estabilidad de la cimbra, y se han de retirar los que se puedan antes del tesado de las armaduras, si la estructura se ha de pretensar.

La cimbra ha de tener una carrera suficiente para poder realizar las operaciones del descimbrado.

Tolerancias de deformaciones para el hormigonado:

- Movimientos locales de la cimbra . 5 mm
- Movimientos del conjunto (L=luz) . L/1000

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Si la estructura puede ser afectada por una corriente fluvial, se han de tomar las precauciones necesarias contra las avenidas.

El montaje de la cimbra se ha de efectuar por personal especializado. Una vez montada la cimbra, se ha de comprobar que los puntos de apoyo del encofrado de la cara inferior de la estructura se ajustan en cota a los cálculos con las tolerancias establecidas.

La D.O. puede ordenar, si lo considera necesario, una prueba de carga de la cimbra hasta un 20% superior al peso que habrá de soportar.

Las pruebas de sobrecarga de la cimbra se han de efectuar de manera uniforme y pausada. Se ha de observar el comportamiento general de la cimbra siguiendo sus deformaciones.

El descimbrado se hará de forma suave y uniforme sin producir golpes ni sacudidas.

No se ha de descimbrar sin la autorización de la D.O.

En los elementos que se hayan de hormigonar a contraflecha, se ha de tener en cuenta ésta en la ejecución de la cimbra.

El desmontaje se ha de efectuar de conformidad con el programa previsto en el Proyecto

Si no lo contraindica el sistema estático de la estructura, el descenso de la cimbra se ha de empezar para el centro del tramo y continuar hacia a los extremos.

El orden, el recorrido del descenso de los apoyos en cada fase del descimbrado, la forma de ejecución y los medios a utilizar en cada caso, se han de ajustar a lo indicado por la D.O.

No se ha de descimbrar hasta que el hormigón haya adquirido la resistencia adecuada. Para conocer el momento de desenganchado de la cimbra se han de realizar los ensayos informativos correspondientes sobre probetas de hormigón.

Cuando los elementos sean de cierta importancia, al descimbrar la cimbra es recomendable utilizar cuñas, cajas de arena, gatos u otros dispositivos similares.

Si la estructura es de cierta importancia y cuando la D.O. lo estime conveniente las cimbras se han de mantener despegadas dos o tres centímetros durante 12 horas, antes de retirarlas completamente.

En el caso de elementos pretensados, el proceso de desmontaje de la cimbra ha de tener en cuenta el tesado del elemento, evitando que la estructura queda sometida, aunque sólo sea temporalmente, a tensiones perjudiciales no previstas.

G308 ARMADURAS PASIVAS

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN:

Se definen como armaduras pasivas las utilizadas para armar el hormigón, formadas por barras de acero corrugadas y/o mallas electrosoldadas, cumpliendo lo especificado en el Pliego PG-3 y la Instrucción EHE.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Despiece de las armaduras.
- Cortado y doblado de las armaduras.
- Colocación de separadores.
- Colocación de las armaduras.
- Atado o soldado de las armaduras, en su caso.

CONDICIONES GENERALES:

Las armaduras se ajustarán a la designación y características mecánicas indicadas en los planos del Proyecto, y deben llevar grabadas las marcas de identificación definidas en la EHE.

El Contratista deberá aportar certificados del suministrador de cada partida que llegue a obra, en los que se garanticen las características del material.

Para el transporte de barras de diámetros hasta diez (10) milímetros, podrán utilizarse rollos de un diámetro mínimo interior igual a cincuenta (50) veces el diámetro de la barra.

Las barras de diámetros superiores, se suministrarán sin curvatura alguna, o bien dobladas ya en forma precisa para su colocación.

Para la puesta en obra, la forma y dimensiones de las armaduras serán las señaladas en los Planos. Cuando en éstos no aparezcan especificados los empalmes o solapes de algunas barras, su distribución se hará de forma que el número de empalmes o solapes sea mínimo, debiendo el Contratista, en cualquier caso, realizar y entregar al Director de las obras los correspondientes esquemas de despiece.

Se almacenarán de forma que no estén expuestas a una oxidación excesiva, separados del suelo y de forma que no se manchen de grasa, ligante, aceite o cualquier otro producto que pueda perjudicar la adherencia de las barras al hormigón.

El doblado se realizará según lo especificado en el Artículo 600 del PG-3, así como en la EHE.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

El contratista ha de presentar a la D.O. para su aprobación, y con suficiente antelación, una propuesta de despiece de las armaduras de todos los elementos a hormigonar.

El despiece ha de contener la forma y medidas exactas de las armaduras definidas en el Proyecto.

Ha de indicar claramente el lugar donde se producen los empalmes y el número y longitud de éstos.

Ha de detallar y despiezar todas las armaduras auxiliares.

Todas y cada una de las figuras han de estar numeradas en la hoja de despiece, en correspondencia con el Proyecto.

En la hoja de despiece han de ser expresados los pesos totales de cada figura.

Las armaduras se colocarán limpias y exentas de toda suciedad y óxido adherente. Se dispondrán de acuerdo con las indicaciones de los Planos y se fijarán entre sí mediante las oportunas sujeciones, manteniéndose mediante piezas adecuadas la distancia al encofrado, de modo que quede impedido todo movimiento de las armaduras durante el vertido y compactación del hormigón.

El control de calidad se realizará a nivel normal. Se realizarán dos (2) ensayos de doblado-desdoblado cada veinte (20) t de acero colocado, verificándose asimismo la sección equivalente. Cada cincuenta (50) t se realizarán ensayos para determinar las características mecánicas (límite elástico y rotura).

Salvo otras instrucciones que consten en los Planos, el recubrimiento mínimo de las armaduras será el siguiente:

- Paramentos expuestos a la intemperie: 2,5 cm
- Paramentos en contacto con tierras, impermeabilizados: 3,5 cm
- Paramentos en contacto con tierras, sin impermeabilizar: 4,0 cm

Caso de tratar las superficies vistas del hormigón por abujardado o cincelado, el recubrimiento de la armadura se aumentará en un centímetro (1 cm). Este aumento se realizará en el espesor de hormigón sin variar la disposición de la armadura.

Los espaciadores entre las armaduras y los encofrados o moldes serán de hormigón suficientemente resistente con alambre de atadura empotrado en él, o bien de otro material adecuado. Las muestras de los mismos se someterán al Director de las Obras antes de su utilización, y su coste se incluye en los precios unitarios de la armadura.

En los cruces de barras y zonas críticas se prepararán con antelación, planos exactos a escala de las armaduras, detallando los distintos redondos que se entrecruzan.

Las características mecánicas a utilizar serán las especificadas en cada plano.

Antes de comenzar las operaciones de hormigonado, el Contratista deberá obtener del Director de Obra o la persona en quien delegue la aprobación por escrito de las armaduras colocadas.

G309 TENDONES PARA ARMADURAS ACTIVAS PARA PRETENSADO

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN:

Se definen como armaduras activas, las formadas por tendones de acero de alta resistencia, mediante los cuales se introduce el esfuerzo de tesado, cumpliendo lo especificado en el Pliego PG-3 y la Instrucción EHE.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Suministro de las armaduras.
- Colocación y fijación de las vainas.
- Colocación de los anclajes.
- Enfilado de las armaduras.
- Tesado de las armaduras.
- Anclaje de las armaduras.
- Inyección de la lechada de cemento dentro de las vainas.

CONDICIONES GENERALES:

Las armaduras se ajustarán a la designación y características mecánicas indicadas en los planos del proyecto. En cuanto a la relajación del acero a las 1.000 horas, en las condiciones especificadas por la EHE, no superará el 2% para los alambres y cordones, bajo garantía certificada del fabricante.

El suministro y almacenamiento se podrá realizar en rollos de diámetro no inferior a setecientos cincuenta (750) mm.

El Contratista deberá presentar para cada partida recibida en obra, el certificado del fabricante que garantiza las características del material.

En el momento de colocarse en la obra, las armaduras han de estar limpias, sin grasa, aceite, polvo, pintura, tierra o cualquier otra materia perjudicial para su conservación y adherencia. No ha de presentar indicios de corrosión, defectos superficiales aparentes, puntos de soldadura, pliegues o doblamientos.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

No se permite dejar las vainas sobre el fondo del encofrado para levantarlas después, a medida que se hormigona la pieza, hasta situarlas en la posición requerida.

Una vez la D.O. haya comprobado la colocación y fijación de las vainas, se pueden iniciar las fases de colocación de anclajes y enfilado de armaduras.

El montaje de dispositivos de anclaje se ha de realizar siguiendo estrictamente las especificaciones propias del sistema utilizado.

Se han de adoptar las precauciones necesarias para evitar que las armaduras sufran daños al colocarlas, especialmente en cortaduras o calentamientos locales que pueden modificar sus características. En especial, se han de evitar las operaciones de soldadura en las proximidades de la zona activa de las armaduras.

Cualquier ajuste de longitud o arreglo de los extremos de la armadura se ha de hacer mecánicamente o por oxicorte y, en este último caso, la zona de acero afectada ha de quedar fuera de la zona activa. En caso de utilizar el soplete, se ha de evitar que la llama afecte a otros tendones ya tesados.

Una vez colocados los tendones, y antes de autorizar el hormigonado, la D.O. ha de revisar tanto las armaduras como las vainas, anclajes y demás elementos ya dispuestos a su posición definitiva y constatar su concordancia con las indicadas en el Proyecto, así como su estanqueidad.

El contratista ha de presentar a la D.O. para su aprobación y con suficiente antelación, el sistema de pretesado.

El tesado no se ha de iniciar sin la autorización de la D.O., la cual ha de comprobar que el hormigón ha alcanzado la resistencia mínima para empezar la operación, según los resultados de la rotura de probetas de hormigón.

Antes de empezar las operaciones de tesado se ha de comprobar el calibrado de los gatos.

Se ha de comprobar el estado del equipo de tesado y se ha de realizar el tesado de acuerdo con las recomendaciones del fabricante del sistema utilizado. En particular, se ha de tener cuidado que el gato se coloque perpendicularmente y centrado respecto al anclaje.

No puede haber más personal que el que haya de tesar, en las proximidades de la zona. Por detrás de los gatos, se han de colocar protecciones resistentes y se prohibirá, durante el tesado, el paso entre estas protecciones y el gato.

Se ha de seguir el programa de tesado que ha de contener, por lo menos: el orden de tesado; eventualmente, las sucesivas etapas parciales de pretensado; el valor de tensión en los anclajes, y los alargamientos que han de obtenerse.

El tesado se ha de efectuar por operarios cualificados.

El tesado, cuando la temperatura sea inferior a 2□C, requiere precauciones especiales, a definir por la Dirección de Obra.

Para poder tomar lectura de los alargamientos, la carga del tesado se ha de introducir por escalones. Como mínimo se han de hacer los dos siguientes: un primero, hasta conseguir un 10% de la fuerza máxima, y el segundo hasta la carga prevista.

Si los alargamientos medidos superan las tolerancias admitidas respecto a los previstos, se han de examinar las posibles causas de variación, como errores de lectura, de sección de las armaduras, de módulos de elasticidad o coeficientes de roce, rotura de algún elemento del tendón, tapones, u otros, y se ha de proceder a un retesado con nueva medición de alargamientos, previa aprobación de la D.O.

No se permite el corte de cables para proceder a la inyección, si no es con la autorización expresa de la D.O.

Antes de inyectar se ha de limpiar el conducto con aire a presión, observando si éste sale por el otro extremo de forma regular. En caso de haber algún tapón, se han de tomar las medidas oportunas para asegurar la inyección correcta.

Las conexiones de las bocas de inyección han de estar limpias de hormigón o cualquier otro material, y han de ser herméticas, para evitar posibles arrastres.

No se ha de inyectar si se prevén heladas en un plazo de 2 días, ni cuando la temperatura de la pieza sea inferior a 5□C; de no ser posible cumplir esta prescripción, se tomarán medidas como el calentamiento del elemento o de la lechada, siempre que sean aprobadas por la D.O.

Antes de iniciar la inyección se han de abrir todos los tubos de purga.

La inyección ha de hacerse desde el anclaje más bajo o desde el tubo de purga inferior del conducto.

No han de transcurrir más de 30 minutos desde el amasado hasta el inicio de la inyección, a menos que se utilicen retardadores.

La bomba ha de proporcionar una inyección continua e ininterrumpida de cada conducto, y con la uniformidad necesaria para no producir segregaciones.

A medida que la inyección vaya saliendo por los sucesivos tubos de purga más próximos al punto por donde se inyecta, se han de ir cerrando éstos, dejando que fluya previamente por ellos la lechada hasta que tenga la misma consistencia que la que se inyecta.

Cuando se inyecte en conductos largos y ondulados, donde se precise una presión elevada, se puede cerrar el extremo por el que se ha iniciado la inyección y continuarla por las sucesivos tubos de purga.

En conductos muy largos o de gran sección útil, puede ser necesaria la reinyección, después de 2 horas, para compensar la eventual reducción de volumen de la mezcla.

CONTROL DE CALIDAD

Para el control de calidad del acero se tomarán dos probetas cada diez (10) t de armadura, verificándose la sección equivalente y realizándose ensayos de doblado-desdoblado. Cada cincuenta (50) t se realizarán ensayos de comprobación de características mecánicas (límite elástico, carga de rotura y alargamiento bajo carga máxima).

El control de la fuerza de pretensado introducida se realizará midiendo simultáneamente el esfuerzo ejercido por el gato y el alargamiento experimentado por la armadura. Los valores se analizarán en la correspondiente tabla de tesado.

El control de los desmontes de anclaje, de las vainas y accesorios, así como de los equipos de tesado y de los productos de inyección, se llevará a cabo de acuerdo con lo especificado en los artículos correspondientes de la EHE.

G30A APOYOS DE NEOPRENO ZUNCHADO

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN:

Se definen así los aparatos de apoyo constituidos por capas alternativas de material elastomérico y acero, capaces de absorber las deformaciones y giros impuestos por la estructura que soportan.

Sus formas y dimensiones varían según los esfuerzos que han de transmitir, tal como se define en los planos.

CONDICIONES GENERALES:

Material elastomérico

El material elastomérico estará constituido por caucho clorado completamente sintético (cloropreno, neopreno), cuyas características deberán cumplir las especificaciones siguientes:

- Dureza Shore a (ASTM D-676) 60 3
- Resistencia mínima a tracción 170 kg/cm^2
- Alargamiento en rotura 350 %

Las variaciones máximas admisibles de estos valores para probeta envejecida en estufa en setenta (70) horas y a cien (100 = grados centígrados con las siguientes):

- Cambio en dureza Shore a + 10%
- Cambio en resistencia a tracción . 15%
- Cambio en alargamiento - 40%
- Deformación remanente 35%

El módulo de deformación transversal no será inferior a once Newton por milímetro cuadrado (11 N/mm^2).

Zunchos de acero

Las placas de acero empleadas en zunchos tendrán un límite elástico mínimo de doscientos cuarenta Newton por milímetro cuadrado (240 N/mm^2) y una carga en rotura mínima de cuatrocientos veinte Newton por milímetro cuadrado (420 N/mm^2).

La carga tangencial mínima capaz de resistir la unión al material elastomérico será en servicio de ocho Newton por milímetro cuadrado (8 N/mm^2), siendo la deformación tangencial correspondiente de siete décimas (0,7).

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

La base de nivelación para asiento del apoyo de neopreno zunchado se ejecutará al mismo tiempo que el hormigonado del dintel de la pila o estribo del puente, y tendrá unas dimensiones superiores a las del propio apoyo elastomérico entre 5 y 10 cm.

Del mismo modo deberá ejecutarse la cuña de nivelación correspondiente al elemento estructural (viga o tablero) que ha de asentarse sobre el apoyo. Cuando este elemento sea prefabricado, la cuña de nivelación se podrá adherir al mismo con resina epoxy.

No se hormigonará o colocará el elemento estructural superior, sin la aprobación por la D.O. del replanteo y cotas de las bases de nivelación. No deberá haber restos del encofrado que sirvió para hormigonar estas bases, y la superficie deberá estar perfectamente limpia.

Deberá quedar altura libre suficiente para la inspección y sustitución del apoyo, si llega el caso.

G30B APARATOS DE APOYO TIPO "POT"

1.- DEFINICIÓN Y CONDICIONES GENERALES.

DEFINICIÓN:

Los apoyos de neopreno confinado-teflón tipo □POT□ son dispositivos de apoyo en estructuras, análogos a los de neopreno zunchado, pero en ellos la capacidad de desplazamiento horizontal está garantizada por la presencia de una placa de acero sobre la que se dispone una capa de teflón. Una placa de acero, dispuesta en la estructura, desliza en su contacto; con el teflón a través de una chapa de acero inoxidable. La capacidad de rotación se consigue mediante la plastificación dentro de un recinto de confinamiento de una pastilla de neopreno.

Los apoyos están caracterizados por su capacidad de carga vertical, el desplazamiento máximo admisible y el tipo de movimiento permitido.

CONDICIONES GENERALES:

Podrán a tal fin emplearse apoyos de los tipos señalados en los planos o cualesquiera otros que cumplan las condiciones señaladas y no presenten contraindicaciones por dimensiones o cualquier otra característica opuesta a lo expresado en los planos contando en todo caso con el visto bueno de la Dirección de Obra.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

El material elastomérico y los zunchos de acero deberán cumplir las mismas condiciones establecidas en el Artículo relativo a los Apoyos de neopreno zunchado.

La chapa intermedia y la placa de deslizamiento serán de acero debidamente protegido contra la corrosión, mediante pintura o galvanización con espesores superiores a 150 micras.

La placa de deslizamiento deberá poseer una chapa de acero inoxidable perfectamente pulida de al menos 2 mm de espesor.

El teflón será puro y sin adición de productos regenerados. Deberá ser sintetizado libremente y enfriado sin presión. La lámina de teflón será del

espesor necesario y dispondrá de los dispositivos precisos que permitan mantener sus propiedades de deslizamiento durante la vida útil de la obra.

El conjunto teflón acero inoxidable tendrá un coeficiente de rozamiento máximo del 3,0 % para una tensión media vertical de 10 N/mm^2.

En los apoyos de mayor tamaño se podrá sustituir la lámina completa de teflón por una serie de bandas alojadas en cavidades talladas en la cara superior de la chapa intermedia. El área en planta de dichas cavidades y, por lo tanto, de la superficie de teflón, estará comprendida entre el diez (10) y el treinta (30) por ciento del total del área de contacto. La profundidad de las cavidades no excederá de la mitad del espesor de la lámina de teflón.

Los lubricantes y adhesivos que se empleen mantendrán sus propiedades frente a la acción de los agentes atmosféricos y biológicos y dentro del intervalo de temperaturas a que pueda estar sometida la estructura.

Los apoyos llegarán a la obra en dos piezas. Por una parte, la cazoleta de confinamiento (POT) con su pastilla de neopreno y la placa intermedia con el pistón. Por otra parte, la placa superior de deslizamiento. Ambos elementos llevan anclajes que quedarán embebidos en el hormigón de pilas o estribos en el primer caso y de tablero, en el segundo. La pieza inferior se colocará en obra antes del hormigonado de los anclajes perfectamente nivelada. Antes del hormigonado del tablero, se colocará la placa superior en la posición relativa indicada en los planos respecto a la placa inferior. El diseño de los anclajes, tanto superiores como inferiores, debe permitir la sustitución de los apoyos en caso necesario.

CONTROL DE CALIDAD

El aparato de apoyo y la chapa de acero inoxidable de deslizamiento tendrán las dimensiones que se indican en Planos.

El fabricante deberá presentar certificado de haber efectuado en un Laboratorio Oficial un ensayo de resistencia de un apoyo completo de tipología similar a los que se utilizarán en obra. En dicho ensayo se habrá sometido al apoyo a la actuación del efecto de un mínimo de 2 millones de ciclos alternativos de carga. Las cargas de ensayo oscilarán entre 0,5 y 1,5 veces la carga nominal del apoyo, indicada por el fabricante.

El apoyo a la terminación del ensayo no deberá presentar ningún desprendimiento entre la chapa de acero y el caucho, ni agrietamiento de éste. Dada la tipología de este ensayo no se fija limitación en la fecha de ejecución, siendo suficiente el haberlo efectuado con resultados satisfactorios una vez.

G30C IMPOSTAS Y ACERAS PREFABRICADAS DE HORMIGÓN

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN:

Se refieren estas unidades a las piezas prefabricadas de hormigón que se colocan en el extremo lateral de los tableros de puentes y estructuras, y a las cuales se unen los montantes de las barandillas. También a las aceras de estos puentes.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Replanteo previo.
- Colocación de los anclajes antes del hormigonado del tablero.
- Colocación de las piezas sobre el tablero y realización de los anclajes definitivos y su protección.
- Rejuntado de piezas si es necesario.
- Retirada de elementos auxiliares, apuntalamientos.

CONDICIONES GENERALES:

Las aceras o impostas se realizarán con hormigón HA-30, según la forma y dimensiones reflejadas en Planos, y las armaduras serán de acero B-5005.

Las piezas tendrán los taladros definidos en los Planos para su propio anclaje al tablero así como las placas de anclajes de los postes de la barandilla.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Se comprobará sobre la acera o imposta colocada y antes de la realización de los anclajes definitivos que las aristas y elementos rectos no presentan curvaturas ni flechas superiores a un (1,0) cm medido con regla de cuatro (4,0) m. Las superficies no presentarán coqueras ni rebabas de lechada, debiendo tener el mismo tono que los elementos de la estructura hormigonados "in situ". Se rechazarán aquellas piezas sobre las que se aprecien fisuras o fracturas y las que no encajen correctamente con las piezas contiguas.

Cualquier daño que pueda producirse como consecuencia de la realización de las obras posteriores en la estructura, será reparado a su costa por el Contratista.

G30D JUNTAS DE DILATACIÓN EN PASOS SUPERIORES

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN:

Se definen como juntas de tablero los dispositivos que enlazan los bordes de los tableros contiguos, o de un tablero y un estribo, de forma que permitan los movimientos por cambios de temperatura, y deformaciones de la estructura. Al tiempo que presentan una superficie lo más continua posible a la rodadura.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Corte y demolición del pavimento en el ancho ocupado por la junta.
- Colocación y anclaje de los elementos de la junta.
- Sellado del perímetro de la junta con resina epoxy, enrasando con el pavimento.

CONDICIONES GENERALES:

El Contratista someterá a la Dirección de Obra las características precisas de la junta que propone utilizar.

Cumplirá lo especificado en el Artículo 694 del PG-3.

Las juntas estarán constituidas por bandas de materiales elastoméricos y en su caso perfiles metálicos y deberán ser capaces de absorber deformaciones en tres direcciones perpendiculares entre si, si bien su función principal es la de recoger los movimientos impuestos por la temperatura y las acciones reológicas, cuando éstas afectan a los tableros de los puentes.

Las características básicas que debe cumplir este tipo de juntas son:

- Elasticidad para seguir los movimientos sin agrietarse o introducir esfuerzos inadmisibles en los tableros. El movimiento total admisible será el indicado en los Planos.
- Estanqueidad en caso de lluvia, nieves, fuertes condensaciones, inundaciones, etc., evitando cualquier filtración.
- Posibilidad de deslizamiento de cualquiera de los bordes en las tres direcciones básicas fundamentales en relación con los ejes de simetría de las juntas.
- Resistencia al desgaste producido por el paso de vehículos en número correspondiente a la intensidad media prevista y a los efectos accidentales de frenado y arranque de los mismos.

- Conservación de las características mecánico elásticas de los materiales de la junta y bordes, dentro de las temperaturas extremas a que van a ser sometidas.

- No ocasionar, en cualquier situación de trabajo, resaltes o hundimientos que se traduzcan en golpeteos molestos al paso de los vehículos.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

La junta se montará de acuerdo con las instrucciones del fabricante, poniendo especial atención a su anclaje al tablero y a su enrase con la superficie del pavimento.

Antes de montar la junta, se ajustará su abertura inicial, en función de la temperatura media de la estructura en ese momento y de los acortamientos diferidos previstos.

G30E JUNTAS DE DILATACIÓN EN VIADUCTOS DE FERROCARRIL

1.- DEFINICIÓN Y CONDICIONES GENERALES.

DEFINICIÓN

Dispositivos que enlazan los bordes de los tableros contiguos o los del tablero y un estribo, de forma que permitan los movimientos originados por cambios de temperaturas y efectos reológicos. Al mismo tiempo dichos dispositivos deben presentar una superficie continua e impedir la entrada de balasto entre los elementos estructurales contiguos.

CONDICIONES GENERALES

Este tipo de junta se empleará exclusivamente en puentes y viaductos de ferrocarril.

La junta de dilatación metálica está compuesta de dos angulares anclados en las esquinas de la losa de hormigón y cubierta por una chapa soldada a uno de los angulares. Las dimensiones se especifican en planos. Una banda de neopreno precomprimida se dispone en el hueco creado por la junta tablero-estribo no anclada.

El acero empleado será tipo A42-b, de acuerdo con las especificaciones del PG-3 Artículo 250, protegido por una capa de pintura anticorrosiva de minio de plomo de 35 micras y una segunda capa de pintura clorocaucho del mismo espesor.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN.

Las partes vistas llevarán una capa de pintura anticorrosiva de minio de plomo clorocaucho de 35 micras, con una segunda capa de pintura clorocaucho de 35 micras.

Las superficies se prepararán previamente con cepillado grado St-3.

El proceso de colocación se someterá a aprobación de la D.O., no producirá desperfectos, ni modificará las condiciones exigidas al material.

G30F IMPERMEABILIZACIÓN Y DRENAJE CON GEOTEXTIL DE TRASDÓS DE MUROS Y DE ESTRIBOS

1.- DEFINICIÓN Y CONDICIONES GENERALES

Consiste en la extensión y fijación al trasdós de los muros y estribos de una lámina drenante que, conectada a un sistema longitudinal constituido por un tubo también drenante, evacue las posibles aguas de filtración que puedan incidir sobre las obras a proteger.

La ejecución de unidad comprende las operaciones siguientes:

- Nivelación de la solera donde se colocará el tubo drenante.
- Colocación y sujeción del tubo drenante.
- Impermeabilización del muro.
- Colocación y fijación al muro de la lámina drenante.

- Relleno con material filtrante.
- Relleno y compactación trasdós del muro.

CONDICIONES GENERALES

La impermeabilización estará constituida por una capa de producto asfáltico aplicada sobre la cara de trasdós del muro, previamente tratada con una imprimación también asfáltica.

La lámina drenante estará compuesta de dos telas filtrantes que cubren al núcleo drenante intermedio. Éste esta formado por monofilamentos de poliamida con un índice de huecos del orden del noventa y cinco por ciento (95%).(1%). Las dos telas filtrantes son de geotextil no tejido a base de hilos de poliester recubiertos de poliamida unidos por soldadura.

Las telas filtrantes sobresalen por cada lado del núcleo drenante para poder solapar la unión de una pieza con la contigua, recubriendo el muro en su totalidad.

El Director de Obra podrá autorizar la utilización de láminas filtrantes en la que una de las telas (la que queda adosada al muro) sea impermeable. En este caso podrá suprimirse la impermeabilización aplicada en el paramento del muro.

El espesor de la lámina filtrante será como mínimo de quince milímetros (15 mm) y su peso por metro cuadrado no será inferior a seiscientos gramos por metro cuadrado (600 gr/m^2). El geotextil en contacto con el terreno tendrá un peso mínimo de ciento cincuenta gramos por metro (150 gr/m^2). La capacidad de evacuación de agua será superior a un litro por segundo y metro (1 l/s*m).

El Director de Obra podrá autorizar el empleo de láminas filtrantes que utilicen otros procedimientos diferentes para mantener la separación entre láminas, previa acreditación por parte del Contratista de que el producto ha sido empleado, con resultados satisfactorios en obras similares.

El sistema descrito es de aplicación a los estribos de puentes y muros de contención de terraplenes. En las pequeñas obras de fábrica cubiertas por los rellenos, se aplicará un pintado con emulsión asfáltica sobre el paramento en contacto con las tierras.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

La colocación de la lámina drenante y su fijación al muro se hará de acuerdo con las instrucciones del fabricante del producto pero siguiendo las siguientes fases:

- Nivelación de la solera donde se colocará el tubo drenante.
- Colocación y sujeción del tubo drenante en la situación indicada en los planos.
- Impermeabilización del muro.
- Colocación y fijación al muro de la lámina drenante.
- Relleno con material filtro, tal como se indica en los planos, de la zona donde va ubicado el dren.
- Por último, relleno y compactación con el material adecuado, del trasdós del muro.

Las láminas de geotextil se protegerán del paso sobre ellas de personas, equipos o materiales.

G30G IMPERMEABILIZACIÓN DE TABLEROS EN PUENTES DE FERROCARRIL

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

Impermeabilización de los tableros de hormigón en puentes y viaductos para ferrocarril, mediante una membrana que impida la filtración del agua a través de la superficie sobre la que apoya el balasto.

CONDICIONES GENERALES:

La membrana de impermeabilización debe adherir perfectamente al tablero de hormigón y, por otro lado, contar con una protección eficaz frente al envejecimiento por la acción de los agentes atmosféricos y frente al punzonado y desgaste que produciría el contacto directo con el balasto.

Se utilizarán membranas prefabricadas a fin de asegurar una mayor garantía de regularidad y control de ejecución.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

La superficie del tablero debe ser objeto de una limpieza previa con chorro de arena a fin de eliminar cualquier elemento suelto o mal adherido. Las irregularidades superficiales de 5 mm en 2 metros de longitud serán eliminadas de forma que se obtenga un soporte uniforme antes de la aplicación de un riego de imprimación con emulsión bituminosa o producto recomendado por el fabricante en la membrana.

A continuación se colocará la membrana principal de impermeabilización, de base bituminosa mejorada con elastómero y armada con un geotextil protegido exteriormente. La adherencia de esta membrana termosoldable al soporte debe ser perfecta a través del riego de imprimación.

Sobre la membrana de impermeabilización se soldarán dos membranas de protección también armadas con geotextil de gramaje no inferior a 250 recubierto finalmente con una capa adherida de arena gruesa de grano duro.

El espesor total de cada una de las membranas referidas debe ser próximo a 4 mm.

G30H IMPERMEABILIZACIÓN DE TABLEROS DE PASOS SUPERIORES DE CARRETERA

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

Ejecución de una capa de impermeabilización en los tableros de hormigón en los Pasos Superiores para carretera, a fin de evitar la penetración del agua infiltrada a través del pavimento.

CONDICIONES GENERALES

Se dispondrá una impermeabilización mediante mástic bituminoso, constituida por:

- Un riego de adherencia con emulsión ECR-1 y dotación de quinientos gramos por metro cuadrado (0,5 kg/m^2) de betún residual.

- Mástic bituminoso de un centímetro (1,0 cm), con la composición siguiente:

  . Emulsión asfáltica 22-30%
  . Arena, contenido 20/25 de filler 72-80%
  . Polvo de amianto de fibra corta 2/4%

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

La superficie del hormigón del tablero estará limpia y perfectamente seca, sin ningún elemento suelto.

No presentará huecos ni resaltes de más de 20 mm. En caso contrario, se corregirán las irregularidades utilizando mortero epoxy para rellenar las cavidades.

Sobre el riego de adherencia ejecutado, se aplicará el mástic bituminoso en dos capas hasta alcanzar su espesor total.

G30J SUMIDERO EN TABLERO DE PUENTES

1.- DEFINICIÓN Y CONDICIONES GENERALES

Se define como sumidero la boca de desagüe, generalmente protegido por una rejilla, que sirve para vaciar el agua de lluvia de los tableros de las obras de fábrica, y que se dispone de forma que la entrada del agua sea en sentido sensiblemente vertical.

Los desagües de tableros de estructuras y los dispuestos en sus estribos tendrán la forma, dimensiones y características definidas en los Planos.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Después de la terminación de cada unidad se procederá a su limpieza total, eliminando todas las acumulaciones de limo, residuos o materias extrañas de cualquier tipo, debiendo mantenerse libres de tales acumulaciones hasta la recepción definitiva de las obras.

G30K BARANDILLAS DE ACERO

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN:

Barandillas unidas mediante soldadura, a las placas de anclaje sobre tableros de puentes y viaductos.

La ejecución de la unidad de obra incluye las operaciones siguientes:

- Replanteo y alineación de los elementos que forman la barandilla.
- Suministro de la barandilla.
- Suministro de la placa de anclaje, en su caso.
- Ejecución de los dados de anclaje.
- Montaje y colocación de la barandilla.
- Limpieza y recogida de tierras y restos de obra.
- Pintura de la barandilla.

CONDICIONES GENERALES:

La barandilla tipo, que se representa en los Planos, está formada por montantes de perfiles laminados y elementos horizontales tubulares.

Los elementos que forman la barandilla cumplirán los Artículos 250, 251 y 640 del PG-3.

Todas las secciones fijas de la barandilla se realizarán por soldadura continua, uniforme e impecable.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

A excepción de aquellas partes de los postes que queden empotradas las demás superficies de las barandillas se suministrarán provistas de dos manos de pintura antioxidante (minio o cianamida de plomo).

Una vez instalada la barandilla y antes de su fijación definitiva, se procederá a una minuciosa alineación de la misma y aprobación del replanteo por la D.O.

El hueco de los cajetines se rellenará con mortero de cemento. Alrededor de los postes y placas de sujeción, se formará una junta de masilla bituminosa de dos por tres (2 x 3) cm.

La barandilla irá pintada en el color que ordene el Director de las Obras, con doble capa de pintura de primera calidad. En las proximidades de las juntas de construcción del tablero se dispondrán también en las barandillas juntas de dilatación.

G30M PUESTA A TIERRA DE ELEMENTOS METÁLICOS Y ARMADURAS EN VIADUCTOS Y PUENTES PARA FERROCARRIL

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

La puesta a tierra de las armaduras, barandillas, postes y todos los elementos metálicos en viaductos y puentes de los ferrocarriles, tiene por objeto proteger a las personas e instalaciones de los efectos derivados de la diferencia de potencial causados por el propio sistema de tracción eléctrica en condiciones normales y en condiciones anormales (fallos, cortocircuitos, descargas atmosféricas etc.).

Esta unidad consiste en la puesta a tierra de las partes metálicas y armaduras de acero (salvo los cables de tesado) de todos los puentes y viaductos para ferrocarril, a fin de conseguir que estos elementos se encuentren unidos equipotencialmente.

Todos los elementos metálicos (incluido señales, barandillas, postes, etc.), deben ponerse a tierra a través del sistema global que se describe.

CONDICIONES GENERALES

Los cables para las conexiones a tierra deben ser, en todos los casos, resistentes a las intensidades de cortocircuito.

La colocación de los cables y conexiones de puesta a tierra se realizará según el detalle que figura en Planos.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

En todos los pilares y estribos se realizará una puesta a tierra de las armaduras. La continuidad eléctrica se obtendrá conectando la armadura del tablero con la armadura del pilar o estribo y con la de la cimentación, y ésta con una puesta a tierra, construida previamente mediante pletinas de acero galvanizado o malla de cables de cobre. Para poder realizar la medición de la tierra, se colocará 1 pica de acero-cobre unida al extremo del cable de toma de tierra, e irá alojada en una arqueta de 0,40 x 0,4 x 0,6 m. rellena de arena y registrable. En la cabeza de la pila o estribo se habrá dejado un terminal de conexión para su unión a la armadura del tablero.

Las puestas a tierra en la cimentación, tanto de pilares como de estribos, deberán tener una resistencia de difusión 10 Ω.

La armadura del tablero estará unida (salvo los cables de tesado), tanto transversal como longitudinalmente para conseguir la continuidad eléctrica, y se conexionará a los carriles exteriores en cada pila y estribo, con cable de cobre de 50 mm como mínimo.

Se dejarán terminales en el tablero (a ambos lados de las vías), a la altura de cada pila y estribo, para las siguientes conexiones:

- Con el carril exterior.
- Con el cable de retorno (a través del poste de electrificación).
- Con la armadura de la pila o estribo.

La conexión al cable de retorno se realizará a través del poste de electrificación más próximo a la pila o estribo.

En el caso particular del tablero solidarizado a los apoyos laterales (caso de pórticos o marcos cerrados), se dará continuidad al conjunto de toda la armadura hasta la puesta a tierra en la cimentación de los apoyos.

En caso que la armadura del tablero no esté unida de la forma indicada anteriormente, se colocará longitudinalmente en ambos lados de las vías, una pletina de acero galvanizado de 30 x 4 mm o preferentemente cable de cobre de 50 mm^2 como mínimo, que se unirá a los redondos de la armadura y a los carriles exteriores en cada pila y estribo, debiéndose conectar al sistema de puesta a tierra descrito anteriormente.

En las juntas de dilatación del tablero deberán montarse las correspondientes conexiones de puenteo de las armaduras.

Cualquier otro elemento metálico situado en viaductos o puentes, se conectará al carril, bien directamente o a través del cable de retorno o poste de electrificación.

G30N ANCLAJE EN TABLERO DE PUENTES, PARA LOS POSTES DE SUJECIÓN DE CATENARIAS

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

Elementos metálicos que quedan sujetos al tablero de la estructura, con el fin de que en su momento se sujeten a ellos los postes de sustentación de la catenaria.

CONDICIONES GENERALES

La posición exacta de los elementos de anclaje sobre el tablero de la estructura se fijará por la D.O. Dicha unidad comprende los siguientes elementos:

- Ocho pernos tipo GEWI ø25 galvanizados, unidos a la armadura del tablero.
- Tres tuercas galvanizadas en cada perno.
- Una pletina de nivelación de dimensiones 500 x 920 x 50 mm.
- Ocho protecciones de los pernos, formadas por caperuzas de PVC previamente rellenas con grasa de silicona.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

El anclaje se realizará de acuerdo a lo indicado en los Planos, y se cuidará especialmente el replanteo de los pernos de anclaje. Éstos quedarán embebidos en el tablero, sobresaliendo 35 cm por debajo del nivel del plano medio de rodadura a la espera de la colocación de la placa de anclaje. La nivelación de la pletina se realizará con la precisión necesaria para que no se necesite utilizar mortero de nivelación en la colocación del poste posteriormente. Cada perno quedará protegido por un tubo de PVC relleno de grasa de silicona.

G30P VALLA METÁLICA ANTIVANDALISMO EN PASOS SUPERIORES

1.- DEFINICIÓN Y CONDICIONES GENERALES.

DEFINICIÓN:

Enrejado de 2,5 m de altura, con malla y postes de tubo, o malla, bastidor y postes, colocados con soldadura sobre la placa de anclaje de la barandilla, en los lugares y forma que indiquen los planos o las instrucciones de la D.O.

La unidad de obra comprende las operaciones siguientes:

- Replanteo y alineación de los elementos que forman la valla.
- Suministro de la valla.

- Colocación de los elementos que forman el enrejado.

CONDICIONES GENERALES:

Los elementos de la valla serán de acero galvanizado y cumplirán las especificaciones del Articulo 620 y siguientes del PG-3.

La reja quedará bien fijada al soporte. Estará aplomada y con los ángulos y niveles previstos.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

La D.O. aprobará el replanteo antes de la fijación de la valla.

Durante todo el proceso constructivo, se garantizará la protección de la valla contra los empujes e impactos mediante los anclajes oportunos y se mantendrá el aplomado con ayuda de elementos auxiliares.

G30Q PRUEBAS DE CARGA EN PASOS SUPERIORES DE CARRETERA

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

Se define como prueba de carga en puentes de carretera, al conjunto de operaciones de control, cuya realización es preceptiva antes de su apertura al tráfico, a fin de comprobar la adecuada concepción, la estabilidad y el buen comportamiento de la obra.

La ejecución de la unidad de obra comprende las operaciones siguientes:

- Inspección previa de todos los elementos de la estructura.
- Marcado de posiciones de los camiones.
- Colocación y nivelación de flexímetros y demás aparatos de medida.
- Ejecución de las fases de carga y medición de flechas.
- Informe de resultados.

CONDICIONES GENERALES

El Contratista deberá presentar a la D.O. el proyecto correspondiente para la realización de la prueba de carga.

La prueba se realizará mediante camiones, según se describe en el Proyecto.

Se tendrán en cuenta las directrices generales incluidas en las "Recomendaciones para el Proyecto y Ejecución de Pruebas de Carga en Puentes de Carretera", MOPU 1988.

Los camiones a utilizar en la prueba de carga cumplirán los requisitos establecidos en las citadas Recomendaciones, de forma que las solicitaciones teóricas elegidas sean prácticamente idénticas a las producidas por los vehículos previstos.

Los equipos de medida cumplirán lo especificado en dicha Recomendación, y serán manipulados por personal adecuadamente formado, de manera que los datos y resultados respondan fehacientemente a la respuesta de la estructura en las diferentes fases de carga.

Se utilizarán, al menos, los siguientes aparatos de medida:

- Flexímetros, para medida de deformaciones verticales: serán adecuados en cada puente a las posibilidades de observación existente, pero en ningún caso tendrán menos de 5 cm de recorrido y 0,01 mm de precisión.

Si las condiciones físicas del puente, no permiten utilizar flexímetros se usarán picas o elementos topográficos que garanticen una sensibilidad de lectura adecuada.

- Lupas graduadas para observar y medir la formación de fisuras: permitirán observar décimas de milímetro

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN.

CARGAS DE LOS ENSAYOS

En ningún caso las acciones del tren de cargas a utilizar y las solicitaciones a que aquéllas den lugar, podrán ser más desfavorables que las del tren de cargas de la "Instrucción de Acciones", estimándose como suficiente si tales esfuerzos oscilan entre el 70 y el 80% de los máximos producidos por el citado tren de la Instrucción.

El tren de cargas estará compuesto por un conjunto de camiones con el peso total, por unidad, adoptado en el cálculo de la prueba, pesados los ejes de cada camión por separado, y colocados en sucesivas filas.

La carga de prueba será estática, es decir, una vez colocados los camiones como se indica en el apartado "Pruebas de carga" del Anejo de Estructuras y en el punto 2 siguiente, se harán las mediciones correspondientes.

En el momento de iniciarse las pruebas, el hormigón de cualquier elemento resistente de la obra deberá tener una edad mínima de 90 días.

Se comprobará, asimismo, que los elementos auxiliares de acceso a las zonas de control y trabajo estén correctamente adaptados con el fin de no retrasar o entorpecer el proceso de ensayo.

Se controlarán especialmente las condiciones generales del ambiente, especialmente los cambios climatológicos y de las situaciones de soleamiento, previo y durante el proceso de ensayo, determinando claramente los aspectos específicos de estos cambios.

MEDICIONES MÍNIMAS A REALIZAR

1. Para cada estado de cargas se medirán, al menos, los siguientes datos de las secciones indicadas:

   a. Sección central: Flecha en sus bordes y punto medio.
   b. Secciones de apoyos: Deformaciones verticales.

2. En cada una de las secciones antes definidas, se harán las mediciones indicadas en cada uno de los siguientes estados:

   a. Descargado el tablero.
   b. Cargada la mitad del tablero longitudinalmente.
   c. Cargado todo el tablero.
   d. Después de retirar la mitad de la carga total.

3. Los camiones se colocarán en la posición de carga en cada caso, manteniéndolos en ella 10 minutos, descargando después el tablero y dejando otros 10 minutos antes de empezar un escalón de carga.

   Las flechas se medirán:

   a. Antes de empezar la prueba de carga.
   b. A los 10 minutos de colocados los camiones de cada escalón de carga.
   c. 10 minutos después de retirados los camiones en cada escalón de carga.

PREPARACIÓN DE LA PRUEBA DE CARGA

1. Cálculo.

El proyecto de la prueba de carga definirá, con los tipos de camiones y cargas elegidos, un croquis en planta de la situación exacta de cada camión y eje en el tablero.

Este croquis servirá para reflejar en el tablero mediante señales adecuadas para la correcta situación de cada camión.

Una vez definido el croquis de cargas y situaciones, se calcularán los esfuerzos y las flechas correspondientes en cada punto y sección antes indicados y para cada escalón de carga antes definido.

2. Referencias fijas y mediciones precisas.

Antes de proceder a la realización de las pruebas se nivelarán los puntos de medición ya indicados en el apartado 1, referidos a puntos de referencia fijos fuera del puente y no afectados por la prueba de carga de forma que sea lo más sencillo posible referir a éstos las deformaciones de un punto cualquiera de cada escalón de carga.

3. Observación previa del tablero.

Antes de comenzar las pruebas se recorrerán detenidamente las estructuras, observando concienzudamente las fisuras que existan, midiendo su tamaño con lupas y marcando los puntos en que se hagan estas medidas para realizar posteriores mediciones en cada escalón de carga.

4. Resultados y tolerancias.

En todo lo que sigue, y a efectos de flechas en centro de vano se considera como tal, la diferencia entre la lectura correspondiente a ese centro de vano y la media de las lecturas correspondientes a las secciones de apoyo del vano.

Las flechas estabilizadas obtenidas para cada escalón, se compararán con las teóricas obtenidas para esa misma fase.

Se considerarán aceptables estos resultados si la diferencia entre ambos valores es inferior, en valor absoluto, al 10% de la flecha teórica.

Del cálculo teórico de las flechas debidas a las sobrecargas y de las flechas medidas, se deducirá el coeficiente de elasticidad medio del hormigón, comprobándose si dicho coeficiente tiene un valor razonable, habida cuenta de las características del hormigón empleado.

Asimismo, se obtendrá la flecha remanente por diferencia entre las lecturas correspondientes a los estados anterior y posterior a la prueba. Como orden de magnitud para valores aceptables de las flechas remanentes, pueden indicarse los siguientes:

a. Del orden del 20% de la flecha teórica máxima, si la edad de la obra es inferior a seis meses.

b. Del orden del 10% de la flecha teórica máxima, si la edad de la obra es superior a seis meses.

Si en la primera carga se obtienen flechas remanentes elevadas, se procederá a un segundo ciclo de carga y si tampoco se obtuviesen resultados satisfactorios, la D.O. suspenderá la prueba y adoptará las medidas convenientes.

DESARROLLO DE LA PRUEBA

1. Antes de comenzar la prueba de carga:

   a) Se marcarán sobre el tablero las posiciones exactas que han de tener los ejes longitudinales de los camiones y los transversales de los ejes en estas posiciones, durante la prueba.

   b) Se pesarán cada uno de los ejes de los camiones, comprobando su coincidencia con las teorías de la prueba.

   c) Se habrán colocado y nivelado o tarado los flexímetros y demás aparatos de medida, en las secciones y puntos antes indicados.

d) Se harán las nivelaciones, observación y medición de fisuras previstas en la preparación de la prueba.

e) Medición de flechas en el tablero descargado.

2. Durante la realización de la prueba de carga.

a) Se colocará primero un camión en su posición exacta antes de entrar el siguiente de la misma fila y así sucesivamente hasta completar ésta.

Durante esta operación, se observarán en todo momento los aparatos de medida, anotando los resultados más importantes, aunque no figurarán en el informe, ni tengan valor para deducir el comportamiento de la estructura mientras se actúe con cargas parciales.

Una vez colocada toda la fila, se harán las medidas en las secciones y puntos previstos.

Se continuará cargando con las mismas precauciones antes citadas en cada uno de los escalones indicados.

b) Se deberá medir con especial cuidado los descensos de los apoyos.

c) Se anotarán siempre los datos siguientes:

- Hora exacta de las sucesivas operaciones efectuadas.
- Lista y matrícula de los vehículos utilizados, con sus pesos por ejes.
- Posiciones de los vehículos en cada escalón de carga.
- Resultados en cada medición de cada aparato.
- Comprobación de flechas calculadas y medidas.
- Datos que permitan el fácil reencuentro de las referencias de nivelación.
- Comienzo y progresión de fisuras.
- Cualquier otro dato que pueda parecer útil (vibraciones, etc.)

3. Una vez terminada la prueba se hará un informe, que constará como mínimo de:

a) Croquis de situación de camiones, indicando posiciones y cargas por eje.

b) Croquis de situación de todos los aparatos de medida.

c) Croquis de situación de puntos de referencias fijos.

d) Lecturas realizadas en todos los aparatos de medida en escalón o estado de carga.

e) Flechas que se deducen de las anteriores lecturas.

f) Diagrama de flechas reales (tanto longitudinalmente como transversales), descontando el descenso de los apoyos.

g) Diagrama de los descensos de los apoyos.

h) Porcentajes de recuperación registrados en flechas.

i) Registros de fisuras.

j) Incidencias que se presentaron durante la realización de la prueba.

k) Conclusiones.

En las conclusiones figurarán expresamente la aceptación o no del puente ensayado con las exigencias de nuevas pruebas de carga, puesta en servicio provisional o definitiva, refuerzo, etc.

G30R PRUEBAS DE CARGA EN PUENTES Y VIADUCTOS DE FERROCARRIL

1.- DEFINICIÓN Y CONDICIONES DE LAS PARTIDAS DE OBRA EJECUTADAS

DEFINICIÓN

Se define como prueba de carga en puentes y viaductos de ferrocarril al conjunto de operaciones de control, cuya realización es preceptiva antes de su apertura al tráfico, a fin de comprobar la adecuada concepción, la estabilidad y el buen comportamiento de la obra.

La ejecución de la unidad de obra comprende las operaciones siguientes:

- Inspección previa de todos los elementos de la estructura.
- Marcado de posiciones de los camiones.
- Colocación y nivelación de flexímetros.
- Ejecución de las fases de carga y medición de flechas.
- Informe de resultados.

Se realizarán dos pruebas de carga mediante camiones:

- Prueba estática.
- Prueba dinámica.

No es objeto del presente proyecto la prueba de carga definitiva del viaducto, utilizando material ferroviario, una vez colocado el balasto y las instalaciones de vía.

CONDICIONES GENERALES

Se realizará una prueba de carga inicial provisional estática sobre la estructura terminada, antes de proceder a la colocación del balasto.

La prueba de carga estática se controlará con ordenador y sistemas de medición de alta precisión.

También se realizará una prueba de carga dinámica utilizándose acelerómetros de 50 Hz y analizadores de espectro. Se obtendrán frecuencias y períodos propios, así como el coeficiente de amortiguamiento de la estructura.

Para la prueba de carga dinámica se utilizarán instrumentos de medición que permitan lecturas de 100 medidas/segundo.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN.

El Contratista presentará a la D.O. el proyecto correspondiente para la realización de la prueba de carga.

El tren de cargas estará compuesto por un conjunto de camiones con el peso y posición indicados en el proyecto de prueba de carga.

En el Anejo de Estructuras se aconseja un tren de cargas compuesto por camiones de 36 t. Se ajustarán las dimensiones y pesos de los camiones a la disponibilidad, previa autorización de la D.O.

Será de aplicación todo lo indicado en el Artículo para Pruebas de carga en pasos superiores en cuento a Mediciones mínimas a realizar y Preparación de la prueba estática.

Desarrollo de la prueba de carga estática

Antes de comenzar la prueba de carga:

a) Se marcarán sobre el tablero las posiciones exactas del tren de cargas.

b) Se pesarán cada uno de los ejes de los camiones, comprobando su coincidencia con las teorías de la prueba.

c) Se habrán colocado y nivelado o tarado los flexímetros y demás aparatos de medida, controlados por ordenador.

d) Se harán nivelaciones, observación y medición de fisuras previstas anteriormente.

e) Medición de flechas en el tablero descargado.

Durante la realización de la prueba de carga:

a) Se colocará primero una línea de camiones (2x3) en su posición exacta. Durante esta operación, se observarán en todo momento los aparatos de medida, anotando los resultados más importantes, aunque no figurarán en el informe, ni tengan valor para deducir el comportamiento de la estructura.

   Una vez colocado una línea de camiones (2x3), se harán las medidas previstas.

   Se continuará cargando el tablero con la segunda línea de camiones (2x3).

b) Se deberá medir con especial cuidado los descensos de los apoyos.

c) Se anotarán siempre los datos siguientes:

   - Hora exacta de las sucesivas operaciones efectuadas.
   - Lista de los camiones utilizados, con sus pesos por ejes.
   - Posiciones del tren de cargas en cada caso de carga.
   - Resultados de cada medición de cada aparato.
   - Comprobación de flechas calculadas y medidas.
   - Datos que permitan el fácil reencuentro de las referencias de nivelación.
   - Comienzo y progresión de fisuras.
   - Cualquier otro dato que pueda parecer útil (vibraciones, etc).

Una vez terminada la prueba se hará un informe, que constará como mínimo de:

a) Croquis de situación de los camiones, indicando posiciones y cargas por eje.

b) Croquis de situación de todos los aparatos de medida.

c) Croquis de situación de puntos de referencias fijos.

d) Lecturas realizadas en todos los aparatos de medida en escalón o estado de carga.

e) Flechas que se deducen de las anteriores lecturas.

f) Diagrama de flechas reales (tanto longitudinalmente como transversales), descontando el descenso de los apoyos.

g) Diagrama de los descensos de los apoyos.

h) Porcentajes de recuperación registrados en flechas.

i) Registros de fisuras.

j) Incidencias que se presentaron durante la realización de la prueba.

k) Conclusiones.

En las conclusiones figurarán expresamente la aceptación o no de la obra ensayada a reserva de las exigencias de la prueba de carga definitiva con material ferroviario.

Desarrollo de la prueba de carga dinámica

El Contratista deberá presentar asimismo el proyecto correspondiente, en el cual se deben incluir como mínimo las siguientes fases de paso de un tren de camiones sobre la estructura, y medidas correspondientes a realizar:

- Un primer paso, a 5 km/hora, para el calibrado inicial de los sistemas de medida, que permita el contraste de resultados en las fases siguientes.

- Un segundo paso a 20 km/hora.

- Un tercer paso a 40 km/hora.

A la terminación de la prueba, el Contratista entregará a la D.O el preceptivo Informe de conclusiones.

G30U PUESTA A TIERRA DE ELEMENTOS METÁLICOS Y ARMADURAS EN PASOS SUPERIORES

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

La puesta a tierra de las armaduras, barandillas y todos los elementos metálicos en pasos superiores sobre ferrocarriles, tiene por objeto proteger a las personas e instalaciones de los efectos derivados de la diferencia de potencial causados por el propio sistema de tracción eléctrica en condiciones normales y en condiciones anormales (fallos, cortocircuitos, etc.).

Esta unidad consiste en la puesta a tierra de las partes metálicas y armaduras de acero (salvo los cables de tesado) de todos los pasos superiores, a fin de conseguir que dichos elementos se encuentren unidos equipotencialmente.

Todos los elementos metálicos (incluido elementos de protección, barandillas, etc), deben ponerse a tierra a través del sistema global que se describe.

CONDICIONES GENERALES

Los cables para las conexiones a tierra deben ser, en todos los casos, resistentes a las intensidades de cortocircuito.

La colocación de los cables y conexiones de puesta a tierra se realizará según el detalle que figura en planos.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

La armadura del tablero estará unida (salvo los cables de tesado), tanto transversal como longitudinalmente para conseguir la continuidad eléctrica. En las juntas de dilatación del tablero, deberán montarse las correspondientes conexiones de puenteo de las armaduras.

Asimismo, en los estribos y en los pilares del paso elevado, la armadura también debe estar unida longitudinal y transversalmente, y conectada a la armadura de la cimentación, para darle continuidad eléctrica.

Para la puesta a tierra de las armaduras se unirá, mediante lazos de conexión, la armadura de los estribos a la del tablero y la de éste a la armadura de los pilares, estando finalmente éstos últimos conectados a los carriles exteriores de las vías, y debiéndose dejar preparados en la fase de construcción del paso superior los siguientes terminales:

- Armadura tablero □ armadura estribos 4 - 4
- Armadura tablero □ armadura pilar 2 - 2
- Armadura pilar □ carriles exteriores 2

La conexión a los carriles se realizará en la fase de instalación de la catenaria.

Las barandillas, las biondas y los dispositivos metálicos de protección de los pasos elevados se pondrán a tierra, conectándose entre sí y, posteriormente, a la armadura de los pilares y a través de éstos a los carriles exteriores.

Las barandillas y biondas deben estar eléctricamente seccionadas al final de la zona de afectación al ferrocarril para impedir que haya fugas del potencial de vía o se produzcan corrientes de retorno.

Todos los lazos de conexión se realizarán mediante cable de Cu desnudo de 50 mm^2, con terminales para atornillar o soldar.

G30V SOSTENIMIENTO DE VÍA FÉRREA CON PANTALLA ATIRANTADA DE CARRILES HINCADOS

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

Esta unidad se refiere a la ejecución de un sostenimiento de los taludes de las excavaciones junto a la vía del ferrocarril necesarias para la ejecución de cimentaciones de muros y estructuras, o para saneos de cimiento de terraplenes de la nueva vía. El sostenimiento consiste en una pantalla de perfiles de acero laminado de sección tipo carril de ferrocarril que son hincados en el terreno hasta la profundidad necesaria para conseguir el funcionamiento como elemento empotrado y resistir los posibles empujes de la profundidad excavada. Cuando el empotramiento en el terreno es reducido, se atirantan en cabeza a una pantalla similar ejecutada al otro lado de la vía a sostener.

Esta unidad comprende al menos los elementos u operaciones siguientes:

- Suministro de los perfiles metálicos.
- Movilización y retirada de equipos de hinca.
- La hinca propiamente dicha.
- Arriostramiento en cabeza de los perfiles hincados con perfiles metálicos o de cualquier otra índole, por ejemplo hormigón.
- Suministro, colocación y atirantamiento de las pantallas cuando es necesario doblarlas a ambos lados de la vía. A cada pantalla se le asocia la mitad de cada tirante.
- Descabezado y retirada de los segmentos cortados una vez finalizada la ejecución de la obra que protegen.
- Operaciones necesarias para emplazamiento de los equipos y para la protección y seguridad frente al tráfico ferroviario.
- Posibles paradas por cualquier causa, especialmente imputables al tráfico ferroviario.

CONDICIONES GENERALES

Los perfiles a hincar serán de acero con sección y rigidez transversal equivalente a la de un carril de 45 kg/m (en adelante se llamarán "carriles").

Las vigas de arriostramiento serán perfiles metálicos de tipo UPN-160 de acero laminado A/42-B, o de rigidez transversal equivalente. También podrán ser de hormigón armado con una sección transversal mayor de 0,20 m^2.

Los tirantes serán barras de acero de alta resistencia, cuyo diámetro y espaciamiento (número de tirantes por metro de pantalla) dependerá de la profundidad de excavación sostenida. Como mínimo se dispondrá un tirante cada 3,5 m (tres metros y medio) de longitud de pantalla en sentido de la vía.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Previamente, el contratista verificará la posición de los conductos y servicios existentes en la vertical de la alineación de la pantalla, en particular la del conducto de fibra óptica, y ajustará la posición del eje de la pantalla a aquellas posiciones.

Como mínimo, y salvo orden en contra de la Dirección de obra, se hincarán tres "carriles" por metro lineal. Asimismo, no se necesitarán tirantes y doble pantalla cuando la profundidad enterrada del carril sea igual a la longitud que queda por encima del fondo de la excavación.

Cuando la profundidad de hinca de un carril sea inferior al 60% del carril contiguo se repetirá la hinca de otro carril a una distancia intermedia entre el anterior y el siguiente, estando éste en la posición primitivamente prevista.

Cuando la profundidad de hinca de un carril sea mayor del 60% y menor del 80% de la del carril contiguo, se procederá a la hinca de otro carril a una distancia intermedia entre el anterior y el siguiente, estando éste en la posición primitivamente prevista. El siguiente carril podrá situarse a la distancia prefijada, pero medida a partir del último hincado.

No se podrá comenzar la excavación hasta que los perfiles estén convenientemente arriostrados y, en su caso, atirantados. El arriostramiento de los carriles cuando sea con perfiles metálicos, exigirá la soldadura de los carriles a la viga o vigas riostras.

Una vez terminadas las obras y restituido el terreno a su primitiva cota por delante de la pantalla de carriles, se procederá al corte y retirada de las cabezas de los carriles, de tal forma que no sobresalga del balasto o del terreno en el que se hayan hincado, una longitud mayor de cinco centímetros.

G30W COLUMNAS DE TERRENO INYECTADO A MUY ALTA PRESIÓN ("JET GROUTING")

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

Esta unidad consiste en la formación de columnas del terreno inyectado, de sección aproximadamente circular, conseguidas mediante mezcla por remoldeo del terreno natural y una lechada de un conglomerante. Esta lechada es introducida en el terreno, a muy alta presión (no inferior a 300 - 400 kg/cm^2), mediante eyectores situados en el extremo inferior de un vástago que se introduce en una perforación previamente realizada en el terreno y que se va extrayendo y girando durante la inyección.

El tipo de Jet a emplear será propuesto por el Contratista a la aprobación por la Dirección de Obra y deberá garantizar la obtención de columnas de terreno tratado de sesenta centímetros (60 cm) de diámetro mínimo en vertical

CONDICIONES GENERALES

Materiales

El material a inyectar está formado por una lechada de cemento obtenida por dispersión en agua mediante batidoras de alta turbulencia. El cemento a utilizar será del tipo aprobado por la Dirección de Obra. Se podrán emplear aditivos en la fabricación de la lechada para mejorar su comportamiento y penetración en el terreno. El tipo y proporción de aditivos a emplear será semejante a los que se empleen en las inyecciones normales del terreno y deberán ser aprobados por la Dirección de Obra.

La relación agua/cemento de la mezcla variará entre dos (2) y cero coma siete (0,7).

Maquinaria

Los equipos a emplear estarán formados por:

- Una unidad dosificadora automática con mezcladora de alta turbulencia.

- Una unidad de inyección con una bomba capaz de dar presiones de hasta 80 MPa (784,8 kg/cm^2) y con registro continuo y automatizado de los siguientes parámetros:

  . Presión de inyección.
  . Caudal de mezcla inyectada.
  . Dosificación de la mezcla.
  . Velocidad de rotación de la lanza de inyección.
  . Velocidad de extracción de la lanza de inyección.

- Una unidad de perforación e inyección con herramienta de taladro mediante tricono, trialeta o martillo en cabeza, y un inyector con toberas de diámetro comprendido entre uno coma cinco (1,5) y cuatro (4) milímetros, ortogonales al eje de la perforación, para la lechada, aire y agua en función del tipo a utilizar.

Los equipos de perforación deberán permitir:

- Un diámetro mínimo de 60 mm.

- Sistema de emplazamiento que permita replantear y ejecutar con precisión el taladro.

- Posibilidades de ejecutar taladros en todas las direcciones (horizontales, verticales e inclinados).

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Columnas de prueba

Previamente al comienzo de los trabajos proyectados, el Contratista realizará a su cargo, cuantas columnas de prueba sean necesarias para poner a punto los procedimientos de ejecución, haciendo variar en su transcurso las velocidades de extracción y rotación de la lanza de inyección, la presión, el caudal y la dosificación de la lechada, etc. Estas columnas de prueba se realizarán a cargo del Contratista.

Como consecuencia de estas pruebas, el Contratista redactará un informe en el que se analicen todos los datos obtenidos y se proponga a la Dirección de Obra la sistemática a emplear para llevar a cabo el trabajo proyectado. Éste no podrá empezar hasta obtener la aprobación escrita de la Dirección de obra sobre el plan de trabajo a seguir.

La inyección se realizará con presiones comprendidas entre trescientos (300) y seiscientos (600) kg/cm^2, asegurando que no se producen presiones intersticiales indeseables en el terreno. La velocidad de rotación de los eyectores estará comprendida entre diez (10) y sesenta (60) giros por minuto y la de extracción de la lanza de inyección lo estará entre cinco (5) y cincuenta (50) centímetros por minuto.

La inyección se realizará en retroceso, comenzando por el final de la perforación, y se suspenderá 1 m antes de alcanzar la superficie, excepto en el caso que la superficie sea la cara inferior de la zapata hormigonada, en cuyo caso la inyección alcanzará el trasdós de la misma.

- Columnas definitivas : El diámetro mínimo de las columnas terminadas no será inferior a sesenta (60) centímetros.

  Se armará la columna con un tubo de acero de ciento diez/ciento tres milímetros (110/103 mm) cuya medición y abono está incluida en la unidad de m de columna.

  De cada unidad ejecutada el Contratista redactará, adjuntando un soporte informático, un parte en el que se indicará:

  . Denominación del elemento.
  . Fecha y hora de comienzo y final de la ejecución.
  . Azimut y pendiente del eje del taladro, incluyendo cota de boca.
  . Sistema empleado en la perforación. Gráfico de avance. Diámetro.
  . Longitud alcanzada, cota absoluta del extremo de la perforación.
  . Tramo del taladro en el que se ha realizado la inyección.
  . Gráficos de velocidad de extracción y de giro de la lanza de inyección.
  . Gráficos de presiones y caudales a lo largo de la columna.
  . Dosificación empleada. Tipo de cemento y aditivos empleados.
  . Incidencias en la ejecución.

Tolerancias en la ejecución

La posición real del eje del taladro de perforación no diferirá en más de cinco (5) centímetros de la teórica y la desviación de su extremo no diferirá en más o

menos tres (3) por ciento de la longitud total de la perforación, respecto de su posición teórica.

G301 PERFORACIÓN Y HORMIGONADO DE PILOTES

1.- DEFINICIÓN Y CONDICIONES GENERALES

Será de aplicación lo especificado en el Apartado G301 del Pliego del Proyecto original, al que nos remitimos.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Será de aplicación lo especificado en el Apartado G301 del Pliego del Proyecto original, al que nos remitimos.

G302 VIGAS, MARCOS Y MUROS PREFABRICADOS

1.- DEFINICIÓN Y CONDICIONES GENERALES

Será de aplicación lo especificado en el Apartado G302 del Pliego del Proyecto original, al que nos remitimos.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

El Director de Obra podrá ordenar la toma de muestras de materiales para su ensayo y la inspección de los procesos de fabricación, realizando las correspondientes visitas a las plantas de fabricación, siempre que lo considere necesario.

Los marcos no deben presentar rebabas que sean indicio de pérdidas graves de lechada, ni superficies deslavadas o aristas descantilladas, ni armaduras visibles.

En cuanto a los materiales, hormigón, encofrados y acero, cumplirán lo establecido en los Artículos correspondientes del Pliego General.

Salvo autorización del Director, no se aceptarán marcos con fisuras de más de una décima de milímetro (0,1 mm) de ancho, o con fisuras de retracción de más de dos centímetros (2 cm) de longitud.

Los operarios de manejo, transporte y acopio de piezas prefabricadas, bien sea en taller o en obra, deberán realizarse con el máximo cuidado posible para que no se produzcan deterioros, no pudiendo apilarse más de tres alturas de marcos.

Los cálculos y los planos de construcción correspondientes, deberán ser presentados a la aprobación del Director de Obra con la suficiente antelación al comienzo de los trabajos de colocación.

El Contratista presentará a la aprobación del Director, un programa detallado, en el que figurará el desarrollo temporal de los trabajos, el personal y la maquinaria que intervendrán en esta operación.

El montaje se realizará sobre una solera de hormigón perfectamente nivelada, y los marcos encajarán a presión, unos contra otros, mediante la junta de goma con gatos para garantizar su correcto acople.

Será también de aplicación lo especificado en el Apartado G302 del Pliego del Proyecto original, al que nos remitimos.

G304 ENCOFRADOS EN ESTRUCTURAS Y OBRAS DE FÁBRICA

1.- DEFINICIÓN Y CONDICIONES GENERALES

Será de aplicación lo especificado en el Apartado G304 del Pliego del Proyecto original, al que nos remitimos.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Será de aplicación lo especificado en el Apartado G304 del Pliego del Proyecto original, al que nos remitimos.

G309X POSTESADO EXTERIOR

1.- DEFINICIÓN Y CONDICIONES GENERALES

Acero activo para postesado exterior

Se define así el acero activo utilizado en el postesado exterior o de continuidad del Viaducto de Vianixa. Será de aplicación lo especificado en el Apartado G309 del Pliego del Proyecto original, al que nos remitimos.

Tubería de polietileno

Se definen como tales, los tubos extruídos de polietileno de alta densidad para el postesado exterior del Viaducto de Vinaixa.

El tubo tendrá la superficie lisa, sin ondulaciones. No tendrá burbujas, grietas, ni otros defectos. Esta formado por polietileno de densidad > 940 Kg/m3 y un contenido de negro de carbono del 2,5% en peso. Cada tubo, llevará marcados a distancias < 1 m. la referencia del material, el diámetro nominal, la presión nominal y el año de fabricación.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Acero activo para postesado exterior

Será de aplicación lo especificado en el Apartado G309 del Pliego del Proyecto original, al que nos remitimos.

Tubería de polietileno

Al cortar un tubo, es preciso hacerlo perpendicularmente al eje y eliminar las rebabas. En caso de aplicarse un accesorio de comprensión hay que achaflanar la arista exterior. Cada vez que se interrumpa el montaje, se taparán los extremos abiertos.

G309Y ELEMENTOS AUXILIARES EN TABLERO CONTINUO DE CAJONES PREFABRICADOS

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

Elementos de unión de tramos prefabricados entre sí o entre tramos prefabricados y zonas in situ, o entre elementos in situ hormigonados en fases distintas.

Se definen las siguientes unidades de obra:

- Manguitos roscados de unión de armaduras entre elementos prefabricados e in situ.
- Barras de acero postesadas de unión entre cajones prefabricados, prefabricados e in situ, o in situ hormigonados en fases distintas.

La ejecución de las unidades de obra incluye las operaciones siguientes:

- Barras de acero postesadas:
  - Transporte a obra de equipos de tesado
  - Suministro de barras con elementos de anclaje
  - Colocación, tesado e inyección
  - Elementos de elevación
  - Agua, cemento y aditivos
- Manguitos roscados:
  - Transporte a obra de equipos
  - Suministro de material (manguito y llaves de apriete)
  - Ejecución de rosca en armaduras
  - Colocación de manguito y roscado de armaduras

CONDICIONES GENERALES

La forma, dimensiones y espesores así como los materiales a utilizar serán los definidos en el proyecto.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN.

Barras de acero postesado

Previamente a su instalación en obra, el Contratista presentará el correspondiente estudio del dimensionamiento de las placas de anclaje y demás complementos para las operaciones de tesado.

Se protegerá adecuadamente la barra a su paso por la junta mediante un manguito o similar.

Las barras nunca se deberán soldar, someter a concentraciones locales de calor ni salpicarse con escoria de soldadura.

Manguitos roscados

La colocación de los elementos ha de estar de acuerdo con los planos del Proyecto.

Tolerancias de colocación: 2,5 mm.

La parte de la pieza insertada en el elemento receptor deberá estar protegida durante la manipulación del mismo para evitar dañar la rosca.

G30B APARATOS DE APOYO TIPO "POT"

1.- DEFINICIÓN Y CONDICIONES GENERALES

Será de aplicación lo especificado en el Apartado G30B del Pliego del Proyecto original, al que nos remitimos.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Será de aplicación lo especificado en el Apartado G30B del Pliego del Proyecto original, al que nos remitimos.

G30BX APOYOS PROVISIONALES

1.- DEFINICIÓN Y CONDICIONES GENERALES

Los apoyos provisionales son los elementos por donde deslizan y se apoyan las dovelas durante la fase de construcción, es decir, durante el empuje del tablero.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Los apoyos provisionales irán emplazados en los extremos de cada pila, entre los apoyos definitivos y los topes de guiado laterales. Estos apoyos irán nivelados con una base de mortero de baja retracción y alta resistencia.

El apoyo provisional está constituido por HEB unidos por los extremos de las alas. Sobre las alas superiores se suelda una chapa de acero inoxidable de 25 mm. de espesor, por donde deslizarán y apoyarán las dovelas. Todos los HEB irán embutidos con un mortero de alta resistencia y de fácil puesta en obra, para asegurar que no queden huecos sin rellenar debajo de las alas del los HEB.

Todos los apoyos deberán ser comprobados topográficamente, tanto antes como después de echar el mortero que fija los HEB.

El hormigón de la dovela nunca podrá estar en contacto directo con el apoyo provisional. Para ello es necesario intercalar entre ellos una almohadilla de neopreno teflón.

G30R PRUEBA DE CARGA EN PUENTES Y VIADUCTOS DE FERROCARRIL

1.- DEFINICIÓN Y CONDICIONES GENERALES

Será de aplicación lo especificado en el Apartado G30R del Pliego del Proyecto original, al que nos remitimos.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Será de aplicación lo especificado en el Apartado G30R del Pliego del Proyecto original, al que nos remitimos.

G30X EMPUJE DE TABLERO EN VIADUCTOS

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

El objeto del presente artículo es definir las condiciones para ejecución del proceso de empuje del tablero en viaductos, estableciendo el control adecuado en cada una de sus fases.

CONDICIONES GENERALES

Almohadillas para cargas verticales

Serán piezas de cuatrocientos milímetros máximos de anchura con un espesor total de quince milímetros (15 mm) formadas por dos chapas de acero envueltas en neopreno y una lámina de teflón de un milímetro (1 mm) de espesor en una de sus caras. El contratista deberá justificar mediante ensayos la aptitud de las almohadillas para soportar los esfuerzos generados por el empuje, aportando datos de los coeficientes de rozamiento obtenidos, estáticos y dinámicos, para un rango de tensiones de compresión similar a las de servicio. En estos ensayos se decidirá el espesor más apropiado de la lámina de teflón.

Durante el proceso de lanzamiento se colocarán las almohadillas sobre los apoyos totalmente pegadas entre sí. El operador ha de cuidar de meterlas lo más posible dentro de la banda de acero inoxidable y unidas canto con canto a la anterior; quedando siempre la cara de neopreno en contacto con el elemento que desliza y la cara con teflón, engrasada con silicona, hacia la placa espejo de acero inoxidable del aparato de apoyo.

Se debe empujar fuertemente con decisión cada almohadilla a la anterior hasta comprobar que ha sido "cogida" entre apoyo y pico o dintel. En caso de que no se pueda introducir, se debe parar el deslizamiento, comprobar si existe algún obstáculo o alguna deformación en alguna almohadilla de pilas y parque y que todas se han introducido de la forma correcta. De no ser así se procederá a introducirla con la ayuda de algún útil que aporte la fuerza necesaria y comprobar con atención las fuerzas de empuje en los gatos.

En cualquier caso siempre se tendrá en cuenta no sobrepasar la carga máxima de empuje horizontal fijada en cada fase ya que se podría poner en peligro a las pilas al aumentar excesivamente las fuerzas horizontales que se ejercen en sus cabezas.

Mientras se estén utilizando las almohadillas estarán permanentemente limpias, incluso de polvo y secas en la cara de neopreno y engrasadas con grasa de silicona en la cara de teflón.

Se debe tener cuidado y no usar almohadillas que tengan estropeada la lámina de teflón en un grado tal que haga disminuir su capacidad de deslizamiento.

Almohadillas para cargas horizontales

Serán piezas de dimensiones orientativas de cien por trescientos cincuenta milímetros (100 x 350 mm) de superficie con un espesor total de catorce milímetros (14 mm) formados por dos chapas de acero envueltas en

neopreno y una lámina de teflón de un milímetro (1 mm) de espesor en una de sus caras.

En este caso también es conveniente que las almohadillas se introduzcan pegadas a la anterior. Así se tiene más facilidad para meterlas.

En el caso de que hubiera que corregir la dirección será necesario introducirlas unidas a una chapa de acero del espesor adecuado que se aumentará progresivamente hasta conseguir el desplazamiento radial buscado.

Todo lo mencionado para las almohadillas para soporte de cargas verticales, respecto a su colocación, "engrase" y conservación, es válido para éstas.

Parque de fabricación de dovelas

El parque de fabricación de dovelas es la zona ubicada tras el estribo en la que se constituye modularmente el tablero a medida que se va lanzando.

Previamente a su ejecución, el Contratista suministrará a la Dirección de Obra el diseño detallado del parque para su aprobación. Los criterios básicos que deben orientar el diseño son los siguientes:

- Criterio de ubicación: La ubicación en planta y alzado del parque debe ser continuación de la alineación precisa de empuje que se define en los planos. El replanteo se debe realizar con precisión, tanto en alzado como en planta, no admitiéndose errores superiores a 1 milímetro. Las coordenadas deberán confirmarse al menos por dos equipos distintos de topografía.
- Criterio de monolitismo: La morfología y concepción del parque debe garantizar el monolitismo de la dovela construida. Los elementos interiores a la dovela tipo, - mamparos y cuñas de anclaje de cables en segunda fase -, deberán hormigonarse con la sección tipo que les rodea. Además, no se permitirán fases parciales de hormigonado con movimientos intermedios del sistema que puedan dañar la integridad de subsecciones parciales potencialmente débiles.
- Criterio de rigidez: La cimentación y demás elementos del sistema deben ser rígidos, de modo que bajo la acción de las cargas de pesos propios y el empuje sucesivo no se varíe la ubicación inicial exacta desde el parque. El Contratista suministrará a la Dirección de Obra para su aprobación justificación expresa del nivel de deformabilidad del parque, tanto de su subestructura como de los entramados metálicos o de hormigón que lo constituyan.
- Criterio de corrección: El parque de fabricación deberá incluir los dispositivos necesarios que permitan efectuar correcciones tanto en planta como en alzado ante posibles modificación respecto a los valores iniciales que pudieran ocurrir durante las obras.
- Criterios de hormigonado: El parque debe prever instalaciones de curado y vibración exterior permanentes.
- Criterios de planeidad: Las superficies de deslizamiento en el parque deben ser perfectamente planas, sin combaduras ni deformaciones que, a juicio de la Dirección Facultativa, cuestionen la bondad de la superficie de hormigón construida.

Gatos de empuje

Los gatos de empuje estarán compuestos por dos elementos de carga, uno en dirección vertical y otro en dirección horizontal unidos por una junta universal. El gato vertical irá sobre un soporte deslizante de acero inoxidable con teflón.

Los gatos, vertical y horizontal, tendrán la capacidad de carga necesaria para, con un margen adecuado de seguridad, hacer frente a los requerimientos más importantes del empuje. Ambos elementos tendrán la misma central de bombeo. Es necesaria la instalación de una válvula de descarga para el funcionamiento de los gatos.

Los gatos de empuje se colocarán en mesetas dispuestas a tal efecto en el estribo desde el que se empuje. Una vez pretensada la dovela que se va a empujar se efectuará el lanzamiento por emboladas. Cada embolada constará de las siguientes operaciones:

- Elevación del gato vertical con la fuerza necesaria para despegar el dintel de la placa rugosa que le retiene. La elevación máxima admisible para no sobrecargar la estructura será la definida por la Dirección de Obra.
- Empuje del dintel con el gato horizontal, el gato vertical está en carga y desliza sobre el teflón.
- Bajada del gato vertical, el dintel se apoya sobre la placa rugosa del estribo, que le retiene.
- Retroceso del gato horizontal con el gato vertical sin carga deslizando sobre el teflón.

Nariz de empuje

El pescante será metálico, de alma llena, constituido por dos cuchillos longitudinales arriostrados entre sí. Su peso será alrededor de 2 T/m y su longitud de 30 metros. Su rigidez, en torno al 20% de la del tablero, será tal que durante el empuje no se superen los esfuerzos considerados en el proyecto. En el extremo delantero del pescante se dispondrá un sistema hidráulico que permita recuperar la flecha existente al llegar a una pila y realizar el apoyo de la misma. La alineación del pescante deberá seguir la curva espacial teórica de empuje. No obstante, podrá sustituirse por una poligonal previa autorización de la Dirección de Obra.

Previamente a su ejecución, deberán presentarse a la Dirección de Obra los planos de taller de ejecución del pescante para su aprobación.

Apeos de empuje

Los apeos que se empleen durante el empuje deberán ser rígidos, manteniendo una deformabilidad bajo las cargas máximas de trabajo durante el lanzamiento inferior a los 2 mm.

Previamente a su ejecución deberá suministrarse a la Dirección de Obra el diseño final de los apeos que vayan a utilizarse, con su cimentación, para su aprobación.

Guiaderas del tablero

Durante los lanzamientos el puente se encontrará apoyado horizontalmente al menos en dos puntos, ubicados uno permanentemente en la zona de empuje, y el otro en la pila más avanzada a la que llegue el hormigón. No obstante, pueden disponerse adicionalmente otros puntos de apoyo si se considera necesario. Es desde estos puntos de apoyo desde los que se realizará el guiado del dintel y se realizarán las correcciones para ajustar la posición en planta del tablero a la teórica.

El diseño y ubicación de guiaderas, así como sus cálculos justificativos, deberá suministrarse a la Dirección de Obra para su aprobación.

Bloqueo longitudinal del tablero

En las situaciones entre empuje y empuje el tablero debe poseer un punto fijo en el estribo para evitar movimientos longitudinales incontrolados. Su diseño, ubicación y cálculos justificativos deberán suministrarse a la Dirección de Obra para su aprobación.

Aparatos de apoyo durante el empuje

Los aparatos de apoyo a emplear durante el empuje serán tipo POT específicos para el empuje y válidos también para la situación de servicio del puente. Cumplirán las prescripciones indicadas en el Artículo G30B de este Pliego.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

Se incluyen a continuación los controles básicos a efectuar durante las operaciones de empuje:

Control topográfico

Para la colocación en su posición definitiva de los apoyos provisionales - definitivos en pilas, estribos y parque, así como la colocación de las bandas de encofrado fijo, se exige una calidad excepcional de medidas. Principalmente en alzados la precisión de medidas ha de ser del orden de medio milímetro (0,5 mm), tanto para cota absoluta como en planeidad en las dos direcciones principales de los apoyos o bandas de deslizamiento.

La curva de los patines del pico de lanzamiento y de los tacones inferiores del dintel que han de deslizar con las almohadillas verticales han de tener errores inferiores a un milímetro (1 mm). Este detalle se cuidará muy especialmente a la hora de replantear el encofrado de las dovelas en el parque, toda vez que en la mayor parte del recorrido la carga contra los apoyos para reacciones radiales se hace en el hormigón.

Es muy importante controlar que la geometría del tablero que se construye corresponde a la alineación en planta teórica del puente. Para ello se establecerán algunos puntos de control en el eje de las dovelas y se comprobará topográficamente que, en sucesivos empujes, permanecen en la alineación teórica correspondiente al eje del puente. Este control cobra el mayor interés en el caso de alineaciones en planta circulares.

Durante el empuje se controlará la alineación del tablero, controlando la posible tendencia del tablero a desviarse hacia uno u otro lado, e inspeccionando durante el empuje los sistemas de guiado del puente.

El control de la situación en planta de la estructura se debe realizar continuamente para evitar desvíos demasiado grandes que luego son difíciles de corregir. Para ello se fijarán puntos en el tablero para que en cada instante, en función de la cantidad de dovela que se ha desplazado, se pueda saber la posición exacta, con error de un milímetro (1 mm), del puente y si se ha producido desvío, poder corregir en desplazamientos sucesivos.

Todas las mediciones de control de longitud y de flechas del pico y del dintel se deben realizar a las horas del día en que se considere que la influencia de la temperatura y del soleamiento es menor, y procurar realizarlas siempre a la misma hora y, si es posible, en las mismas condiciones. Suelen ser buenas las primeras horas del día, sobre todo en épocas calurosas y de mucho soleamiento.

Control fuerza de empuje longitudinal

Para cada una de las fases del proceso se suministrará previamente la fuerza necesaria para producir el deslizamiento, considerando los coeficientes de rozamiento esperables entre las distintas superficies implicadas. Para tener una buena información de los coeficientes de rozamiento estos se ajustarán en función de las medidas tomadas en los primeros empujes.

Se controlará la fuerza de empuje real para evitar que un crecimiento anómalo de la misma sobresolicite indeseablemente las pilas. Se fija un límite máximo de desviación de la fuerza de empuje respecto a la prevista del 20%, y, se sobrepasarse, deberá detenerse el empuje para analizar la causa. En cualquier caso, se realizará un control topográfico de la flecha horizontal en cabeza de pila, con aparatos estacionados lo más perpendicularmente a la dirección del desplazamiento, con objeto de detectar lo más rápido posible cualquier anomalía.

En cualquier caso, la Dirección de Obra fijará las tolerancias exigibles en todo el proceso.

Control de llegada del pescante a pilas

A la llegada del pescante a pilas, se controlará la flecha de llegada del mismo y la reacción de remonte en los gatos delanteros, con objeto de comparar los valores reales con los teóricos y tomar las decisiones oportunas.

Control de asientos en pilas

Se dejarán testigos nivelados en cada una de las pilas, a las que se tomará lectura periódicamente para detectar posibles movimientos en las mismas.

Los resultados de todos los controles anteriores quedarán reflejados en estadillos preparados al efecto, previamente aprobadas por la Dirección de Obra, que serán suministrados a ésta a medida que se disponga de los datos.

G30Y PUERTA METÁLICA DE ACCESO A CÁMARA DE TESADO

1.- DEFINICIÓN Y CONDICIONES GENERALES

DEFINICIÓN

Se define la siguiente unidad de obra:

- Puerta metálica para acceso a cámara de tesado en viaductos de ferrocarril.

CONDICIONES GENERALES:

El marco colocado quedará bien enrasado con el muro, nivelado previamente con mortero. Quedará sólidamente trabado por un anillo perimetral de mortero.

La puerta quedará enrasada sobre el marco en todo su perímetro. No tendrá movimientos que puedan provocar su rotura por impacto o producir ruidos.

2.- CONDICIONES DEL PROCESO DE EJECUCIÓN

El proceso de colocación no producirá desperfectos, ni modificará las condiciones exigidas al material.

6. Resumen de control de calidad (Empresa Constructora y Asistencia Técnica)

6. Resumen del control de calidad

La Asistencia Técnica así como la Empresa Constructora no presentaron ningún resumen del control de calidad que cumpliera los requisitos establecidos en este epígrafe.
El control de calidad realizado en los hormigones de las estructuras se encuentra recogido en el “Documento nº 3. Auscultación”.

7. Accesos y elementos para mantenimiento

7.- ACCESOS Y ELEMENTOS PARA MANTENIMIENTO

Los accesos a las diferentes estructuras están definidos en el Anejo nº14 "Recomendaciones a tener en cuenta para el mantenimiento y Accesos a la Traza"

8. Recomendaciones para la conservación y mantenimiento

8.- RECOMENDACIONES PARA LA CONSERVACIÓN Y MANTENIMIENTO

No hay ninguna recomendación especial para el mantenimiento y conservación de las estructuras. No obstante, se observará en todo momento las prescripciones del GIF

MOVIMIENTOS PREVISTOS EN LAS ESTRUCTURAS

Viaducto de Andomá		
	Acort(mm)	Alarg (mm)
Estribo 1	0	0
Pila 1	17	3
Pila 2	40	7
Pila 3	59	11
Pila 4	81	15
Pila 5	105	20
Pila 6	132	24
Pila 7	160	28
Estribo 2	185	31

Viaducto de Vinaixa		
	Acort(mm)	Alarg (mm)
Estribo 1	0	0
Pila 1	33	12
Pila 2	74	26
Pila 3	115	41
Pila 4	158	56
Pila 5	201	71
Pila 6	242	66
Pila 7	283	100
Pila 8	324	114
Pila 9	365	129
Pila 10	405	143
Pila 11	446	158
Pila 12	487	172
Pila 13	528	186
Pila 14	569	201
Pila 15	609	215
Pila 16	650	230
Pila 17	691	244
Pila 18	732	258
Pila 19	773	273
Pila 20	813	287
Pila 21	854	302
Estribo 2	887	313