# *ANEJO Nº 6. ESTRUCTURAS*

# ANEJO Nº 6. ESTRUCTURAS

## ÍNDICE

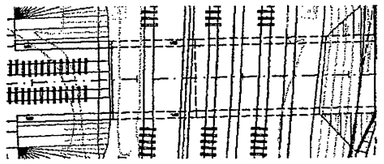
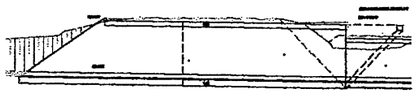
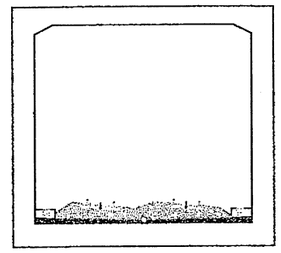
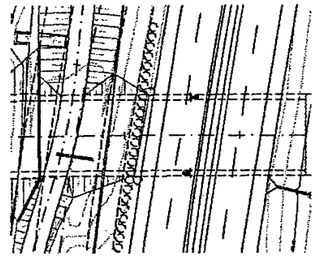
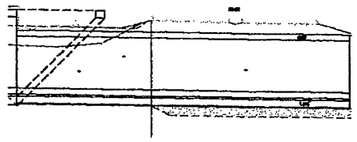
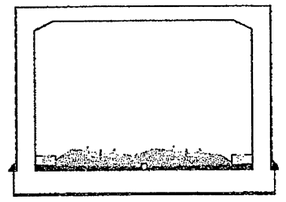
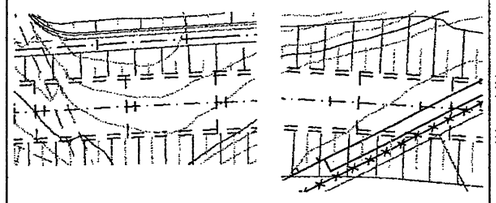
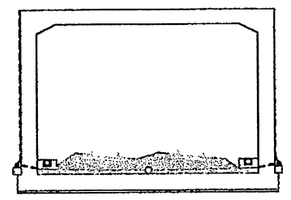
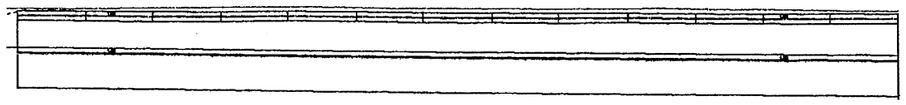
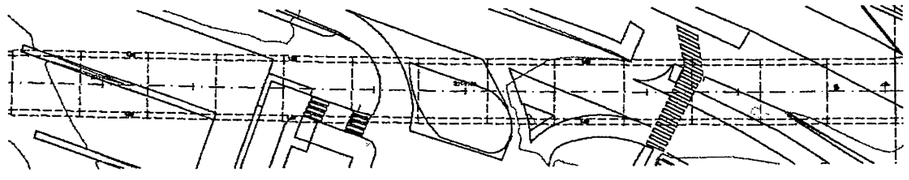
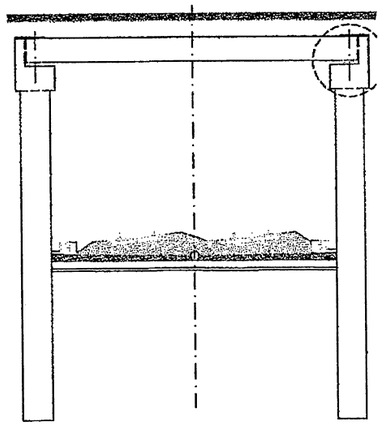

1. CUADRO RESUMEN
2. DESCRIPCIÓN (Tipología, aparatos de apoyo, juntas, impermeabilización, etc.)
3. DEFINICIÓN GEOMÉTRICA
   - 3.1. DEFINICIÓN GEOMÉTRICA
   - 3.2. CLASIFICACIÓN DE LAS ESTRUCTURAS (VIADUCTOS, PUENTES, PASOS SUPERIORES, PASOS INFERIORES, PEQUEÑAS OBRAS DE FÁBRICA, PASOS DE FAUNA)
4. CÁLCULOS
   - 4.1. ACCIONES CONSIDERADAS
   - 4.2. PROGRAMAS DE CÁLCULOS UTILIZADOS
   - 4.3. CÁLCULOS
     - O.D.T 300.2
       1. INTRODUCCIÓN
       2. BASES DE CÁLCULO
       3. INSTRUCCIONES Y NORMAS APLICADAS
       4. DESCRIPCIÓN DE LOS PROGRAMAS DE ORDENADOR UTILIZADOS
       5. MATERIALES Y COEFICIENTES DE MAYORACIÓN
       6. ACCIONES
       7. HIPÓTESIS DE CARGA Y COEFICIENTES DE MAYORACIÓN
       8. MODELO DE CÁLCULO
       9. O.D.T. 300.2
     - ESTRUCTURA SINGULAR. TÚNEL ARTIFICIAL. TRAMO CUBIERTO CRUCE CON O.D.T.-300.2
       1. INTRODUCCIÓN
       2. BASES DE CÁLCULO
       3. INSTRUCCIONES Y NORMAS APLICADAS
       4. DESCRIPCIÓN DE LOS PROGRAMAS DE ORDENADOR UTILIZADOS
       5. MATERIALES Y COEFICIENTES DE PONDERACIÓN
       6. ACCIONES
       7. HIPÓTESIS DE CARGA Y COEFICIENTES DE MAYORACIÓN
       8. MODELO DE CÁLCULO
       9. CÁLCULO LONGITUDINAL
       10. CÁLCULO TRANSVERSAL
     - O.D.T 300.4
       1. INTRODUCCIÓN
       2. BASES DE CÁLCULO
       3. INSTRUCCIONES Y NORMAS CONSIDERADAS
       4. DESCRIPCIÓN DE LOS PROGRAMAS DE ORDENADOR UTILIZADO
       5. MATERIALES Y COEFICIENTES DE MAYORACIÓN
       6. ACCIONES
       7. HIPÓTESIS DE CARGA Y COEFICIENTES DE MAYORACIÓN
       8. MODELO DE CÁLCULO
       9. O.D.T. 4
          - 9.1. GEOMETRÍA BÁSICA
          - 9.2. ANÁLISI DE ESFUERZOS
          - 9.3. ARMADO GENERAL
          - 9.4. EMBOCADURAS
     - O.D.T 300.9
       1. INTRODUCCIÓN
       2. BASES DE CÁLCULO
       3. INSTRUCCIONES Y NORMAS APLICADAS
       4. DESCRIPCIÓN DE LOS PROGRAMAS DE ORDENADOR UTILIZADOS
       5. MATERIALES Y COEFICIENTES DE PONDERACIÓN

6. ACCIONES
7. HIPÓTESIS DE CARGA Y COEFICIENTES DE MAYORACIÓN
8. MODELO DE CÁLCULO
9. O.D.T. 300.9

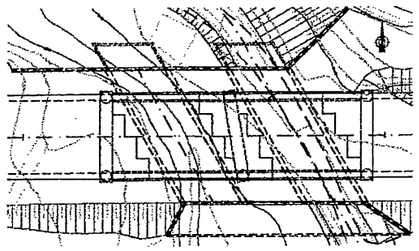
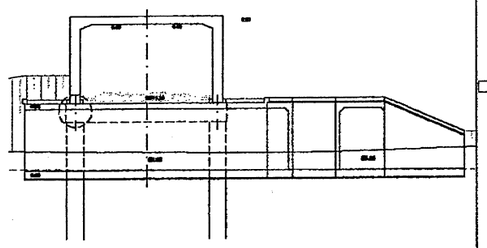
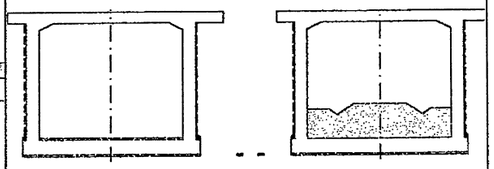
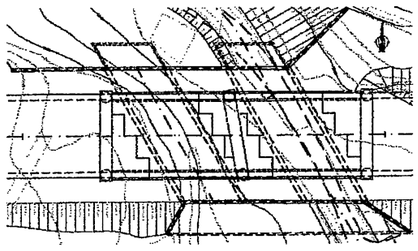
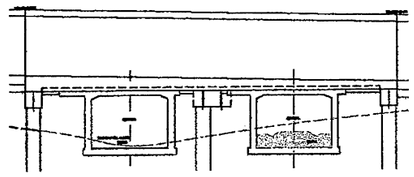
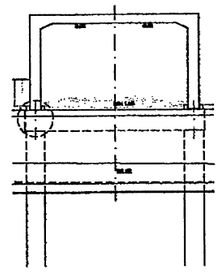
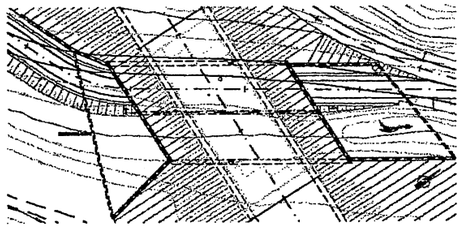
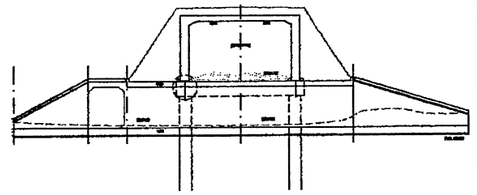
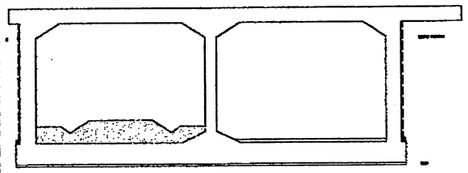
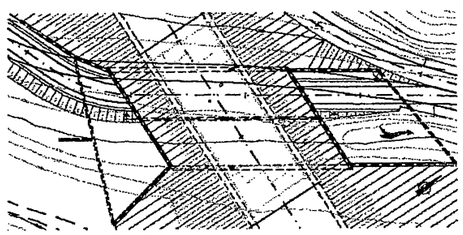
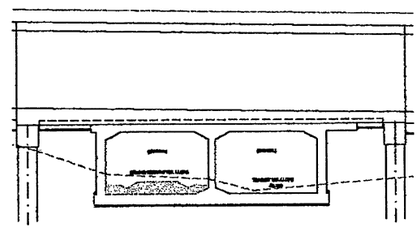
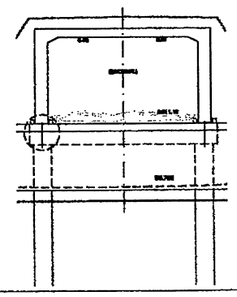
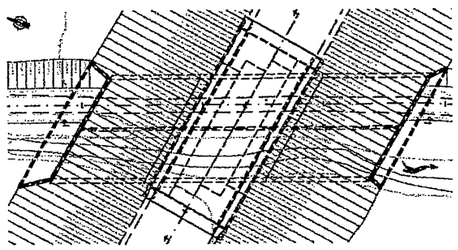
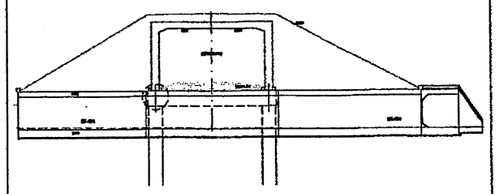
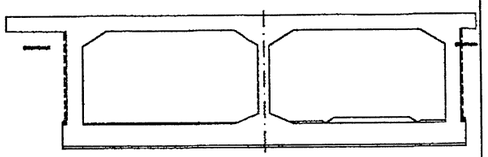
- O.D.T 300.8.1
  - INFORME. ANEJO DE CÁLCULO DE ZAPATAS
    1. INTRODUCCIÓN
    2. SOLUCIÓN ADOPTADA
    3. CÁLCULOS HIDRÁULICOS
    4. CÁLCULOS RESISTENTES
    5. CONCLUSIÓN
  - ANEJO DE CÁLCULOS DE ZAPATAS
  - ANEJO DE CÁLCULO DE PANELES PREFABRICADOS DE ALETA
  - ANEJO DE CÁLCULO DE PANELES PREFABRICADOS DE ESTRIBO
  - ANEJO DE CÁLCULO DEL TABLERO
  - LOSA DE TRANSICIÓN
  - MURO DE PROTECCIÓN O.D.T. 308.1
  - DISEÑO ESCOLLERA O.D.T. 308.1
  - MUROS CONVENCIONALES
  - CÁLCULO DE LA CIMENTACIÓN DE LOS VESTUARIOS DEL CAMPO DE FÚTBOL
    1. BASES DE CÁLCULO
    2. DESCRIPCIÓN DE LA OBRA
    3. HIPÓTESIS DE CARGA
    4. EVALUACIÓN DE LAS CARGAS
    5. HIPÓTESIS DE CÁLCULO
    6. ELEMENTOS DE CÁLCULO
    7. MODELO DE CÁLCULO
    - INFORME GEOTÉCNICO

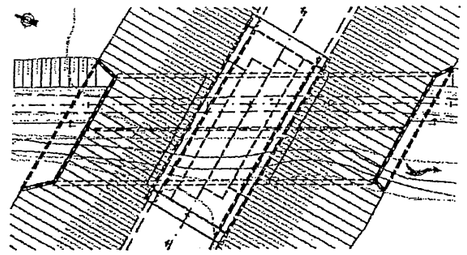
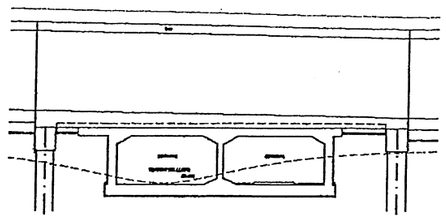
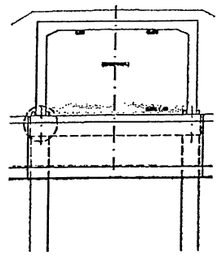
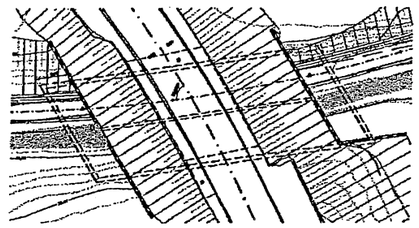
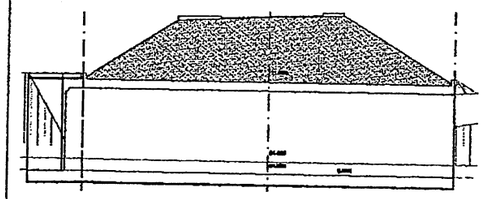
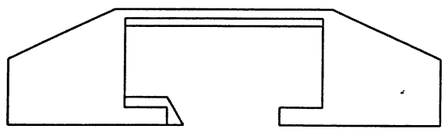
5. PROCESO CONSTRUCTIVO
6. CONTROL DE CALIDAD
   - 6.1. EMPRESA CONSTRUCTORA
     - 6.1.1. ESTRUCTURAS “IN SITU” Y PEQUEÑAS OBRAS DE FÁBRICA
       - CONTROL DEL HORMIGÓN
         - CAJÓN HINCADO
         - DESVÍO AP-7. PILOTES Y VIGAS DE ATADO
         - MARCO CONEXIÓN N-II-AP7
         - O.D.T. 300.2
         - O.D.T. 300.4
         - O.D.T. 300.9
         - O.D.T. 300.8.1
       - CONTROL DEL ACERO
       - OTROS ENSAYOS
       - CONTROL GEOMÉTRICO
     - 6.1.2. ESTRUCTURAS PREFABRICADAS (EXPEDIENTE DE FABRICACIÓN)
       - EXPEDIENTE DE FABRICACIÓN TUBO ∅ 2000 (O.D.T. 300.1)
       - EXPEDIENTE DE FABRICACIÓN DE LAS VIGAS DEL PUENTE C/ JOSEPH VILAR
   - 6.2. ASISTENCIA TÉCNICA
     - 6.2.1. ESTRUCTURAS “IN SITU” Y PEQUEÑAS OBRAS DE FÁBRICA
       - CONTROL DEL HORMIGÓN
         - CAJÓN HINCADO
         - DESVÍO AP-7. MICROPILOTES Y ANCLAJES
         - DESVÍO AP-7. PILOTES Y VIGAS DE ATADO
         - MARCO CONEXIÓN N-II-AP7
         - O.D.T. 300.2
         - O.D.T. 300.4
         - O.D.T. 300.8.1
         - O.D.T. 300.9
         - VESTUARIOS CAMPO DE FUTBOL
       - CONTROL DEL ACERO
       - OTROS ENSAYOS
       - CONTROL GEOMÉTRICO
     - 6.2.2. ESTRUCTURAS PREFABRICADAS (EXPEDIENTE DE FABRICACIÓN)
7. ACCESOS Y ELEMENTOS PARA MANTENIMIENTO
8. RECOMENDACIONES PARA LA CONSERVACIÓN Y MANTENIMIENTO
9. MOVIMIENTOS PREVISTOS EN LAS ESTRUCTURAS

# 1. Cuadro resumen

| ESTRUCTURA Nº | P.K. | TIPOLOGIA | DIMENSIONES BÁSICAS | PLANTA | PERFIL | SECCIÓN |
|---|---|---|---|---|---|---|
| | | | | TRAMO CUBIERTO | | |
| 1.Cajon hincado | 300+115<br>300+167 | Marco de Hormigon armado empujado<br>Estructura hiperestatica | Montera de tierras: 1.10 m<br>Longitud: 50 m + 18 m aletas<br>Seccion: 12.20x10.90<br>Espesores:<br>Dintel: 1.00<br>Cartelas: 1.00H:0.50V<br>Hastiales: 1.20<br>solera: 1.25 |  |  |  |
| 2.Marco bajo conexión N-II con A-7 | 300+167<br>300+211 | Marco de Hormigon armado<br>Estructura hiperestatica | Montera de tierras: 1.50 m<br>Longitud: 46 m<br>Seccion: 12.20x8.25<br>Espesores:<br>Dintel: 0.80<br>Cartelas: 1.00H:0.50V<br>Hastiales: 0.90<br>solera: 1.00 |  |  |  |
| 3.Tunel artificial tramo cubierto | 300+211<br>300+252.751<br><br>300+298.011<br>300+438.411<br><br>300+474.311<br>300+898.257<br><br>300+932.877<br>301+000<br><br>301+000<br>301+195 | Marco de Hormigon armado<br>Estructura hiperestatica | Montera de tierras: 1.00 m<br>Longitud: 789 m<br>Seccion: 12.00x8.25<br>Espesores:<br>Dintel: 0.80<br>Cartelas: 1.00H:0.50V<br>Hastiales: 0.90<br>solera:<br>Tipo 1 y 2: 0.90 m<br>Tipo 3: 1.00 m |  |  |  |
| 4.Tunel artificial entre pantallas | 301+000<br>301+195 | Pantallas continuas de hormigon armado<br>Estructura hiperestatica<br>Losa superior de hormigon armado<br>Estructura isostatica<br>Losa inferior de hormigon armado<br>Estructura hiperestatica | Galibo horizontal: 12.00<br>Galibo vertical: min 7.15<br>Altura entre carril y base de losa inferior: 1.50<br>Pantallas:<br>Espesor:<br>Tipo 1: 1.20<br>Tipo 2: 1.40<br>Longitud de empotramiento:<br>Tipo 1: 7.50<br>Tipo 2: 8.25<br>Losa superior<br>Espesor: 1.00<br>Montera de tierras:<br>Var 1.00-1.50 | PERFIL<br>  <br>PLANTA<br>  | |  |

## OBRAS DE DRENAJE

| ESTRUCTURA Nº | P.K. | TIPOLOGIA | DIMENSIONES BÁSICAS | PLANTA | PERFIL | SECCIÓN |
|---|---|---|---|---|---|---|
| .ODT 300.2 | 300+285.439 | 2 Marcos de Hormigon armado<br><br>Estructura hiperestatica | Montera de tierras: 1.30 m<br>Longitud: 25.46 m<br>Seccion: 2x8.00x6.40<br>Espesores:<br>Dintel: 0.60<br>Cartelas: 0.60H:0.40V<br>Hastiales: 0.70<br>solera: 0.80 m<br>Esviaje: 66.41g |  |  |  |
| .Tunel artificial tramo cubierto | 300+252.751<br>300+298.011 | Viga de hormigon armado<br><br>Estructura hiperestatica | Galibo vert: 7.15 m<br>Galibo hor: 12.00 m<br>Luces:22.74+20.52<br>Seccion: "U" invertida<br>Espesores:<br>Dintel: 0.80<br>Cartelas: 1.00H:0.50V<br>Hastiales: 0.80<br>Apoyos 6 pilotes d1.80m |  |  |  |
| '.ODT 300.4 | 300+451.880 | Marco bicelular Hormigon armado<br>Estructura hiperestatica | Montera de tierras: 10.05 m<br>Longitud: 31.54 m<br>Seccion: 2x8.00x5.70<br>Espesores:<br>Dintel: 0.70<br>Cartelas superiores: 1.10H:0.70V<br>Cartela inferior: 1.10H:0.55V<br>Hastiales exteriores: 0.75<br>Hastiales interior: 0.50<br>solera: 1.00 m<br>Esviaje:63.07g |  |  |  |
| Tunel artificial tramo cubierto | 300+898.257<br>300+932.877 | Viga de hormigon armado<br><br>Estructura hiperestatica | Galibo vert: 7.15 m<br>Galibo hor: 12.00 m<br>Luz:32.62 m<br>Seccion: "U" invertida<br>Espesores:<br>Dintel: 0.80<br>Cartelas: 1.00H:0.50V<br>Hastiales: 0.80<br>Apoyos 4 pilotes d1.80m |  |  |  |
| .ODT 300.9 | 300+920.475 | Marco bicelular Hormigon armado<br>Estructura hiperestatica | Montera de tierras: 10.05 m<br>Longitud: 52.78 m<br>Seccion: 2x8.00x4.30<br>Espesores:<br>Dintel: 0.70<br>Cartelas superiores: 1.10H:0.70V<br>Cartela inferior: 1.10H:0.55V<br>Hastiales exteriores: 0.75<br>Hastiales interior: 0.50<br>solera: 1.00 m<br>Esviaje:66.57g |  |  |  |

| ESTRUCTURA Nº | P.K. | TIPOLOGIA | DIMENSIONES BÁSICAS | PLANTA | PERFIL | SECCIÓN |
|---|---|---|---|---|---|---|
| | | | OBRAS DE DRENAJE | | | |
| **10.Tunel artificial tramo cubierto** | **300+438.411<br>300+474.311** | **Viga de hormigon armado<br><br>Estructura hiperestatica** | **Galibo vert: 7.15 m<br>Galibo hor: 12.00 m<br>Luz:35.90 m<br>Seccion: "U" invertida<br>Espesores:<br>Dintel: 0.80<br>Cartelas: 1.00H:0.50V<br>Hastiales: 0.80<br>Apoyos 4 pilotes d1.80m** |  |  |  |
| **11.ODT 300.8.1** | **Camino<br>0+548.243<br><br>Calle<br>0+199.762** | Puente de 6 vigas prefabricadas doble T.<br><br>Estructura isoestática. | Montera de tierras: 5,90 m<br>Longitud: 16 m<br>Sección: 11,21 m<br>Losa superior: 0,30 m<br>Esviaje: 73.59g |  |  |  |
| | | | | | | |
| | | | | | | |
| | | | | | | |

## *2. Descripción (Tipología, aparatos de apoyo, juntas, impermeabilización, etc.)*

## 6.2. DESCRIPCIÓN

### OBRAS DE DRENAJE

**O.D.T. 300.2**

Se trata de dos marcos unicelulares separados entre ejes una distancia de 17,38 m, de forma que por uno de ellos pasa el Camino de Margen Derecha del Torrent dels Llops, y por el otro el propio Torrent dels Llops. El punto de intersección entre el Camino y el tronco de la L.A.V. son los:

$$P.K._{LAV}\ 300+285{,}439 - P.K._{CAMINO}\ 0+047{,}715$$

Presentan un esviaje respecto a la L.A.V. de 33,5891g, de 25,46 m de longitud, con una distancia mínima desde carril hasta superficie del dintel de 1.10 m. La sección transversal de los marcos es la siguiente:

| | |
|---|---|
| Gálibo vertical: | 6,40 m |
| Gálibo horizontal: | 8,00 m |
| Canto cimentación: | 0,80 m |
| Espesor hastiales: | 0,70 m |
| Canto dintel: | 0,60 m |

Los marcos presentan unas cartelas superiores de 0,40 m V: 0,80 m H.

Los marcos se realizarán horizontales en toda su longitud, por lo que para el caso del Torrent dels Llops se colocará sobre la solera un hormigón de forma con pendiente longitudinal del 0,50%, para adaptarse correctamente al terreno. Para el marco del camino, se colocará la sub-base necesaria sobre la losa para alcanzar su rasante. La cota de la superficie de la solera es la 68,080. Con esta cota y con el gálibo vertical de 6,40 m se consigue respetar tanto el gálibo de 4,50 m para el camino como la distancia mínima de 1,10 m entre el dintel del marco y el carril.

Como ya se ha explicado en apartados anteriores, los marcos tendrán unos voladizos en la zona de cruce con el tronco de la L.A.V., para apoyar los muretes guía de la estructura tipo viga del tramo cubierto. La longitud de estos voladizos es variable desde 0,74 a 3,03 m (según la dirección de esviaje).

El Marco tendrá una aleta de entrada en vuelta en la dirección del trazado de la L.A.V. en la zona de menor P.K., para evitar que las tierras invadan el cauce del Torrente del Llops. Las aletas restantes irán orientadas entre 25,90° y 75,30° respecto al eje del marco, según las necesidades del terreno en cada punto. Entre los dos marcos se realizarán unos muros de conexión entre ambos.

El Bloque Técnico esta formado por una cuña de transición compuesta por material granular y material granular tratado con cemento, que ocupa 14,00 m desde el eje de la L.A.V. y que se extiende 20,00 m a cada lado del mismo, acabando con un talud 3H:2V.

Tanto a la entrada como a la salida de las obras de drenaje se colocarán unas losas de hormigón, y unos rastrillos de 1,00 m de profundidad para evitar la erosión del cauce

**O.D.T. 300.4**

Se trata de un marco bicelular, por el que pasa el Camino de Margen Derecha del Torrent dels Llops, y el propio Torrent dels Llops. El punto de intersección entre el Camino y el tronco de la L.A.V. son los:

$$P.K._{LAV}\ 300+451{,}280 - P.K._{CAMINO}\ 0+254{,}554$$

Presenta un esviaje respecto a la L.A.V. de 36,9303g, tiene una longitud de 31,54 m, con una distancia mínima desde carril hasta superficie del dintel de 1,10 m. La sección transversal del marco es la siguiente:

| | |
|---|---|
| Gálibo vertical: | 5,70 m |
| Gálibo horizontal: | 2 x 8,00 m |
| Canto cimentación: | 1,00 m |
| Espesor hastiales extremos: | 0,75 m |

Espesor hastial intermedio: 0,50 m
Canto dintel: 0,70 m

El marco presenta unas cartelas superiores tanto en los hastiales exteriores como en el interior de 0,70 m V: 1,10 m H. Y unas catelas inferiores en el hastial central de 0,55 m V: 1,10 m H.

El marco se realizará horizontal en toda su longitud, por lo que para el caso del Torrent dels Llops se colocará sobre la solera un hormigón de forma con pendiente longitudinal del 0,50%, para adaptarse correctamente al terreno. Para el marco del camino, se colocará la sub-base necesaria sobre la losa para alcanzar su rasante. La cota de la superficie de la solera es la 65,750. Con esta cota y con el gálibo vertical de 5,70 m se consigue respetar tanto el gálibo de 4,50 m para el camino como la distancia mínima de 1.10 m entre el dintel del marco y el carril.

Como ya se ha explicado en apartados anteriores, el marco tendrá unos voladizos en la zona de cruce con el tronco de la L.A.V., para apoyar los muretes guía de la estructura tipo viga del tramo cubierto. La longitud de estos voladizos es variable desde 0,83 a 2,85 m (según la dirección de esviaje).

El condicionante para el dimensionamiento del marco es en este caso el recubrimiento de tierras (10,05 m) que viene del vertido de la estructura del tramo cubierto.

El Marco tendrá las aletas de salida en prolongación. Las aletas de entrada irán orientadas entre 23,90° y 45,00° respecto al eje del marco, según las necesidades del terreno en cada punto. La aleta de entrada de menor P.K. irá quebrada para adaptarse al trazado del Camino de Margen Derecha del Torrent dels Llops.

El Bloque Técnico esta formado por una cuña de transición compuesta por material granular y material granular tratado con cemento, que ocupa 14,00 m desde el eje de la L.A.V. y que se extiende 20,00 m a cada lado del mismo, acabando con un talud 3H:2V.

Tanto a la entrada como a la salida de las obras de drenaje se colocarán unas losas de hormigón, y unos rastrillos de 1,00 m de profundidad para evitar la erosión del cauce.

**O.D.T. 300.9**

Se trata de marco bicelular m, por el que pasa el Camino de Torrent dels Llops, y por el otro el propio Torrent dels Llops. El punto de intersección entre el Camino y el tronco de la L.A.V. son los:

$$P.K._{LAV}\ 300+920{,}475 - P.K._{CAMINO}\ 0+707{,}251$$

Presenta un esviaje respecto a la L.A.V. de 33,4317g , tiene una longitud de 52,78m, con una distancia mínima desde carril hasta superficie del dintel de 1,10 m. La sección transversal del marco es la siguiente:

Gálibo vertical: 5,30 m
Gálibo horizontal: 2 x 8,00 m
Canto cimentación: 1,00 m
Espesor hastiales extremos: 0,75 m
Espesor hastial intermedio: 0,50 m
Canto dintel: 0,70 m

El marco presenta unas cartelas superiores tanto en los hastiales exteriores como en el interior de 0,70 m V: 1,10 m H. Y unas catelas inferiores en el hastial central de 0,55 m V: 1,10 m H.

El marco se realizará horizontal en toda su longitud, por lo que para el caso del Torrent dels Llops se colocará sobre la solera un hormigón de forma con pendiente longitudinal del 0,50%, para adaptarse correctamente al terreno. Para el marco del camino, se colocará la sub-base necesaria sobre la losa para alcanzar su rasante. La cota de la superficie de la solera es la 59,484. Con esta cota y con el gálibo vertical de 4,30 m se consigue un gálibo de 3,80 m para el camino como la distancia mínima de 1,10 m entre el dintel del marco y el carril.

Como ya se ha explicado en apartados anteriores, el marco tendrá unos voladizos en la zona de cruce con el tronco de la L.A.V., para apoyar los muretes guía de la estructura tipo viga del tramo cubierto. La longitud de estos voladizos es variable desde 0,73 a 2,80 m (según la dirección de esviaje).

El condicionante para el dimensionamiento del marco es en este caso el recubrimiento de tierras (10,05 m) que viene del vertido de la estructura del tramo cubierto.

El Marco tendrá unas aletas orientadas entre 12,00° y 46,50° respecto al eje del marco, según las necesidades del terreno en cada punto. El hastial intermedio conectará con unos muretes que avanzan con el camino del Torrent dels LLops.

El Bloque Técnico esta formado por una cuña de transición compuesta por material granular y material granular tratado con cemento, que ocupa 14,00 m desde el eje de la L.A.V. y que se extiende 20,00 m a cada lado del mismo, acabando con un talud 3H:2V.

Tanto a la entrada como a la salida de las obras de drenaje se colocarán unas losas de hormigón, y unos rastrillos de 1,00 m de profundidad para evitar la erosión del cauce.

## MUROS

### MUROS CONVENCIONALES

Muro en reposición de Carrer Josep Vilar, entre P.K. 0+065 y P.K. 0+95, y entre P.k.0+110 y P.k.0+185.

Este muro se sitúa al borde de la reposición de Carrer Josep Vilar, impidiendo que el terraplén originado en dicha reposición invada el acceso a las instalaciones deportivas.

Su longitud es de 105,00 m y discurre entre los P.K. 0+065,000 y P.K. 0+180,000, con una altura máxima de 2,90 m.

La sección del hastial es de espesor variable, siendo 0,30 m en la coronación del muro y aumentando con un talud 0,05H:1V. Dicha sección está coronada en cabeza por una barrera rígida.

### ODT 300.8.1

La estructura ODT 300.8.1 es un puente de vigas de un solo vano para paso de una calle de Martorell sobre el torrente Llops.
Aún cuando la cimentación de los estribos está protegida con escollera, los cálculos hidráulicos indican la posibilidad de un resalto hidráulico que podría viajar afectando a estas protecciones.
Por otro lado el estrechamiento del cauce puede producir un incremento de calado aguas arriba con inundación de las riberas en caso de avenidas máximas.
Con el fin de mejorar las condiciones de seguridad de la cimentación ante posibles asientos por arrastre de finos y conseguir un funcionamiento hidráulico, más acorde con el existente antes de la obra del puente, se proyecta una protección del cauce en hormigón con sección en "U" en la zona de estribos y muros de acompañamiento aguas arriba y aguas abajo.

### MUROS VERDES

La necesidad de ocupación del tramo, exige que la en zona de Túnel Artificial-Tramo Cubierto, haya que adoptar rellenos de tierras con un ángulo de inclinación elevado. Esto ocasiona adoptar un refuerzo para dichos tramos, consistente en una serie de georedes que penetran horizontalmente en el terraplén confiriéndole la consistencia necesaria para alcanzar ángulos de hasta 60°. Estas georedes permiten la siembra del talud consiguiéndose adicionalmente atenuar el impacto medio ambiental del mismo.

Las georedes se colocarán cada 0,75 m. El relleno deberá compactarse al 98% PN. La longitud de estas georedes es función del ángulo del talud y de la altura. Por este motivo se necesita una berma de 0,50 m desde el borde del hastial de la estructura del túnel artificial para poder anclar convenientemente la armadura.

Los puntos en donde se localizan estos muros verdes son los siguientes:

Margen Derecha:

- Entre P.K. 300+454.347 al 300+482.232, con una altura máxima de terraplén de 14,60 m

– Entre P.K. 300+540.043 al 300+746.207, con una altura máxima de terraplén de 15,25 m

Margen Izquierda:

– Entre P.K. 300+414.066 al 300+465.588, con una altura máxima de terraplén de 14,60 m

**VESTUARIOS CAMPO DE FUTBOL**

Se trata del proyecto de un edificio para vestuarios. La estructura se compone de pilares de hormigón realizados in situ y de forjados de losa alveolar apoyados en vigas de canto.

# 3. Definición geométrica

# 3.1. Definición geométrica

## 3.1.DEFINICIÓN GEOMÉTRICA

La ubicación y predimensionamiento de las obras de desagüe transversal se determinan a partir de los caudales obtenidos del Estudio Hidrológico realizado en el Anejo nº 5, Climatología e Hidrología.

Para el dimensionamiento se ha estimado conveniente imponer la condición de sección inicial crítica (sección crítica en la entrada de la obra de fábrica), para tener el control del caudal desaguado aguas arriba, procurando una pendiente supracrítica. De esta forma se garantiza el régimen rápido en el desagüe, y el control de los niveles de la lámina de agua aguas arriba.

Las dimensiones indicadas son las mínimas necesarias cuando sólo existen condicionantes hidráulicos. Cuando concurren otros factores como respetar el ancho de un cauce, empleo de la obra de drenaje como paso de ganado o fauna, coincidencia con paso inferior o viaducto, etc, las obras pueden sobredimensionarse para tener en cuenta los factores complementarios.

Con los caudales calculados y según los criterios anteriores, se ha procedido al dimensionamiento de las obras de drenaje, cuyos resultados se recogen en la tabla 1.5.1, donde:

- Las siete columnas que definen la cuenca representan su denominación, el punto kilométrico de intersección inicial, final y con la vaguada y los caudales para un período de retorno de 100, 300 y 500 años.

- Las cinco siguientes columnas definen la obra de desagüe con el nº asignado a cada obra, el nombre del cauce sobre el que va situada, su situación, el punto kilométrico de paso, y la tipología adoptada.

- En la columna final se indican las singularidades de las diferentes obras de drenaje y sus cuencas aportantes.

## TABLA 1.5.1. DIMENSIONAMIENTO DE LAS OBRAS DE DRENAJE

| CUENCA | | | | | | | OBRAS DE DRENAJE TRANSVERSAL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CÓDIGO | P.K. ORIGEN | P.K. FINAL | P.K. VAGUADA | $Q_{100}$ ($m^3/s$) | $Q_{300}$ ($m^3/s$) | $Q_{500}$ ($m^3/s$) | NOMBRE DE LA ODT | NOMBRE O CARACTERÍSTICAS DEL CAUCE | SITUACIÓN | P.K. DE CRUCE | TIPOLOGÍA | OBSERVACIONES |
| 300.2 | 300+000 | 300+100 | 300+050 | 1,24 | 1,78 | 2,03 | 300.1 | - | Tronco | 300+094 | 1 tubo $\phi$ 2.00 m | Bajante prefabricada a la entrada y la salida |
| 300.2.1 | 300+100 | 300+200 | 300+120 | 0,67 | 0,96 | 1,09 | 300.1.1 | - | Reposición de camino en PK 300+170 | 0+060 | 1 tubo $\phi$ 2.00 m | Bajante prefabricada a la salida |
| 300.1 | 300+000 | 300+350 | 300+280 | 61,64 | 89,08 | 102,22 | 300.2 | Torrent del Llops | Tronco | 300+267 | 2 marcos de 8,00 m x 6,40 m | |
| 300.3.1 | 300+000 | 300+520 | 300+450 | 64,55 | 93,31 | 107,09 | 300.4 | Torrent del Llops | Tronco | 300+462 | 2 marcos de 8,00 m x 5,70 m | |
| 300.8.1 | 300+000 | 301+120 | 300+920 | 64,67 | 93,49 | 107,29 | 300.8.1 | Torrent del Llops | Carrer Josep Vilar | 0+200 | Canal de 9,20 m | |
| | | | | | | | 300.9 | Torrent del Llops | Tronco | 300+912 | 2 marcos de 8,00 m x 4,30 m | |

En la tabla 1.5.2. se realiza la comprobación de las obras proyectadas, indicándose las siguientes características:

- Designación de la obra de drenaje.
- Nombre del cauce que atraviesa.
- Situación
- Punto kilométrico en su intersección con el eje de la traza.
- Caudal de diseño, correspondiente a un período de retorno de 500 años.
- Tipología de la obra.
- Caudal unitario utilizado para determinar el rastrillo de las embocaduras.
- Pendiente, en %.
- Esviaje, en (g), respecto de la normal al eje de la traza.
- Cota de la solera a la entrada de la obra de drenaje, utilizada en el cálculo de la sobreelevación.
- Criterio de dimensionamiento. La codificación utilizada es la siguiente:

  a) Sobredimensionamiento por razones no hidráulicas

  b) Altura de lámina de agua en embocadura

  c) Desbordamiento a cuencas vecinas

- Cota del agua a la entrada de la obra de drenaje, calculada a partir de la sobreelevación obtenida y de la cota de la solera.
- Velocidad del agua a la salida de la obra de drenaje.
- Cota de desbordamiento. Corresponde al mínimo de las divisorias intercuencas o al máximo de la cuneta de la plataforma adyacente, según el caso.
- Singularidades de las obras de drenaje:

  1) Uso de conductos de tamaño inferior a 1,5 metros

  2) Estructuras sobre cauces importantes condicionadas por el caudal de 500 años de período de retorno

  3) Solera deprimida

  4) Trasvase a cuencas vecinas

  5) Los daños a terceros condicionan la obra

  6) Desvío por cunetas de caudales superiores a 1 $m^3/s$

## TABLA 1.5.2. COMPROBACIÓN DE LAS OBRAS DE DRENAJE TRANSVERSAL

| Nombre de la ODT | Nombre o Características del cauce | Situación | P.K. de cruce | $Q_{500}$ ($m^3/s$) | Tipología | Caudal unitario para $Q_{300}$ ($m^3/s/m$) | Pendiente (%) | Esviaje (g) | Cota de solera en la entrada (m) | Criterios de dimensionamiento | Faceta singular | Cota de la lámina de agua a la entrada de la ODT (m) | Velocidad del agua a la salida de la ODT (m/s) | Cota de desbordamiento (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 300.1 | - | Tronco | 300+094 | 2,03 | 1 tubo ϕ 2.00 m | 0,99 | 2,00 | 300 | 76,29 | -b- | -3- | 77,15 | 4,36 | 78,29 |
| 300.1.1 | - | Reposición de camino en PK 300+170 | 0+060 | 1,09 | 1 tubo ϕ 2.00 m | 0,53 | 1,00 | 100 | 83,80 | -b- | -5- | 84,30 | 2,84 | 86,53 |
| 300.2 | Torrent del Llops | Tronco | 300+267 | 102,22 | 2 marcos de 8,00 m x 6,40 m | 5,57 | 0,50 | 68 | 68,21 | -a- | -2- | 70,51 | 4,45 | 79,50 |
| 300.4 | Torrent del Llops | Tronco | 300+462 | 107,09 | 2 marcos de 8,00 m x 5,70 m | 5,83 | 0,50 | 297 | 65,91 | -a- | -2- | 68,76 | 4,52 | 69,50 |
| 300.8.1 | Torrent del Llops | Carrer Josep Vilar | 0+200 | 107,29 | Canal de 9,20 m | 5,84 | 0,50 | 258 | 63,02 | -a- | -2- | 65,15 | 4,82 | 71,50 |
| 300.9 | Torrent del Llops | Tronco | 300+912 | 107,29 | 2 marcos de 8,00 m x 4,30 m | 5,84 | 0,50 | 66 | 59,76 | -a- | -2- | 62,72 | 4,76 | 63,37 |

La altura de la lámina de agua se determina en el apartado 1.6 dedicado al cálculo de las sobrelevaciones para el período de retorno de 500 años

## 3.2. Clasificación de las estructuras

## 3.2. CLASIFICACIÓN DE LAS ESTRUCTURAS

Incluida en definición geométrica.

# 4. Cálculos

# 4.1. Acciones consideradas para el cálculo

## .4.1. ACCIONES CONSIDERADAS PARA EL CÁLCULO

INTRODUCCIÓN

La Instrucción 5.2.I.C. "Drenaje Superficial" de la Dirección General de Carreteras se considera en términos generales la guía fundamental para el diseño y dimensionado de las obras de desagüe. En los apartados siguientes se introducen sin embargo algunas modificaciones a los criterios y recomendaciones de dicha Instrucción, aconsejadas por las peculiaridades de los ferrocarriles de alta velocidad, a la vez que se hacen otras consideraciones complementarias.

CRITERIOS DE DIMENSIONADO

En el dimensionado de los conductos se han tenido en cuenta los siguientes criterios:

a) Tamaño mínimo. La altura de los conductos se fija con carácter general en 1,80 m, cifra establecida en la Instrucción 5.2.I.C. de la D.G.C. En aquellos casos en que estas dimensiones planteen problemas, se admiten conductos de diámetro 1,5 m que también son compatibles con unas operaciones de limpieza eficaces y razonablemente cómodas.

b) Afecciones a terceros. Para todas las obras de desagüe transversal se debe calcular la cota de inundación correspondiente al período de retorno de 100 años, antes de la obra y después de ejecutada la obra, a fin de comprobar que no se producirán daños de elevada magnitud.

c) Daños a la propia vía. Tanto el coste de la reparación de los daños originados por las inundaciones de la vía de comunicación como el tiempo de reposición del servicio, son mayores en los ferrocarriles de alta velocidad que en las carreteras, a causa de la inadmisible contaminación que las aguas sucias provocan en el balasto. Por ello parece razonable incrementar las garantías señaladas en la Instrucción, por tanto se establece que durante el paso de la avenida de 300 años de período de retorno la lámina de agua no alcance la base del balasto (plataforma del subbalasto) en ningún punto del trazado.

Las estructuras muy importantes o con cimentaciones complejas, cuyo tiempo de reposición sea largo, se dimensionarán para que no se produzca el fallo de la obra ni con la avenida de 500 años, tal como indica la Instrucción, aunque el agua en esas condiciones pueda afectar al balasto.

Para el drenaje longitudinal (caudales y duraciones pequeñas y aguas casi limpias) se considera suficiente un período de retorno de 50 años, excepto cuando en grandes trincheras sean de temer aguas sucias capaces de contaminar en alguna medida el balasto, en cuyo caso se diseñará con período de retorno de 100 años.

d) Fugas laterales. Se han tenido en cuenta los posibles escapes de agua hacia las cuencas vecinas, favorecidos por el suave relieve de las divisorias topográficas o por la disposición de las trincheras y cunetas de la propia vía.

En general se deben evitar esas fugas con la avenida de 300 años limitando la máxima altura de agua tolerable y dimensionando consecuentemente los conductos de desagüe. En casos singulares se adoptarán medidas constructivas para evitar los escapes o bien tolerar los trasvases contemplando un reparto de caudales entre cuencas acorde con esa realidad y los posibles efectos negativos asociados a esa alteración del régimen natural.

En la figura 1 - Cotas de desbordamiento, se presentan los esquemas de dos perfiles longitudinales donde la rasante de la vía de comunicación en un caso supera al terreno en todas las secciones mientras en el otro lo corta en los puntos altos provocando las correspondientes trincheras.

Las cotas $C_l$ que marcan el inicio de los desbordamientos, o desvíos laterales, son las mínimas de las divisorias intercuencas en la primera situación y las máximas de las soleras de las cunetas de las trincheras en el segundo caso.

Para que no se produzcan los desvíos laterales, los niveles de agua no superarán las cotas $C_l$.

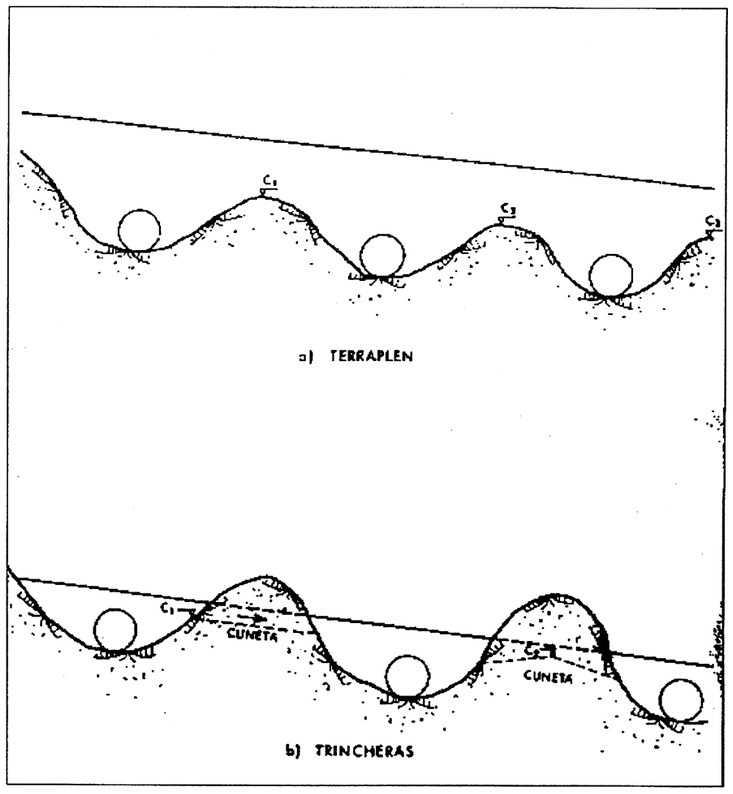



Fig. 1 - COTAS DE DESBORDAMIENTO

e) Desagües moderados. Aún cuando tanto los daños a terceros como los daños a la vía y las cotas de desbordamiento permiten grandes alturas de lámina aguas arriba, éstas se evitan en la medida de lo posible a fin de reducir los riesgos de erosiones a la salida de los conductos y de obstrucciones en la entrada de los mismos, así como no alterar los regímenes naturales y evitar grandes contactos del terraplén de la vía con el agua.

Por ello se ha dispuesto un ancho de conducto no inferior al del cauce principal cuando éste es inciso y bien definido y se ha procurado que la avenida de 300 años de período de retorno desagüe por los conductos en régimen libre sin presiones de forma que los caudales unitarios por metro de ancho no excedan los 3 m $^2$/s en los cauces difusos de gran ancho ni los 6 m$^2$/s en los cauces incisos bien definidos, salvo que ya el funcionamiento natural del curso de agua en la situación previa a la construcción de la vía determine lo contrario.

## TIPOLOGÍA DE LAS OBRAS DE DRENAJE

Conforme con lo apuntado en el apartado 1.3.2 dedicado a los "criterios de dimensionado", se ha elegido como conducto mínimo, con carácter general, el tubo de 1,8 m de diámetro, que en ocasiones podrá ser sustituido por el tubo de 1,5 m. Excepcionalmente, en el caso de caudales apreciables y gálibo ajustado, es preferible colocar marcos de 2,5 x 1,25 m.

A continuación viene el marco de 2,0 x 2,0 m y la unidad inmediatamente superior que, además de sus funciones hidráulicas, puede permitir el paso de personas, animales habituales en la zona, y vehículos ligeros es el marco de 2,5 x 2,5 m.

La dimensión máxima de marco de 6,0 x 6,0 m, es adecuada para el cruce con corrientes de agua de cierta entidad que discurran por cauces incisos bien definidos, o bien para permitir el paso de vehículos pesados como tractores y camiones.

Las obras de mayor envergadura se conciben como estructuras de puentes.

OTRAS CONSIDERACIONES

a) En muchos casos la solución de drenaje transversal más idónea no consiste en un conducto sino en una batería de conductos de categoría inferior, más fáciles de compatibilizar con la altura disponible del terraplén. Además, de esta forma se reparte más favorablemente el flujo, y se tiene un mejor aprovechamiento hidráulico de la sección de los conductos, cuando las máximas alturas tolerables de la lámina de aguas arriba son reducidas. Por el contrario los conductos múltiples tienen el inconveniente de un mayor riesgo de obstrucción, por lo que debe limitarse su uso a casos excepcionales.

b) Las obras de paso en los cruces de la vía con caminos y carreteras secundarias ubicadas en el entorno de la vaguada pueden en general utilizarse para el desagüe, puesto que en la mayoría de la cuencas los cauces están habitualmente secos, e incluso los caudales de avenida son prácticamente nulos para los bajos períodos de retorno. Pueden complementarse con una cuneta o un tubo para aguas bajas, cuando así se considere oportuno.

c) Como regla general el diseño de las pequeñas obras de desagüe (P.O.D.) se ajustará el perfil longitudinal de la vaguada, y en los extremos del conducto se han dispuesto muros de cabecera y aletas al uso tradicional.

d) Cuando la altura del terraplén sea insuficiente para albergar el conducto mínimo en el talud de aguas arriba, pero no suceda lo mismo en el de aguas abajo, se puede recurrir a deprimir la solera de la embocadura y proceder con criterios hidráulicos al oportuno despeje del terreno hasta enlazar con la topografía natural (Fig. 2 a 5).

   Con un terraplén de altura insuficiente en ambos taludes, también la salida será deprimida y deberá disponerse un despeje análogo al de entrada, dotado de zanja de drenaje para evitar aterramientos. El proyecto de la rasante de la vía debe procurar evitar estas situaciones y cuando se presenten puede optarse por relajar el criterio general del tamaño mínimo deseable fijado en 1,80 m y aceptar tubos de 1,50 m, e incluso si fuera necesario 1,2 m, antes que afrontar los problemas y los riesgos de las salidas deprimidas.

e) Debe prestarse atención a las posibles interferencias de los pasos elevados en el esquema circulatorio de las crecidas, e incorporar a sus terraplenes las oportunas obras de drenaje cuando resulte pertinente.

f) El cerramiento de la franja de terreno reservada al tren de alta velocidad, que se hace con tela metálica, se retranquea por detrás de los extremos de las obras de desagüe a fin de evitar que las brozas y flotantes queden retenidos en dicha tela y obstruyan la circulación de las aguas.

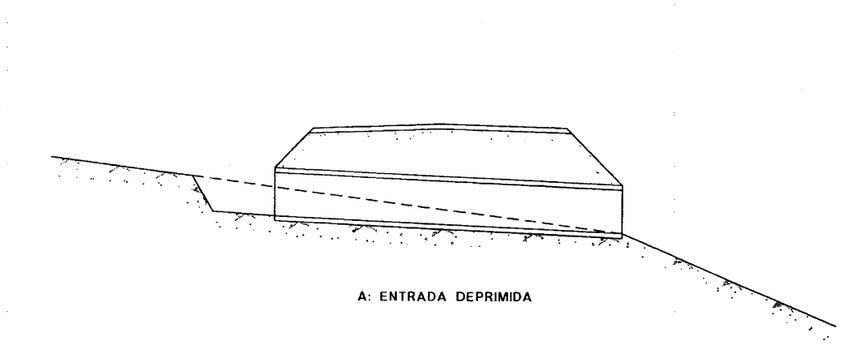



FIG. 2 - SOLERAS DEPRIMIDAS

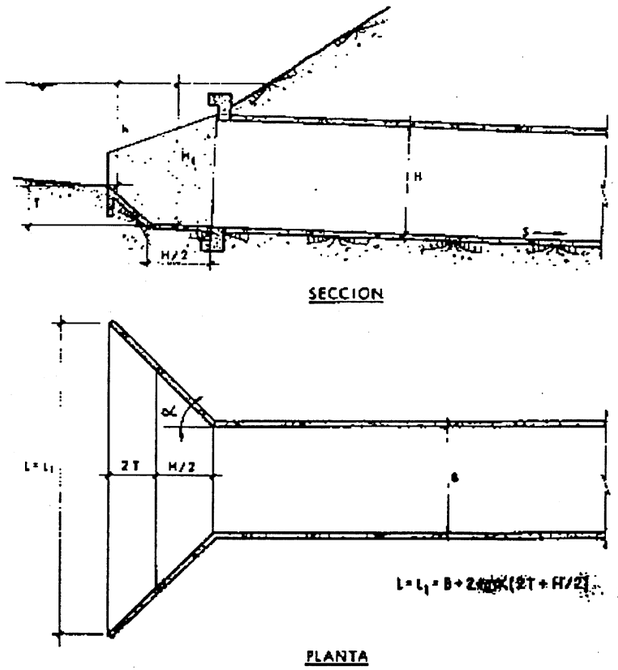



FIG. 3 - SOLERA DEPRIMIDA. ENTRADA FRONTAL

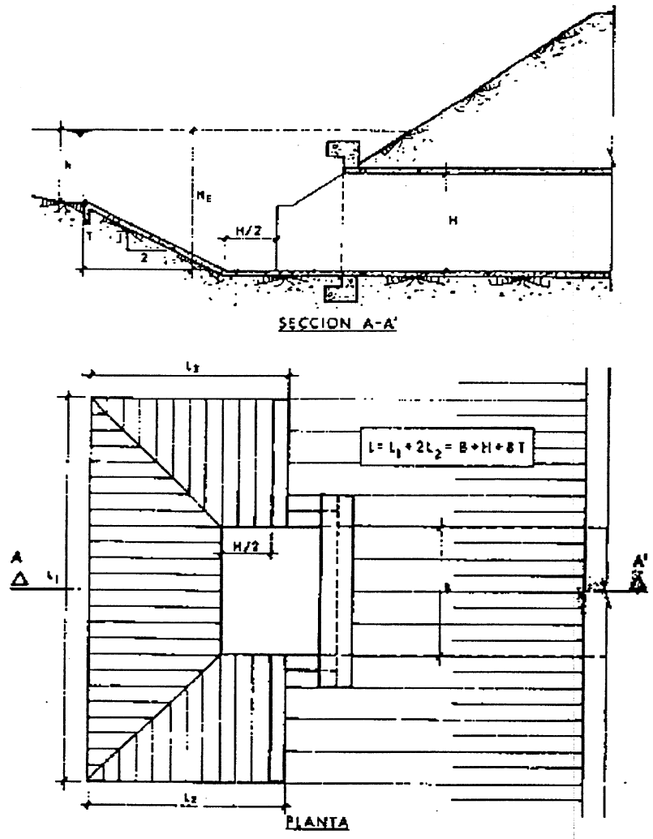



FIG. 4 - SOLERA DEPRIMIDA. MODELO ARTESA

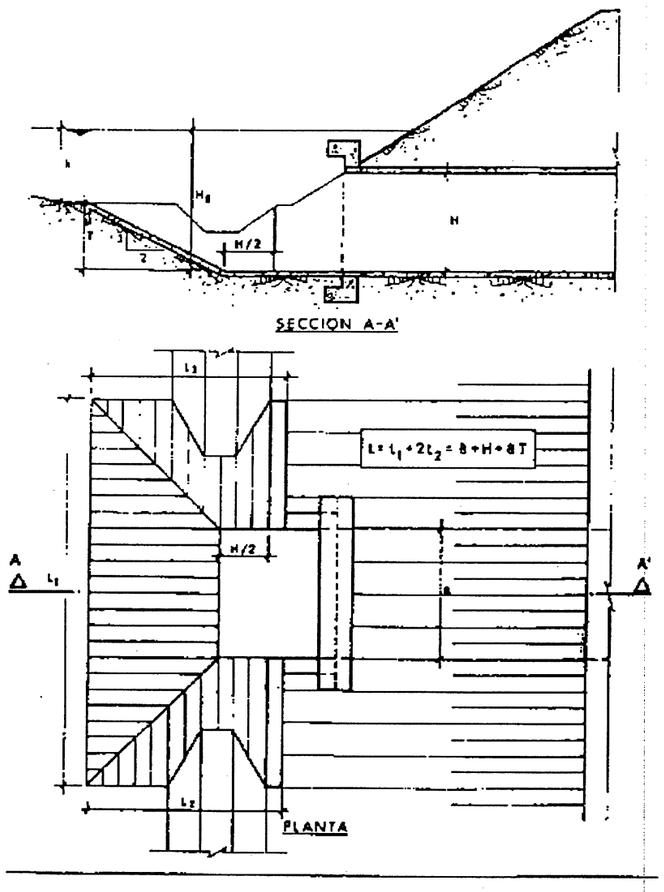



FIG. 5 - SOLERA DEPRIMIDA. MODELO ARTESA

## 4.2 Programas de cálculo utilizados

## .4.2. PROGRAMAS DE CÁLCULO UTILIZADOS.

Para el desarrollo de los cálculos estructurales se han empleado dos programas comerciales suficientemente conocidos y sancionados por a práctica:

1. GT-Strudl:

   Cálculo matricial de estructuras de barras, por el método de los elementos finitos.Cálculo tridiensional.

2. FAGUS-2/3:

   Control de secciones de hormigón armado o pretensazo, implementando los diagramas tensión-deformación y dominios de rotura que se establecen en la instrucción EHE.

Adicionalmente se emplean programas propios e preprocesamiento y postproceso de los anteriores, cuya única misión es la de agilizar la manipulación de datos y resultados.

## 4.3 Cálculos

**O.D.T. 300.2.**

# LINEA DE ALTA VELOCIDAD. MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA

## TRAMO: SANT ESTEVE SESROVIRES-MARTORELL

**ANEJO DE CALCULO:**

**O.D.T.300.2.**

# O.D.T. 300.2

## ÍNDICE


1. INTRODUCCIÓN
2. BASES DE CÁLCULO
3. INSTRUCCIONES Y NORMAS CONSIDERADAS
4. DESCRIPCIÓN DE LOS PROGRAMAS DE ORDENADOR UTILIZADOS
5. MATERIALES Y COEFICIENTES DE MAYORACIÓN
6. ACCIONES
7. HIPÓTESIS DE CARGA Y COEFICIENTES DE MAYORACIÓN
8. MODELO DE CÁLCULO
9. O.D.T. 300.02
   - 9.1. GEOMETRÍA BÁSICA
   - 9.2. ANÁLISIS DE ESFUERZOS
   - 9.3. ARMADO GENERAL. FISURACIÓN
   - 9.4. EMBOCADURAS

# 1.- INTRODUCCIÓN

Se trata de dos marcos unicelulares separados entre ejes una distancia de 17.38 m, de forma que por uno de ellos pasa el Camino de Margen Derecha del Torrent del Llops, y por el otro el propio Torrent del Llops. El punto de intersección entre el Camino y el tronco de la L.A.V. son los:

$$P.K._{\cdot LAV}\ 300+285.439\text{-}P.K._{\cdot CAMINO}\ 0+047.715$$

Presentan un esviaje respecto a la L.A.V. de 33..5891$^g$ , de 25.46 m de longitud, con una distancia mínima desde carril hasta superficie del dintel de 1.10 m. La sección transversal de los marcos es la siguiente:

Gálibo vertical: 6.40 m

Gálibo horizontal: 8.00 m

Canto cimentación: 0.80 m

Espesor hastiales: 0.70 m

Canto dintel: 0.60 m

Los marcos presentan unas cartelas superiores de 0.40m V: 0.80 m H.

Los marcos se realizarán horizontales en toda su longitud, por lo que para el caso del Torrent del Llops se colocará sobre la solera un hormigón de forma con pendiente longitudinal del 0.50%, para adaptarse correctamente al terreno. Para el marco del camino, se colocará la sub-base necesaria sobre la losa para alcanzar su rasante. La cota de la superficie de la solera es la 68.080. Con esta cota y con el gálibo vertical de 6.40 m se consigue respetar tanto el gálibo de 4.50 m para el camino como la distancia mínima de 1.10 m entre el dintel del marco y el carril.

Como ya se ha explicado en apartados anteriores, los marcos tendrán unos voladizos en la zona de cruce con el tronco de la L.A.V., para apoyar los muretes guía de la estructura tipo viga del tramo cubierto. La longitud de estos voladizos es variable desde 0.74 a 3.03 m (según la dirección de esviaje)

El Marco tendrá una aleta de entrada en vuelta en la dirección del trazado de la L.A.V. en la zona de menor P.K., para evitar que las tierras invadan el cauce del Torrente del Llops. Las aletas restantes irán orientadas entre 25.90° y 75.30° respecto al eje del marco, según las necesidades del terreno en cada punto. Entre los dos marcos se realizarán unos muros de conexión entre ambos.

Madrid, Mayo de 2002



# 2.- BASES DE CÁLCULO

El dimensionamiento de las estructuras se ha realizado según los principios de mecánica racional, con su adaptación al diseño estructural, establecida por la práctica ingenieril. Se han tenido en cuenta las normas de obligado cumplimiento en el territorio español, así como las recomendaciones y la normativa internacional de aplicación, cuando proceda. De acuerdo con ellas, el cálculo se ha realizado siguiendo el principio de los Estados Límites, que establece que la seguridad de la estructura en conjunto, o cualquiera de sus partes, se garantiza comprobando que la solicitación no supera la respuesta última de las mismas. Este formato de seguridad se expresa sintéticamente mediante la siguiente desigualdad:

$$\mathbf{Sd \leq Rd}$$

Donde Sd representa la solicitación de cálculo aplicable en cada caso, y Rd la respuesta última de la sección o elemento.

Para la aplicación de este criterio de seguridad, se consideran tanto situaciones de servicio, como de agotamiento, esto es, Estados Límites de Servicio (ELS) y de Agotamiento (ELU), de acuerdo con las definiciones dadas para los mismos en las normativas de referencia. En principio, los Estados Límites Ultimos están asociados a la Rotura de las secciones o elementos. Para ellos, se evalúan las solicitaciones mediante la mayoración de los valores representativos de las acciones (en general característicos) utilizando los oportunos coeficientes parciales que luego se detallan. Las resistencias de las secciones o elementos se estiman mediante las características geométricas, y las resistencias minoradas de los materiales.

Por el contrario, los Estados Límites de Servicio están asociados a la pérdida de funcionalidad de la estructura. Las solicitaciones se evalúan mediante sus valores representativos, en general sin mayorar, afectados de los oportunos coeficientes de combinación, para tener en cuenta la probabilidad de ocurrencia simultanea de varias acciones. Las resistencias se estiman a partir de los valores nominales de las dimensiones y resistencias de los elementos o secciones de la estructura, sin minorar.

Los cálculos se realizará mediante programas informáticas de aplicación general al cálculo de estructuras, así como mediante programas propios de diseño de elementos particulares. Los cálculos por ordenador se justifican mediante los oportunos listados de datos y resultados incluidos en el presente anejo. Adicionalmente, cuando sea preciso para la correcta comprensión de los resultados, así como para su oportuno chequeo, se realizarán comprobaciones manuales aproximadas, que justifiquen los órdenes de magnitud.

## 3.- INSTRUCCIONES Y NORMAS APLICADAS

El dimensionamiento general de las estructuras se ha realizado conforme a las instrucciones principales siguientes:

| | |
|---|---|
| Acciones : | IAP-98 |
| Hormigón Armado: | EHE-98 |
| Estructura Metálica y Mixta: | NBE-EA-95,RPM-95,RPX-95 |

No obstante, para realizar el dimensionamiento completo, se han considerado una lista de normas e instrucciones de referencia más amplia, que se detallan a continuación.

* EHE-98, Instrucción de Hormigón Estructural. Real Decreto 2661/1998, de 11 de Diciembre.
* Instrucción relativa a las acciones a considerar en el Proyecto de Puentes de Ferrocarril, aprobada por Orden de 25 de Junio de 1975.
* IAP-98, Instrucción sobre las acciones a considerar en el Proyecto de puentes de carretera
  * Instrucción para el proyecto y ejecución de las obras de hormigón en masa o armado, EH-91, aprobada por Real Decreto 1039/1991 de 28 de Junio.
  * Instrucción para el proyecto y la ejecución de obras de hormigón pretensado, EP-93, aprobada por Real Decreto 805/1993, de 28 de Mayo.
* Norma de Construcción Sismorresistente NCSE-94: Parte General y Edificación.
* Norma sismorresistente PDS-1 (1974), aprobada por Decreto 3209/1974, de 30 de Agosto.
* Recomendaciones para el proyecto y ejecución de pruebas de carga en puentes de carreteras, publicadas en 1988 por el MOPU.
* Recomendaciones para el proyecto y ejecución de pruebas de carga en puentes de ferrocarril.
* Instrucción EM-62 para Estructuras de Acero. Instituto Eduardo Torroja.
* Cálculo de Estructuras de Acero Laminado en Edificación. NB-MV-103/72.
* European Recomendations for Steel Construction. ECCS/CECM/EKS. 1.978.
* Recomendaciones para el cálculo de Estructuras Mixtas de la Comisión Conjunta IABSE-CEB-FIP-CECM(1975).
* Eurocódigos
  ENV 1991 : EC1 - Bases de diseño y acciones
  ENV 1992 : EC2 - Estructuras de Hormigón
  ENV 1993 : EC3 - Estructuras Metálicas
  ENV 1994 : EC4 - Estructuras Mixtas.
* Código Modelo CEB-FIP para Estructuras de Hormigón MC-90 .
* Recomendaciones para el Proyecto de Puentes Metálicos de Carretera. RPM-95. Ministerio de Fomento.
* Recomendaciones para el Proyecto de Puentes Mixtos de Carretera. RPX-95. Ministerio de Fomento.
* Recomendaciones CIRIA para el diseño de bloques de anclaje de pretensado.
* Recomendaciones para el cálculo de apoyos del Ministerio de Fomento.



## 4.- DESCRIPCIÓN DE LOS PROGRAMAS DE ORDENADOR UTILIZADOS

Para el desarrollo de los cálculos estructurales se han empleado fundamentalmente dos programas comerciales, suficientemente conocidos y sancionados por la práctica:

1. GT-Strudl:
   Cálculo matricial de estructuras de barras, por el método de los elementos finitos.
   Cálculo tridimensional.

2. FAGUS-2/3:
   Control de secciones de hormigón armado o pretensado, implementando los diagramas tensión-deformación y dominios de rotura que se establecen en la Instrucción EHE

Adicionalmente se emplean programas propios de preprocesamiento y postproceso de los anteriores, cuya única misión es la de agilizar la manipulación de datos y resultados.

## 5.- MATERIALES Y COEFICIENTES DE PONDERACIÓN.

Las características de los materiales que se consideran en el presente Anejo son las detalladas en la siguiente tabla:

**Hormigones:**

Según EHE, control de ejecución Intenso para el tablero y normal para el resto:

| ELEMENTO | HORMIGON | $\gamma_c$ | *Recubrimiento [mm]* | $E_c$ *[kp/cm²]* |
|---|---|---|---|---|
| CIMENTACIONES | HA-25/P/20/IIa | 1.50 | 30 | 278 000 |
| ALZADOS | HA-25/P/20/IIa | 1.50 | 30 | 278 000 |
| DINTELES | HA-25/P/20/IIa | 1.50 | 30 | 278 000 |
| NIVELACION Y LIMPIEZA | HM-15 | | No estructural | |

**Acero Pasivo:**

Todos los elementos serán del tipo: **B 500-S**, de acuerdo con EHE

El límite elástico del acero será
$f_y$ = 5100 kp/cm²
El coeficiente de minoración del acero adoptado es $\gamma_s$ = 1.15



## 6.- ACCIONES

Las acciones consideradas en el dimensionamiento del Marco se expresan a continuación:

### ACCIÓN PERMANENTE (G): PESO PROPIO

Peso Propio: Según sección, con $\gamma$=2.50 Tn/m³

### ACCIÓN PERMANENTE DE VALOR NO CONSTANTE (G*): ACCIONES DEBIDAS AL TERRENO

Se realizan los cálculos considerando dos posibles situaciones en cuanto al empuje de Tierras:

*a) Fases Constructivas:*

Marco "in situ": Tiene en cuenta la posibilidad de un llenado parcial del trasdós del marco (no hasta cota final), considerando un posible desequilibrio entre un hastial y otro, por haberse colocado una tongada más en un lado que en otro. El número de fases constructivas debido a este fenómeno viene determinado por la altura del Marco y el espesor de la tongada en desequilibrio, que en nuestro caso ha sido fijada en e=0.80m.

b) Marco en Servicio:

Se considera el empuje provocado por el relleno de tierras hasta cota final, así como su peso sobre el dintel.

En ambas situaciones (constructiva o servicio) el Coeficiente de empuje tomado será el pésimo entre activo y reposo, en función de la envolvente de esfuerzos estudiada.

El ángulo de rozamiento interno del terreno se fija en $\phi$=30°.
El peso de las tierras se estima con $\gamma$=2.00 Tn/m3.

Cabe decir en este caso, que el recubrimiento de las tierras es de 1.10m, correspondiente a la carga del balasto, y que no existe relleno de tierras encima de la estructura del túnel artificial.

## ACCIÓN VARIABLE (Q): SOBRECARGAS DE USO

Se consideran dos situaciones en cuanto a las sobrecargas:

*a) Construcción:*

Se considera la actuación de una sobrecarga durante fases constructivas de 1.0 Tn/m$^2$ para el caso del Marco "in situ".

*b) Marco en Servicio:*

S.C. en rellenos laterales:

Al ser un paso inferior de ferrocarril, se toma 3.0 Tn/m$^2$. Al igual que para el empuje de Tierras, los empujes de SC se envuelven entre el Activo y el Reposo.

S.C. sobre Marco:

Se toman la envolvente de los trenes tipo según I.P.F.:

Tren Tipo-A: tres cargas puntuales de 30.00 T separadas 1.50 m

Tren Tipo-B: carga uniforme de 12.00 T/m

La difusión de la sobrecarga se realiza según el ángulo $\phi$ del relleno.

S.C. en Losa Inferior:

Se considera una SCU de 0.40 Tn/m$^2$ sobre la Solera.

Igualmente se considera un paseo del V.P. en de 60 T.

Adicionalmente se considera una sobrecarga accidental por inundación del marco.



## ACCIONES ACCIDENTALES (A)

ACCIONES SÍSMICAS

Según las Bases de Cálculo y la norma NCSE-94, los parámetros a considerar son los siguientes:

- $a_b < 0.04 \cdot g$ (aceleración sísmica máxima en el tramo).

El coeficiente de nivel de daño, $\gamma_i = 1.0$ (Período de retorno de 50 años)

- $a_c = \gamma_i \cdot a_b = 0.04 \cdot g$ (aceleración sísmica de cálculo).

***No es necesario considerar esta acción por ser $a_c = \gamma_i \cdot a_b < 0.06g$***

# 7.- HIPÓTESIS DE CARGA Y COEFICIENTES DE MAYORACIÓN

## 7.1.- VALORES REPRESENTATIVOS DE LAS ACCIONES.

Según EHE: Acciones Variables; Coeficientes de Combinación.

| | $\Psi_{0,i}$ (Valor de Combinación) | $\Psi_{1,i}$ (Valor Frecuente) | $\Psi_{2,i}$ (Valor Cuasi-Permanente) |
|---|---|---|---|
| Sobrecargas. | 0.60 | 0.50 | 0.20 |

## 7.2.- VALORES DE CÁLCULO DE LAS ACCIONES.

De acuerdo con EHE, para control de ejecución Intenso

ESTADO LÍMITE ÚLTIMO:

| | $\gamma_{desfavorable}$ | | $\gamma_{favorable}$ | |
|---|---|---|---|---|
| | Construcción | Servicio | Construcción | Servicio |
| Permanentes. | 1.35 | 1.35 | 1.00 | 1.00 |
| Peso y Empuje de Tierras. | 1.35 | 1.50 | 1.00 | 1.00 |
| Sobrecargas. | 1.35 | 1.50 | 0.00 | 0.00 |

Nota: Para el empuje de tierras se toma siempre el empuje más desfavorable entre el activo y el reposo

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2 | Fecha JUNIO-2002 | Página de

ESTADO LÍMITE SERVICIO :

| | $\gamma_{desfavorable}$ | $\gamma_{favorable}$ |
|---|---|---|
| Permanentes. | 1.00 | 1.00 |
| Peso y Empuje de Tierras. | 1.00 | 1.00 |
| Sobrecargas. | 1.00 | 0.00 |

Nota: Para el empuje de tierras se toma siempre el empuje más desfavorable entre el activo y el reposo

## 7.3.- COMBINACIÓN DE ACCIONES.

ESTADO LÍMITE ÚLTIMO:

Según EHE:

$$\sum_{j\geq 1}\gamma_{G,j}\cdot G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\gamma_{Q,1}\cdot Q_{K,1}+\sum_{i>1}\gamma_{Q,i}\cdot\Psi_{0,i}\cdot Q_{K,i}$$

Donde:

$G_{K,j}$ = *Valor Representativo de cada Acción Permanente.*

$G^*_{K,j}$ = *Valor Representativo de cada Acción Permanente de Valor no Constante.*

$P_K$ = *Valor Representativo de la Acción del Pretensado.*

$Q_{K,1}$ = *Valor Representativo (Valor Característico) de la Acción Variable Dominante.*

$\Psi_{0,i}\cdot Q_{K,i}$ = *Valor Representativos (Valores de Combinación) de las Acciones Variables Concomitantes con la Acción Variable Dominante.*

- *Si la Acción de Sobrecarga es considerada como Dominante, se tomará ésta con su Valor Representativo y la Acción del Viento con su Valor Reducido (reducción del 50%), aplicándose además los coeficientes $\psi_i$ pertinentes.*

- *Si la Acción del Viento es considerada como Dominante, se tomará ésta con su Valor Representativo y NO se considerará la actuación simultanea de la Acción de la Sobrecarga de Uso.*

ESTADO LÍMITE DE SERVICIO:

Según EHE:

- *Combinación Característica.(poco probable o rara)*

$$\sum_{j\geq 1} G_{K,j} + \sum_{i\geq 1} \gamma_{G^*,i} \cdot G^*_{K,i} + \gamma_P \cdot P_K + \gamma_{Q,1} \cdot Q_{K,1} + \sum_{i>1} \gamma_{Q,i} \cdot \Psi_{0,i} \cdot Q_{K,i}$$

- *Combinación Frecuente.*

$$\sum_{j\geq 1} G_{K,j} + \sum_{i\geq 1} \gamma_{G^*,i} \cdot G^*_{K,i} + \gamma_P \cdot P_K + \gamma_{Q,1} \cdot \Psi_{1,1} \cdot Q_{K,1} + \sum_{i>1} \gamma_{Q,i} \cdot \Psi_{2,i} \cdot Q_{K,i}$$

- *Combinación Cuasi-Permanente.*

$$\sum_{j\geq 1} G_{K,j} + \sum_{i\geq 1} \gamma_{G^*,i} \cdot G^*_{K,i} + \gamma_P \cdot P_K + \sum_{i\geq 1} \gamma_{Q,i} \cdot \Psi_{2,i} \cdot Q_{K,i}$$

En cuanto al Viento, es de aplicación lo dicho para el Estado Límite Último.

ALEPH consultores
Asunto LAV-MARTORELL. ODT 300.2 Fecha JUNIO-2002 Página de

## 8.- MODELO DE CÁLCULO

El cálculo se realiza mediante un proceso automático, de tal forma que tras la introducción de la geometría básica mediante una serie de dimensiones que la definen, se procede a formar un modelo con barras de iguales características mecánicas que las secciones que representan.

También se introducen en dicho cálculo automático las situaciones de carga descritas en el apartado anterior, de tal forma que el programa procede a formar los ficheros de cálculo necesarios para ser procesados por el programa de cálculo matricial de estructuras.

Así mismo produce una serie de ficheros de postproceso de resultados.

A continuación se ofrecen los parámetros introducidos para el cálculo de la estructura, que se particularizarán para cada una de las estructuras consideradas.

# 9. O.D.T. 300.2

## 9.1. GEOMETRÍA BÁSICA

El marco a calcular tiene las dimensiones siguientes:

Gálibo horizontal, según la normal: 8.00 m
Gálibo esviado ($\alpha$=30.23°): 9.26 m
Gálibo vertical: 6.40
Espesor de Solera: 0.80 m
Espesor de Hastiales exteriores: 0.70 m
Espesor de Dintel: 0.80 m

La altura de tierras sobre el tiene un máximo de 1.90 .

Dadas las características de la cimentación y su variación de propiedades a lo largo del conjunto de la estructura, se ha considerado conservadoramente un coeficiente de balasto vertical de 1.50 kp/cm$^3$

Las hojas siguientes resumen recogen los datos geométricos y de cargas considerados.

# MODELO NUMÉRICO.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2 | Fecha JUNIO-2002 | Página de

**Fichero: MARCO.GEO**

```
STRUDL 'GEO' 'L.A.V. TRAMO: MARTORELL-LLEIDA : ODT 300.2'
 UNITS  M MTON RADIANS CENTIGRADE SECONDS
TYPE SPACE FRAME
$ COORDENADAS
JOINT COORDS
$ NUDO    X     Y     Z
1 -3.700 7.500 0.000
2 -2.960 7.500 0.000
3 -2.220 7.500 0.000
4 -1.480 7.500 0.000
5 -0.740 7.500 0.000
6 0.000 7.500 0.000
7 0.740 7.500 0.000
8 1.480 7.500 0.000
9 2.220 7.500 0.000
10 2.960 7.500 0.000
11 3.700 7.500 0.000
111 -4.980 1.200 0.000
112 -4.980 2.133 0.000
113 -4.980 3.067 0.000
114 -4.980 4.000 0.000
115 -4.980 4.933 0.000
116 -4.980 5.867 0.000
117 -4.980 6.800 0.000
121 4.980 1.200 0.000
122 4.980 2.133 0.000
123 4.980 3.067 0.000
124 4.980 4.000 0.000
125 4.980 4.933 0.000
126 4.980 5.867 0.000
127 4.980 6.800 0.000
211 -4.980 7.012 0.000
212 -4.980 7.225 0.000
213 -4.630 7.300 0.000
214 -4.165 7.400 0.000
221 4.980 7.012 0.000
222 4.980 7.225 0.000
223 4.630 7.300 0.000
224 4.165 7.400 0.000
310 -4.980 0.400 0.000
311 -4.980 0.800 0.000
312 -4.980 1.000 0.000
320 4.980 0.400 0.000
321 4.980 0.800 0.000
322 4.980 1.000 0.000
400 0.000 0.400 0.000
411 -4.630 0.400 0.000
412 -3.704 0.400 0.000
413 -2.778 0.400 0.000
414 -1.852 0.400 0.000
415 -0.926 0.400 0.000
421 4.630 0.400 0.000
422 3.704 0.400 0.000
423 2.778 0.400 0.000
424 1.852 0.400 0.000
425 0.926 0.400 0.000
511 -5.330 0.400 0.000
512 -5.380 0.400 0.000
513 -5.430 0.400 0.000
514 -5.480 0.400 0.000
515 -5.530 0.400 0.000
521 5.330 0.400 0.000
522 5.380 0.400 0.000
523 5.430 0.400 0.000
524 5.480 0.400 0.000
525 5.530 0.400 0.000

$ CONECTIVIDAD DE ELEMENTOS
MEMBER INCI
$ Dintel
 1          1          2
 2          2          3
 3          3          4
 4          4          5
```

```
5          5          6
6          6          7
7          7          8
8          8          9
9          9          10
10         10         11
$ Hastiales
111        111        112
112        112        113
113        113        114
114        114        115
115        115        116
116        116        117
121        121        122
122        122        123
123        123        124
124        124        125
125        125        126
126        126        127
$ Cartelas superiores
210        117        211
211        211        212
212        212        213
213        213        214
214        214        1
220        127        221
221        221        222
222        222        223
223        223        224
224        224        11
$ Cartelas Inferiores
310        310        311
311        311        312
312        312        111
320        320        321
321        321        322
322        322        121
$ Talones Zapata
510        310        511
511        511        512
512        512        513
513        513        514
514        514        515
520        320        521
521        521        522
522        522        523
523        523        524
524        524        525
$ Punteras Zapata
410        310        411
411        411        412
412        412        413
413        413        414
414        414        415
415        415        400
420        320        421
421        421        422
422        422        423
423        423        424
424        424        425
425        425        400

$ CARACTERÍSTICAS MECÁNICAS DE LOS ELEMENTOS
MEMBER PROPERTIES
1 TO 10 PRIS AX 0.6000 IX 1.0000 IY 1.0000 IZ 0.0180 YD 0.6000 YC 0.3
$ Hastiales
111 121 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.70 YC 0.35
112 122  PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.70 YC 0.35
113 123 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.70 YC 0.35
```



```
114 124 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.70 YC 0.35
115 125 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.70 YC 0.35
116 126 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.70 YC 0.35
210 220 PRIS AX 0.9469 IX 1.0000 IY 1.0000 IZ 0.0852 YD 0.95 YC 0.475
$ Cartelas
211 221 PRIS AX 1.4119 IX 1.0000 IY 1.0000 IZ 0.2513 YD 1.41 YC 0.705
212 222  PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5
213 223 PRIS AX 0.9000 IX 1.0000 IY 1.0000 IZ 0.0630 YD 0.90 YC 0.45
214 224 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0303 YD 0.70 YC 0.35
310 320 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.70 YC 0.35
311 321 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.70 YC 0.35
312 322 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.70 YC 0.35
$ Zapata
510 TO 514 PRIS AX 0.8000 IX 1.0000 IY 1.0000 IZ 0.0427 YD 0.80 YC 0.4
520 TO 524 PRIS AX 0.8000 IX 1.0000 IY 1.0000 IZ 0.0427 YD 0.80 YC 0.4
410 TO 415 PRIS AX 0.8000 IX 1.0000 IY 1.0000 IZ 0.0427 YD 0.80 YC 0.4
420 TO 425 PRIS AX 0.8000 IX 1.0000 IY 1.0000 IZ 0.0427 YD 0.80 YC 0.4

$ CARACTERISTICAS DE LOS MATERIALES
 UNITS  M MTON DEGREES CENTIGRADE SECONDS
CONST
$ TODAS LAS BARRAS
E 2780000.00 ALL
G 1158333.33 ALL
CTE 1.00E-05 ALL
BETA 180.0 MEMB 222 TO 224
 UNITS  M MTON RADIANS CENTIGRADE SECONDS

$ APOYOS
STATUS SUP  511 TO 515 521 TO 525 310 320 411 TO 415 421 TO 425 400
$ LIBERACIONES DE APOYOS
 JOINT RELEASES
515 525 FORCE X MOMENT Z KFY 37.500
514 524 FORCE X MOMENT Z KFY 75.000
513 523 FORCE X MOMENT Z KFY 75.000
512 522 FORCE X MOMENT Z KFY 75.000
511 521 FORCE X MOMENT Z KFY 300.000
310 FORCE X MOMENT Z KFY 525.000
320 MOMENT Z KFY 525.000
411 421 FORCE X MOMENT Z KFY 957.000
412 422 FORCE X MOMENT Z KFY 1389.000
413 423 FORCE X MOMENT Z KFY 1389.000
414 424 FORCE X MOMENT Z KFY 1389.000
415 425 FORCE X MOMENT Z KFY 1389.000
400 FORCE X MOMENT Z KFY 1389.000
```

### 9.2.- ANÁLISIS DE ESFUERZOS

De las acciones introducidas en el modelo, se obtienen sus esfuerzos correspondientes y las combinaciones de servicio y rotura. A continuación se listan ambas envolventes, generadas de acuerdo con los siguientes criterios:

*E.L.U.:

Cajón hincado en Servicio:

Rotura en Servicio, sin Sismo

Rotura con Sismo

Estas envolventes se envuelven obteniéndose una envolvente total para el cajón hincado en servicio.

*E.L.S.:

A partir de los estados elementales (y sus envolventes parciales), se realiza una envolvente única de Servicio, en combinación característica.

Las reacciones y esfuerzos de esta envolvente nos permitirán comprobar el estado de la cimentación del cajón hincado en servicio. Según estas reacciones es necesario una tensión mínima de 2.50 Kp/cm$^2$.

Los esfuerzos y reacciones de dicha envolvente pueden observarse a continuación.

Para la comprobación del estado de fisuración del cajón hincado, se realiza la envolvente con sobrecargas frecuentes. Dicha envolvente así como las comprobaciones pertinentes se explicitan más adelante en el presente Anejo.

Los listados que aparecen a continuación son los de definición de los estados de cargas.

ALEPH consultores
Asunto LAV-MARTORELL. ODT 300.2 Fecha JUNIO-2002 Página de

## GENERACIÓN DE ENVOLVENTES.

*Marco.gec*: Define los estados de carga elementales y envolventes totales, tanto en servicio como en rotura. Importa estados de carga calculados en el archivo: *Ma2.gec*, para realizar las envolventes totales.

*Ma2.gec:* Genera todos los posibles estados elementales de sobrecarga uniforme y sobrecaga puntual, colocándolas en distintas posiciones de la estructura y obtiene una envolvente de sobrecargas que se exporta al "*Marco.Gec*".

**Fichero: MARCO.GEC**

```
"
" Proyecto:L.A.V. TRAMO: MARTORELL-LLEIDA
" Elemento:ODT 300.2
" Cliente:INOCSA
"
" Creado por ALEPH-MARCOS 4.2.1
" Fecha: 09.05.02 Hora: 10:11:10
"
" Generación de envolventes Totales.
"          Servicio y Rotura.



* TIT
L.A.V. TRAMO: MARTORELL-LLEIDA - ODT 300.2
Envolventes totales

* DIRESF ESF
* SDF MARCO.SDF

* EC
" ---- ESTADOS DE CARGA MARCO EN SERVICIO -----
   1   MA1001      0   Peso Propio
   2   MA1002      0   Empuje Activo
   3   MA1003      0   Empuje Reposo
   4   MA1004      0   Sismo en Tierras
   5   SC_S_ACT    1   Envolvente S.C.U. Dintel (Empuje Activo)
   6   SC_S_REP    1   Envolvente S.C.U. Dintel (Empuje Reposo)
   7   VP_SUP      1   Envolvente Vehiculo Pesado Dintel
   8   SC_S_INF    1   Envolvente S.C.U. Zapata
   9   VP_INF      1   Envolvente Vehiculo Pesado Zapata

" ---- ESTADOS DE CARGA MARCO EN CONSTRUCCION -----
   20    EM_C_ACT     1    Envolvente Empujes Activo (Construccion Por
Tongadas)
   21    EM_C_REP     1    Envolvente Empujes Reposo (Construccion Por
Tongadas)
   22    SC_C_ACT     1    Envolvente S.C.U. Dintel (Marco Constru.,
Empuje Activo)
   23    SC_C_REP     1    Envolvente S.C.U. Dintel (Marco Constru.,
Empuje Reposo)
   24   SC_C_INF    1   Envolvente S.C.U. Zapata (Marco Construccion)


* ENV

   30   MA_SERV  1    Envolvente de Servicio (Marco en Servicio)

   incomp 2 3  " Empujes
```



```
   incomp 4 5  " Sobrecargas
   ec1    1.00   1.00    " Peso Propio
   ec2    1.00   1.00    " Empuje Activo
   ec3   1.00   1.00    " Empuje Reposo
   ec5    0.00   1.00    " Envolvente S.C.U. Dintel (Empuje Activo)
   ec6   0.00  1.00    " Envolvente S.C.U. Dintel (Empuje Reposo)
    ec7    0.00   1.00    " Envolvente Vehiculo Pesado Dintel
   ec8    0.00   1.00    " Envolvente S.C.U. Zapata
   ec9   0.00  1.00   " Envolvente Vehiculo Pesado Zapata

   31   MA_RO1  1    Envolvente de Rotura (Marco en Servicio)

   incomp 2 3  " Empujes
   incomp 4 5  " Sobrecargas
   ec1   1.00   1.35    " Peso Propio
   ec2   1.00  1.50   " Empuje Activo
   ec3   1.00   1.50    " Empuje Reposo
   ec5   0.00  1.50   " Envolvente S.C.U. Dintel (Empuje Activo)
   ec6    0.00   1.50    " Envolvente S.C.U. Dintel (Empuje Reposo)
   ec7    0.00   1.50    " Envolvente Vehiculo Pesado Dintel
   ec8    0.00   1.50    " Envolvente S.C.U. Zapata
    ec9    0.00   1.50    " Envolvente Vehiculo Pesado Zapata

   32   MA_SIS  1    Envolvente de Rotura en SISMO (Marco en Servicio)

   incomp 2 3  " Empujes
   incomp 5 6  " Sobrecargas
   ec1   1.00  1.35   " Peso Propio
   ec2   1.00  1.50    " Empuje Activo
   ec3   1.00  1.50   " Empuje Reposo
   ec4  -1.00  1.00   " Sismo en Tierras
    ec5    0.00   0.20    " Envolvente S.C.U. Dintel (Empuje Activo)
   ec6   0.00  0.20   " Envolvente S.C.U. Dintel (Empuje Reposo)
   ec7    0.00   0.20    " Envolvente Vehiculo Pesado Dintel
   ec8    0.00   0.20    " Envolvente S.C.U. Zapata
    ec9    0.00   0.20    " Envolvente Vehiculo Pesado Zapata

    33   MA_ROT  1    Envolvente de Rotura (Envolvente Servicio-Sismo)

    incomp todos
    ec31  1.00  1.00   " Marco en Servicio
   ec32  1.00  1.00   " Marco en Sismo

    34   MA_C1  1    Envolvente de Rotura en Construccion (Tongadas)

    incomp 2 3  " Empujes
    ec1    1.00  1.35   " Peso Propio
   ec20  1.00  1.35   " Empuje Activo (Tongadas, incluye SCU 1.0 Tn/m2)
   ec21  1.00  1.35   " Empuje Reposo (Tongadas, incluye SCU 1.0 Tn/m2)
   ec24  0.00  1.35   " Envolvente S.C.U. Zapata (construccion)

    35    MA_C2   1     Envolvente de Rotura en Construccion (Terraplen
Terminado)

   incomp 2 3  " Empujes
    incomp 4 5  " Sobrecargas
   ec1   1.00  1.35   " Peso Propio
    ec2    1.00  1.35    " Empuje Activo
   ec3   1.00  1.35   " Empuje Reposo
    ec22   0.00   1.35    " Envolvente S.C.U. Dintel (Construccion, Empuje
Activo)
   ec23   0.00   1.35    " Envolvente S.C.U. Dintel (Construccion, Empuje
Reposo)
   ec24  0.00  1.35   " Envolvente S.C.U. Zapata (Construccion)
```

```
   36   MA_CON  1     Envolvente de Rotura en Construccion (Envolvente)

   incomp todos
    ec34   1.00   1.00    " Tongadas
   ec35  1.00  1.00   " Terraplen Terminado

* SELECT

  mbdesel todos
  nddesel todos

"   Seleccionamos medio Marco.
  mbsel i 1 a 6        " Dintel
  mbsel i 111 a 116   " Hastial.
  mbsel d 116          " Hastial
  mbsel i 211 a 214    " Cartela Sup
  mbsel i 311 312      " Cartela Inf
  mbsel i 511 a 514    " Talon Zapata
   mbsel d 514          " Talon Zapata
  mbsel i 411 a 415   " Puntera Zapata
   mbsel d 415          " Puntera Zapata
  mbsel i 410 520      " Empotramiento Hastial-Zapata
   ndmb

   esfsel x y zz

   ressel Esfuerzos Reacciones Desplazamientos


* PRINT

   output -r MA_ELE.LST
   grupos si

   tit Estados Elementales. Proyecto: L.A.V. TRAMO: MARTORELL-LLEIDA -
ODT 300.2
   ec(1 a 29) x+ x- y+ y- zz+ zz-

   output -a MA_ELE.LST
   grupos si

   tit  Estados  Envolventes  secundarias.  Proyecto:  L.A.V.  TRAMO:
MARTORELL-LLEIDA - ODT 300.2
   ec(31 32 34 35) x+ x- y+ y- zz+ zz-


* PRINT

   output -r MA_SER.LST
   grupos si

   tit Estado Servicio. Proyecto: L.A.V. TRAMO: MARTORELL-LLEIDA - ODT
300.2
   ec(30) x+ x- y+ y- zz+ zz-


* PRINT

   output -r MA_ROT.LST
   grupos si

   tit Estados Rotura. Proyecto: L.A.V. TRAMO: MARTORELL-LLEIDA - ODT
300.2
```



```
   ec(33 36) x+ x- y+ y- zz+ zz-
```

**Fichero: MA2.GEC**

```
"
" Proyecto:L.A.V. TRAMO: MARTORELL-LLEIDA
" Elemento:ODT 300.2
" Cliente:INOCSA
"
" Creado por ALEPH-MARCOS 4.2.1
" Creado por ALEPH-MARCOS 1.0.2.
" Fecha: 09.05.02 Hora: 10:10:11
"
" Generación de envolvente de Sobrecargas Servicio.



* TIT
L.A.V. TRAMO: MARTORELL-LLEIDA - ODT 300.2
Paseo de Sobrecargas


* DIRESF ESF
* SDF MARCO.SDF

* EC
     1   MA2001  0  PASEO SCU Posicion 1 (Activo)
     2    MA2002  0  PASEO SCU Posicion 18 (Activo)
     3    MA2003  0  PASEO SCU Posicion 1 (Reposo)
     4    MA2004  0  PASEO SCU Posicion 18 (Reposo)
     5    MA2005  0  PASEO SCU Posicion 2
     6    MA2006  0  PASEO SCU Posicion 3
     7   MA2007   0  PASEO SCU Posicion 4
     8   MA2008   0  PASEO SCU Posicion 5
     9   MA2009   0  PASEO SCU Posicion 6
    10    MA2010  0  PASEO SCU Posicion 7
    11    MA2011  0  PASEO SCU Posicion 8
    12   MA2012   0  PASEO SCU Posicion 9
    13   MA2013   0  PASEO SCU Posicion 10
    14    MA2014  0  PASEO SCU Posicion 11
    15   MA2015   0  PASEO SCU Posicion 12
    16   MA2016   0  PASEO SCU Posicion 13
    17    MA2017  0  PASEO SCU Posicion 14
    18   MA2018   0  PASEO SCU Posicion 15
    19    MA2019  0  PASEO SCU Posicion 16
    20   MA2020   0  PASEO SCU Posicion 17
    21    MA2021  0  PASEO SCU INF. Posicion 1
    22   MA2022   0  PASEO SCU INF. Posicion 2
    23   MA2023   0  PASEO SCU INF. Posicion 3
    24   MA2024   0  PASEO SCU INF. Posicion 4
    25   MA2025   0  PASEO SCU INF. Posicion 5
    26   MA2026   0  PASEO SCU INF. Posicion 6
    27   MA2027   0  PASEO SCU INF. Posicion 7
    28   MA2028   0  PASEO SCU INF. Posicion 8
    29   MA2029   0  PASEO SCU INF. Posicion 9
    30   MA2030   0  PASEO SCU INF. Posicion 10
    31   MA2031   0  PASEO TREN PUNTUAL. Posicion 1
    32   MA2032   0  PASEO TREN PUNTUAL. Posicion 2
    33   MA2033   0  PASEO TREN PUNTUAL. Posicion 3
    34   MA2034   0  PASEO TREN PUNTUAL. Posicion 4
    35   MA2035   0  PASEO TREN PUNTUAL. Posicion 5
    36   MA2036   0  PASEO TREN PUNTUAL. Posicion 6
    37   MA2037   0  PASEO TREN PUNTUAL. Posicion 7
    38   MA2038   0  PASEO TREN PUNTUAL. Posicion 8
    39   MA2039   0  PASEO TREN PUNTUAL. Posicion 9
    40   MA2040   0  PASEO TREN PUNTUAL. Posicion 10
    41   MA2041   0  PASEO TREN PUNTUAL. Posicion 11
    42   MA2042   0  PASEO TREN PUNTUAL. Posicion 12
    43   MA2043   0  PASEO TREN PUNTUAL. Posicion 13
    44   MA2044   0  PASEO TREN PUNTUAL. Posicion 14
    45   MA2045   0  PASEO TREN PUNTUAL. Posicion 15
    46   MA2046   0  PASEO TREN PUNTUAL. Posicion 16
    47   MA2047   0  PASEO TREN PUNTUAL. Posicion 17
    48   MA2048   0  PASEO TREN PUNTUAL. Posicion 18
    49   MA2049   0  PASEO TREN PUNTUAL. Posicion 19
    50   MA2050   0  PASEO TREN PUNTUAL. Posicion 20
    51   MA2051   0  PASEO TREN PUNTUAL. Posicion 21
    52   MA2052   0  PASEO TREN PUNTUAL. Posicion 22
    53   MA2053   0  PASEO TREN PUNTUAL. Posicion 23
    54   MA2054   0  PASEO TREN PUNTUAL. Posicion 24
    55   MA2055   0  PASEO TREN PUNTUAL. Posicion 25
    56   MA2056   0  PASEO TREN PUNTUAL. Posicion 26
    57   MA2057   0  PASEO TREN PUNTUAL. Posicion 27
    58   MA2058   0  PASEO TREN PUNTUAL. Posicion 28
    59   MA2059   0  PASEO TREN PUNTUAL. Posicion 29
    60   MA2060   0  PASEO TREN PUNTUAL. Posicion 30
    61   MA2061   0  PASEO TREN PUNTUAL. Posicion 31
    62   MA2062   0  PASEO TREN PUNTUAL. Posicion 32
    63   MA2063   0  PASEO TREN REPARTIDO. Posicion 1
    64   MA2064   0  PASEO TREN REPARTIDO. Posicion 2
    65   MA2065   0  PASEO TREN REPARTIDO. Posicion 3
    66   MA2066   0  PASEO TREN REPARTIDO. Posicion 4
    67   MA2067   0  PASEO TREN REPARTIDO. Posicion 5
    68   MA2068   0  PASEO TREN REPARTIDO. Posicion 6
    69   MA2069   0  PASEO TREN REPARTIDO. Posicion 7
    70   MA2070   0  PASEO TREN REPARTIDO. Posicion 8
    71   MA2071   0  PASEO TREN REPARTIDO. Posicion 9
    72    MA2072  0  PASEO TREN REPARTIDO. Posicion 10
    73    MA2073  0  PASEO TREN REPARTIDO. Posicion 11
    74   MA2074   0  PASEO TREN REPARTIDO. Posicion 12
    75   MA2075   0  PASEO TREN REPARTIDO. Posicion 13
    76    MA2076  0  PASEO TREN REPARTIDO. Posicion 14
    77   MA2077   0  PASEO TREN REPARTIDO. Posicion 15
    78   MA2078   0  PASEO TREN REPARTIDO. Posicion 16
    79   MA2079   0  PASEO TREN REPARTIDO. Posicion 17
    80   MA2080   0  PASEO TREN REPARTIDO. Posicion 18
    81    MA2081  0  PASEO TREN REPARTIDO. Posicion 19
    82    MA2082  0  PASEO TREN REPARTIDO. Posicion 20
    83   MA2083   0  PASEO TREN REPARTIDO. Posicion 21
    84    MA2084  0  PASEO TREN REPARTIDO. Posicion 22
    85    MA2085  0  PASEO TREN REPARTIDO. Posicion 23
    86   MA2086   0  PASEO TREN REPARTIDO. Posicion 24
    87    MA2087  0  PASEO TREN REPARTIDO. Posicion 25
    88    MA2088  0  PASEO TREN REPARTIDO. Posicion 26
    89   MA2089   0  PASEO TREN REPARTIDO. Posicion 27
    90    MA2090  0  PASEO TREN REPARTIDO. Posicion 28
    91    MA2091  0  PASEO TREN REPARTIDO. Posicion 29
    92   MA2092   0  PASEO TREN REPARTIDO. Posicion 30
    93    MA2093  0  PASEO TREN REPARTIDO. Posicion 31
    94    MA2094  0  PASEO TREN REPARTIDO. Posicion 32
    95   MA2095   0  PASEO VP INFERIOR. Posicion 1
    96    MA2096  0  PASEO VP INFERIOR. Posicion 2
    97    MA2097  0  PASEO VP INFERIOR. Posicion 3
    98   MA2098   0  PASEO VP INFERIOR. Posicion 4
    99    MA2099  0  PASEO VP INFERIOR. Posicion 5
   100    MA2100  0  PASEO VP INFERIOR. Posicion 6
   101   MA2101   0  PASEO VP INFERIOR. Posicion 7
   102    MA2102  0  PASEO VP INFERIOR. Posicion 8
   103    MA2103  0  PASEO VP INFERIOR. Posicion 9
   104    MA2104  0  PASEO VP INFERIOR. Posicion 10
   105    MA2105  0  PASEO VP INFERIOR. Posicion 11
   106   MA2106   0  PASEO VP INFERIOR. Posicion 12
   107    MA2107  0  PASEO VP INFERIOR. Posicion 13
   108   MA2108   0  PASEO VP INFERIOR. Posicion 14
   109    MA2109  0  PASEO VP INFERIOR. Posicion 15
   110    MA2110  0  PASEO VP INFERIOR. Posicion 16


* ENV
111  SC_S_ACT   1   Envolvente Paseo SCU (ACTIVO)

     ec1   0.00  1.00
     ec2   0.00  1.00
     ec5   0.00  1.00
     ec6   0.00  1.00
     ec7   0.00  1.00
     ec8   0.00  1.00
     ec9   0.00  1.00
    ec10   0.00  1.00
    ec11   0.00  1.00
    ec12   0.00  1.00
    ec13   0.00  1.00
    ec14   0.00  1.00
    ec15   0.00  1.00
    ec16   0.00  1.00
```

ec17 0.00 1.00
ec18 0.00 1.00
ec19 0.00 1.00
ec20 0.00 1.00

112 SC_S_REP 1 Envolvente Paseo SCU (REPOSO)

ec3 0.00 1.00
ec4 0.00 1.00
ec5 0.00 1.00
ec6 0.00 1.00
ec7 0.00 1.00
ec8 0.00 1.00
ec9 0.00 1.00
ec10 0.00 1.00
ec11 0.00 1.00
ec12 0.00 1.00
ec13 0.00 1.00
ec14 0.00 1.00
ec15 0.00 1.00
ec16 0.00 1.00
ec17 0.00 1.00
ec18 0.00 1.00
ec19 0.00 1.00
ec20 0.00 1.00

113 SC_S_INF 1 Envolvente Paseo SCU Inferior

ec21 0.00 1.00
ec22 0.00 1.00
ec23 0.00 1.00
ec24 0.00 1.00
ec25 0.00 1.00
ec26 0.00 1.00
ec27 0.00 1.00
ec28 0.00 1.00
ec29 0.00 1.00
ec30 0.00 1.00

114 VP_SUP 1 Envolvente Paseo VP SUPERIOR
incomp todos

ec31 0.00 1.00
ec32 0.00 1.00
ec33 0.00 1.00
ec34 0.00 1.00
ec35 0.00 1.00
ec36 0.00 1.00
ec37 0.00 1.00
ec38 0.00 1.00
ec39 0.00 1.00
ec40 0.00 1.00
ec41 0.00 1.00
ec42 0.00 1.00
ec43 0.00 1.00
ec44 0.00 1.00
ec45 0.00 1.00
ec46 0.00 1.00
ec47 0.00 1.00
ec48 0.00 1.00
ec49 0.00 1.00
ec50 0.00 1.00
ec51 0.00 1.00
ec52 0.00 1.00
ec53 0.00 1.00
ec54 0.00 1.00
ec55 0.00 1.00
ec56 0.00 1.00
ec57 0.00 1.00
ec58 0.00 1.00
ec59 0.00 1.00
ec60 0.00 1.00
ec61 0.00 1.00
ec62 0.00 1.00
ec63 0.00 1.00
ec64 0.00 1.00

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2 | Fecha JUNIO-2002 | Página de

ec65 0.00 1.00
ec66 0.00 1.00
ec67 0.00 1.00
ec68 0.00 1.00
ec69 0.00 1.00
ec70 0.00 1.00
ec71 0.00 1.00
ec72 0.00 1.00
ec73 0.00 1.00
ec74 0.00 1.00
ec75 0.00 1.00
ec76 0.00 1.00
ec77 0.00 1.00
ec78 0.00 1.00
ec79 0.00 1.00
ec80 0.00 1.00
ec81 0.00 1.00
ec82 0.00 1.00
ec83 0.00 1.00
ec84 0.00 1.00
ec85 0.00 1.00
ec86 0.00 1.00
ec87 0.00 1.00
ec88 0.00 1.00
ec89 0.00 1.00
ec90 0.00 1.00
ec91 0.00 1.00
ec92 0.00 1.00
ec93 0.00 1.00
ec94 0.00 1.00

115 VP_INF 1 Envolvente Paseo VP INFERIOR
incomp todos

ec95 0.00 1.00
ec96 0.00 1.00
ec97 0.00 1.00
ec98 0.00 1.00
ec99 0.00 1.00
ec100 0.00 1.00
ec101 0.00 1.00
ec102 0.00 1.00
ec103 0.00 1.00
ec104 0.00 1.00
ec105 0.00 1.00
ec106 0.00 1.00
ec107 0.00 1.00
ec108 0.00 1.00
ec109 0.00 1.00
ec110 0.00 1.00

```
* BORRA EC 1 a 110
```



# ENVOLVENTES DE ROTURA.

**Fichero: MA_ROT.LST**

LISTADO DE ESTADOS DE CARGA
Fecha : 09.05.2002 10:34:42
T¡tulo: L.A.V. TRAMO: MARTORELL-LLEIDA - ODT 300.2
Coment: Envolventes totales
Titlst: Estados Rotura. Proyecto: L.A.V. TRAMO: MARTORELL-

Tabla de estados de carga a listar

| ec | Fichero | tipo | T¡tulo |
|---|---|---|---|
| 33 | MA_ROT | 1 | [Envolvente de Rotura (Envolvente Servicio-Sismo) ] |
| 36 | MA_CON | 1 | [Envolvente de Rotura en Construccion (Envolvente) ] |

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Mz |
|---|---|---|---|---|---|---|
| 1 | 1 | 33 | Nx+ | -12.99 | -21.81 | -11.30 |
| | | 33 | Fy+ | -25.12 | -15.67 | 0.54 |
| | | 33 | Mz+ | -19.26 | -26.78 | 6.71 |
| | | 33 | Nx- | -46.61 | -52.10 | -38.56 |
| | | 33 | Fy- | -40.50 | -61.27 | -43.85 |
| | | 33 | Mz- | -40.78 | -49.78 | -53.51 |
| | | 36 | Nx+ | 0.50 | -7.49 | -1.23 |
| | | 36 | Fy+ | -7.60 | -4.23 | -0.62 |
| | | 36 | Mz+ | -12.47 | -7.97 | 2.12 |
| | | 36 | Nx- | -30.80 | -29.53 | -21.03 |
| | | 36 | Fy- | -29.08 | -32.54 | -24.83 |
| | | 36 | Mz- | -28.98 | -30.89 | -25.34 |
| 2 | 2 | 33 | Nx+ | -12.99 | -17.50 | 3.24 |
| | | 33 | Fy+ | -25.45 | -10.80 | 15.16 |
| | | 33 | Mz+ | -20.79 | -26.66 | 27.07 |
| | | 33 | Nx- | -46.61 | -46.77 | -1.99 |
| | | 33 | Fy- | -40.92 | -51.71 | -9.20 |
| | | 33 | Mz- | -39.75 | -37.83 | -21.25 |
| | | 36 | Nx+ | 0.50 | -5.99 | 3.76 |
| | | 36 | Fy+ | -7.60 | -3.12 | 2.10 |
| | | 36 | Mz+ | -12.17 | -12.24 | 10.50 |
| | | 36 | Nx- | -30.80 | -23.62 | -1.37 |
| | | 36 | Fy- | -20.96 | -26.38 | -0.45 |
| | | 36 | Mz- | -18.14 | -12.63 | -14.19 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2. Fecha JUNIO-2002 Página de

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 3 | 33 | Nx+ | -12.99 | -13.19 | 14.58 |
| | | 33 | Fy+ | -26.02 | -5.45 | 27.67 |
| | | 33 | Mz+ | -29.60 | -25.94 | 49.28 |
| | | 33 | Nx- | -46.61 | -34.73 | 28.16 |
| | | 33 | Fy- | -40.92 | -42.12 | 18.12 |
| | | 33 | Mz- | -27.07 | -19.99 | -0.54 |
| | | 36 | Nx+ | 0.50 | -4.50 | 7.64 |
| | | 36 | Fy+ | -7.60 | -2.01 | 3.99 |
| | | 36 | Mz+ | -20.73 | -17.21 | 22.19 |
| | | 36 | Nx- | -30.80 | -17.72 | 13.93 |
| | | 36 | Fy- | -28.95 | -20.30 | 12.55 |
| | | 36 | Mz- | -18.14 | -11.12 | -5.41 |
| 4 | 4 | 33 | Nx+ | -12.99 | -8.88 | 22.75 |
| | | 33 | Fy+ | -26.78 | 0.42 | 37.34 |
| | | 33 | Mz+ | -30.74 | -17.21 | 64.94 |
| | | 33 | Nx- | -46.61 | -22.69 | 49.40 |
| | | 33 | Fy- | -40.48 | -32.58 | 37.94 |
| | | 33 | Mz- | -25.60 | -11.17 | 9.97 |
| | | 36 | Nx+ | 0.50 | -3.00 | 10.41 |
| | | 36 | Fy+ | -12.47 | -0.44 | 11.46 |
| | | 36 | Mz+ | -20.99 | -11.60 | 32.96 |
| | | 36 | Nx- | -30.80 | -11.81 | 24.86 |
| | | 36 | Fy- | -20.76 | -14.30 | 27.50 |
| | | 36 | Mz- | -12.45 | -6.80 | 0.04 |
| 5 | 5 | 33 | Nx+ | -12.99 | -4.57 | 27.71 |
| | | 33 | Fy+ | -27.67 | 6.86 | 43.38 |
| | | 33 | Mz+ | -31.17 | -7.67 | 73.45 |
| | | 33 | Nx- | -46.61 | -10.64 | 61.73 |
| | | 33 | Fy- | -39.58 | -23.09 | 50.22 |
| | | 33 | Mz- | -25.66 | -7.19 | 16.77 |
| | | 36 | Nx+ | 0.50 | -1.50 | 12.08 |
| | | 36 | Fy+ | -18.17 | 2.48 | 17.55 |
| | | 36 | Mz+ | -20.99 | -5.31 | 39.21 |
| | | 36 | Nx- | -30.80 | -5.91 | 31.41 |
| | | 36 | Fy- | -18.02 | -8.49 | 11.94 |
| | | 36 | Mz- | -7.59 | -2.43 | 3.37 |
| 6 | 6 | 33 | Nx+ | -12.99 | -0.25 | 29.49 |
| | | 33 | Fy+ | -38.49 | 13.85 | 54.96 |
| | | 33 | Mz+ | -25.98 | 1.35 | 76.07 |
| | | 33 | Nx- | -46.61 | 1.40 | 65.13 |
| | | 33 | Fy- | -38.47 | -13.85 | 55.04 |
| | | 33 | Mz- | -30.85 | 0.00 | 19.10 |
| | | 36 | Nx+ | 0.50 | 0.00 | 12.63 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Fy+ | -18.05 | 6.59 | 17.46 |
| | | 36 | Mz+ | -19.43 | 0.00 | 41.28 |
| | | 36 | Nx- | -30.80 | 0.00 | 33.59 |
| | | 36 | Fy- | -18.02 | -6.59 | 17.52 |
| | | 36 | Mz- | -7.60 | 1.32 | 4.73 |
| 111 | 111 | 33 | Nx+ | -36.66 | -28.66 | -36.66 |
| | | 33 | Fy+ | -68.77 | 0.92 | -16.46 |
| | | 33 | Mz+ | -43.32 | -11.12 | -4.62 |
| | | 33 | Nx- | -96.18 | -16.41 | -33.25 |
| | | 33 | Fy- | -54.10 | -38.19 | -53.83 |
| | | 33 | Mz- | -89.56 | -24.95 | -68.52 |
| | | 36 | Nx+ | -18.36 | -20.70 | -20.27 |
| | | 36 | Fy+ | -19.68 | -0.35 | -11.91 |
| | | 36 | Mz+ | -24.26 | -11.86 | -3.58 |
| | | 36 | Nx- | -61.80 | -20.60 | -31.38 |
| | | 36 | Fy- | -41.69 | -27.49 | -37.78 |
| | | 36 | Mz- | -59.84 | -17.26 | -41.15 |
| 112 | 112 | 33 | Nx+ | -35.03 | -19.06 | -14.47 |
| | | 33 | Fy+ | -67.14 | 5.92 | -19.67 |
| | | 33 | Mz+ | -41.63 | -3.69 | 2.25 |
| | | 33 | Nx- | -93.98 | -5.17 | -23.27 |
| | | 33 | Fy- | -51.90 | -24.85 | -24.51 |
| | | 33 | Mz- | -82.98 | -14.36 | -50.49 |
| | | 36 | Nx+ | -16.73 | -13.11 | -4.59 |
| | | 36 | Fy+ | -18.19 | -0.15 | -10.64 |
| | | 36 | Mz+ | -22.63 | -4.89 | 4.14 |
| | | 36 | Nx- | -59.60 | -10.48 | -16.97 |
| | | 36 | Fy- | -39.49 | -17.88 | -16.70 |
| | | 36 | Mz- | -57.64 | -9.90 | -28.53 |
| 113 | 113 | 33 | Nx+ | -33.39 | -10.33 | -0.83 |
| | | 33 | Fy+ | -65.51 | 10.34 | -27.30 |
| | | 33 | Mz+ | -46.90 | -6.17 | 7.92 |
| | | 33 | Nx- | -91.77 | 4.77 | -23.20 |
| | | 33 | Fy- | -49.69 | -12.81 | -7.06 |
| | | 33 | Mz- | -84.04 | 2.15 | -43.92 |
| | | 36 | Nx+ | -15.09 | -6.67 | 4.55 |
| | | 36 | Fy+ | -43.40 | 1.17 | -16.45 |
| | | 36 | Mz+ | -20.99 | 0.92 | 5.90 |
| | | 36 | Nx- | -57.39 | -1.53 | -11.46 |
| | | 36 | Fy- | -37.28 | -9.43 | -4.04 |
| | | 36 | Mz- | -56.42 | -0.96 | -23.25 |
| 114 | 114 | 33 | Nx+ | -31.76 | -2.48 | 5.06 |
| | | 33 | Fy+ | -74.06 | 16.06 | -28.05 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.2.* | Fecha JUNIO-2002 | Página de

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Mz+ | -45.27 | 4.56 | 8.58 |
| | | 33 | Nx- | -89.56 | 13.41 | -31.77 |
| | | 33 | Fy- | -37.31 | -3.97 | -10.94 |
| | | 33 | Mz- | -81.84 | 7.91 | -48.70 |
| | | 36 | Nx+ | -13.46 | -1.42 | 8.23 |
| | | 36 | Fy+ | -48.89 | 6.43 | -9.42 |
| | | 36 | Mz+ | -13.46 | -1.42 | 8.23 |
| | | 36 | Nx- | -55.19 | 6.24 | -13.75 |
| | | 36 | Fy- | -25.51 | -2.65 | 3.81 |
| | | 36 | Mz- | -54.21 | 4.22 | -24.83 |
| 115 | 115 | 33 | Nx+ | -30.13 | 4.50 | 4.04 |
| | | 33 | Fy+ | -72.42 | 23.39 | -46.55 |
| | | 33 | Mz+ | -30.17 | 4.80 | 4.30 |
| | | 33 | Nx- | -87.36 | 20.73 | -47.80 |
| | | 33 | Fy- | -35.10 | 1.39 | -9.80 |
| | | 33 | Mz- | -80.93 | 18.73 | -63.31 |
| | | 36 | Nx+ | -11.83 | 2.64 | 7.57 |
| | | 36 | Fy+ | -47.26 | 13.02 | -18.59 |
| | | 36 | Mz+ | -11.83 | 2.64 | 7.57 |
| | | 36 | Nx- | -52.98 | 12.83 | -22.73 |
| | | 36 | Fy- | -17.75 | -0.50 | -14.36 |
| | | 36 | Mz- | -52.98 | 10.17 | -32.21 |
| 116 | 116 | 33 | Nx+ | -28.49 | 10.62 | -3.10 |
| | | 33 | Fy+ | -70.79 | 29.41 | -71.31 |
| | | 33 | Mz+ | -28.49 | 10.74 | -3.07 |
| | | 33 | Nx- | -85.15 | 26.75 | -70.08 |
| | | 33 | Fy- | -32.90 | 6.17 | -13.37 |
| | | 33 | Mz- | -74.95 | 23.18 | -82.86 |
| | | 36 | Nx+ | -10.19 | 5.55 | 3.65 |
| | | 36 | Fy+ | -45.62 | 18.44 | -33.38 |
| | | 36 | Mz+ | -10.19 | 5.55 | 3.65 |
| | | 36 | Nx- | -50.77 | 18.25 | -37.34 |
| | | 36 | Fy- | -15.55 | -0.50 | -13.89 |
| | | 36 | Mz- | -50.77 | 13.78 | -43.46 |
| 116 | 117 | 33 | Nx+ | -26.86 | 15.86 | -15.54 |
| | | 33 | Fy+ | -65.89 | 34.74 | -85.01 |
| | | 33 | Mz+ | -26.86 | 15.59 | -15.49 |
| | | 33 | Nx- | -82.95 | 31.47 | -97.32 |
| | | 33 | Fy- | -33.96 | 9.75 | -37.15 |
| | | 33 | Mz- | -72.81 | 27.10 | -106.47 |
| | | 36 | Nx+ | -8.56 | 7.27 | -2.42 |
| | | 36 | Fy+ | -43.02 | 22.87 | -47.85 |
| | | 36 | Mz+ | -8.56 | 7.27 | -2.42 |
| | | 36 | Nx- | -48.57 | 22.49 | -56.44 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Fy- | -13.34 | -0.50 | -13.43 |
| | | 36 | Mz- | -48.57 | 16.61 | -57.69 |
| 211 | 211 | 33 | Nx+ | -26.36 | 16.93 | -19.02 |
| | | 33 | Fy+ | -65.38 | 36.11 | -92.53 |
| | | 33 | Mz+ | -26.39 | 11.94 | -18.90 |
| | | 33 | Nx- | -82.27 | 32.35 | -104.08 |
| | | 33 | Fy- | -33.28 | 10.14 | -39.26 |
| | | 33 | Mz- | -72.13 | 34.57 | -112.31 |
| | | 36 | Nx+ | -8.06 | 7.50 | -3.99 |
| | | 36 | Fy+ | -42.52 | 23.81 | -52.79 |
| | | 36 | Mz+ | -8.06 | 7.50 | -3.99 |
| | | 36 | Nx- | -47.89 | 23.29 | -61.29 |
| | | 36 | Fy- | -12.66 | -0.50 | -13.32 |
| | | 36 | Mz- | -47.89 | 23.31 | -61.29 |
| 212 | 212 | 33 | Nx+ | -16.22 | -24.99 | -37.63 |
| | | 33 | Fy+ | -22.94 | -19.95 | -23.11 |
| | | 33 | Mz+ | -17.54 | -21.11 | -21.51 |
| | | 33 | Nx- | -50.63 | -62.66 | -101.23 |
| | | 33 | Fy- | -41.31 | -72.14 | -108.77 |
| | | 33 | Mz- | -49.14 | -60.17 | -119.78 |
| | | 36 | Nx+ | -1.44 | -8.53 | -9.79 |
| | | 36 | Fy+ | -8.96 | -5.54 | -5.60 |
| | | 36 | Mz+ | -8.96 | -5.54 | -5.60 |
| | | 36 | Nx- | -33.23 | -37.95 | -61.61 |
| | | 36 | Fy- | -26.69 | -40.39 | -64.98 |
| | | 36 | Mz- | -32.98 | -39.05 | -66.35 |
| 213 | 213 | 33 | Nx+ | -16.28 | -22.38 | -29.16 |
| | | 33 | Fy+ | -24.07 | -17.10 | -16.49 |
| | | 33 | Mz+ | -19.16 | -22.24 | -13.93 |
| | | 33 | Nx- | -51.96 | -58.62 | -79.57 |
| | | 33 | Fy- | -41.68 | -66.58 | -87.30 |
| | | 33 | Mz- | -49.70 | -56.22 | -98.98 |
| | | 36 | Nx+ | -1.20 | -7.37 | -6.96 |
| | | 36 | Fy+ | -8.71 | -4.39 | -3.83 |
| | | 36 | Mz+ | -8.71 | -4.39 | -3.83 |
| | | 36 | Nx- | -33.85 | -33.81 | -48.82 |
| | | 36 | Fy- | -26.67 | -36.39 | -51.26 |
| | | 36 | Mz- | -33.23 | -34.35 | -53.20 |
| 214 | 214 | 33 | Nx+ | -16.31 | -19.00 | -17.52 |
| | | 33 | Fy+ | -25.33 | -13.68 | -7.63 |
| | | 33 | Mz+ | -21.41 | -24.43 | -3.83 |
| | | 33 | Nx- | -53.78 | -53.98 | -52.78 |
| | | 33 | Fy- | -42.05 | -59.88 | -61.72 |



| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Mz- | -49.65 | -48.02 | -74.62 |
| | | 36 | Nx+ | -0.97 | -6.33 | -3.72 |
| | | 36 | Fy+ | -8.49 | -3.34 | -2.01 |
| | | 36 | Mz+ | -13.17 | -7.08 | -0.80 |
| | | 36 | Nx- | -34.70 | -29.03 | -34.08 |
| | | 36 | Fy- | -26.72 | -31.78 | -35.24 |
| | | 36 | Mz- | -33.54 | -28.83 | -38.04 |
| 311 | 311 | 33 | Nx+ | -37.36 | -33.04 | -48.99 |
| | | 33 | Fy+ | -69.47 | -1.40 | -16.54 |
| | | 33 | Mz+ | -44.02 | -7.16 | -7.43 |
| | | 33 | Nx- | -97.12 | -21.63 | -40.87 |
| | | 33 | Fy- | -55.05 | -44.31 | -70.33 |
| | | 33 | Mz- | -90.51 | -40.49 | -82.87 |
| | | 36 | Nx+ | -19.06 | -24.32 | -29.27 |
| | | 36 | Fy+ | -20.38 | -0.35 | -12.05 |
| | | 36 | Mz+ | -24.96 | -15.20 | -8.99 |
| | | 36 | Nx- | -62.75 | -25.30 | -40.56 |
| | | 36 | Fy- | -42.64 | -31.97 | -49.66 |
| | | 36 | Mz- | -60.79 | -30.71 | -51.86 |
| 312 | 312 | 33 | Nx+ | -37.01 | -30.83 | -42.62 |
| | | 33 | Fy+ | -69.12 | -0.23 | -16.37 |
| | | 33 | Mz+ | -43.67 | -5.99 | -6.11 |
| | | 33 | Nx- | -96.65 | -18.99 | -36.81 |
| | | 33 | Fy- | -54.58 | -41.22 | -61.77 |
| | | 33 | Mz- | -90.04 | -37.40 | -75.09 |
| | | 36 | Nx+ | -18.71 | -22.48 | -24.59 |
| | | 36 | Fy+ | -20.03 | -0.35 | -11.98 |
| | | 36 | Mz+ | -24.61 | -13.50 | -6.12 |
| | | 36 | Nx- | -62.27 | -22.92 | -35.73 |
| | | 36 | Fy- | -42.16 | -29.70 | -43.49 |
| | | 36 | Mz- | -60.32 | -28.20 | -45.96 |
| 511 | 511 | 33 | Nx+ | -4.96 | -0.84 | -0.04 |
| | | 33 | Fy+ | -4.96 | 2.66 | 0.37 |
| | | 33 | Mz+ | -4.96 | 2.66 | 0.37 |
| | | 33 | Nx- | -12.96 | -1.14 | -0.02 |
| | | 33 | Fy- | -12.96 | -5.05 | -0.48 |
| | | 33 | Mz- | -12.96 | -5.05 | -0.48 |
| | | 36 | Nx+ | 0.00 | 1.25 | 0.15 |
| | | 36 | Fy+ | 0.00 | 1.25 | 0.15 |
| | | 36 | Mz+ | 0.00 | 1.25 | 0.15 |
| | | 36 | Nx- | -10.58 | -2.20 | -0.17 |
| | | 36 | Fy- | -8.75 | -3.32 | -0.32 |
| | | 36 | Mz- | -8.75 | -3.32 | -0.32 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 512 | 512 | 33 | Nx+ | -4.96 | -0.74 | -0.02 |
| | | 33 | Fy+ | -4.96 | 1.78 | 0.19 |
| | | 33 | Mz+ | -4.96 | 1.77 | 0.19 |
| | | 33 | Nx- | -12.96 | -1.05 | -0.03 |
| | | 33 | Fy- | -12.96 | -3.85 | -0.28 |
| | | 33 | Mz- | -12.96 | -3.83 | -0.28 |
| | | 36 | Nx+ | 0.00 | 0.88 | 0.09 |
| | | 36 | Fy+ | 0.00 | 0.88 | 0.09 |
| | | 36 | Mz+ | -0.43 | 0.87 | 0.09 |
| | | 36 | Nx- | -10.58 | -1.77 | -0.09 |
| | | 36 | Fy- | -8.75 | -2.54 | -0.18 |
| | | 36 | Mz- | -8.75 | -2.54 | -0.18 |
| 513 | 513 | 33 | Nx+ | -4.96 | -0.65 | -0.01 |
| | | 33 | Fy+ | -4.96 | 0.88 | 0.08 |
| | | 33 | Mz+ | -4.96 | 0.87 | 0.08 |
| | | 33 | Nx- | -12.96 | -0.96 | -0.01 |
| | | 33 | Fy- | -12.96 | -2.65 | -0.12 |
| | | 33 | Mz- | -12.96 | -2.61 | -0.12 |
| | | 36 | Nx+ | 0.00 | 0.50 | 0.04 |
| | | 36 | Fy+ | 0.00 | 0.50 | 0.04 |
| | | 36 | Mz+ | -0.43 | 0.50 | 0.04 |
| | | 36 | Nx- | -10.58 | -1.33 | -0.04 |
| | | 36 | Fy- | -8.75 | -1.75 | -0.08 |
| | | 36 | Mz- | -8.75 | -1.75 | -0.08 |
| 514 | 514 | 33 | Nx+ | -4.96 | -0.55 | 0.00 |
| | | 33 | Fy+ | -4.96 | -0.05 | 0.02 |
| | | 33 | Mz+ | -7.44 | -0.06 | 0.02 |
| | | 33 | Nx- | -12.96 | -0.88 | 0.00 |
| | | 33 | Fy- | -12.96 | -1.43 | -0.03 |
| | | 33 | Mz- | -12.96 | -1.38 | -0.03 |
| | | 36 | Nx+ | 0.00 | 0.12 | 0.01 |
| | | 36 | Fy+ | 0.00 | 0.12 | 0.01 |
| | | 36 | Mz+ | -0.43 | 0.12 | 0.01 |
| | | 36 | Nx- | -10.58 | -0.90 | -0.01 |
| | | 36 | Fy- | -10.58 | -1.03 | -0.01 |
| | | 36 | Mz- | -5.83 | -0.92 | -0.02 |
| 514 | 515 | 33 | Nx+ | -4.96 | 0.47 | 0.00 |
| | | 33 | Fy+ | -7.44 | 1.05 | 0.00 |
| | | 33 | Mz+ | -11.40 | 0.51 | 0.00 |
| | | 33 | Nx- | -12.96 | 0.83 | 0.00 |
| | | 33 | Fy- | -9.24 | 0.17 | 0.00 |
| | | 33 | Mz- | -11.40 | 0.51 | 0.00 |
| | | 36 | Nx+ | 0.00 | 0.26 | 0.00 |
| | | 36 | Fy+ | -6.70 | 0.54 | 0.00 |



| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Mz+ | -10.58 | 0.50 | 0.00 |
| | | 36 | Nx- | -10.58 | 0.50 | 0.00 |
| | | 36 | Fy- | -7.88 | 0.14 | 0.00 |
| | | 36 | Mz- | -10.58 | 0.50 | 0.00 |
| 520 | 320 | 33 | Nx+ | -4.96 | 1.64 | 0.69 |
| | | 33 | Fy+ | -4.96 | 9.33 | 3.79 |
| | | 33 | Mz+ | -4.96 | 9.33 | 3.79 |
| | | 33 | Nx- | -12.96 | 2.37 | 0.85 |
| | | 33 | Fy- | -12.96 | -3.89 | -1.71 |
| | | 33 | Mz- | -12.96 | -3.89 | -1.71 |
| | | 36 | Nx+ | 0.00 | 2.33 | 1.13 |
| | | 36 | Fy+ | -0.97 | 2.33 | 1.13 |
| | | 36 | Mz+ | -0.97 | 2.33 | 1.13 |
| | | 36 | Nx- | -10.58 | 0.74 | 0.26 |
| | | 36 | Fy- | -7.88 | -2.73 | -1.13 |
| | | 36 | Mz- | -7.88 | -2.73 | -1.13 |
| 410 | 310 | 33 | Nx+ | -6.36 | 55.08 | 19.31 |
| | | 33 | Fy+ | -48.24 | 80.85 | 81.07 |
| | | 33 | Mz+ | -53.45 | 75.21 | 100.30 |
| | | 33 | Nx- | -57.27 | 53.63 | 86.71 |
| | | 33 | Fy- | -18.36 | 31.52 | 36.74 |
| | | 33 | Mz- | -12.12 | 35.27 | 11.30 |
| | | 36 | Nx+ | -0.35 | 16.12 | 13.03 |
| | | 36 | Fy+ | -39.74 | 54.44 | 58.70 |
| | | 36 | Mz+ | -41.29 | 54.26 | 64.22 |
| | | 36 | Nx- | -42.35 | 49.79 | 62.13 |
| | | 36 | Fy- | -0.35 | 16.12 | 13.03 |
| | | 36 | Mz- | -4.00 | 16.86 | 12.94 |
| 411 | 411 | 33 | Nx+ | -6.36 | 40.35 | -0.10 |
| | | 33 | Fy+ | -53.42 | 67.51 | 73.55 |
| | | 33 | Mz+ | -53.73 | 66.49 | 73.85 |
| | | 33 | Nx- | -57.27 | 46.33 | 67.79 |
| | | 33 | Fy- | -12.78 | 20.66 | 3.74 |
| | | 33 | Mz- | -6.78 | 37.02 | -1.66 |
| | | 36 | Nx+ | -0.35 | 12.38 | 7.27 |
| | | 36 | Fy+ | -41.29 | 44.19 | 45.06 |
| | | 36 | Mz+ | -41.58 | 32.68 | 47.86 |
| | | 36 | Nx- | -42.35 | 40.66 | 44.54 |
| | | 36 | Fy- | -0.35 | 12.38 | 7.27 |
| | | 36 | Mz- | -4.00 | 12.91 | 6.92 |
| 412 | 412 | 33 | Nx+ | -6.36 | 22.93 | -38.33 |
| | | 33 | Fy+ | -52.44 | 50.25 | 8.75 |
| | | 33 | Mz+ | -56.66 | 33.43 | 30.46 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Nx- | -57.27 | 37.48 | 23.48 |
| | | 33 | Fy- | -12.42 | 8.76 | -20.57 |
| | | 33 | Mz- | -16.47 | 36.50 | -42.00 |
| | | 36 | Nx+ | -0.35 | 8.49 | -5.05 |
| | | 36 | Fy+ | -41.29 | 32.26 | 2.98 |
| | | 36 | Mz+ | -37.63 | 17.36 | 18.82 |
| | | 36 | Nx- | -42.35 | 29.80 | 5.73 |
| | | 36 | Fy- | -0.35 | 8.49 | -5.05 |
| | | 36 | Mz- | -21.92 | 28.99 | -15.38 |
| 413 | 413 | 33 | Nx+ | -6.36 | 8.84 | -60.67 |
| | | 33 | Fy+ | -52.46 | 36.39 | -38.67 |
| | | 33 | Mz+ | -42.20 | 19.26 | 6.18 |
| | | 33 | Nx- | -57.27 | 28.93 | -12.66 |
| | | 33 | Fy- | -12.20 | -0.01 | -34.60 |
| | | 33 | Mz- | -17.19 | 23.35 | -78.52 |
| | | 36 | Nx+ | -0.35 | 5.26 | -13.77 |
| | | 36 | Fy+ | -41.29 | 21.89 | -28.03 |
| | | 36 | Mz+ | -37.63 | 12.94 | 1.89 |
| | | 36 | Nx- | -42.35 | 20.32 | -23.03 |
| | | 36 | Fy- | -20.21 | 4.70 | -14.78 |
| | | 36 | Mz- | -21.95 | 18.12 | -43.44 |
| 414 | 414 | 33 | Nx+ | -6.36 | -3.03 | -69.97 |
| | | 33 | Fy+ | -53.03 | 28.13 | -51.01 |
| | | 33 | Mz+ | -41.99 | 14.00 | -9.95 |
| | | 33 | Nx- | -57.27 | 20.01 | -40.63 |
| | | 33 | Fy- | -12.36 | -6.72 | -46.29 |
| | | 33 | Mz- | -17.69 | 10.84 | -102.13 |
| | | 36 | Nx+ | -0.35 | 2.56 | -19.50 |
| | | 36 | Fy+ | -41.27 | 12.86 | -48.72 |
| | | 36 | Mz+ | -32.20 | 6.80 | -8.80 |
| | | 36 | Nx- | -42.35 | 11.99 | -43.01 |
| | | 36 | Fy- | -20.21 | 0.88 | -19.99 |
| | | 36 | Mz- | -21.95 | 8.82 | -61.39 |
| 415 | 415 | 33 | Nx+ | -6.36 | -3.38 | -69.77 |
| | | 33 | Fy+ | -52.65 | 18.97 | -69.54 |
| | | 33 | Mz+ | -41.92 | 9.15 | -22.06 |
| | | 33 | Nx- | -57.27 | 10.87 | -60.33 |
| | | 33 | Fy- | -10.74 | -13.66 | -64.80 |
| | | 33 | Mz- | -17.70 | -1.69 | -113.43 |
| | | 36 | Nx+ | -0.35 | 0.20 | -22.72 |
| | | 36 | Fy+ | -41.58 | 5.17 | -35.87 |
| | | 36 | Mz+ | -32.20 | 3.75 | -15.94 |
| | | 36 | Nx- | -42.35 | 4.37 | -55.26 |
| | | 36 | Fy- | -22.55 | -3.08 | -27.45 |



| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Mz- | -21.95 | 0.68 | -70.72 |
| 415 | 400 | 33 | Nx+ | -6.36 | -0.97 | -67.76 |
| | | 33 | Fy+ | -52.59 | 22.15 | -86.83 |
| | | 33 | Mz+ | -36.80 | 2.12 | -29.32 |
| | | 33 | Nx- | -57.27 | 13.37 | -71.55 |
| | | 33 | Fy- | -10.79 | -11.11 | -54.92 |
| | | 33 | Mz- | -22.89 | 7.14 | -114.45 |
| | | 36 | Nx+ | -0.35 | 2.05 | -23.76 |
| | | 36 | Fy+ | -41.58 | 7.67 | -41.82 |
| | | 36 | Mz+ | -20.21 | -0.64 | -20.22 |
| | | 36 | Nx- | -42.35 | 6.87 | -60.46 |
| | | 36 | Fy- | -22.55 | -1.23 | -25.45 |
| | | 36 | Mz- | -23.50 | 5.06 | -72.92 |

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | éz |
|---|---|---|---|---|---|
| 1 | 33 | ux+ | 0.014559 | -0.013982 | -0.003576 |
| | 33 | uy+ | 0.012165 | -0.007517 | -0.002059 |
| | 33 | éz+ | -0.012589 | -0.016169 | 0.000598 |
| | 33 | ux- | -0.014284 | -0.024467 | -0.000519 |
| | 33 | uy- | -0.014171 | -0.026981 | -0.000860 |
| | 33 | éz- | 0.012222 | -0.018056 | -0.003953 |
| | 36 | ux+ | 0.004747 | -0.007534 | -0.000756 |
| | 36 | uy+ | 0.003538 | -0.004352 | -0.000393 |
| | 36 | éz+ | -0.003387 | -0.005657 | 0.000198 |
| | 36 | ux- | -0.004556 | -0.008253 | 0.000028 |
| | 36 | uy- | -0.002376 | -0.015316 | -0.001347 |
| | 36 | éz- | 0.002674 | -0.014108 | -0.001813 |
| 2 | 33 | ux+ | 0.014544 | -0.016712 | -0.003747 |
| | 33 | uy+ | 0.007649 | -0.008785 | -0.001317 |
| | 33 | éz+ | -0.013315 | -0.017176 | 0.000387 |
| | 33 | ux- | -0.014295 | -0.024919 | -0.000628 |
| | 33 | uy- | -0.014024 | -0.027716 | -0.001042 |
| | 33 | éz- | 0.012960 | -0.019150 | -0.004059 |
| | 36 | ux+ | 0.004741 | -0.008072 | -0.000680 |
| | 36 | uy+ | 0.003534 | -0.004641 | -0.000383 |
| | 36 | éz+ | -0.003391 | -0.005559 | 0.000079 |
| | 36 | ux- | -0.004563 | -0.008320 | -0.000189 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | uy- | -0.002165 | -0.016397 | -0.001524 |
| | 36 | éz- | 0.002772 | -0.015283 | -0.001868 |
| 3 | 33 | ux+ | 0.014527 | -0.019445 | -0.003585 |
| | 33 | uy+ | 0.007639 | -0.009702 | -0.001142 |
| | 33 | éz+ | -0.013326 | -0.016888 | 0.000421 |
| | 33 | ux- | -0.014305 | -0.025294 | -0.000333 |
| | 33 | uy- | -0.010333 | -0.028593 | -0.001716 |
| | 33 | éz- | 0.013775 | -0.021395 | -0.003824 |
| | 36 | ux+ | 0.004736 | -0.008524 | -0.000528 |
| | 36 | uy+ | 0.003532 | -0.004910 | -0.000336 |
| | 36 | éz+ | -0.003394 | -0.005525 | 0.000023 |
| | 36 | ux- | -0.004568 | -0.008506 | -0.000293 |
| | 36 | uy- | -0.002176 | -0.017492 | -0.001384 |
| | 36 | éz- | 0.002762 | -0.016608 | -0.001669 |
| 4 | 33 | ux+ | 0.014509 | -0.021959 | -0.003162 |
| | 33 | uy+ | 0.007627 | -0.010453 | -0.000874 |
| | 33 | éz+ | -0.014089 | -0.019377 | 0.000679 |
| | 33 | ux- | -0.014315 | -0.025344 | 0.000242 |
| | 33 | uy- | -0.007763 | -0.029694 | -0.001280 |
| | 33 | éz- | 0.014463 | -0.023526 | -0.003329 |
| | 36 | ux+ | 0.004730 | -0.008842 | -0.000331 |
| | 36 | uy+ | 0.003528 | -0.005134 | -0.000268 |
| | 36 | éz+ | -0.003398 | -0.005511 | 0.000019 |
| | 36 | ux- | -0.004574 | -0.008729 | -0.000297 |
| | 36 | uy- | -0.001408 | -0.018398 | -0.001064 |
| | 36 | éz- | 0.002822 | -0.017500 | -0.001281 |
| 5 | 33 | ux+ | 0.014493 | -0.024071 | -0.002531 |
| | 33 | uy+ | 0.000098 | -0.010761 | -0.000285 |
| | 33 | éz+ | -0.014250 | -0.020269 | 0.001142 |
| | 33 | ux- | -0.014323 | -0.022654 | 0.001029 |
| | 33 | uy- | -0.002840 | -0.030455 | -0.000593 |
| | 33 | éz- | 0.014451 | -0.025734 | -0.002617 |
| | 36 | ux+ | 0.004725 | -0.009010 | -0.000120 |
| | 36 | uy+ | 0.003526 | -0.005304 | -0.000190 |
| | 36 | éz+ | 0.002177 | -0.009892 | 0.000068 |
| | 36 | ux- | -0.004578 | -0.006682 | -0.000170 |
| | 36 | uy- | 0.000062 | -0.019040 | -0.000598 |
| | 36 | éz- | 0.002877 | -0.017813 | -0.000778 |
| 6 | 33 | ux+ | 0.014476 | -0.025667 | -0.001758 |
| | 33 | uy+ | 0.000084 | -0.010871 | 0.000000 |
| | 33 | éz+ | -0.014280 | -0.025680 | 0.001758 |
| | 33 | ux- | -0.014334 | -0.021624 | 0.001758 |
| | 33 | uy- | 0.002955 | -0.030522 | -0.000423 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2. Fecha JUNIO-2002 Página de

| | | | | | |
|---|---|---|---|---|---|
| | 33 | éz- | 0.014476 | -0.025667 | -0.001758 |
| | 36 | ux+ | 0.004720 | -0.009026 | 0.000072 |
| | 36 | uy+ | 0.003522 | -0.005417 | -0.000116 |
| | 36 | éz+ | 0.002171 | -0.012000 | 0.000340 |
| | 36 | ux- | -0.004584 | -0.006775 | -0.000072 |
| | 36 | uy- | 0.000055 | -0.019260 | 0.000000 |
| | 36 | éz- | -0.002071 | -0.012007 | -0.000340 |
| 111 | 33 | ux+ | 0.001121 | -0.006537 | -0.001391 |
| | 33 | uy+ | 0.001089 | -0.004645 | -0.001389 |
| | 33 | éz+ | -0.002911 | -0.025935 | 0.003544 |
| | 33 | ux- | -0.002911 | -0.025935 | 0.003544 |
| | 33 | uy- | -0.002902 | -0.025986 | 0.003535 |
| | 33 | éz- | 0.001099 | -0.004742 | -0.001398 |
| | 36 | ux+ | 0.000475 | -0.004806 | -0.000561 |
| | 36 | uy+ | 0.000429 | -0.003819 | -0.000487 |
| | 36 | éz+ | -0.001089 | -0.013696 | 0.001308 |
| | 36 | ux- | -0.001089 | -0.013696 | 0.001308 |
| | 36 | uy- | -0.001089 | -0.013696 | 0.001308 |
| | 36 | éz- | 0.000475 | -0.004806 | -0.000561 |
| 112 | 33 | ux+ | 0.002638 | -0.006515 | -0.001806 |
| | 33 | uy+ | 0.002585 | -0.004663 | -0.001775 |
| | 33 | éz+ | -0.006018 | -0.026010 | 0.003134 |
| | 33 | ux- | -0.006021 | -0.025980 | 0.003134 |
| | 33 | uy- | -0.006003 | -0.026031 | 0.003128 |
| | 33 | éz- | 0.002636 | -0.006617 | -0.001817 |
| | 36 | ux+ | 0.001115 | -0.004818 | -0.000772 |
| | 36 | uy+ | 0.000962 | -0.003828 | -0.000626 |
| | 36 | éz+ | -0.002153 | -0.013708 | 0.000996 |
| | 36 | ux- | -0.002153 | -0.013723 | 0.000995 |
| | 36 | uy- | -0.002153 | -0.013723 | 0.000995 |
| | 36 | éz- | 0.001115 | -0.004818 | -0.000772 |
| 113 | 33 | ux+ | 0.004428 | -0.006640 | -0.001984 |
| | 33 | uy+ | 0.004337 | -0.004680 | -0.001946 |
| | 33 | éz+ | -0.008760 | -0.026054 | 0.002733 |
| | 33 | ux- | -0.008763 | -0.026023 | 0.002731 |
| | 33 | uy- | -0.008740 | -0.026075 | 0.002728 |
| | 33 | éz- | 0.004425 | -0.006610 | -0.001985 |
| | 36 | ux+ | 0.001863 | -0.004828 | -0.000805 |
| | 36 | uy+ | 0.001555 | -0.003835 | -0.000621 |
| | 36 | éz+ | -0.001952 | -0.008417 | 0.000753 |
| | 36 | ux- | -0.002959 | -0.013736 | 0.000742 |
| | 36 | uy- | -0.002957 | -0.013751 | 0.000738 |
| | 36 | éz- | 0.001863 | -0.004828 | -0.000805 |

| | | | | | |
|---|---|---|---|---|---|
| 114 | 33 | ux+ | 0.006301 | -0.006663 | -0.002023 |
| | 33 | uy+ | 0.006183 | -0.004698 | -0.001997 |
| | 33 | éz+ | -0.010003 | -0.024060 | 0.002276 |
| | 33 | ux- | -0.011100 | -0.026067 | 0.002257 |
| | 33 | uy- | -0.011076 | -0.026118 | 0.002256 |
| | 33 | éz- | 0.005159 | -0.007440 | -0.002090 |
| | 36 | ux+ | 0.002587 | -0.004839 | -0.000740 |
| | 36 | uy+ | 0.002100 | -0.003843 | -0.000541 |
| | 36 | éz+ | -0.002364 | -0.006729 | 0.000768 |
| | 36 | ux- | -0.003534 | -0.013767 | 0.000483 |
| | 36 | uy- | -0.003526 | -0.013782 | 0.000475 |
| | 36 | éz- | 0.002287 | -0.006539 | -0.000747 |
| 115 | 33 | ux+ | 0.008199 | -0.006682 | -0.002050 |
| | 33 | uy+ | 0.008053 | -0.004712 | -0.002012 |
| | 33 | éz+ | -0.010555 | -0.021340 | 0.001910 |
| | 33 | ux- | -0.012933 | -0.026140 | 0.001654 |
| | 33 | uy- | -0.012909 | -0.026161 | 0.001651 |
| | 33 | éz- | 0.006636 | -0.010154 | -0.002405 |
| | 36 | ux+ | 0.003235 | -0.004848 | -0.000647 |
| | 36 | uy+ | 0.002559 | -0.003849 | -0.000445 |
| | 36 | éz+ | -0.003084 | -0.006738 | 0.000765 |
| | 36 | ux- | -0.003845 | -0.013789 | 0.000165 |
| | 36 | uy- | -0.003827 | -0.013804 | 0.000153 |
| | 36 | éz- | 0.002962 | -0.006550 | -0.000698 |
| 116 | 33 | ux+ | 0.010227 | -0.005117 | -0.002301 |
| | 33 | uy+ | 0.009954 | -0.004728 | -0.002070 |
| | 33 | éz+ | -0.011558 | -0.020233 | 0.001512 |
| | 33 | ux- | -0.014127 | -0.026181 | 0.000861 |
| | 33 | uy- | -0.014100 | -0.026202 | 0.000858 |
| | 33 | éz- | 0.009081 | -0.010182 | -0.002853 |
| | 36 | ux+ | 0.003803 | -0.004857 | -0.000579 |
| | 36 | uy+ | 0.002939 | -0.003853 | -0.000376 |
| | 36 | éz+ | -0.003760 | -0.006747 | 0.000663 |
| | 36 | ux- | -0.003965 | -0.008451 | 0.000570 |
| | 36 | uy- | -0.003775 | -0.013831 | -0.000279 |
| | 36 | éz- | 0.000576 | -0.011752 | -0.000979 |
| 117 | 33 | ux+ | 0.012505 | -0.005556 | -0.002732 |
| | 33 | uy+ | 0.011952 | -0.004741 | -0.002238 |
| | 33 | éz+ | -0.011951 | -0.017160 | 0.001002 |
| | 33 | ux- | -0.014476 | -0.026221 | -0.000158 |
| | 33 | uy- | -0.014448 | -0.026242 | -0.000161 |
| | 33 | éz- | 0.009716 | -0.013238 | -0.003460 |
| | 36 | ux+ | 0.004339 | -0.004864 | -0.000583 |
| | 36 | uy+ | 0.003281 | -0.003858 | -0.000367 |



| | | | | | |
|---|---|---|---|---|---|
| | 36 | éz+ | -0.004285 | -0.006753 | 0.000440 |
| | 36 | ux- | -0.004383 | -0.008459 | 0.000305 |
| | 36 | uy- | -0.003251 | -0.013851 | -0.000867 |
| | 36 | éz- | 0.001594 | -0.011961 | -0.001466 |
| 211 | 33 | ux+ | 0.013097 | -0.007382 | -0.002849 |
| | 33 | uy+ | 0.012429 | -0.004743 | -0.002258 |
| | 33 | éz+ | -0.012157 | -0.017162 | 0.000955 |
| | 33 | ux- | -0.014433 | -0.026228 | -0.000250 |
| | 33 | uy- | -0.014403 | -0.026249 | -0.000253 |
| | 33 | éz- | 0.010459 | -0.013244 | -0.003527 |
| | 36 | ux+ | 0.004464 | -0.004867 | -0.000588 |
| | 36 | uy+ | 0.003358 | -0.003858 | -0.000371 |
| | 36 | éz+ | -0.004375 | -0.006755 | 0.000416 |
| | 36 | ux- | -0.004444 | -0.008462 | 0.000278 |
| | 36 | uy- | -0.003062 | -0.013855 | -0.000915 |
| | 36 | éz- | 0.001910 | -0.011965 | -0.001507 |
| 212 | 33 | ux+ | 0.013705 | -0.007388 | -0.002866 |
| | 33 | uy+ | 0.012911 | -0.004746 | -0.002266 |
| | 33 | éz+ | -0.012358 | -0.017166 | 0.000939 |
| | 33 | ux- | -0.014377 | -0.026232 | -0.000279 |
| | 33 | uy- | -0.014347 | -0.026253 | -0.000282 |
| | 33 | éz- | 0.011210 | -0.013248 | -0.003551 |
| | 36 | ux+ | 0.004588 | -0.004868 | -0.000590 |
| | 36 | uy+ | 0.003437 | -0.003859 | -0.000372 |
| | 36 | éz+ | -0.004463 | -0.006756 | 0.000408 |
| | 36 | ux- | -0.004504 | -0.008463 | 0.000269 |
| | 36 | uy- | -0.002866 | -0.013858 | -0.000941 |
| | 36 | éz- | 0.002232 | -0.011968 | -0.001530 |
| 213 | 33 | ux+ | 0.013920 | -0.009044 | -0.003132 |
| | 33 | uy+ | 0.012400 | -0.005546 | -0.002121 |
| | 33 | éz+ | -0.012432 | -0.016852 | 0.000861 |
| | 33 | ux- | -0.014356 | -0.026358 | -0.000427 |
| | 33 | uy- | -0.014326 | -0.026381 | -0.000430 |
| | 33 | éz- | 0.011474 | -0.014514 | -0.003658 |
| | 36 | ux+ | 0.004631 | -0.005076 | -0.000600 |
| | 36 | uy+ | 0.003464 | -0.003991 | -0.000380 |
| | 36 | éz+ | -0.004494 | -0.006620 | 0.000364 |
| | 36 | ux- | -0.004524 | -0.008377 | 0.000220 |
| | 36 | uy- | -0.002697 | -0.014205 | -0.001052 |
| | 36 | éz- | 0.002344 | -0.012517 | -0.001601 |
| 214 | 33 | ux+ | 0.014233 | -0.010531 | -0.003252 |
| | 33 | uy+ | 0.012610 | -0.006541 | -0.002158 |
| | 33 | éz+ | -0.012516 | -0.016481 | 0.000755 |

| | | | | | |
|---|---|---|---|---|---|
| | 33 | ux- | -0.014322 | -0.024491 | -0.000383 |
| | 33 | uy- | -0.014280 | -0.026631 | -0.000617 |
| | 33 | éz- | 0.011840 | -0.016249 | -0.003796 |
| | 36 | ux+ | 0.004690 | -0.005357 | -0.000607 |
| | 36 | uy+ | 0.003501 | -0.004169 | -0.000387 |
| | 36 | éz+ | -0.004529 | -0.006469 | 0.000299 |
| | 36 | ux- | -0.004544 | -0.008293 | 0.000150 |
| | 36 | uy- | -0.002587 | -0.014724 | -0.001168 |
| | 36 | éz- | 0.002507 | -0.013285 | -0.001694 |
| 310 | 33 | ux+ | 0.000258 | -0.008528 | -0.000470 |
| | 33 | uy+ | 0.000194 | -0.004630 | -0.000807 |
| | 33 | éz+ | 0.000085 | -0.025894 | 0.003956 |
| | 33 | ux- | 0.000031 | -0.017622 | 0.002550 |
| | 33 | uy- | 0.000085 | -0.025945 | 0.003943 |
| | 33 | éz- | 0.000194 | -0.004728 | -0.000821 |
| | 36 | ux+ | 0.000190 | -0.011853 | 0.000906 |
| | 36 | uy+ | 0.000145 | -0.003813 | -0.000192 |
| | 36 | éz+ | 0.000104 | -0.013671 | 0.001677 |
| | 36 | ux- | 0.000002 | -0.004825 | 0.000505 |
| | 36 | uy- | 0.000104 | -0.013671 | 0.001677 |
| | 36 | éz- | 0.000145 | -0.003813 | -0.000192 |
| 311 | 33 | ux+ | 0.000619 | -0.006529 | -0.001099 |
| | 33 | uy+ | 0.000583 | -0.004638 | -0.001133 |
| | 33 | éz+ | -0.001454 | -0.025913 | 0.003737 |
| | 33 | ux- | -0.001454 | -0.025913 | 0.003737 |
| | 33 | uy- | -0.001449 | -0.025964 | 0.003724 |
| | 33 | éz- | 0.000587 | -0.004736 | -0.001147 |
| | 36 | ux+ | 0.000283 | -0.004802 | -0.000393 |
| | 36 | uy+ | 0.000258 | -0.003816 | -0.000363 |
| | 36 | éz+ | -0.000533 | -0.013682 | 0.001478 |
| | 36 | ux- | -0.000533 | -0.013682 | 0.001478 |
| | 36 | uy- | -0.000533 | -0.013682 | 0.001478 |
| | 36 | éz- | 0.000283 | -0.004802 | -0.000393 |
| 312 | 33 | ux+ | 0.000854 | -0.006534 | -0.001251 |
| | 33 | uy+ | 0.000821 | -0.004642 | -0.001267 |
| | 33 | éz+ | -0.002189 | -0.025924 | 0.003640 |
| | 33 | ux- | -0.002189 | -0.025924 | 0.003640 |
| | 33 | uy- | -0.002182 | -0.025975 | 0.003631 |
| | 33 | éz- | 0.000829 | -0.004740 | -0.001276 |
| | 36 | ux+ | 0.000371 | -0.004804 | -0.000484 |
| | 36 | uy+ | 0.000336 | -0.003817 | -0.000431 |
| | 36 | éz+ | -0.000819 | -0.013689 | 0.001391 |
| | 36 | ux- | -0.000819 | -0.013689 | 0.001391 |
| | 36 | uy- | -0.000819 | -0.013689 | 0.001391 |



| | | | | | |
|---|---|---|---|---|---|
| | 36 | éz- | 0.000371 | -0.004804 | -0.000484 |
| 320 | 33 | ux+ | 0.000000 | -0.012613 | -0.001070 |
| | 33 | uy+ | 0.000000 | -0.004626 | 0.000812 |
| | 33 | éz+ | 0.000000 | -0.004723 | 0.000825 |
| | 33 | ux- | 0.000000 | -0.012613 | -0.001070 |
| | 33 | uy- | 0.000000 | -0.025949 | -0.003947 |
| | 33 | éz- | 0.000000 | -0.025898 | -0.003961 |
| | 36 | ux+ | 0.000000 | -0.012543 | -0.001130 |
| | 36 | uy+ | 0.000000 | -0.003808 | 0.000194 |
| | 36 | éz+ | 0.000000 | -0.003808 | 0.000194 |
| | 36 | ux- | 0.000000 | -0.012543 | -0.001130 |
| | 36 | uy- | 0.000000 | -0.013673 | -0.001678 |
| | 36 | éz- | 0.000000 | -0.013673 | -0.001678 |
| 400 | 33 | ux+ | 0.000127 | -0.009033 | 0.000105 |
| | 33 | uy+ | 0.000041 | -0.005035 | 0.000000 |
| | 33 | éz+ | 0.000075 | -0.010359 | 0.001358 |
| | 33 | ux- | 0.000014 | -0.008490 | 0.000647 |
| | 33 | uy- | 0.000103 | -0.011747 | 0.000011 |
| | 33 | éz- | 0.000120 | -0.010356 | -0.001358 |
| | 36 | ux+ | 0.000095 | -0.007544 | -0.000081 |
| | 36 | uy+ | 0.000001 | -0.002949 | 0.000000 |
| | 36 | éz+ | 0.000081 | -0.007298 | 0.000174 |
| | 36 | ux- | 0.000001 | -0.002949 | 0.000000 |
| | 36 | uy- | 0.000090 | -0.007582 | 0.000000 |
| | 36 | éz- | 0.000095 | -0.007298 | -0.000174 |
| 411 | 33 | ux+ | 0.000249 | -0.008652 | -0.000245 |
| | 33 | uy+ | 0.000187 | -0.004879 | -0.000624 |
| | 33 | éz+ | 0.000082 | -0.024441 | 0.004063 |
| | 33 | ux- | 0.000028 | -0.016724 | 0.002580 |
| | 33 | uy- | 0.000082 | -0.024544 | 0.004048 |
| | 33 | éz- | 0.000187 | -0.004983 | -0.000639 |
| | 36 | ux+ | 0.000184 | -0.011505 | 0.001072 |
| | 36 | uy+ | 0.000140 | -0.003860 | -0.000090 |
| | 36 | éz+ | 0.000100 | -0.013064 | 0.001782 |
| | 36 | ux- | 0.000002 | -0.004642 | 0.000535 |
| | 36 | uy- | 0.000100 | -0.013064 | 0.001782 |
| | 36 | éz- | 0.000140 | -0.003860 | -0.000090 |
| 412 | 33 | ux+ | 0.000223 | -0.008755 | 0.000158 |
| | 33 | uy+ | 0.000168 | -0.005293 | -0.000310 |
| | 33 | éz+ | 0.000073 | -0.020671 | 0.004010 |
| | 33 | ux- | 0.000025 | -0.014381 | 0.002439 |
| | 33 | uy- | 0.000073 | -0.020794 | 0.003983 |
| | 33 | éz- | 0.000165 | -0.005510 | -0.000337 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | ux+ | 0.000165 | -0.010396 | 0.001261 |
| | 36 | uy+ | 0.000125 | -0.003853 | 0.000087 |
| | 36 | éz+ | 0.000089 | -0.011370 | 0.001821 |
| | 36 | ux- | 0.000001 | -0.004135 | 0.000545 |
| | 36 | uy- | 0.000089 | -0.011370 | 0.001821 |
| | 36 | éz- | 0.000125 | -0.003853 | 0.000087 |
| 413 | 33 | ux+ | 0.000201 | -0.008559 | 0.000204 |
| | 33 | uy+ | 0.000114 | -0.005455 | 0.000235 |
| | 33 | éz+ | 0.000066 | -0.017177 | 0.003589 |
| | 33 | ux- | 0.000022 | -0.012274 | 0.002074 |
| | 33 | uy- | 0.000118 | -0.017346 | 0.003424 |
| | 33 | éz- | 0.000148 | -0.005780 | -0.000292 |
| | 36 | ux+ | 0.000147 | -0.009260 | 0.001162 |
| | 36 | uy+ | 0.000002 | -0.003650 | 0.000460 |
| | 36 | éz+ | 0.000080 | -0.009761 | 0.001594 |
| | 36 | ux- | 0.000001 | -0.003659 | 0.000472 |
| | 36 | uy- | 0.000127 | -0.009842 | 0.001470 |
| | 36 | éz- | 0.000112 | -0.003735 | 0.000149 |
| 414 | 33 | ux+ | 0.000175 | -0.008435 | 0.000136 |
| | 33 | uy+ | 0.000101 | -0.005238 | 0.000299 |
| | 33 | éz+ | 0.000058 | -0.014138 | 0.002945 |
| | 33 | ux- | 0.000020 | -0.010736 | 0.001765 |
| | 33 | uy- | 0.000103 | -0.014444 | 0.002818 |
| | 33 | éz- | 0.000128 | -0.006233 | -0.000460 |
| | 36 | ux+ | 0.000130 | -0.008308 | 0.000861 |
| | 36 | uy+ | 0.000001 | -0.003278 | 0.000344 |
| | 36 | éz+ | 0.000070 | -0.008458 | 0.001196 |
| | 36 | ux- | 0.000001 | -0.003278 | 0.000344 |
| | 36 | uy- | 0.000111 | -0.008644 | 0.001077 |
| | 36 | éz- | 0.000098 | -0.003605 | 0.000121 |
| 415 | 33 | ux+ | 0.000153 | -0.008469 | -0.000233 |
| | 33 | uy+ | 0.000087 | -0.005066 | 0.000055 |
| | 33 | éz+ | 0.000051 | -0.011766 | 0.002163 |
| | 33 | ux- | 0.000018 | -0.009353 | 0.001214 |
| | 33 | uy- | 0.000085 | -0.012319 | 0.001268 |
| | 33 | éz- | 0.000109 | -0.007022 | -0.000830 |
| | 36 | ux+ | 0.000113 | -0.007704 | 0.000424 |
| | 36 | uy+ | 0.000001 | -0.003033 | 0.000180 |
| | 36 | éz+ | 0.000061 | -0.007518 | 0.000701 |
| | 36 | ux- | 0.000001 | -0.003033 | 0.000180 |
| | 36 | uy- | 0.000097 | -0.007860 | 0.000601 |
| | 36 | éz- | 0.000086 | -0.003531 | 0.000026 |
| 511 | 33 | ux+ | 0.000259 | -0.008367 | -0.000468 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.2.* Fecha JUNIO-*2002* Página de

| | | | | | |
|---|---|---|---|---|---|
| | 33 | uy+ | 0.000195 | -0.004351 | -0.000805 |
| | 33 | éz+ | 0.000085 | -0.027277 | 0.003952 |
| | 33 | ux- | 0.000031 | -0.018516 | 0.002547 |
| | 33 | uy- | 0.000085 | -0.027324 | 0.003939 |
| | 33 | éz- | 0.000195 | -0.004444 | -0.000819 |
| | 36 | ux+ | 0.000192 | -0.012169 | 0.000907 |
| | 36 | uy+ | 0.000146 | -0.003745 | -0.000191 |
| | 36 | éz+ | 0.000104 | -0.014257 | 0.001677 |
| | 36 | ux- | 0.000002 | -0.005001 | 0.000503 |
| | 36 | uy- | 0.000104 | -0.014257 | 0.001677 |
| | 36 | éz- | 0.000146 | -0.003745 | -0.000191 |
| 512 | 33 | ux+ | 0.000259 | -0.008339 | -0.000468 |
| | 33 | uy+ | 0.000195 | -0.004307 | -0.000805 |
| | 33 | éz+ | 0.000087 | -0.027473 | 0.003952 |
| | 33 | ux- | 0.000032 | -0.018641 | 0.002547 |
| | 33 | uy- | 0.000087 | -0.027520 | 0.003939 |
| | 33 | éz- | 0.000195 | -0.004400 | -0.000819 |
| | 36 | ux+ | 0.000192 | -0.012213 | 0.000907 |
| | 36 | uy+ | 0.000146 | -0.003735 | -0.000190 |
| | 36 | éz+ | 0.000105 | -0.014341 | 0.001677 |
| | 36 | ux- | 0.000002 | -0.005026 | 0.000503 |
| | 36 | uy- | 0.000105 | -0.014341 | 0.001677 |
| | 36 | éz- | 0.000146 | -0.003735 | -0.000190 |
| 513 | 33 | ux+ | 0.000261 | -0.008319 | -0.000468 |
| | 33 | uy+ | 0.000196 | -0.004268 | -0.000805 |
| | 33 | éz+ | 0.000087 | -0.027673 | 0.003951 |
| | 33 | ux- | 0.000032 | -0.018771 | 0.002546 |
| | 33 | uy- | 0.000087 | -0.027720 | 0.003937 |
| | 33 | éz- | 0.000196 | -0.004361 | -0.000819 |
| | 36 | ux+ | 0.000193 | -0.012259 | 0.000907 |
| | 36 | uy+ | 0.000146 | -0.003725 | -0.000190 |
| | 36 | éz+ | 0.000105 | -0.014426 | 0.001677 |
| | 36 | ux- | 0.000002 | -0.005051 | 0.000503 |
| | 36 | uy- | 0.000105 | -0.014426 | 0.001677 |
| | 36 | éz- | 0.000146 | -0.003725 | -0.000190 |
| 514 | 33 | ux+ | 0.000261 | -0.008299 | -0.000468 |
| | 33 | uy+ | 0.000196 | -0.004230 | -0.000805 |
| | 33 | éz+ | 0.000087 | -0.027871 | 0.003951 |
| | 33 | ux- | 0.000032 | -0.018899 | 0.002546 |
| | 33 | uy- | 0.000087 | -0.027916 | 0.003937 |
| | 33 | éz- | 0.000196 | -0.004322 | -0.000819 |
| | 36 | ux+ | 0.000193 | -0.012304 | 0.000907 |
| | 36 | uy+ | 0.000146 | -0.003717 | -0.000190 |
| | 36 | éz+ | 0.000105 | -0.014507 | 0.001677 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | ux- | 0.000002 | -0.005076 | 0.000503 |
| | 36 | uy- | 0.000105 | -0.014507 | 0.001677 |
| | 36 | éz- | 0.000146 | -0.003717 | -0.000190 |
| 515 | 33 | ux+ | 0.000261 | -0.008271 | -0.000468 |
| | 33 | uy+ | 0.000196 | -0.004187 | -0.000805 |
| | 33 | éz+ | 0.000087 | -0.028068 | 0.003951 |
| | 33 | ux- | 0.000032 | -0.019024 | 0.002546 |
| | 33 | uy- | 0.000087 | -0.028111 | 0.003937 |
| | 33 | éz- | 0.000196 | -0.004277 | -0.000819 |
| | 36 | ux+ | 0.000193 | -0.012350 | 0.000907 |
| | 36 | uy+ | 0.000146 | -0.003707 | -0.000190 |
| | 36 | éz+ | 0.000105 | -0.014592 | 0.001677 |
| | 36 | ux- | 0.000002 | -0.005102 | 0.000503 |
| | 36 | uy- | 0.000105 | -0.014592 | 0.001677 |
| | 36 | éz- | 0.000146 | -0.003707 | -0.000190 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 310 | 33 | Fx+ | 0.00 | 6.85 | 0.00 |
| | 33 | Fy+ | 0.00 | 13.64 | 0.00 |
| | 33 | Mz+ | 0.00 | 6.85 | 0.00 |
| | 33 | Fx- | 0.00 | 6.85 | 0.00 |
| | 33 | Fy- | 0.00 | 2.43 | 0.00 |
| | 33 | Mz- | 0.00 | 6.85 | 0.00 |
| | 36 | Fx+ | 0.00 | 6.59 | 0.00 |
| | 36 | Fy+ | 0.00 | 7.18 | 0.00 |
| | 36 | Mz+ | 0.00 | 6.59 | 0.00 |
| | 36 | Fx- | 0.00 | 6.59 | 0.00 |
| | 36 | Fy- | 0.00 | 2.01 | 0.00 |
| | 36 | Mz- | 0.00 | 6.59 | 0.00 |
| 320 | 33 | Fx+ | 19.88 | 7.89 | 0.00 |
| | 33 | Fy+ | -19.88 | 13.64 | 0.00 |
| | 33 | Mz+ | 0.00 | 6.62 | 0.00 |
| | 33 | Fx- | -19.88 | 10.38 | 0.00 |
| | 33 | Fy- | 19.88 | 2.42 | 0.00 |
| | 33 | Mz- | 0.00 | 6.62 | 0.00 |
| | 36 | Fx+ | 15.50 | 4.36 | 0.00 |
| | 36 | Fy+ | -5.97 | 7.18 | 0.00 |



| | | | | | |
|---|---|---|---|---|---|
| | 36 | Mz+ | 0.00 | 6.59 | 0.00 |
| | 36 | Fx- | -15.50 | 4.74 | 0.00 |
| | 36 | Fy- | 12.02 | 1.99 | 0.00 |
| | 36 | Mz- | 0.00 | 6.59 | 0.00 |
| 400 | 33 | Fx+ | 0.00 | 10.97 | 0.00 |
| | 33 | Fy+ | 0.00 | 16.32 | 0.00 |
| | 33 | Mz+ | 0.00 | 10.97 | 0.00 |
| | 33 | Fx- | 0.00 | 10.97 | 0.00 |
| | 33 | Fy- | 0.00 | 6.99 | 0.00 |
| | 33 | Mz- | 0.00 | 10.97 | 0.00 |
| | 36 | Fx+ | 0.00 | 10.53 | 0.00 |
| | 36 | Fy+ | 0.00 | 10.53 | 0.00 |
| | 36 | Mz+ | 0.00 | 10.53 | 0.00 |
| | 36 | Fx- | 0.00 | 10.53 | 0.00 |
| | 36 | Fy- | 0.00 | 4.10 | 0.00 |
| | 36 | Mz- | 0.00 | 10.53 | 0.00 |
| 411 | 33 | Fx+ | 0.00 | 12.07 | 0.00 |
| | 33 | Fy+ | 0.00 | 23.51 | 0.00 |
| | 33 | Mz+ | 0.00 | 12.07 | 0.00 |
| | 33 | Fx- | 0.00 | 12.07 | 0.00 |
| | 33 | Fy- | 0.00 | 4.67 | 0.00 |
| | 33 | Mz- | 0.00 | 12.07 | 0.00 |
| | 36 | Fx+ | 0.00 | 11.59 | 0.00 |
| | 36 | Fy+ | 0.00 | 12.50 | 0.00 |
| | 36 | Mz+ | 0.00 | 11.59 | 0.00 |
| | 36 | Fx- | 0.00 | 11.59 | 0.00 |
| | 36 | Fy- | 0.00 | 3.70 | 0.00 |
| | 36 | Mz- | 0.00 | 11.59 | 0.00 |
| 412 | 33 | Fx+ | 0.00 | 15.72 | 0.00 |
| | 33 | Fy+ | 0.00 | 28.88 | 0.00 |
| | 33 | Mz+ | 0.00 | 15.72 | 0.00 |
| | 33 | Fx- | 0.00 | 15.72 | 0.00 |
| | 33 | Fy- | 0.00 | 7.34 | 0.00 |
| | 33 | Mz- | 0.00 | 15.72 | 0.00 |
| | 36 | Fx+ | 0.00 | 15.05 | 0.00 |
| | 36 | Fy+ | 0.00 | 15.80 | 0.00 |
| | 36 | Mz+ | 0.00 | 15.05 | 0.00 |
| | 36 | Fx- | 0.00 | 15.05 | 0.00 |
| | 36 | Fy- | 0.00 | 5.35 | 0.00 |
| | 36 | Mz- | 0.00 | 15.05 | 0.00 |
| 413 | 33 | Fx+ | 0.00 | 13.90 | 0.00 |
| | 33 | Fy+ | 0.00 | 24.10 | 0.00 |
| | 33 | Mz+ | 0.00 | 13.90 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| | 33 | Fx- | 0.00 | 13.90 | 0.00 |
| | 33 | Fy- | 0.00 | 7.58 | 0.00 |
| | 33 | Mz- | 0.00 | 13.90 | 0.00 |
| | 36 | Fx+ | 0.00 | 13.29 | 0.00 |
| | 36 | Fy+ | 0.00 | 13.67 | 0.00 |
| | 36 | Mz+ | 0.00 | 13.29 | 0.00 |
| | 36 | Fx- | 0.00 | 13.29 | 0.00 |
| | 36 | Fy- | 0.00 | 5.07 | 0.00 |
| | 36 | Mz- | 0.00 | 13.29 | 0.00 |
| 414 | 33 | Fx+ | 0.00 | 12.39 | 0.00 |
| | 33 | Fy+ | 0.00 | 20.06 | 0.00 |
| | 33 | Mz+ | 0.00 | 12.39 | 0.00 |
| | 33 | Fx- | 0.00 | 12.39 | 0.00 |
| | 33 | Fy- | 0.00 | 7.28 | 0.00 |
| | 33 | Mz- | 0.00 | 12.39 | 0.00 |
| | 36 | Fx+ | 0.00 | 11.82 | 0.00 |
| | 36 | Fy+ | 0.00 | 12.01 | 0.00 |
| | 36 | Mz+ | 0.00 | 11.82 | 0.00 |
| | 36 | Fx- | 0.00 | 11.82 | 0.00 |
| | 36 | Fy- | 0.00 | 4.55 | 0.00 |
| | 36 | Mz- | 0.00 | 11.82 | 0.00 |
| 415 | 33 | Fx+ | 0.00 | 11.36 | 0.00 |
| | 33 | Fy+ | 0.00 | 17.10 | 0.00 |
| | 33 | Mz+ | 0.00 | 11.36 | 0.00 |
| | 33 | Fx- | 0.00 | 11.36 | 0.00 |
| | 33 | Fy- | 0.00 | 7.03 | 0.00 |
| | 33 | Mz- | 0.00 | 11.36 | 0.00 |
| | 36 | Fx+ | 0.00 | 10.86 | 0.00 |
| | 36 | Fy+ | 0.00 | 10.91 | 0.00 |
| | 36 | Mz+ | 0.00 | 10.86 | 0.00 |
| | 36 | Fx- | 0.00 | 10.86 | 0.00 |
| | 36 | Fy- | 0.00 | 4.21 | 0.00 |
| | 36 | Mz- | 0.00 | 10.86 | 0.00 |
| 511 | 33 | Fx+ | 0.00 | 4.03 | 0.00 |
| | 33 | Fy+ | 0.00 | 8.18 | 0.00 |
| | 33 | Mz+ | 0.00 | 4.03 | 0.00 |
| | 33 | Fx- | 0.00 | 4.03 | 0.00 |
| | 33 | Fy- | 0.00 | 1.31 | 0.00 |
| | 33 | Mz- | 0.00 | 4.03 | 0.00 |
| | 36 | Fx+ | 0.00 | 3.88 | 0.00 |
| | 36 | Fy+ | 0.00 | 4.27 | 0.00 |
| | 36 | Mz+ | 0.00 | 3.88 | 0.00 |
| | 36 | Fx- | 0.00 | 3.88 | 0.00 |
| | 36 | Fy- | 0.00 | 1.12 | 0.00 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.2.* Fecha JUNIO-2002 Página de

| | | | | | |
|---|---|---|---|---|---|
| | 36 | Mz- | 0.00 | 3.88 | 0.00 |
| 512 | 33 | Fx+ | 0.00 | 1.01 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.07 | 0.00 |
| | 33 | Mz+ | 0.00 | 1.01 | 0.00 |
| | 33 | Fx- | 0.00 | 1.01 | 0.00 |
| | 33 | Fy- | 0.00 | 0.34 | 0.00 |
| | 33 | Mz- | 0.00 | 1.01 | 0.00 |
| | 36 | Fx+ | 0.00 | 0.97 | 0.00 |
| | 36 | Fy+ | 0.00 | 1.07 | 0.00 |
| | 36 | Mz+ | 0.00 | 0.97 | 0.00 |
| | 36 | Fx- | 0.00 | 0.97 | 0.00 |
| | 36 | Fy- | 0.00 | 0.28 | 0.00 |
| | 36 | Mz- | 0.00 | 0.97 | 0.00 |
| 513 | 33 | Fx+ | 0.00 | 1.02 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.07 | 0.00 |
| | 33 | Mz+ | 0.00 | 1.02 | 0.00 |
| | 33 | Fx- | 0.00 | 1.02 | 0.00 |
| | 33 | Fy- | 0.00 | 0.33 | 0.00 |
| | 33 | Mz- | 0.00 | 1.02 | 0.00 |
| | 36 | Fx+ | 0.00 | 0.98 | 0.00 |
| | 36 | Fy+ | 0.00 | 1.08 | 0.00 |
| | 36 | Mz+ | 0.00 | 0.98 | 0.00 |
| | 36 | Fx- | 0.00 | 0.98 | 0.00 |
| | 36 | Fy- | 0.00 | 0.28 | 0.00 |
| | 36 | Mz- | 0.00 | 0.98 | 0.00 |
| 514 | 33 | Fx+ | 0.00 | 1.02 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.09 | 0.00 |
| | 33 | Mz+ | 0.00 | 1.02 | 0.00 |
| | 33 | Fx- | 0.00 | 1.02 | 0.00 |
| | 33 | Fy- | 0.00 | 0.33 | 0.00 |
| | 33 | Mz- | 0.00 | 1.02 | 0.00 |
| | 36 | Fx+ | 0.00 | 0.98 | 0.00 |
| | 36 | Fy+ | 0.00 | 1.08 | 0.00 |
| | 36 | Mz+ | 0.00 | 0.98 | 0.00 |
| | 36 | Fx- | 0.00 | 0.98 | 0.00 |
| | 36 | Fy- | 0.00 | 0.27 | 0.00 |
| | 36 | Mz- | 0.00 | 0.98 | 0.00 |
| 515 | 33 | Fx+ | 0.00 | 0.51 | 0.00 |
| | 33 | Fy+ | 0.00 | 1.05 | 0.00 |
| | 33 | Mz+ | 0.00 | 0.51 | 0.00 |
| | 33 | Fx- | 0.00 | 0.51 | 0.00 |
| | 33 | Fy- | 0.00 | 0.17 | 0.00 |
| | 33 | Mz- | 0.00 | 0.51 | 0.00 |

| | | | | |
|---|---|---|---|---|
| 36 | Fx+ | 0.00 | 0.50 | 0.00 |
| 36 | Fy+ | 0.00 | 0.54 | 0.00 |
| 36 | Mz+ | 0.00 | 0.50 | 0.00 |
| 36 | Fx- | 0.00 | 0.50 | 0.00 |
| 36 | Fy- | 0.00 | 0.14 | 0.00 |
| 36 | Mz- | 0.00 | 0.50 | 0.00 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.2.* Fecha JUNIO-*2002* Página de

# ENVOLVENTE DE SERVICIO.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2. Fecha JUNIO-2002 Página de

**Fichero: MA_SER.LST**

```
LISTADO DE ESTADOS DE CARGA
Fecha : 09.05.2002 10:34:42
Título: L.A.V. TRAMO: MARTORELL-LLEIDA - ODT 300.2
Coment: Envolventes totales
Titlst: Estado Servicio. Proyecto: L.A.V. TRAMO: MARTORELL


Tabla de estados de carga a listar
 ec Fichero    tipo   Título
 30 MA_SERV       1   [Envolvente de Servicio (Marco en Servicio)         ]


ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

 MEMB    JT    EC  ENV     Nx         Fy         Mz
    1     1    30  Nx+    -13.30     -19.78     -10.99
               30  Fy+    -23.29     -16.98      -4.13
               30  Mz+    -17.40     -24.39       0.80
               30  Nx-    -30.95     -36.58     -26.01
               30  Fy-    -26.96     -41.40     -29.32
               30  Mz-    -27.15     -33.74     -35.76

    2     2    30  Nx+    -13.30     -15.86       2.19
               30  Fy+    -23.51     -12.43       9.97
               30  Mz+    -18.49     -21.97      18.08
               30  Nx-    -30.95     -32.66      -0.40
               30  Fy-    -27.24     -34.92      -5.85
               30  Mz-    -26.38     -26.70     -13.24

    3     3    30  Nx+    -13.30     -11.94      12.47
               30  Fy+    -23.89      -7.56      21.70
               30  Mz+    -19.70     -17.63      33.42
               30  Nx-    -30.95     -24.27      20.66
               30  Fy-    -27.24     -28.42      12.65
               30  Mz-    -24.59     -17.25       2.89

    4     4    30  Nx+    -13.30      -8.01      19.85
               30  Fy+    -24.40      -2.33      30.56
               30  Mz+    -20.46     -11.69      44.06
               30  Nx-    -30.95     -15.86      35.50
               30  Fy-    -26.95     -21.94      26.06
               30  Mz-    -23.61     -10.06      12.31

    5     5    30  Nx+    -13.30      -4.09      24.33
               30  Fy+    -24.99       3.27      36.04
               30  Mz+    -20.75      -5.22      49.86
               30  Nx-    -30.95      -7.46      44.14
               30  Fy-    -26.35     -15.50      34.37
               30  Mz-    -23.65      -6.10      18.29

    6     6    30  Nx+    -13.30      -0.17      25.90
               30  Fy+    -25.62       9.23      37.58
               30  Mz+    -17.29       0.90      51.65
               30  Nx-    -30.95       0.93      46.54
               30  Fy-    -25.61      -9.23      37.63
               30  Mz-    -27.11       0.00      20.34

  111   111    30  Nx+    -37.79     -24.82     -32.46
               30  Fy+    -59.20      -3.01     -19.13
               30  Mz+    -42.23     -13.13     -11.10
               30  Nx-    -66.09     -10.98     -23.36
               30  Fy-    -38.04     -25.50     -37.08
               30  Mz-    -61.68     -16.67     -46.87

  112   112    30  Nx+    -36.16     -15.92     -13.52
               30  Fy+    -57.56       1.99     -18.69
               30  Mz+    -40.56      -5.67      -2.37
               30  Nx-    -64.46      -3.48     -16.67
               30  Fy-    -36.41     -16.60     -17.50
               30  Mz-    -57.13      -9.61     -34.82

  113   113    30  Nx+    -34.52      -7.89      -2.48
               30  Fy+    -55.93       6.41     -22.65
```

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Mz+ | -36.74 | -4.23 | 1.53 |
| | | 30 | Nx- | -62.82 | 3.15 | -16.59 |
| | | 30 | Fy- | -34.77 | -8.57 | -5.83 |
| | | 30 | Mz- | -57.67 | 1.40 | -30.40 |
| 114 | 114 | 30 | Nx+ | -32.89 | -0.74 | 1.47 |
| | | 30 | Fy+ | -54.30 | 10.59 | -22.34 |
| | | 30 | Mz+ | -35.11 | 2.92 | 2.08 |
| | | 30 | Nx- | -61.19 | 8.90 | -22.27 |
| | | 30 | Fy- | -33.14 | -1.76 | -9.36 |
| | | 30 | Mz- | -56.04 | 5.24 | -33.56 |
| 115 | 115 | 30 | Nx+ | -31.26 | 5.54 | -0.85 |
| | | 30 | Fy+ | -52.67 | 15.47 | -34.57 |
| | | 30 | Mz+ | -31.29 | 5.74 | -0.68 |
| | | 30 | Nx- | -59.56 | 13.78 | -32.93 |
| | | 30 | Fy- | -31.51 | 2.89 | -9.95 |
| | | 30 | Mz- | -55.27 | 12.45 | -43.27 |
| 116 | 116 | 30 | Nx+ | -29.62 | 10.96 | -8.63 |
| | | 30 | Fy+ | -51.03 | 19.49 | -50.96 |
| | | 30 | Mz+ | -29.62 | 11.04 | -8.61 |
| | | 30 | Nx- | -57.92 | 17.80 | -47.75 |
| | | 30 | Fy- | -29.87 | 6.97 | -14.59 |
| | | 30 | Mz- | -51.12 | 15.42 | -56.27 |
| 116 | 117 | 30 | Nx+ | -27.99 | 15.50 | -21.05 |
| | | 30 | Fy+ | -47.22 | 23.04 | -59.98 |
| | | 30 | Mz+ | -27.99 | 15.32 | -21.02 |
| | | 30 | Nx- | -56.29 | 20.94 | -65.87 |
| | | 30 | Fy- | -30.42 | 10.05 | -33.45 |
| | | 30 | Mz- | -49.53 | 18.03 | -71.97 |
| 211 | 211 | 30 | Nx+ | -27.49 | 16.41 | -24.44 |
| | | 30 | Fy+ | -46.72 | 23.95 | -64.97 |
| | | 30 | Mz+ | -27.51 | 11.57 | -24.36 |
| | | 30 | Nx- | -55.79 | 21.53 | -70.37 |
| | | 30 | Fy- | -29.92 | 10.45 | -35.63 |
| | | 30 | Mz- | -49.03 | 23.01 | -75.86 |
| 212 | 212 | 30 | Nx+ | -16.39 | -24.90 | -37.62 |
| | | 30 | Fy+ | -22.42 | -21.20 | -28.28 |
| | | 30 | Mz+ | -17.27 | -22.31 | -26.88 |
| | | 30 | Nx- | -33.90 | -42.62 | -68.47 |
| | | 30 | Fy- | -27.68 | -48.95 | -73.49 |
| | | 30 | Mz- | -32.91 | -40.96 | -80.83 |
| 213 | 213 | 30 | Nx+ | -16.45 | -22.28 | -29.19 |
| | | 30 | Fy+ | -23.28 | -18.41 | -21.20 |
| | | 30 | Mz+ | -18.37 | -22.19 | -19.04 |
| | | 30 | Nx- | -34.76 | -39.81 | -53.74 |
| | | 30 | Fy- | -27.91 | -45.12 | -58.90 |
| | | 30 | Mz- | -33.25 | -38.21 | -66.68 |
| 214 | 214 | 30 | Nx+ | -16.51 | -19.04 | -18.17 |
| | | 30 | Fy+ | -24.28 | -15.12 | -12.20 |
| | | 30 | Mz+ | -19.91 | -22.66 | -9.04 |
| | | 30 | Nx- | -35.95 | -36.62 | -35.56 |
| | | 30 | Fy- | -28.13 | -40.55 | -41.52 |
| | | 30 | Mz- | -33.20 | -32.65 | -50.12 |
| 311 | 311 | 30 | Nx+ | -38.49 | -28.90 | -43.19 |
| | | 30 | Fy+ | -59.90 | -5.33 | -20.78 |
| | | 30 | Mz+ | -42.93 | -9.17 | -14.71 |
| | | 30 | Nx- | -66.79 | -14.46 | -28.45 |
| | | 30 | Fy- | -38.74 | -29.58 | -48.09 |
| | | 30 | Mz- | -62.38 | -27.03 | -56.45 |
| 312 | 312 | 30 | Nx+ | -38.14 | -26.84 | -37.63 |
| | | 30 | Fy+ | -59.55 | -4.15 | -19.83 |
| | | 30 | Mz+ | -42.58 | -7.99 | -12.99 |
| | | 30 | Nx- | -66.44 | -12.70 | -25.74 |
| | | 30 | Fy- | -38.39 | -27.52 | -42.37 |
| | | 30 | Mz- | -62.03 | -24.97 | -51.25 |
| 511 | 511 | 30 | Nx+ | -4.96 | 0.51 | 0.12 |
| | | 30 | Fy+ | -4.96 | 1.03 | 0.18 |
| | | 30 | Mz+ | -4.96 | 1.03 | 0.18 |
| | | 30 | Nx- | -8.64 | -0.67 | 0.00 |
| | | 30 | Fy- | -8.64 | -3.06 | -0.28 |
| | | 30 | Mz- | -8.64 | -3.06 | -0.28 |
| 512 | 512 | 30 | Nx+ | -4.96 | 0.23 | 0.06 |
| | | 30 | Fy+ | -4.96 | 0.61 | 0.09 |
| | | 30 | Mz+ | -4.96 | 0.60 | 0.09 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2. Fecha JUNIO-2002 Página de

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Nx- | -8.64 | -0.64 | -0.02 |
| | | 30 | Fy- | -8.64 | -2.35 | -0.17 |
| | | 30 | Mz- | -8.64 | -2.34 | -0.17 |
| 513 | 513 | 30 | Nx+ | -4.96 | -0.06 | 0.03 |
| | | 30 | Fy+ | -4.96 | 0.18 | 0.04 |
| | | 30 | Mz+ | -4.96 | 0.17 | 0.04 |
| | | 30 | Nx- | -8.64 | -0.60 | 0.00 |
| | | 30 | Fy- | -8.64 | -1.64 | -0.07 |
| | | 30 | Mz- | -8.64 | -1.61 | -0.07 |
| 514 | 514 | 30 | Nx+ | -4.96 | -0.34 | 0.00 |
| | | 30 | Fy+ | -4.96 | -0.27 | 0.01 |
| | | 30 | Mz+ | -7.44 | -0.28 | 0.01 |
| | | 30 | Nx- | -8.64 | -0.58 | 0.00 |
| | | 30 | Fy- | -8.64 | -0.92 | -0.02 |
| | | 30 | Mz- | -8.64 | -0.89 | -0.02 |
| 514 | 515 | 30 | Nx+ | -4.96 | 0.65 | 0.00 |
| | | 30 | Fy+ | -4.96 | 0.72 | 0.00 |
| | | 30 | Mz+ | -8.64 | 0.57 | 0.00 |
| | | 30 | Nx- | -8.64 | 0.57 | 0.00 |
| | | 30 | Fy- | -8.64 | 0.22 | 0.00 |
| | | 30 | Mz- | -8.64 | 0.57 | 0.00 |
| 520 | 320 | 30 | Nx+ | -4.96 | 3.57 | 1.42 |
| | | 30 | Fy+ | -4.96 | 5.95 | 2.38 |
| | | 30 | Mz+ | -4.96 | 5.95 | 2.38 |
| | | 30 | Nx- | -8.64 | 1.75 | 0.65 |
| | | 30 | Fy- | -8.64 | -2.02 | -0.86 |
| | | 30 | Mz- | -8.64 | -2.02 | -0.86 |
| 410 | 310 | 30 | Nx+ | -10.29 | 48.66 | 24.43 |
| | | 30 | Fy+ | -32.20 | 55.51 | 55.35 |
| | | 30 | Mz+ | -35.67 | 51.75 | 68.17 |
| | | 30 | Nx- | -38.22 | 37.36 | 59.11 |
| | | 30 | Fy- | -18.29 | 32.95 | 36.05 |
| | | 30 | Mz- | -14.13 | 35.45 | 19.09 |
| 411 | 411 | 30 | Nx+ | -10.29 | 36.42 | 7.28 |
| | | 30 | Fy+ | -35.65 | 46.25 | 49.76 |
| | | 30 | Mz+ | -35.86 | 45.57 | 49.96 |
| | | 30 | Nx- | -38.22 | 32.13 | 45.92 |
| | | 30 | Fy- | -14.57 | 23.29 | 9.84 |
| | | 30 | Mz- | -10.57 | 34.20 | 6.24 |
| 412 | 412 | 30 | Nx+ | -10.29 | 22.01 | -27.31 |
| | | 30 | Fy+ | -35.00 | 34.35 | 5.32 |
| | | 30 | Mz+ | -37.89 | 25.12 | 18.63 |
| | | 30 | Nx- | -38.22 | 25.84 | 15.14 |
| | | 30 | Fy- | -14.33 | 12.56 | -15.47 |
| | | 30 | Mz- | -11.02 | 25.18 | -28.51 |
| 413 | 413 | 30 | Nx+ | -10.29 | 10.25 | -48.71 |
| | | 30 | Fy+ | -35.01 | 24.79 | -27.16 |
| | | 30 | Mz+ | -37.49 | 17.36 | -2.75 |
| | | 30 | Nx- | -38.22 | 19.82 | -9.82 |
| | | 30 | Fy- | -14.18 | 4.35 | -31.33 |
| | | 30 | Mz- | -11.50 | 16.09 | -53.72 |
| 414 | 414 | 30 | Nx+ | -10.29 | 0.32 | -59.24 |
| | | 30 | Fy+ | -35.39 | 19.01 | -35.96 |
| | | 30 | Mz+ | -37.35 | 11.78 | -17.97 |
| | | 30 | Nx- | -38.22 | 13.60 | -29.04 |
| | | 30 | Fy- | -14.29 | -2.14 | -43.45 |
| | | 30 | Mz- | -11.83 | 7.48 | -70.04 |
| 415 | 415 | 30 | Nx+ | -10.29 | -1.70 | -61.55 |
| | | 30 | Fy+ | -35.14 | 12.67 | -48.63 |
| | | 30 | Mz+ | -37.30 | 6.69 | -28.59 |
| | | 30 | Nx- | -38.22 | 7.27 | -42.49 |
| | | 30 | Fy- | -13.21 | -8.55 | -58.24 |
| | | 30 | Mz- | -11.84 | -1.10 | -77.89 |
| 415 | 400 | 30 | Nx+ | -10.29 | 0.52 | -61.01 |
| | | 30 | Fy+ | -35.10 | 14.97 | -60.26 |
| | | 30 | Mz+ | -33.89 | 2.62 | -34.26 |
| | | 30 | Nx- | -38.22 | 9.12 | -50.07 |
| | | 30 | Fy- | -13.24 | -6.24 | -52.45 |
| | | 30 | Mz- | -15.30 | 4.97 | -78.68 |

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | éz |
|---|---|---|---|---|---|
| 1 | 30 | ux+ | 0.009706 | -0.009863 | -0.002428 |
| | 30 | uy+ | 0.008145 | -0.008143 | -0.001637 |
| | 30 | éz+ | -0.008357 | -0.013911 | 0.000135 |
| | 30 | ux- | -0.009499 | -0.018341 | -0.000568 |
| | 30 | uy- | -0.009447 | -0.018529 | -0.000617 |
| | 30 | éz- | 0.008148 | -0.012579 | -0.002679 |
| 2 | 30 | ux+ | 0.009696 | -0.011715 | -0.002540 |
| | 30 | uy+ | 0.005132 | -0.009200 | -0.001175 |
| | 30 | éz+ | -0.008844 | -0.014794 | -0.000039 |
| | 30 | ux- | -0.009508 | -0.018819 | -0.000665 |
| | 30 | uy- | -0.009349 | -0.019051 | -0.000737 |
| | 30 | éz- | 0.008640 | -0.013340 | -0.002748 |
| 3 | 30 | ux+ | 0.009685 | -0.013566 | -0.002426 |
| | 30 | uy+ | 0.005122 | -0.010025 | -0.001034 |
| | 30 | éz+ | -0.008854 | -0.014816 | 0.000008 |
| | 30 | ux- | -0.009517 | -0.019246 | -0.000447 |
| | 30 | uy- | -0.006889 | -0.019665 | -0.001180 |
| | 30 | éz- | 0.009183 | -0.014866 | -0.002585 |
| 4 | 30 | ux+ | 0.009673 | -0.015265 | -0.002134 |
| | 30 | uy+ | 0.005111 | -0.010705 | -0.000788 |
| | 30 | éz+ | -0.009366 | -0.016655 | 0.000247 |
| | 30 | ux- | -0.009526 | -0.019427 | -0.000008 |
| | 30 | uy- | -0.005175 | -0.020422 | -0.000879 |
| | 30 | éz- | 0.009642 | -0.016310 | -0.002245 |
| 5 | 30 | ux+ | 0.009662 | -0.016688 | -0.001701 |
| | 30 | uy+ | 0.000089 | -0.011029 | -0.000300 |
| | 30 | éz+ | -0.009476 | -0.017367 | 0.000651 |
| | 30 | ux- | -0.009533 | -0.019226 | 0.000564 |
| | 30 | uy- | -0.001893 | -0.020944 | -0.000409 |
| | 30 | éz- | 0.009634 | -0.017797 | -0.001758 |
| 6 | 30 | ux+ | 0.009651 | -0.017757 | -0.001172 |
| | 30 | uy+ | 0.000077 | -0.011143 | 0.000000 |
| | 30 | éz+ | -0.009520 | -0.017766 | 0.001172 |
| | 30 | ux- | -0.009542 | -0.018585 | 0.001172 |
| | 30 | uy- | 0.001970 | -0.020994 | -0.000282 |
| | 30 | éz- | 0.009651 | -0.017757 | -0.001172 |
| 111 | 30 | ux+ | 0.000629 | -0.005969 | -0.000799 |
| | 30 | uy+ | 0.000623 | -0.005904 | -0.000793 |
| | 30 | éz+ | -0.001976 | -0.017773 | 0.002401 |
| | 30 | ux- | -0.001976 | -0.017773 | 0.002401 |
| | 30 | uy- | -0.001970 | -0.017807 | 0.002395 |
| | 30 | éz- | 0.000629 | -0.005969 | -0.000799 |
| 112 | 30 | ux+ | 0.001543 | -0.005957 | -0.001122 |
| | 30 | uy+ | 0.001531 | -0.005923 | -0.001118 |
| | 30 | éz+ | -0.004077 | -0.017824 | 0.002114 |
| | 30 | ux- | -0.004079 | -0.017804 | 0.002114 |
| | 30 | uy- | -0.004067 | -0.017838 | 0.002110 |
| | 30 | éz- | 0.001542 | -0.006025 | -0.001129 |
| 113 | 30 | ux+ | 0.002681 | -0.006043 | -0.001285 |
| | 30 | uy+ | 0.002655 | -0.005940 | -0.001264 |
| | 30 | éz+ | -0.005921 | -0.017854 | 0.001833 |
| | 30 | ux- | -0.005923 | -0.017834 | 0.001832 |
| | 30 | uy- | -0.005908 | -0.017868 | 0.001830 |
| | 30 | éz- | 0.002679 | -0.006023 | -0.001286 |
| 114 | 30 | ux+ | 0.003915 | -0.006061 | -0.001355 |
| | 30 | uy+ | 0.003864 | -0.005958 | -0.001319 |
| | 30 | éz+ | -0.006954 | -0.017659 | 0.001511 |
| | 30 | ux- | -0.007486 | -0.017864 | 0.001503 |
| | 30 | uy- | -0.007470 | -0.017898 | 0.001502 |
| | 30 | éz- | 0.003206 | -0.006731 | -0.001379 |
| 115 | 30 | ux+ | 0.005206 | -0.006076 | -0.001415 |
| | 30 | uy+ | 0.005112 | -0.005972 | -0.001359 |
| | 30 | éz+ | -0.007297 | -0.015848 | 0.001225 |
| | 30 | ux- | -0.008700 | -0.017913 | 0.001088 |
| | 30 | uy- | -0.008684 | -0.017927 | 0.001086 |
| | 30 | éz- | 0.004346 | -0.007256 | -0.001618 |
| 116 | 30 | ux+ | 0.006603 | -0.006248 | -0.001610 |
| | 30 | uy+ | 0.006421 | -0.005988 | -0.001456 |
| | 30 | éz+ | -0.007901 | -0.015112 | 0.000919 |
| | 30 | ux- | -0.009477 | -0.017941 | 0.000547 |
| | 30 | uy- | -0.009459 | -0.017955 | 0.000545 |
| | 30 | éz- | 0.005995 | -0.007275 | -0.001929 |
| 117 | 30 | ux+ | 0.008236 | -0.006545 | -0.001998 |
| | 30 | uy+ | 0.007867 | -0.006002 | -0.001668 |
| | 30 | éz+ | -0.008068 | -0.014281 | 0.000492 |
| | 30 | ux- | -0.009679 | -0.017968 | -0.000144 |
| | 30 | uy- | -0.009660 | -0.017982 | -0.000146 |
| | 30 | éz- | 0.006449 | -0.009313 | -0.002345 |
| 211 | 30 | ux+ | 0.008665 | -0.006547 | -0.002031 |
| | 30 | uy+ | 0.008224 | -0.006004 | -0.001692 |
| | 30 | éz+ | -0.008167 | -0.014283 | 0.000450 |
| | 30 | ux- | -0.009642 | -0.017973 | -0.000206 |
| | 30 | uy- | -0.009622 | -0.017987 | -0.000208 |
| | 30 | éz- | 0.006953 | -0.009317 | -0.002391 |
| 212 | 30 | ux+ | 0.009098 | -0.006551 | -0.002043 |
| | 30 | uy+ | 0.008585 | -0.006007 | -0.001701 |
| | 30 | éz+ | -0.008261 | -0.014287 | 0.000436 |
| | 30 | ux- | -0.009596 | -0.017976 | -0.000226 |
| | 30 | uy- | -0.009576 | -0.017990 | -0.000228 |
| | 30 | éz- | 0.007462 | -0.009320 | -0.002407 |
| 213 | 30 | ux+ | 0.009252 | -0.007702 | -0.002225 |
| | 30 | uy+ | 0.008258 | -0.006610 | -0.001622 |
| | 30 | éz+ | -0.008296 | -0.014147 | 0.000366 |
| | 30 | ux- | -0.009579 | -0.018074 | -0.000326 |
| | 30 | uy- | -0.009559 | -0.018089 | -0.000328 |
| | 30 | éz- | 0.007641 | -0.010178 | -0.002480 |
| 214 | 30 | ux+ | 0.009474 | -0.008758 | -0.002310 |
| | 30 | uy+ | 0.008419 | -0.007376 | -0.001670 |
| | 30 | éz+ | -0.008332 | -0.014003 | 0.000272 |
| | 30 | ux- | -0.009544 | -0.018259 | -0.000452 |
| | 30 | uy- | -0.009524 | -0.018275 | -0.000454 |
| | 30 | éz- | 0.007889 | -0.011354 | -0.002573 |
| 310 | 30 | ux+ | 0.000172 | -0.006168 | -0.000263 |
| | 30 | uy+ | 0.000171 | -0.005889 | -0.000299 |
| | 30 | éz+ | 0.000057 | -0.017745 | 0.002688 |
| | 30 | ux- | 0.000048 | -0.014629 | 0.001997 |
| | 30 | uy- | 0.000057 | -0.017779 | 0.002679 |
| | 30 | éz- | 0.000171 | -0.005954 | -0.000308 |
| 311 | 30 | ux+ | 0.000350 | -0.005962 | -0.000585 |
| | 30 | uy+ | 0.000347 | -0.005897 | -0.000576 |
| | 30 | éz+ | -0.000988 | -0.017758 | 0.002536 |
| | 30 | ux- | -0.000988 | -0.017758 | 0.002536 |
| | 30 | uy- | -0.000985 | -0.017792 | 0.002527 |
| | 30 | éz- | 0.000350 | -0.005962 | -0.000585 |
| 312 | 30 | ux+ | 0.000478 | -0.005966 | -0.000696 |
| | 30 | uy+ | 0.000473 | -0.005901 | -0.000690 |
| | 30 | éz+ | -0.001487 | -0.017766 | 0.002468 |
| | 30 | ux- | -0.001487 | -0.017766 | 0.002468 |
| | 30 | uy- | -0.001482 | -0.017800 | 0.002462 |
| | 30 | éz- | 0.000478 | -0.005966 | -0.000696 |
| 320 | 30 | ux+ | 0.000000 | -0.012038 | -0.001070 |
| | 30 | uy+ | 0.000000 | -0.005886 | 0.000302 |
| | 30 | éz+ | 0.000000 | -0.005951 | 0.000311 |
| | 30 | ux- | 0.000000 | -0.012038 | -0.001070 |
| | 30 | uy- | 0.000000 | -0.017782 | -0.002682 |
| | 30 | éz- | 0.000000 | -0.017748 | -0.002691 |
| 400 | 30 | ux+ | 0.000085 | -0.006317 | 0.000070 |
| | 30 | uy+ | 0.000041 | -0.005035 | 0.000000 |
| | 30 | éz+ | 0.000050 | -0.007201 | 0.000905 |
| | 30 | ux- | 0.000023 | -0.007338 | 0.000431 |
| | 30 | uy- | 0.000069 | -0.008126 | 0.000007 |
| | 30 | éz- | 0.000080 | -0.007199 | -0.000905 |
| 411 | 30 | ux+ | 0.000166 | -0.006232 | -0.000110 |
| | 30 | uy+ | 0.000165 | -0.005965 | -0.000144 |
| | 30 | éz+ | 0.000055 | -0.016758 | 0.002762 |
| | 30 | ux- | 0.000045 | -0.013921 | 0.002045 |
| | 30 | uy- | 0.000055 | -0.016827 | 0.002752 |
| | 30 | éz- | 0.000165 | -0.006034 | -0.000154 |

| | | | | | |
|---|---|---|---|---|---|
| 412 | 30 | ux+ | 0.000149 | -0.006250 | 0.000160 |
| | 30 | uy+ | 0.000148 | -0.005967 | 0.000100 |
| | 30 | éz+ | 0.000049 | -0.014194 | 0.002728 |
| | 30 | ux- | 0.000040 | -0.012042 | 0.001973 |
| | 30 | uy- | 0.000049 | -0.014276 | 0.002710 |
| | 30 | éz- | 0.000146 | -0.006112 | 0.000082 |
| 413 | 30 | ux+ | 0.000134 | -0.006072 | 0.000183 |
| | 30 | uy+ | 0.000097 | -0.005784 | 0.000465 |
| | 30 | éz+ | 0.000044 | -0.011817 | 0.002440 |
| | 30 | ux- | 0.000036 | -0.010330 | 0.001691 |
| | 30 | uy- | 0.000079 | -0.011930 | 0.002330 |
| | 30 | éz- | 0.000131 | -0.006016 | 0.000085 |
| 414 | 30 | ux+ | 0.000117 | -0.005951 | 0.000125 |
| | 30 | uy+ | 0.000086 | -0.005389 | 0.000427 |
| | 30 | éz+ | 0.000039 | -0.009753 | 0.001998 |
| | 30 | ux- | 0.000032 | -0.009054 | 0.001404 |
| | 30 | uy- | 0.000069 | -0.009957 | 0.001913 |
| | 30 | éz- | 0.000114 | -0.006089 | -0.000097 |
| 415 | 30 | ux+ | 0.000102 | -0.005949 | -0.000137 |
| | 30 | uy+ | 0.000074 | -0.005112 | 0.000157 |
| | 30 | éz+ | 0.000034 | -0.008147 | 0.001460 |
| | 30 | ux- | 0.000028 | -0.007970 | 0.000929 |
| | 30 | uy- | 0.000057 | -0.008516 | 0.000863 |
| | 30 | éz- | 0.000098 | -0.006465 | -0.000442 |
| 511 | 30 | ux+ | 0.000173 | -0.006078 | -0.000262 |
| | 30 | uy+ | 0.000172 | -0.005786 | -0.000298 |
| | 30 | éz+ | 0.000057 | -0.018685 | 0.002685 |
| | 30 | ux- | 0.000048 | -0.015329 | 0.001995 |
| | 30 | uy- | 0.000057 | -0.018716 | 0.002676 |
| | 30 | éz- | 0.000172 | -0.005848 | -0.000307 |
| 512 | 30 | ux+ | 0.000173 | -0.006062 | -0.000262 |
| | 30 | uy+ | 0.000172 | -0.005769 | -0.000298 |
| | 30 | éz+ | 0.000058 | -0.018818 | 0.002685 |
| | 30 | ux- | 0.000049 | -0.015427 | 0.001995 |
| | 30 | uy- | 0.000058 | -0.018849 | 0.002676 |
| | 30 | éz- | 0.000172 | -0.005831 | -0.000307 |
| 513 | 30 | ux+ | 0.000174 | -0.006051 | -0.000262 |
| | 30 | uy+ | 0.000173 | -0.005755 | -0.000298 |
| | 30 | éz+ | 0.000058 | -0.018954 | 0.002684 |
| | 30 | ux- | 0.000049 | -0.015529 | 0.001994 |
| | 30 | uy- | 0.000058 | -0.018985 | 0.002675 |
| | 30 | éz- | 0.000173 | -0.005817 | -0.000307 |
| 514 | 30 | ux+ | 0.000174 | -0.006040 | -0.000262 |
| | 30 | uy+ | 0.000173 | -0.005742 | -0.000298 |
| | 30 | éz+ | 0.000058 | -0.019088 | 0.002684 |
| | 30 | ux- | 0.000049 | -0.015629 | 0.001994 |
| | 30 | uy- | 0.000058 | -0.019118 | 0.002675 |
| | 30 | éz- | 0.000173 | -0.005803 | -0.000307 |
| 515 | 30 | ux+ | 0.000174 | -0.006024 | -0.000262 |
| | 30 | uy+ | 0.000173 | -0.005725 | -0.000298 |
| | 30 | éz+ | 0.000058 | -0.019222 | 0.002684 |
| | 30 | ux- | 0.000049 | -0.015727 | 0.001994 |
| | 30 | uy- | 0.000058 | -0.019251 | 0.002675 |
| | 30 | éz- | 0.000173 | -0.005785 | -0.000307 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 310 | 30 | Fx+ | 0.00 | 7.45 | 0.00 |
| | 30 | Fy+ | 0.00 | 9.35 | 0.00 |
| | 30 | Mz+ | 0.00 | 7.45 | 0.00 |
| | 30 | Fx- | 0.00 | 7.45 | 0.00 |
| | 30 | Fy- | 0.00 | 3.09 | 0.00 |
| | 30 | Mz- | 0.00 | 7.45 | 0.00 |
| 320 | 30 | Fx+ | 13.25 | 5.51 | 0.00 |
| | 30 | Fy+ | -13.25 | 9.35 | 0.00 |
| | 30 | Mz+ | 0.00 | 6.32 | 0.00 |
| | 30 | Fx- | -13.25 | 7.17 | 0.00 |
| | 30 | Fy- | 13.25 | 3.08 | 0.00 |



| | | | | | |
|---|---|---|---|---|---|
| | 30 | Mz- | 0.00 | 6.32 | 0.00 |
| 400 | 30 | Fx+ | 0.00 | 10.99 | 0.00 |
| | 30 | Fy+ | 0.00 | 11.29 | 0.00 |
| | 30 | Mz+ | 0.00 | 10.99 | 0.00 |
| | 30 | Fx- | 0.00 | 10.99 | 0.00 |
| | 30 | Fy- | 0.00 | 6.99 | 0.00 |
| | 30 | Mz- | 0.00 | 10.99 | 0.00 |
| 411 | 30 | Fx+ | 0.00 | 13.08 | 0.00 |
| | 30 | Fy+ | 0.00 | 16.12 | 0.00 |
| | 30 | Mz+ | 0.00 | 13.08 | 0.00 |
| | 30 | Fx- | 0.00 | 13.08 | 0.00 |
| | 30 | Fy- | 0.00 | 5.71 | 0.00 |
| | 30 | Mz- | 0.00 | 13.08 | 0.00 |
| 412 | 30 | Fx+ | 0.00 | 16.84 | 0.00 |
| | 30 | Fy+ | 0.00 | 19.83 | 0.00 |
| | 30 | Mz+ | 0.00 | 16.84 | 0.00 |
| | 30 | Fx- | 0.00 | 16.84 | 0.00 |
| | 30 | Fy- | 0.00 | 8.28 | 0.00 |
| | 30 | Mz- | 0.00 | 16.84 | 0.00 |
| 413 | 30 | Fx+ | 0.00 | 14.74 | 0.00 |
| | 30 | Fy+ | 0.00 | 16.57 | 0.00 |
| | 30 | Mz+ | 0.00 | 14.74 | 0.00 |
| | 30 | Fx- | 0.00 | 14.74 | 0.00 |
| | 30 | Fy- | 0.00 | 8.04 | 0.00 |
| | 30 | Mz- | 0.00 | 14.74 | 0.00 |
| 414 | 30 | Fx+ | 0.00 | 12.96 | 0.00 |
| | 30 | Fy+ | 0.00 | 13.83 | 0.00 |
| | 30 | Mz+ | 0.00 | 12.96 | 0.00 |
| | 30 | Fx- | 0.00 | 12.96 | 0.00 |
| | 30 | Fy- | 0.00 | 7.49 | 0.00 |
| | 30 | Mz- | 0.00 | 12.96 | 0.00 |
| 415 | 30 | Fx+ | 0.00 | 11.65 | 0.00 |
| | 30 | Fy+ | 0.00 | 11.82 | 0.00 |
| | 30 | Mz+ | 0.00 | 11.65 | 0.00 |
| | 30 | Fx- | 0.00 | 11.65 | 0.00 |
| | 30 | Fy- | 0.00 | 7.10 | 0.00 |
| | 30 | Mz- | 0.00 | 11.65 | 0.00 |
| 511 | 30 | Fx+ | 0.00 | 4.40 | 0.00 |
| | 30 | Fy+ | 0.00 | 5.61 | 0.00 |
| | 30 | Mz+ | 0.00 | 4.40 | 0.00 |
| | 30 | Fx- | 0.00 | 4.40 | 0.00 |
| | 30 | Fy- | 0.00 | 1.74 | 0.00 |
| | 30 | Mz- | 0.00 | 4.40 | 0.00 |
| 512 | 30 | Fx+ | 0.00 | 1.10 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.41 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.10 | 0.00 |
| | 30 | Fx- | 0.00 | 1.10 | 0.00 |
| | 30 | Fy- | 0.00 | 0.44 | 0.00 |
| | 30 | Mz- | 0.00 | 1.10 | 0.00 |
| 513 | 30 | Fx+ | 0.00 | 1.11 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.42 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.11 | 0.00 |
| | 30 | Fx- | 0.00 | 1.11 | 0.00 |
| | 30 | Fy- | 0.00 | 0.43 | 0.00 |
| | 30 | Mz- | 0.00 | 1.11 | 0.00 |
| 514 | 30 | Fx+ | 0.00 | 1.12 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.43 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.12 | 0.00 |
| | 30 | Fx- | 0.00 | 1.12 | 0.00 |
| | 30 | Fy- | 0.00 | 0.44 | 0.00 |
| | 30 | Mz- | 0.00 | 1.12 | 0.00 |
| 515 | 30 | Fx+ | 0.00 | 0.57 | 0.00 |
| | 30 | Fy+ | 0.00 | 0.72 | 0.00 |
| | 30 | Mz+ | 0.00 | 0.57 | 0.00 |
| | 30 | Fx- | 0.00 | 0.57 | 0.00 |
| | 30 | Fy- | 0.00 | 0.22 | 0.00 |
| | 30 | Mz- | 0.00 | 0.57 | 0.00 |

## 9.3.- ARMADO GENERAL. FISURACIÓN

*Control en rotura*

*** Armado a Flexión.**

De las envolventes de rotura antes comentadas, se extraen las envolvente de Axil, Cortante y Flector para cada sección con objeto de dimensionar la armadura en Estado Límite Último.

A continuación se exponen los resultados de dicho dimensionamiento para cada uno de los extremos de barra del modelo (se muestra medio cajón sólo, puesto que éste es simétrico).

Las secciones geométricas consideradas para el armado son las correspondientes a la definición geométrica establecida en el apartado precedente de este anejo.

En las páginas siguientes se muestra el dimensionamiento de armadura realizado, considerando los mínimos mecánicos y geométricos de las secciones, así como las posibles necesidades de armadura requeridas por el dimensionamiento a cortante.

*** Armado a Cortante.**

Una vez realizado el armado a flexión de las secciones y de forma paralela a éste, se procede al control a cortante de la estructura. Dicho control se realiza según la norma EHE-98.

A continuación se exponen los resultados de dicho dimensionamiento para cada uno de los extremos de barra del modelo (se muestra medio cajón sólo, puesto que éste es simétrico).

Los resultados expuestos se han resumido según las hipótesis dimensionantes.

# ARMADO A FLEXIÓN.

PROYECTO: L.A.V. TRAMO: MARTORELL-LLEIDA
ELEMENTO: ODT300.2
*MARCOS-ALEPH Ver. 4.2.1*

ARMADO A FLEXION

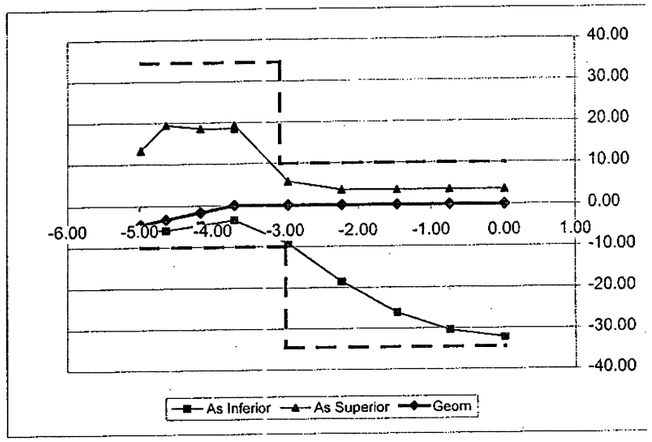
**ARMADO DEL DINTEL**

*Armadura Superior*

| | Cuantías | | Longitudes |
|---|---|---|---|
| As,1 | 24.54 | S.1 | 1.9 |
| As,2 | 0 | S.2 | 0 |
| As,3 | 10.05 | | |

*Armadura Inferior*

| | Cuantías | | Longitudes |
|---|---|---|---|
| As,1 | 10.05 | S.1 | 3 |
| As,2 | 24.54 | | |



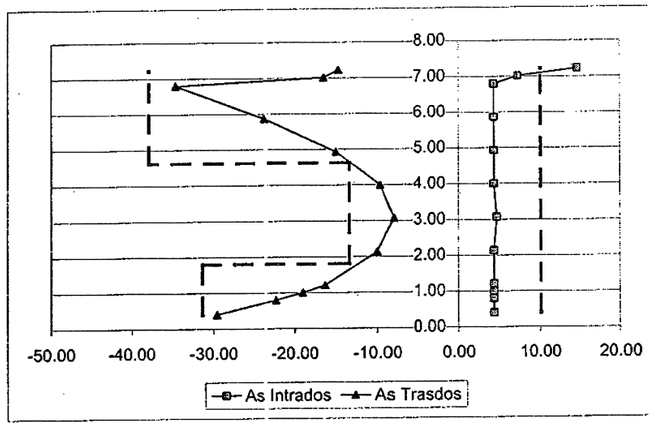

**ARMADO DEL HASTIAL**

*Armadura Trasdós*

| | Cuantías | | Longitudes |
|---|---|---|---|
| As,1 | 24.54 | S.3 | 2.6 |
| As,2 | 0 | S.4 | 0 |
| As,4 | 13.4 | S.5 | 1.4 |
| As,5 | 18 | S.6 | 0 |
| As,6 | 0 | | |

*Armadura Intradós*

| | Cuantías | | Longitudes |
|---|---|---|---|
| As,3 | 10.05 | | |



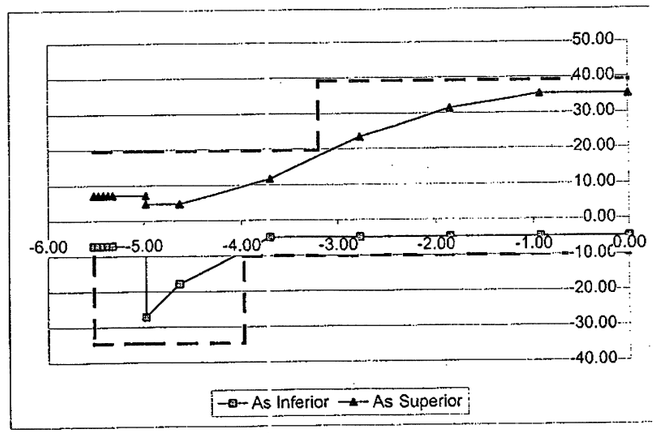

**ARMADO DE ZAPATA**

*Armadura Inferior*

| | Cuantías | | Longitudes |
|---|---|---|---|
| As,7 | 0 | S.7 | 0.55 |
| As,8 | 24.54 | S.8 | 0 |
| As,9 | 10.05 | S.9 | 1 |
| | | S.10 | 0 |

*Armadura Superior*

| | Cuantías | | Longitudes |
|---|---|---|---|
| As,4 | 0.00 | S.2 | 0 |
| As,5 | 19.63 | S.3 | 0 |
| As,6 | 19.63 | S.4 | 3.2 |



**Fichero: ROTFG.LST**

RESULTADOS CALCULO FAGUS2
Fecha : 09.05.2002 10:35:53
T¡tulo : L.A.V. TRAMO: MARTORELL-LLEIDA - ODT 300.2
Coment : Envolventes Rotura
Calculo: DIMENSIONAMIENTO DE SECCIONES

Lista de estados de carga y envolventes

| ec | Fichero | env | T¡tulo |
|---|---|---|---|
| 1 | MA_ROT | Nx+ | [Envolvente de Rotura (Envolvente Servicio-Sismo) ] |
| 1 | MA_ROT | Fy+ | [Envolvente de Rotura (Envolvente Servicio-Sismo) ] |
| 1 | MA_ROT | Mz+ | [Envolvente de Rotura (Envolvente Servicio-Sismo) ] |
| 1 | MA_ROT | Nx- | [Envolvente de Rotura (Envolvente Servicio-Sismo) ] |
| 1 | MA_ROT | Fy- | [Envolvente de Rotura (Envolvente Servicio-Sismo) ] |
| 1 | MA_ROT | Mz- | [Envolvente de Rotura (Envolvente Servicio-Sismo) ] |
| 2 | MA_CON | Nx+ | [Envolvente de Rotura en Construccion (Envolvente) ] |
| 2 | MA_CON | Fy+ | [Envolvente de Rotura en Construccion (Envolvente) ] |
| 2 | MA_CON | Mz+ | [Envolvente de Rotura en Construccion (Envolvente) ] |
| 2 | MA_CON | Nx- | [Envolvente de Rotura en Construccion (Envolvente) ] |
| 2 | MA_CON | Fy- | [Envolvente de Rotura en Construccion (Envolvente) ] |
| 2 | MA_CON | Mz- | [Envolvente de Rotura en Construccion (Envolvente) ] |

Esfuerzos exportados: Nx Mz

Tabla de Resultados, segun ejes GEC
Unidades Esfuerzos [m tm]

| Elem | Nudo | Seccion | Nx | Mz | Armadura | Cuantia |
|---|---|---|---|---|---|---|
| 1 | 1 | DINTEL | -12.99 | -11.30 | 3.27 | 0.05 |
| | | | -25.12 | 0.54 | 0.10 | 0.00 * |
| | | | -19.26 | 6.71 | 0.56 | 0.01 |
| | | | -46.61 | -38.56 | 11.66 | 0.19 |
| | | | -40.50 | -43.85 | 14.81 | 0.25 |
| | | | -40.78 | -53.51 | 19.43 | 0.32 |
| | | | 0.50 | -1.23 | 0.62 | 0.01 |
| | | | -7.60 | -0.62 | 0.10 | 0.00 * |
| | | | -12.47 | 2.12 | 0.10 | 0.00 * |
| | | | -30.80 | -21.03 | 5.45 | 0.09 |
| | | | -29.08 | -24.83 | 7.34 | 0.12 |
| | | | -28.98 | -25.34 | 7.58 | 0.13 |
| 1 | 2 | DINTEL | -12.99 | 3.24 | 0.10 | 0.00 * |
| | | | -25.45 | 15.16 | 3.49 | 0.06 |
| | | | -20.79 | 27.07 | 9.28 | 0.15 |
| | | | -46.61 | -1.99 | 0.10 | 0.00 * |
| | | | -40.92 | -9.20 | 0.10 | 0.00 * |
| | | | -39.75 | -21.25 | 4.53 | 0.08 |
| | | | 0.50 | 3.76 | 1.67 | 0.03 |
| | | | -7.60 | 2.10 | 0.10 | 0.00 * |
| | | | -12.17 | 10.50 | 3.03 | 0.05 |
| | | | -30.80 | -1.37 | 0.10 | 0.00 * |
| | | | -20.96 | -0.45 | 0.10 | 0.00 * |
| | | | -18.14 | -14.19 | 3.92 | 0.07 |
| 2 | 2 | DINTEL | -12.99 | 3.24 | 0.10 | 0.00 * |
| | | | -25.45 | 15.16 | 3.49 | 0.06 |
| | | | -20.79 | 27.07 | 9.28 | 0.15 |
| | | | -46.61 | -1.99 | 0.10 | 0.00 * |
| | | | -40.92 | -9.20 | 0.10 | 0.00 * |
| | | | -39.75 | -21.25 | 4.53 | 0.08 |
| | | | 0.50 | 3.76 | 1.67 | 0.03 |
| | | | -7.60 | 2.10 | 0.10 | 0.00 * |
| | | | -12.17 | 10.50 | 3.03 | 0.05 |
| | | | -30.80 | -1.37 | 0.10 | 0.00 * |
| | | | -20.96 | -0.45 | 0.10 | 0.00 * |
| | | | -18.14 | -14.19 | 3.92 | 0.07 |
| 2 | 3 | DINTEL | -12.99 | 14.58 | 4.69 | 0.08 |
| | | | -26.02 | 27.67 | 8.95 | 0.15 |
| | | | -29.60 | 49.28 | 18.55 | 0.31 |
| | | | -46.61 | 28.16 | 6.86 | 0.11 |
| | | | -40.92 | 18.12 | 3.00 | 0.05 |
| | | | -27.07 | -0.54 | 0.10 | 0.00 * |
| | | | 0.50 | 7.64 | 3.31 | 0.06 |
| | | | -7.60 | 3.99 | 0.80 | 0.01 |
| | | | -20.73 | 22.19 | 7.12 | 0.12 |
| | | | -30.80 | 13.93 | 2.33 | 0.04 |
| | | | -28.95 | 12.55 | 1.94 | 0.03 |
| | | | -18.14 | -5.41 | 0.14 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 3 DINTEL | -12.99 | 14.58 | 4.69 | 0.08 |
| | | -26.02 | 27.67 | 8.95 | 0.15 |
| | | -29.60 | 49.28 | 18.55 | 0.31 |
| | | -46.61 | 28.16 | 6.86 | 0.11 |
| | | -40.92 | 18.12 | 3.00 | 0.05 |
| | | -27.07 | -0.54 | 0.10 | 0.00 * |
| | | 0.50 | 7.64 | 3.31 | 0.06 |
| | | -7.60 | 3.99 | 0.80 | 0.01 |
| | | -20.73 | 22.19 | 7.12 | 0.12 |
| | | -30.80 | 13.93 | 2.33 | 0.04 |
| | | -28.95 | 12.55 | 1.94 | 0.03 |
| | | -18.14 | -5.41 | 0.14 | 0.00 |
| 3 | 4 DINTEL | -12.99 | 22.75 | 8.26 | 0.14 |
| | | -26.78 | 37.34 | 13.26 | 0.22 |
| | | -30.74 | 64.94 | 26.13 | 0.44 |
| | | -46.61 | 49.40 | 16.83 | 0.28 |
| | | -40.48 | 37.94 | 12.03 | 0.20 |
| | | -25.60 | 9.97 | 1.22 | 0.02 |
| | | 0.50 | 10.41 | 4.49 | 0.07 |
| | | -12.47 | 11.46 | 3.40 | 0.06 |
| | | -20.99 | 32.96 | 11.91 | 0.20 |
| | | -30.80 | 24.86 | 7.15 | 0.12 |
| | | -20.76 | 27.50 | 9.48 | 0.16 |
| | | -12.45 | 0.04 | 0.10 | 0.00 * |
| 4 | 4 DINTEL | -12.99 | 22.75 | 8.26 | 0.14 |
| | | -26.78 | 37.34 | 13.26 | 0.22 |
| | | -30.74 | 64.94 | 26.13 | 0.44 |
| | | -46.61 | 49.40 | 16.83 | 0.28 |
| | | -40.48 | 37.94 | 12.03 | 0.20 |
| | | -25.60 | 9.97 | 1.22 | 0.02 |
| | | 0.50 | 10.41 | 4.49 | 0.07 |
| | | -12.47 | 11.46 | 3.40 | 0.06 |
| | | -20.99 | 32.96 | 11.91 | 0.20 |
| | | -30.80 | 24.86 | 7.15 | 0.12 |
| | | -20.76 | 27.50 | 9.48 | 0.16 |
| | | -12.45 | 0.04 | 0.10 | 0.00 * |
| 4 | 5 DINTEL | -12.99 | 27.71 | 10.46 | 0.17 |
| | | -27.67 | 43.38 | 15.96 | 0.27 |
| | | -31.17 | 73.45 | 30.42 | 0.51 |
| | | -46.61 | 61.73 | 22.91 | 0.38 |
| | | -39.58 | 50.22 | 17.96 | 0.30 |
| | | -25.66 | 16.77 | 4.17 | 0.07 |
| | | 0.50 | 12.08 | 5.20 | 0.09 |
| | | -18.17 | 17.55 | 5.38 | 0.09 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.2.* Fecha JUNIO-2002 Página de

| | | | | | |
|---|---|---|---|---|---|
| | | -20.99 | 39.21 | 14.76 | 0.25 |
| | | -30.80 | 31.41 | 10.10 | 0.17 |
| | | -18.02 | 11.94 | 2.96 | 0.05 |
| | | -7.59 | 3.37 | 0.54 | 0.01 |
| 5 | 5 DINTEL | -12.99 | 27.71 | 10.46 | 0.17 |
| | | -27.67 | 43.38 | 15.96 | 0.27 |
| | | -31.17 | 73.45 | 30.42 | 0.51 |
| | | -46.61 | 61.73 | 22.91 | 0.38 |
| | | -39.58 | 50.22 | 17.96 | 0.30 |
| | | -25.66 | 16.77 | 4.17 | 0.07 |
| | | 0.50 | 12.08 | 5.20 | 0.09 |
| | | -18.17 | 17.55 | 5.38 | 0.09 |
| | | -20.99 | 39.21 | 14.76 | 0.25 |
| | | -30.80 | 31.41 | 10.10 | 0.17 |
| | | -18.02 | 11.94 | 2.96 | 0.05 |
| | | -7.59 | 3.37 | 0.54 | 0.01 |
| 5 | 6 DINTEL | -12.99 | 29.49 | 11.25 | 0.19 |
| | | -38.49 | 54.96 | 20.38 | 0.34 |
| | | -25.98 | 76.07 | 32.28 | 0.54 |
| | | -46.61 | 65.13 | 24.63 | 0.41 |
| | | -38.47 | 55.04 | 20.42 | 0.34 |
| | | -30.85 | 19.10 | 4.59 | 0.08 |
| | | 0.50 | 12.63 | 5.44 | 0.09 |
| | | -18.05 | 17.46 | 5.35 | 0.09 |
| | | -19.43 | 41.28 | 15.88 | 0.26 |
| | | -30.80 | 33.59 | 11.09 | 0.18 |
| | | -18.02 | 17.52 | 5.38 | 0.09 |
| | | -7.60 | 4.73 | 1.11 | 0.02 |
| 111 | 111 H-1 | -36.66 | -36.66 | 9.21 | 0.13 |
| | | -68.77 | -16.46 | 0.10 | 0.00 * |
| | | -43.32 | -4.62 | 0.10 | 0.00 * |
| | | -96.18 | -33.25 | 1.34 | 0.02 |
| | | -54.10 | -53.83 | 13.96 | 0.20 |
| | | -89.56 | -68.52 | 16.28 | 0.23 |
| | | -18.36 | -20.27 | 5.18 | 0.07 |
| | | -19.68 | -11.91 | 1.97 | 0.03 |
| | | -24.26 | -3.58 | 0.10 | 0.00 * |
| | | -61.80 | -31.38 | 4.41 | 0.06 |
| | | -41.69 | -37.78 | 9.08 | 0.13 |
| | | -59.84 | -41.15 | 8.37 | 0.12 |
| 111 | 112 H-2 | -35.03 | -14.47 | 1.13 | 0.02 |
| | | -67.14 | -19.67 | 0.10 | 0.00 * |
| | | -41.63 | 2.25 | 0.10 | 0.00 * |

| | | | | | |
|---|---|---|---|---|---|
| | | -93.98 | -23.27 | 0.10 | 0.00 * |
| | | -51.90 | -24.51 | 2.92 | 0.04 |
| | | -82.98 | -50.49 | 9.56 | 0.14 |
| | | -16.73 | -4.59 | 0.10 | 0.00 * |
| | | -18.19 | -10.64 | 1.69 | 0.02 |
| | | -22.63 | 4.14 | 0.10 | 0.00 * |
| | | -59.60 | -16.97 | 0.10 | 0.00 * |
| | | -39.49 | -16.70 | 1.43 | 0.02 |
| | | -57.64 | -28.53 | 3.79 | 0.05 |
| 112 | 112 H-2 | -35.03 | -14.47 | 1.13 | 0.02 |
| | | -67.14 | -19.67 | 0.10 | 0.00 * |
| | | -41.63 | 2.25 | 0.10 | 0.00 * |
| | | -93.98 | -23.27 | 0.10 | 0.00 * |
| | | -51.90 | -24.51 | 2.92 | 0.04 |
| | | -82.98 | -50.49 | 9.56 | 0.14 |
| | | -16.73 | -4.59 | 0.10 | 0.00 * |
| | | -18.19 | -10.64 | 1.69 | 0.02 |
| | | -22.63 | 4.14 | 0.10 | 0.00 * |
| | | -59.60 | -16.97 | 0.10 | 0.00 * |
| | | -39.49 | -16.70 | 1.43 | 0.02 |
| | | -57.64 | -28.53 | 3.79 | 0.05 |
| 112 | 113 H-3 | -33.39 | -0.83 | 0.10 | 0.00 * |
| | | -65.51 | -27.30 | 2.44 | 0.03 |
| | | -46.90 | 7.92 | 0.10 | 0.00 * |
| | | -91.77 | -23.20 | 0.10 | 0.00 * |
| | | -49.69 | -7.06 | 0.10 | 0.00 * |
| | | -84.04 | -43.92 | 6.83 | 0.10 |
| | | -15.09 | 4.55 | 0.10 | 0.00 * |
| | | -43.40 | -16.45 | 0.89 | 0.01 |
| | | -20.99 | 5.90 | 0.10 | 0.00 * |
| | | -57.39 | -11.46 | 0.10 | 0.00 * |
| | | -37.28 | -4.04 | 0.10 | 0.00 * |
| | | -56.42 | -23.25 | 1.94 | 0.03 |
| 113 | 113 H-3 | -33.39 | -0.83 | 0.10 | 0.00 * |
| | | -65.51 | -27.30 | 2.44 | 0.03 |
| | | -46.90 | 7.92 | 0.10 | 0.00 * |
| | | -91.77 | -23.20 | 0.10 | 0.00 * |
| | | -49.69 | -7.06 | 0.10 | 0.00 * |
| | | -84.04 | -43.92 | 6.83 | 0.10 |
| | | -15.09 | 4.55 | 0.10 | 0.00 * |
| | | -43.40 | -16.45 | 0.89 | 0.01 |
| | | -20.99 | 5.90 | 0.10 | 0.00 * |
| | | -57.39 | -11.46 | 0.10 | 0.00 * |
| | | -37.28 | -4.04 | 0.10 | 0.00 * |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2. Fecha JUNIO-2002 Página de

| | | | | | |
|---|---|---|---|---|---|
| | | -56.42 | -23.25 | 1.94 | 0.03 |
| 113 | 114 H-4 | -31.76 | 5.06 | 0.10 | 0.00 * |
| | | -74.06 | -28.05 | 1.78 | 0.03 |
| | | -45.27 | 8.58 | 0.10 | 0.00 * |
| | | -89.56 | -31.77 | 1.49 | 0.02 |
| | | -37.31 | -10.94 | 0.10 | 0.00 * |
| | | -81.84 | -48.70 | 8.97 | 0.13 |
| | | -13.46 | 8.23 | 1.37 | 0.02 |
| | | -48.89 | -9.42 | 0.10 | 0.00 * |
| | | -13.46 | 8.23 | 1.37 | 0.02 |
| | | -55.19 | -13.75 | 0.10 | 0.00 * |
| | | -25.51 | 3.81 | 0.10 | 0.00 * |
| | | -54.21 | -24.83 | 2.78 | 0.04 |
| 114 | 114 H-4 | -31.76 | 5.06 | 0.10 | 0.00 * |
| | | -74.06 | -28.05 | 1.78 | 0.03 |
| | | -45.27 | 8.58 | 0.10 | 0.00 * |
| | | -89.56 | -31.77 | 1.49 | 0.02 |
| | | -37.31 | -10.94 | 0.10 | 0.00 * |
| | | -81.84 | -48.70 | 8.97 | 0.13 |
| | | -13.46 | 8.23 | 1.37 | 0.02 |
| | | -48.89 | -9.42 | 0.10 | 0.00 * |
| | | -13.46 | 8.23 | 1.37 | 0.02 |
| | | -55.19 | -13.75 | 0.10 | 0.00 * |
| | | -25.51 | 3.81 | 0.10 | 0.00 * |
| | | -54.21 | -24.83 | 2.78 | 0.04 |
| 114 | 115 H-5 | -30.13 | 4.04 | 0.10 | 0.00 * |
| | | -72.42 | -46.55 | 9.12 | 0.13 |
| | | -30.17 | 4.30 | 0.10 | 0.00 * |
| | | -87.36 | -47.80 | 8.02 | 0.11 |
| | | -35.10 | -9.80 | 0.10 | 0.00 * |
| | | -80.93 | -63.31 | 14.98 | 0.21 |
| | | -11.83 | 7.57 | 1.33 | 0.02 |
| | | -47.26 | -18.59 | 1.24 | 0.02 |
| | | -11.83 | 7.57 | 1.33 | 0.02 |
| | | -52.98 | -22.73 | 2.13 | 0.03 |
| | | -17.75 | -14.36 | 3.09 | 0.04 |
| | | -52.98 | -32.21 | 5.70 | 0.08 |
| 115 | 115 H-5 | -30.13 | 4.04 | 0.10 | 0.00 * |
| | | -72.42 | -46.55 | 9.12 | 0.13 |
| | | -30.17 | 4.30 | 0.10 | 0.00 * |
| | | -87.36 | -47.80 | 8.02 | 0.11 |
| | | -35.10 | -9.80 | 0.10 | 0.00 * |
| | | -80.93 | -63.31 | 14.98 | 0.21 |

| | | | | | |
|---|---|---|---|---|---|
| | | -11.83 | 7.57 | 1.33 | 0.02 |
| | | -47.26 | -18.59 | 1.24 | 0.02 |
| | | -11.83 | 7.57 | 1.33 | 0.02 |
| | | -52.98 | -22.73 | 2.13 | 0.03 |
| | | -17.75 | -14.36 | 3.09 | 0.04 |
| | | -52.98 | -32.21 | 5.70 | 0.08 |
| 115 | 116 H-6 | -28.49 | -3.10 | 0.10 | 0.00 * |
| | | -70.79 | -71.31 | 19.32 | 0.28 |
| | | -28.49 | -3.07 | 0.10 | 0.00 * |
| | | -85.15 | -70.08 | 17.38 | 0.25 |
| | | -32.90 | -13.37 | 0.97 | 0.01 |
| | | -74.95 | -82.86 | 23.81 | 0.34 |
| | | -10.19 | 3.65 | 0.12 | 0.00 |
| | | -45.62 | -33.38 | 6.97 | 0.10 |
| | | -10.19 | 3.65 | 0.12 | 0.00 |
| | | -50.77 | -37.34 | 7.90 | 0.11 |
| | | -15.55 | -13.89 | 3.17 | 0.05 |
| | | -50.77 | -43.46 | 10.26 | 0.15 |
| 116 | 116 H-6 | -28.49 | -3.10 | 0.10 | 0.00 * |
| | | -70.79 | -71.31 | 19.32 | 0.28 |
| | | -28.49 | -3.07 | 0.10 | 0.00 * |
| | | -85.15 | -70.08 | 17.38 | 0.25 |
| | | -32.90 | -13.37 | 0.97 | 0.01 |
| | | -74.95 | -82.86 | 23.81 | 0.34 |
| | | -10.19 | 3.65 | 0.12 | 0.00 |
| | | -45.62 | -33.38 | 6.97 | 0.10 |
| | | -10.19 | 3.65 | 0.12 | 0.00 |
| | | -50.77 | -37.34 | 7.90 | 0.11 |
| | | -15.55 | -13.89 | 3.17 | 0.05 |
| | | -50.77 | -43.46 | 10.26 | 0.15 |
| 116 | 117 H-7 | -26.86 | -15.54 | 2.46 | 0.04 |
| | | -65.89 | -85.01 | 25.61 | 0.37 |
| | | -26.86 | -15.49 | 2.44 | 0.03 |
| | | -82.95 | -97.32 | 29.48 | 0.42 |
| | | -33.96 | -37.15 | 9.70 | 0.14 |
| | | -72.81 | -106.47 | 34.58 | 0.49 |
| | | -8.56 | -2.42 | 0.10 | 0.00 * |
| | | -43.02 | -47.85 | 12.81 | 0.18 |
| | | -8.56 | -2.42 | 0.10 | 0.00 * |
| | | -48.57 | -56.44 | 15.58 | 0.22 |
| | | -13.34 | -13.43 | 3.26 | 0.05 |
| | | -48.57 | -57.69 | 16.08 | 0.23 |
| 210 | 117 H-7 | -26.86 | -15.54 | 2.46 | 0.04 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2. Fecha JUNIO-2002 Página de

| | | | | | |
|---|---|---|---|---|---|
| | | -65.89 | -85.01 | 25.61 | 0.37 |
| | | -26.86 | -15.49 | 2.44 | 0.03 |
| | | -82.95 | -97.32 | 29.48 | 0.42 |
| | | -33.96 | -37.15 | 9.70 | 0.14 |
| | | -72.81 | -106.47 | 34.58 | 0.49 |
| | | -8.56 | -2.42 | 0.10 | 0.00 * |
| | | -43.02 | -47.85 | 12.81 | 0.18 |
| | | -8.56 | -2.42 | 0.10 | 0.00 * |
| | | -48.57 | -56.44 | 15.58 | 0.22 |
| | | -13.34 | -13.43 | 3.26 | 0.05 |
| | | -48.57 | -57.69 | 16.08 | 0.23 |
| 210 | 211 CS-1 | -26.36 | -19.02 | 0.84 | 0.01 |
| | | -65.38 | -92.53 | 11.84 | 0.10 |
| | | -26.39 | -18.90 | 0.81 | 0.01 |
| | | -82.27 | -104.08 | 12.49 | 0.10 |
| | | -33.28 | -39.26 | 4.21 | 0.04 |
| | | -72.13 | -112.31 | 15.36 | 0.13 |
| | | -8.06 | -3.99 | 0.10 | 0.00 * |
| | | -42.52 | -52.79 | 5.98 | 0.05 |
| | | -8.06 | -3.99 | 0.10 | 0.00 * |
| | | -47.89 | -61.29 | 7.16 | 0.06 |
| | | -12.66 | -13.32 | 1.25 | 0.01 |
| | | -47.89 | -61.29 | 7.16 | 0.06 |
| 211 | 211 CS-1 | -26.36 | -19.02 | 0.84 | 0.01 |
| | | -65.38 | -92.53 | 11.84 | 0.10 |
| | | -26.39 | -18.90 | 0.81 | 0.01 |
| | | -82.27 | -104.08 | 12.49 | 0.10 |
| | | -33.28 | -39.26 | 4.21 | 0.04 |
| | | -72.13 | -112.31 | 15.36 | 0.13 |
| | | -8.06 | -3.99 | 0.10 | 0.00 * |
| | | -42.52 | -52.79 | 5.98 | 0.05 |
| | | -8.06 | -3.99 | 0.10 | 0.00 * |
| | | -47.89 | -61.29 | 7.16 | 0.06 |
| | | -12.66 | -13.32 | 1.25 | 0.01 |
| | | -47.89 | -61.29 | 7.16 | 0.06 |
| 211 | 212 CS-2 | -25.60 | -22.73 | 0.42 | 0.00 |
| | | -64.63 | -100.35 | 7.62 | 0.05 |
| | | -25.63 | -21.51 | 0.24 | 0.00 |
| | | -81.26 | -111.08 | 7.42 | 0.05 |
| | | -32.27 | -41.47 | 2.43 | 0.01 |
| | | -71.12 | -119.78 | 9.85 | 0.06 |
| | | -7.31 | -5.60 | 0.10 | 0.00 * |
| | | -41.76 | -57.97 | 3.81 | 0.02 |
| | | -7.31 | -5.60 | 0.10 | 0.00 * |

| | | | | | |
|---|---|---|---|---|---|
| | | -46.88 | -66.33 | 4.48 | 0.03 |
| | | -11.65 | -13.21 | 0.62 | 0.00 |
| | | -46.88 | -66.35 | 4.48 | 0.03 |
| 212 | 212 CS-2 | -16.22 | -37.63 | 3.67 | 0.02 |
| | | -22.94 | -23.11 | 0.78 | 0.00 |
| | | -17.54 | -21.51 | 1.16 | 0.01 |
| | | -50.63 | -101.23 | 9.30 | 0.06 |
| | | -41.31 | -108.77 | 11.46 | 0.07 |
| | | -49.14 | -119.78 | 12.26 | 0.08 |
| | | -1.44 | -9.79 | 1.29 | 0.01 |
| | | -8.96 | -5.60 | 0.10 | 0.00 * |
| | | -8.96 | -5.60 | 0.10 | 0.00 * |
| | | -33.23 | -61.61 | 5.30 | 0.03 |
| | | -26.69 | -64.98 | 6.53 | 0.04 |
| | | -32.98 | -66.35 | 6.03 | 0.04 |
| 212 | 213 CS-3 | -16.26 | -29.16 | 5.29 | 0.05 |
| | | -24.06 | -16.49 | 1.26 | 0.01 |
| | | -19.13 | -13.93 | 1.20 | 0.01 |
| | | -51.93 | -79.57 | 14.11 | 0.14 |
| | | -41.62 | -87.30 | 17.24 | 0.17 |
| | | -49.65 | -98.98 | 19.43 | 0.19 |
| | | -1.19 | -6.96 | 1.58 | 0.02 |
| | | -8.71 | -3.83 | 0.10 | 0.00 * |
| | | -8.71 | -3.83 | 0.10 | 0.00 * |
| | | -33.83 | -48.82 | 8.23 | 0.08 |
| | | -26.64 | -51.26 | 9.65 | 0.10 |
| | | -33.21 | -53.20 | 9.40 | 0.09 |
| 213 | 213 CS-3 | -16.28 | -29.16 | 5.29 | 0.05 |
| | | -24.07 | -16.49 | 1.26 | 0.01 |
| | | -19.16 | -13.93 | 1.20 | 0.01 |
| | | -51.96 | -79.57 | 14.11 | 0.14 |
| | | -41.68 | -87.30 | 17.23 | 0.17 |
| | | -49.70 | -98.98 | 19.43 | 0.19 |
| | | -1.20 | -6.96 | 1.58 | 0.02 |
| | | -8.71 | -3.83 | 0.10 | 0.00 * |
| | | -8.71 | -3.83 | 0.10 | 0.00 * |
| | | -33.85 | -48.82 | 8.23 | 0.08 |
| | | -26.67 | -51.26 | 9.64 | 0.10 |
| | | -33.23 | -53.20 | 9.40 | 0.09 |
| 213 | 214 CS-4 | -16.31 | -17.52 | 3.56 | 0.04 |
| | | -25.33 | -7.63 | 0.10 | 0.00 * |
| | | -21.41 | -3.83 | 0.10 | 0.00 * |
| | | -53.78 | -52.78 | 10.73 | 0.13 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2. Fecha JUNIO-2002 Página de

| | | | | | |
|---|---|---|---|---|---|
| | | -42.05 | -61.72 | 14.98 | 0.19 |
| | | -49.65 | -74.62 | 18.54 | 0.23 |
| | | -0.97 | -3.72 | 1.06 | 0.01 |
| | | -8.49 | -2.01 | 0.10 | 0.00 * |
| | | -13.17 | -0.80 | 0.10 | 0.00 * |
| | | -34.70 | -34.08 | 6.73 | 0.08 |
| | | -26.72 | -35.24 | 8.00 | 0.10 |
| | | -33.54 | -38.04 | 8.14 | 0.10 |
| 214 | 214 CS-4 | -16.31 | -17.52 | 3.56 | 0.04 |
| | | -25.33 | -7.63 | 0.10 | 0.00 * |
| | | -21.41 | -3.83 | 0.10 | 0.00 * |
| | | -53.78 | -52.78 | 10.73 | 0.13 |
| | | -42.05 | -61.72 | 14.98 | 0.19 |
| | | -49.65 | -74.62 | 18.54 | 0.23 |
| | | -0.97 | -3.72 | 1.06 | 0.01 |
| | | -8.49 | -2.01 | 0.10 | 0.00 * |
| | | -13.17 | -0.80 | 0.10 | 0.00 * |
| | | -34.70 | -34.08 | 6.73 | 0.08 |
| | | -26.72 | -35.24 | 8.00 | 0.10 |
| | | -33.54 | -38.04 | 8.14 | 0.10 |
| 214 | 1 DINTEL | -16.44 | -7.14 | 1.08 | 0.02 |
| | | -26.85 | 0.13 | 0.10 | 0.00 * |
| | | -23.40 | 6.71 | 0.10 | 0.00 * |
| | | -55.58 | -33.20 | 8.18 | 0.14 |
| | | -42.27 | -39.24 | 12.44 | 0.21 |
| | | -49.37 | -53.51 | 18.53 | 0.31 |
| | | -0.80 | -0.91 | 0.33 | 0.01 |
| | | -8.31 | -0.62 | 0.10 | 0.00 * |
| | | -13.47 | 2.12 | 0.10 | 0.00 * |
| | | -35.55 | -21.66 | 5.19 | 0.09 |
| | | -26.77 | -21.48 | 6.11 | 0.10 |
| | | -33.94 | -25.34 | 7.01 | 0.12 |
| 310 | 310 CI-1 | -37.36 | -62.20 | 19.06 | 0.27 |
| | | -69.47 | -17.10 | 0.10 | 0.00 * |
| | | -44.02 | -10.30 | 0.10 | 0.00 * |
| | | -97.12 | -49.52 | 7.69 | 0.11 |
| | | -55.05 | -88.05 | 27.96 | 0.40 |
| | | -90.51 | -99.06 | 29.62 | 0.42 |
| | | -19.06 | -39.01 | 12.07 | 0.17 |
| | | -20.38 | -12.20 | 2.00 | 0.03 |
| | | -20.38 | -12.20 | 2.00 | 0.03 |
| | | -62.75 | -50.68 | 11.79 | 0.17 |
| | | -42.64 | -62.44 | 18.60 | 0.27 |
| | | -60.79 | -64.14 | 17.41 | 0.25 |

| | | | | | |
|---|---|---|---|---|---|
| 310 | 311 CI-1 | -37.36 | -48.99 | 13.86 | 0.20 |
| | | -69.47 | -16.54 | 0.10 | 0.00 * |
| | | -44.02 | -7.43 | 0.10 | 0.00 * |
| | | -97.12 | -40.87 | 4.23 | 0.06 |
| | | -55.05 | -70.33 | 20.53 | 0.29 |
| | | -90.51 | -82.87 | 22.33 | 0.32 |
| | | -19.06 | -29.27 | 8.42 | 0.12 |
| | | -20.38 | -12.05 | 1.94 | 0.03 |
| | | -24.96 | -8.99 | 0.30 | 0.00 |
| | | -62.75 | -40.56 | 7.83 | 0.11 |
| | | -42.64 | -49.66 | 13.55 | 0.19 |
| | | -60.79 | -51.86 | 12.47 | 0.18 |
| 311 | 311 CI-1 | -37.36 | -48.99 | 13.86 | 0.20 |
| | | -69.47 | -16.54 | 0.10 | 0.00 * |
| | | -44.02 | -7.43 | 0.10 | 0.00 * |
| | | -97.12 | -40.87 | 4.23 | 0.06 |
| | | -55.05 | -70.33 | 20.53 | 0.29 |
| | | -90.51 | -82.87 | 22.33 | 0.32 |
| | | -19.06 | -29.27 | 8.42 | 0.12 |
| | | -20.38 | -12.05 | 1.94 | 0.03 |
| | | -24.96 | -8.99 | 0.30 | 0.00 |
| | | -62.75 | -40.56 | 7.83 | 0.11 |
| | | -42.64 | -49.66 | 13.55 | 0.19 |
| | | -60.79 | -51.86 | 12.47 | 0.18 |
| 311 | 312 CI-2 | -37.01 | -42.62 | 11.45 | 0.16 |
| | | -69.12 | -16.37 | 0.10 | 0.00 * |
| | | -43.67 | -6.11 | 0.10 | 0.00 * |
| | | -96.65 | -36.81 | 2.68 | 0.04 |
| | | -54.58 | -61.77 | 17.09 | 0.24 |
| | | -90.04 | -75.09 | 19.02 | 0.27 |
| | | -18.71 | -24.59 | 6.73 | 0.10 |
| | | -20.03 | -11.98 | 1.96 | 0.03 |
| | | -24.61 | -6.12 | 0.10 | 0.00 * |
| | | -62.27 | -35.73 | 6.02 | 0.09 |
| | | -42.16 | -43.49 | 11.21 | 0.16 |
| | | -60.32 | -45.96 | 10.19 | 0.15 |
| 312 | 312 CI-2 | -37.01 | -42.62 | 11.45 | 0.16 |
| | | -69.12 | -16.37 | 0.10 | 0.00 * |
| | | -43.67 | -6.11 | 0.10 | 0.00 * |
| | | -96.65 | -36.81 | 2.68 | 0.04 |
| | | -54.58 | -61.77 | 17.09 | 0.24 |
| | | -90.04 | -75.09 | 19.02 | 0.27 |
| | | -18.71 | -24.59 | 6.73 | 0.10 |



| | | | | | |
|---|---|---|---|---|---|
| | | -20.03 | -11.98 | 1.96 | 0.03 |
| | | -24.61 | -6.12 | 0.10 | 0.00 * |
| | | -62.27 | -35.73 | 6.02 | 0.09 |
| | | -42.16 | -43.49 | 11.21 | 0.16 |
| | | -60.32 | -45.96 | 10.19 | 0.15 |
| 312 | 111 H-1 | -36.66 | -36.66 | 9.21 | 0.13 |
| | | -68.77 | -16.46 | 0.10 | 0.00 * |
| | | -43.32 | -4.62 | 0.10 | 0.00 * |
| | | -96.18 | -33.25 | 1.34 | 0.02 |
| | | -54.10 | -53.83 | 13.96 | 0.20 |
| | | -89.56 | -68.52 | 16.28 | 0.23 |
| | | -18.36 | -20.27 | 5.18 | 0.07 |
| | | -19.68 | -11.91 | 1.97 | 0.03 |
| | | -24.26 | -3.58 | 0.10 | 0.00 * |
| | | -61.80 | -31.38 | 4.41 | 0.06 |
| | | -41.69 | -37.78 | 9.08 | 0.13 |
| | | -59.84 | -41.15 | 8.37 | 0.12 |
| 510 | 310 ZAP | -4.96 | 0.79 | 0.10 | 0.00 * |
| | | -4.96 | 3.79 | 0.61 | 0.01 |
| | | -4.96 | 3.79 | 0.61 | 0.01 |
| | | -12.96 | 1.63 | 0.10 | 0.00 * |
| | | -12.96 | -1.71 | 0.10 | 0.00 * |
| | | -12.96 | -1.71 | 0.10 | 0.00 * |
| | | 0.00 | 1.13 | 0.39 | 0.00 |
| | | 0.00 | 1.13 | 0.39 | 0.00 |
| | | -10.58 | 0.26 | 0.10 | 0.00 * |
| | | -7.88 | -1.13 | 0.10 | 0.00 * |
| | | -7.88 | -1.13 | 0.10 | 0.00 * |
| 510 | 511 ZAP | -4.96 | -0.04 | 0.10 | 0.00 * |
| | | -4.96 | 0.37 | 0.10 | 0.00 * |
| | | -4.96 | 0.37 | 0.10 | 0.00 * |
| | | -12.96 | -0.02 | 0.10 | 0.00 * |
| | | -12.96 | -0.48 | 0.10 | 0.00 * |
| | | -12.96 | -0.48 | 0.10 | 0.00 * |
| | | 0.00 | 0.15 | 0.10 | 0.00 * |
| | | 0.00 | 0.15 | 0.10 | 0.00 * |
| | | 0.00 | 0.15 | 0.10 | 0.00 * |
| | | -10.58 | -0.17 | 0.10 | 0.00 * |
| | | -7.88 | -0.31 | 0.10 | 0.00 * |
| | | -8.75 | -0.32 | 0.10 | 0.00 * |
| 511 | 511 ZAP | -4.96 | -0.04 | 0.10 | 0.00 * |
| | | -4.96 | 0.37 | 0.10 | 0.00 * |

| | | | | | |
|---|---|---|---|---|---|
| | | -4.96 | 0.37 | 0.10 | 0.00 * |
| | | -12.96 | -0.02 | 0.10 | 0.00 * |
| | | -12.96 | -0.48 | 0.10 | 0.00 * |
| | | -12.96 | -0.48 | 0.10 | 0.00 * |
| | | 0.00 | 0.15 | 0.10 | 0.00 * |
| | | 0.00 | 0.15 | 0.10 | 0.00 * |
| | | 0.00 | 0.15 | 0.10 | 0.00 * |
| | | -10.58 | -0.17 | 0.10 | 0.00 * |
| | | -8.75 | -0.32 | 0.10 | 0.00 * |
| | | -8.75 | -0.32 | 0.10 | 0.00 * |
| 511 | 512 ZAP | -4.96 | -0.02 | 0.10 | 0.00 * |
| | | -4.96 | 0.19 | 0.10 | 0.00 * |
| | | -4.96 | 0.19 | 0.10 | 0.00 * |
| | | -12.96 | -0.03 | 0.10 | 0.00 * |
| | | -12.96 | -0.28 | 0.10 | 0.00 * |
| | | -12.96 | -0.28 | 0.10 | 0.00 * |
| | | 0.00 | 0.09 | 0.10 | 0.00 * |
| | | 0.00 | 0.09 | 0.10 | 0.00 * |
| | | -0.43 | 0.09 | 0.10 | 0.00 * |
| | | -10.58 | -0.09 | 0.10 | 0.00 * |
| | | -8.75 | -0.18 | 0.10 | 0.00 * |
| | | -8.75 | -0.18 | 0.10 | 0.00 * |
| 512 | 512 ZAP | -4.96 | -0.02 | 0.10 | 0.00 * |
| | | -4.96 | 0.19 | 0.10 | 0.00 * |
| | | -4.96 | 0.19 | 0.10 | 0.00 * |
| | | -12.96 | -0.03 | 0.10 | 0.00 * |
| | | -12.96 | -0.28 | 0.10 | 0.00 * |
| | | -12.96 | -0.28 | 0.10 | 0.00 * |
| | | 0.00 | 0.09 | 0.10 | 0.00 * |
| | | 0.00 | 0.09 | 0.10 | 0.00 * |
| | | -0.43 | 0.09 | 0.10 | 0.00 * |
| | | -10.58 | -0.09 | 0.10 | 0.00 * |
| | | -8.75 | -0.18 | 0.10 | 0.00 * |
| | | -8.75 | -0.18 | 0.10 | 0.00 * |
| 512 | 513 ZAP | -4.96 | -0.01 | 0.10 | 0.00 * |
| | | -4.96 | 0.08 | 0.10 | 0.00 * |
| | | -4.96 | 0.08 | 0.10 | 0.00 * |
| | | -12.96 | -0.01 | 0.10 | 0.00 * |
| | | -12.96 | -0.12 | 0.10 | 0.00 * |
| | | -12.96 | -0.12 | 0.10 | 0.00 * |
| | | 0.00 | 0.04 | 0.10 | 0.00 * |
| | | 0.00 | 0.04 | 0.10 | 0.00 * |
| | | -0.43 | 0.04 | 0.10 | 0.00 * |
| | | -10.58 | -0.04 | 0.10 | 0.00 * |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.2.* Fecha JUNIO-*2002* Página de

| | | | | | |
|---|---|---|---|---|---|
| | | -8.75 | -0.08 | 0.10 | 0.00 * |
| | | -8.75 | -0.08 | 0.10 | 0.00 * |
| 513 | 513 ZAP | -4.96 | -0.01 | 0.10 | 0.00 * |
| | | -4.96 | 0.08 | 0.10 | 0.00 * |
| | | -4.96 | 0.08 | 0.10 | 0.00 * |
| | | -12.96 | -0.01 | 0.10 | 0.00 * |
| | | -12.96 | -0.12 | 0.10 | 0.00 * |
| | | -12.96 | -0.12 | 0.10 | 0.00 * |
| | | 0.00 | 0.04 | 0.10 | 0.00 * |
| | | 0.00 | 0.04 | 0.10 | 0.00 * |
| | | -0.43 | 0.04 | 0.10 | 0.00 * |
| | | -10.58 | -0.04 | 0.10 | 0.00 * |
| | | -8.75 | -0.08 | 0.10 | 0.00 * |
| | | -8.75 | -0.08 | 0.10 | 0.00 * |
| 513 | 514 ZAP | -4.96 | 0.00 | 0.10 | 0.00 * |
| | | -4.96 | 0.02 | 0.10 | 0.00 * |
| | | -7.44 | 0.02 | 0.10 | 0.00 * |
| | | -12.96 | 0.00 | 0.10 | 0.00 * |
| | | -12.96 | -0.03 | 0.10 | 0.00 * |
| | | -12.96 | -0.03 | 0.10 | 0.00 * |
| | | 0.00 | 0.01 | 0.10 | 0.00 * |
| | | 0.00 | 0.01 | 0.10 | 0.00 * |
| | | -0.43 | 0.01 | 0.10 | 0.00 * |
| | | -10.58 | -0.01 | 0.10 | 0.00 * |
| | | -7.88 | -0.02 | 0.10 | 0.00 * |
| | | -5.83 | -0.02 | 0.10 | 0.00 * |
| 514 | 514 ZAP | -4.96 | 0.00 | 0.10 | 0.00 * |
| | | -4.96 | 0.02 | 0.10 | 0.00 * |
| | | -7.44 | 0.02 | 0.10 | 0.00 * |
| | | -12.96 | 0.00 | 0.10 | 0.00 * |
| | | -12.96 | -0.03 | 0.10 | 0.00 * |
| | | -12.96 | -0.03 | 0.10 | 0.00 * |
| | | 0.00 | 0.01 | 0.10 | 0.00 * |
| | | 0.00 | 0.01 | 0.10 | 0.00 * |
| | | -0.43 | 0.01 | 0.10 | 0.00 * |
| | | -10.58 | -0.01 | 0.10 | 0.00 * |
| | | -10.58 | -0.01 | 0.10 | 0.00 * |
| | | -5.83 | -0.02 | 0.10 | 0.00 * |
| 514 | 515 ZAP | -4.96 | 0.00 | 0.10 | 0.00 * |
| | | -7.44 | 0.00 | 0.10 | 0.00 * |
| | | -11.40 | 0.00 | 0.10 | 0.00 * |
| | | -12.96 | 0.00 | 0.10 | 0.00 * |
| | | -9.24 | 0.00 | 0.10 | 0.00 * |

| | | | | | |
|---|---|---|---|---|---|
| | | -11.40 | 0.00 | 0.10 | 0.00 * |
| | | 0.00 | 0.00 | 0.10 | 0.00 * |
| | | -6.70 | 0.00 | 0.10 | 0.00 * |
| | | -10.58 | 0.00 | 0.10 | 0.00 * |
| | | -10.58 | 0.00 | 0.10 | 0.00 * |
| | | -7.88 | 0.00 | 0.10 | 0.00 * |
| | | -10.58 | 0.00 | 0.10 | 0.00 * |
| 410 | 310 ZAP | -6.36 | 19.31 | 5.27 | 0.07 |
| | | -48.24 | 81.07 | 20.91 | 0.26 |
| | | -53.45 | 100.30 | 27.16 | 0.34 |
| | | -57.27 | 86.71 | 21.95 | 0.27 |
| | | -18.36 | 36.74 | 9.43 | 0.12 |
| | | -12.12 | 11.30 | 2.10 | 0.03 |
| | | -0.35 | 13.03 | 4.01 | 0.05 |
| | | -39.74 | 58.70 | 14.23 | 0.18 |
| | | -41.29 | 64.22 | 15.90 | 0.20 |
| | | -42.35 | 62.13 | 15.09 | 0.19 |
| | | -0.35 | 13.03 | 4.01 | 0.05 |
| | | -4.00 | 12.94 | 3.55 | 0.04 |
| 410 | 411 ZAP | -6.36 | -0.10 | 0.10 | 0.00 * |
| | | -48.24 | 52.63 | 11.28 | 0.14 |
| | | -53.73 | 73.85 | 17.85 | 0.22 |
| | | -57.27 | 67.79 | 15.40 | 0.19 |
| | | -18.36 | 25.60 | 5.87 | 0.07 |
| | | -6.78 | -1.66 | 0.10 | 0.00 * |
| | | -0.35 | 7.27 | 2.23 | 0.03 |
| | | -39.74 | 39.48 | 7.91 | 0.10 |
| | | -41.58 | 47.86 | 10.44 | 0.13 |
| | | -42.35 | 44.54 | 9.27 | 0.12 |
| | | -0.35 | 7.27 | 2.23 | 0.03 |
| | | -4.00 | 6.92 | 1.69 | 0.02 |
| 411 | 411 ZAP | -6.36 | -0.10 | 0.10 | 0.00 * |
| | | -53.42 | 73.55 | 17.77 | 0.22 |
| | | -53.73 | 73.85 | 17.85 | 0.22 |
| | | -57.27 | 67.79 | 15.40 | 0.19 |
| | | -12.78 | 3.74 | 0.10 | 0.00 * |
| | | -6.78 | -1.66 | 0.10 | 0.00 * |
| | | -0.35 | 7.27 | 2.23 | 0.03 |
| | | -41.29 | 45.06 | 9.56 | 0.12 |
| | | -41.58 | 47.86 | 10.44 | 0.13 |
| | | -42.35 | 44.54 | 9.27 | 0.12 |
| | | -0.35 | 7.27 | 2.23 | 0.03 |
| | | -4.00 | 6.92 | 1.69 | 0.02 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.2.* Fecha JUNIO-*2002* Página de

| | | | | | |
|---|---|---|---|---|---|
| 411 | 412 ZAP | -6.36 | -38.33 | 11.30 | 0.14 |
| | | -53.03 | 13.40 | 0.10 | 0.00 * |
| | | -56.66 | 30.46 | 3.09 | 0.04 |
| | | -57.27 | 23.48 | 0.77 | 0.01 |
| | | -12.69 | -17.34 | 3.92 | 0.05 |
| | | -16.47 | -42.00 | 11.34 | 0.14 |
| | | -0.35 | -5.05 | 1.55 | 0.02 |
| | | -41.29 | 2.98 | 0.10 | 0.00 * |
| | | -37.63 | 18.82 | 1.52 | 0.02 |
| | | -42.35 | 5.73 | 0.10 | 0.00 * |
| | | -0.35 | -5.05 | 1.55 | 0.02 |
| | | -21.92 | -15.38 | 2.24 | 0.03 |
| 412 | 412 ZAP | -6.36 | -38.33 | 11.30 | 0.14 |
| | | -52.44 | 8.75 | 0.10 | 0.00 * |
| | | -56.66 | 30.46 | 3.09 | 0.04 |
| | | -57.27 | 23.48 | 0.77 | 0.01 |
| | | -12.42 | -20.57 | 4.96 | 0.06 |
| | | -16.47 | -42.00 | 11.34 | 0.14 |
| | | -0.35 | -5.05 | 1.55 | 0.02 |
| | | -41.29 | 2.98 | 0.10 | 0.00 * |
| | | -37.63 | 18.82 | 1.52 | 0.02 |
| | | -42.35 | 5.73 | 0.10 | 0.00 * |
| | | -0.35 | -5.05 | 1.55 | 0.02 |
| | | -21.92 | -15.38 | 2.24 | 0.03 |
| 412 | 413 ZAP | -6.36 | -60.67 | 18.54 | 0.23 |
| | | -51.69 | -29.94 | 3.48 | 0.04 |
| | | -42.20 | 6.18 | 0.10 | 0.00 * |
| | | -57.27 | -12.66 | 0.10 | 0.00 * |
| | | -12.38 | -30.80 | 8.21 | 0.10 |
| | | -17.19 | -78.52 | 23.31 | 0.29 |
| | | -0.35 | -13.77 | 4.24 | 0.05 |
| | | -41.29 | -28.03 | 4.04 | 0.05 |
| | | -37.63 | 1.89 | 0.10 | 0.00 * |
| | | -42.35 | -23.03 | 2.32 | 0.03 |
| | | -0.35 | -13.77 | 4.24 | 0.05 |
| | | -21.95 | -43.44 | 11.19 | 0.14 |
| 413 | 413 ZAP | -6.36 | -60.67 | 18.54 | 0.23 |
| | | -52.46 | -38.67 | 6.23 | 0.08 |
| | | -42.20 | 6.18 | 0.10 | 0.00 * |
| | | -57.27 | -12.66 | 0.10 | 0.00 * |
| | | -12.20 | -34.60 | 9.44 | 0.12 |
| | | -17.19 | -78.52 | 23.31 | 0.29 |
| | | -0.35 | -13.77 | 4.24 | 0.05 |
| | | -41.29 | -28.03 | 4.04 | 0.05 |

| | | | | | |
|---|---|---|---|---|---|
| | | -37.63 | 1.89 | 0.10 | 0.00 * |
| | | -42.35 | -23.03 | 2.32 | 0.03 |
| | | -20.21 | -14.78 | 2.25 | 0.03 |
| | | -21.95 | -43.44 | 11.19 | 0.14 |
| 413 | 414 ZAP | -6.36 | -69.97 | 21.62 | 0.27 |
| | | -52.44 | -71.50 | 17.18 | 0.21 |
| | | -41.99 | -9.95 | 0.10 | 0.00 * |
| | | -57.27 | -40.63 | 6.34 | 0.08 |
| | | -12.20 | -36.96 | 10.20 | 0.13 |
| | | -17.69 | -102.13 | 31.42 | 0.39 |
| | | -0.35 | -19.50 | 6.02 | 0.08 |
| | | -41.29 | -49.47 | 11.01 | 0.14 |
| | | -32.20 | -8.80 | 0.10 | 0.00 * |
| | | -42.35 | -43.01 | 8.77 | 0.11 |
| | | -20.21 | -19.99 | 3.89 | 0.05 |
| | | -21.95 | -61.39 | 17.07 | 0.21 |
| 414 | 414 ZAP | -6.36 | -69.97 | 21.62 | 0.27 |
| | | -53.03 | -51.01 | 10.22 | 0.13 |
| | | -41.99 | -9.95 | 0.10 | 0.00 * |
| | | -57.27 | -40.63 | 6.34 | 0.08 |
| | | -12.36 | -46.29 | 13.19 | 0.16 |
| | | -17.69 | -102.13 | 31.42 | 0.39 |
| | | -0.35 | -19.50 | 6.02 | 0.08 |
| | | -41.27 | -48.72 | 10.76 | 0.13 |
| | | -32.20 | -8.80 | 0.10 | 0.00 * |
| | | -42.35 | -43.01 | 8.77 | 0.11 |
| | | -20.21 | -19.99 | 3.89 | 0.05 |
| | | -21.95 | -61.39 | 17.07 | 0.21 |
| 414 | 415 ZAP | -6.36 | -69.77 | 21.55 | 0.27 |
| | | -52.94 | -76.66 | 18.89 | 0.24 |
| | | -41.92 | -22.06 | 2.06 | 0.03 |
| | | -57.27 | -60.33 | 12.87 | 0.16 |
| | | -12.38 | -42.65 | 12.01 | 0.15 |
| | | -17.70 | -113.43 | 35.44 | 0.44 |
| | | -0.35 | -22.72 | 7.03 | 0.09 |
| | | -41.27 | -61.79 | 15.09 | 0.19 |
| | | -32.20 | -15.94 | 1.23 | 0.02 |
| | | -42.35 | -55.26 | 12.80 | 0.16 |
| | | -20.21 | -21.67 | 4.42 | 0.06 |
| | | -21.95 | -70.72 | 20.17 | 0.25 |
| 415 | 415 ZAP | -6.36 | -69.77 | 21.55 | 0.27 |
| | | -52.65 | -69.54 | 16.49 | 0.21 |
| | | -41.92 | -22.06 | 2.06 | 0.03 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2. Fecha JUNIO-2002 Página de

| | | | | | |
|---|---|---|---|---|---|
| | | -57.27 | -60.33 | 12.87 | 0.16 |
| | | -10.74 | -64.80 | 19.42 | 0.24 |
| | | -17.70 | -113.43 | 35.44 | 0.44 |
| | | -0.35 | -22.72 | 7.03 | 0.09 |
| | | -41.58 | -35.87 | 6.54 | 0.08 |
| | | -32.20 | -15.94 | 1.23 | 0.02 |
| | | -42.35 | -55.26 | 12.80 | 0.16 |
| | | -22.55 | -27.45 | 5.98 | 0.07 |
| | | -21.95 | -70.72 | 20.17 | 0.25 |
| 415 | 400 ZAP | -6.36 | -67.76 | 20.88 | 0.26 |
| | | -52.59 | -86.83 | 22.47 | 0.28 |
| | | -36.80 | -29.32 | 4.96 | 0.06 |
| | | -57.27 | -71.55 | 16.68 | 0.21 |
| | | -10.79 | -54.92 | 16.17 | 0.20 |
| | | -22.89 | -114.45 | 35.29 | 0.44 |
| | | -0.35 | -23.76 | 7.36 | 0.09 |
| | | -41.58 | -41.82 | 8.47 | 0.11 |
| | | -20.21 | -20.22 | 3.96 | 0.05 |
| | | -42.35 | -60.46 | 14.53 | 0.18 |
| | | -22.55 | -25.45 | 5.35 | 0.07 |
| | | -23.50 | -72.92 | 20.75 | 0.26 |

Nota: * La cuantia dispuesta es suficiente

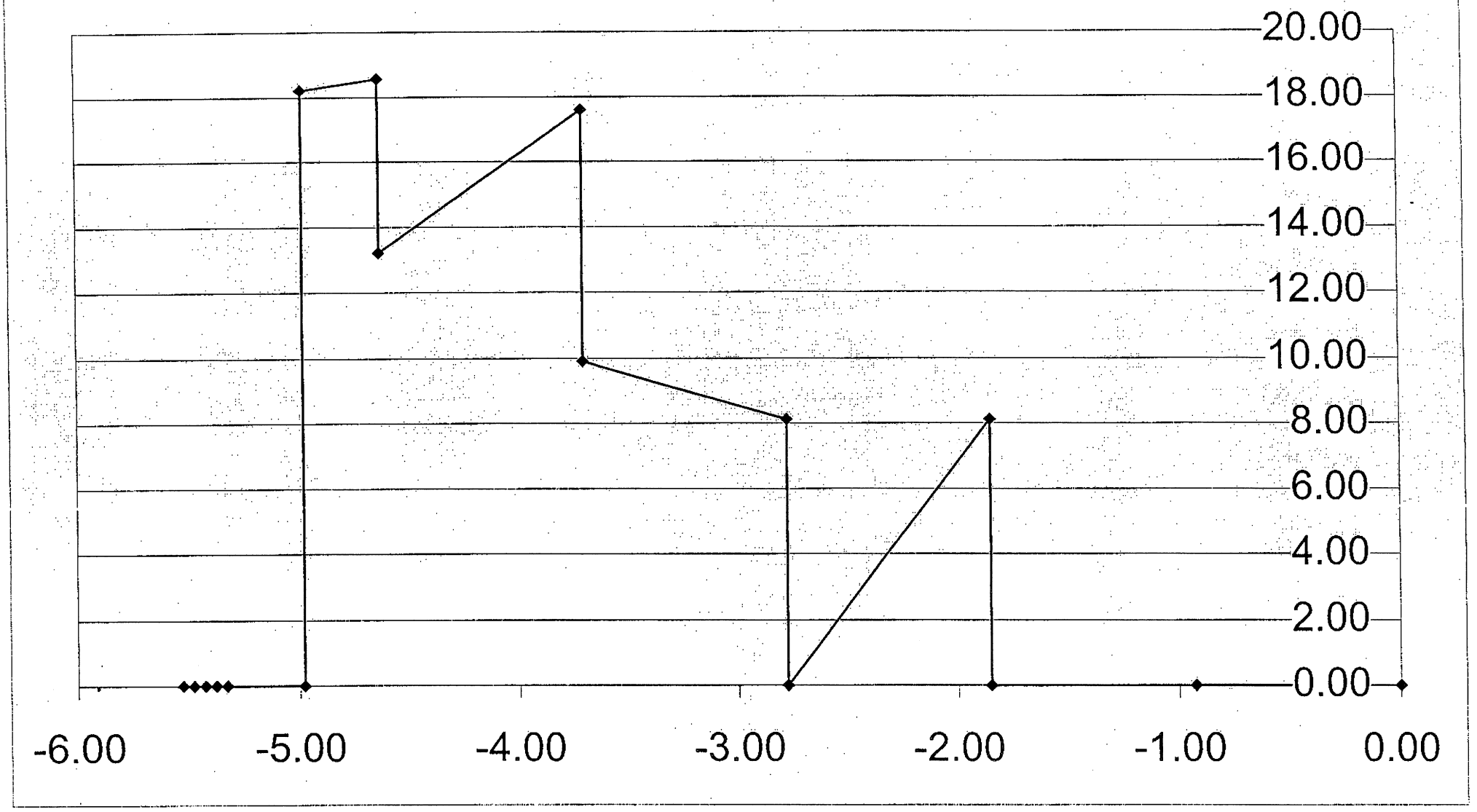
# ARMADO A CORTANTE.

PROYECTO L.A.V. TRAMO: MARTORELL-LLEIDA
ELEMENTO: TRAMO CUBIERTO
*MARCOS-ALEPH Ver. 4.2.1*

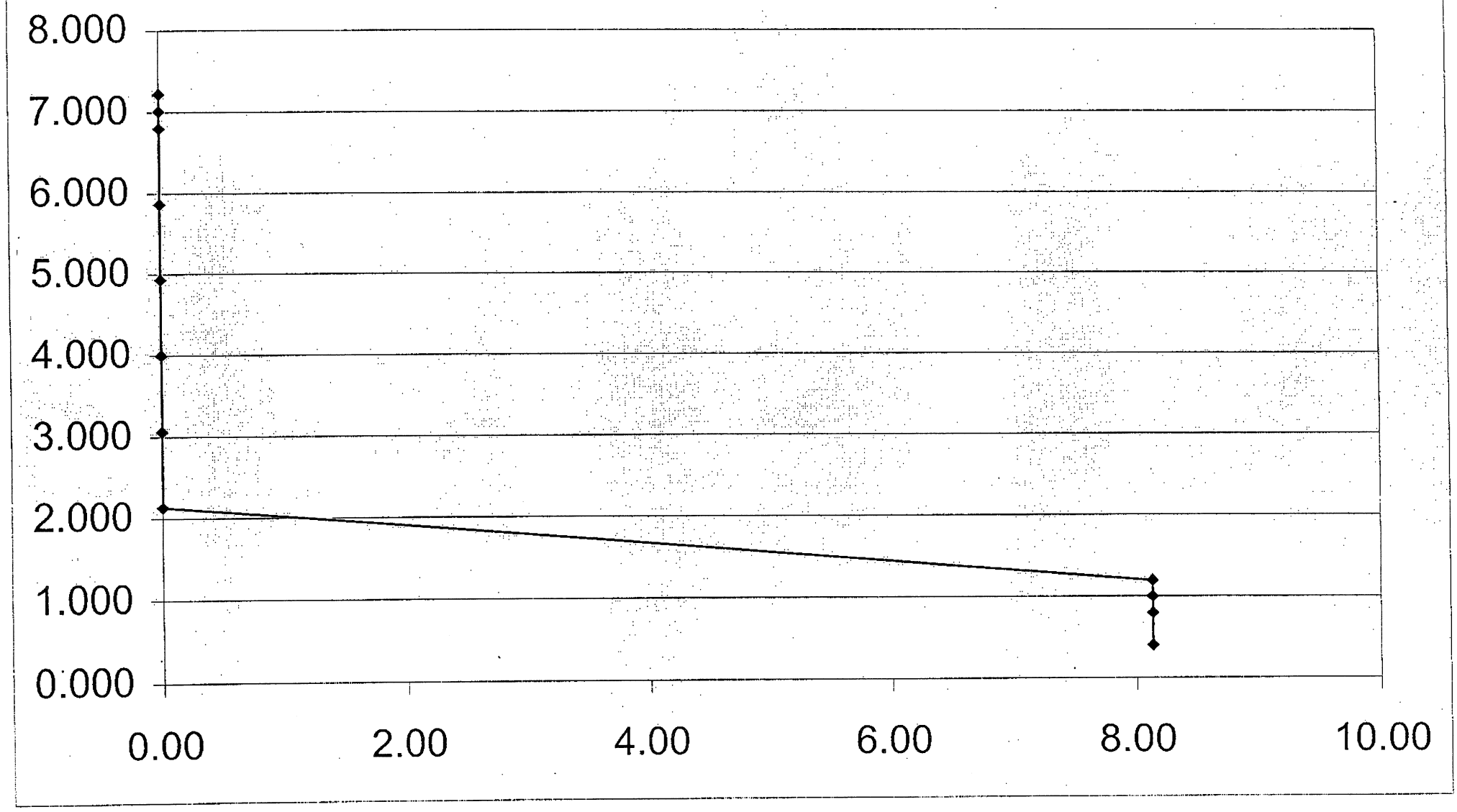
S+Dsada

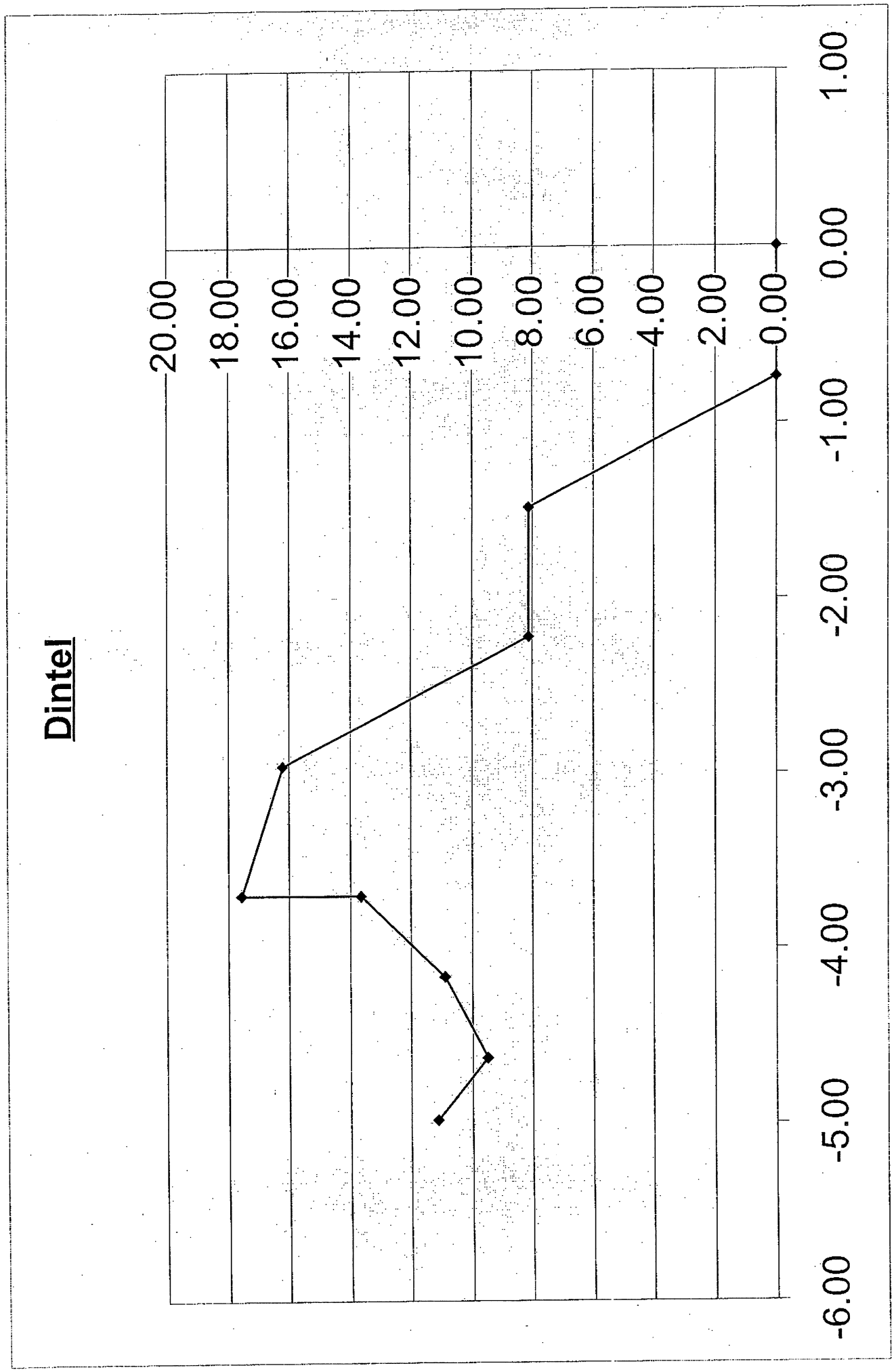
| HIPOTESIS | Nd | Flexión Mz+ | | | | HIPOTESIS | Nd | Flexión Mz- | | | | As.e. max |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | [Tn] | Fyd [Tn] | Mzd [mTn] | As.e [cm2/m] | | | [Tn] | Fyd [Tn] | Mzd [mTn] | As.e [cm2/m] | | [cm2/m] |
| Ninguna | 0.00 | 0.00 | 0.00 | 0.00 | | Ninguna | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 

## Zapata




## Hastial




Dintel
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00

*Control de fisuración.*

Como ya se ha comentado, se realiza el control de esfuerzos de servicio en combinación frecuente. Al igual que para la rotura, se toman los esfuerzos en servicio de la envolvente correspondiente y se procede a la comprobación de tensiones en la sección con la armadura procedente del cálculo en rotura.

En las páginas siguientes se muestra la generación de envolventes así como el resumen de resultados, seleccionando el caso pésimo para cada sección (máxima tensión de tracción en la armadura). Se da también la tensión en la fibra extrema de hormigón en estado elástico al objeto de proceder adecuadamente a la comprobación.

En cada elemento del pórtico (dintel, paredes) se comprueba la sección pésima en cuanto a la apertura de fisura que se produce.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2. Fecha JUNIO-2002 Página de

# ENVOLVENTE FRECUENTE.

**Fichero: FISURA.GEC**

```
"
" Proyecto:L.A.V. TRAMO: MARTORELL-LLEIDA
" Elemento:TRAMO CUBIERTO. ODT300.2
" Cliente:INOCSA
"
" Creado por ALEPH-MARCOS 4.2.1
" Fecha: 17.05.02 Hora: 23:25:01
"
" Exportación automática a FAGUS2.
"       Control de Fisuración.



* TIT
L.A.V. TRAMO: MARTORELL-LLEIDA - TRAMO CUBIERTO
Envolvente Servicio


* DIRESF ESF
* SDF MARCO.SDF


* EC
" ---- ESTADOS DE CARGA MARCO EN SERVICIO -----
   1   MA1001      0   Peso Propio
   2   MA1002      0   Empuje Activo
   3   MA1003      0   Empuje Reposo
   4   MA1004      0   Sismo en Tierras
   5   SC_S_ACT    1   Envolvente S.C.U. Dintel (Empuje Activo)
   6   SC_S_REP    1   Envolvente S.C.U. Dintel (Empuje Reposo)
   7   VP_SUP      1   Envolvente Vehiculo Pesado Dintel
   8   SC_S_INF    1   Envolvente S.C.U. Zapata
   9   VP_INF      1   Envolvente Vehiculo Pesado Zapata

* ENV

   30   MA_FREC  1    Envolvente de Servicio (Cargas Frecuentes)

   incomp 2 3  " Empujes
   incomp 4 5  " Sobrecargas
   ec1   1.00  1.00   " Peso Propio
   ec2   1.00  1.00   " Empuje Activo
   ec3   1.00  1.00   " Empuje Reposo
   ec5   0.00  0.50   " Envolvente S.C.U. Dintel (Empuje Activo)
   ec6   0.00  0.50   " Envolvente S.C.U. Dintel (Empuje Reposo)
   ec7   0.00  0.50   " Envolvente Vehiculo Pesado Dintel
   ec8   0.00  0.50   " Envolvente S.C.U. Zapata
   ec9   0.00  0.50   " Envolvente Vehiculo Pesado Zapata


* EXPORT FAGUS2
    direxp -r FAGUS\MARCO.$ST\


    outres -r FIS_FG2.lst

    tipoexp  Comprobacion

"  Esfuerzos Exportados
   esfexp  X ZZ
st  514514  i   514
st  514515  d   514
st  513513  i   513
st  513514  d   513
st  512512  i   512
st  512513  d   512
st  511511  i   511
st  511512  d   511
st  510310  i   510
st  510511  d   510
st  410310  i   410
st  410411  d   410
st  411411  i   411
st  411412  d   411
st  412412  i   412
st  412413  d   412
st  413413  i   413
st  413414  d   413
st  414414  i   414
st  414415  d   414
st  415415  i   415
st  415400  d   415
st  310310  i   310
st  310311  d   310
st  311311  i   311
st  311312  d   311
st  312312  i   312
st  312111  d   312
st  111111  i   111
st  111112  d   111
st  112112  i   112
st  112113  d   112
st  113113  i   113
st  113114  d   113
st  114114  i   114
st  114115  d   114
st  115115  i   115
st  115116  d   115
st  116116  i   116
st  116117  d   116
st  210117  i   210
st  210211  d   210
st  211211  i   211
st  211212  d   211
st  212212  i   212
st  212213  d   212
st  213213  i   213
st  213214  d   213
st  214214  i   214
st  2141  d   214
st  11  i   1
st  12  d   1
st  22  i   2
st  23  d   2
st  33  i   3
st  34  d   3
st  44  i   4
st  45  d   4
st  55  i   5
st  56  d   5


" Estado de carga y envolventes a Exportar.
ec30 y+ y- x+ x- zz+ zz-
```

# TENSIONES EN SERVICIO (Comb. Frecuente).

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.2. Fecha JUNIO-2002 Página de

**Fichero: FIS_FG2.LST**

```
        RESULTADOS CALCULO FAGUS2
        Fecha : 17.05.2002 23:26:18
        Título : L.A.V. TRAMO: MARTORELL. ODT 300.2
        Coment : Envolvente Servicio
        Calculo:  CONTROL TENSIONAL DE SECCIONES


Lista de estados de carga y envolventes
 ec  Fichero  env  Título
 30  MA_FREC   Nx+ [Envolvente de Servicio (Cargas Frecuentes)          ]
 30  MA_FREC   Fy+ [Envolvente de Servicio (Cargas Frecuentes)        ]
 30  MA_FREC   Mz+ [Envolvente de Servicio (Cargas Frecuentes)          ]
 30  MA_FREC   Nx- [Envolvente de Servicio (Cargas Frecuentes)          ]
 30  MA_FREC   Fy- [Envolvente de Servicio (Cargas Frecuentes)        ]
 30  MA_FREC   Mz- [Envolvente de Servicio (Cargas Frecuentes)          ]


 Esfuerzos exportados: Nx Mz

 Tabla de Resultados, segun ejes GEC
 Unidades Esfuerzos [m tm]

 Elem Nudo  Seccion        Nx          Mz    Tensiones
                                             H-Bruto   As-Fis.
-------------------------------------------------------------

   1    1 11          -13.48     -11.01      16.10     459.30
                      -21.47      -8.80      11.09     245.24
                      -15.53      -5.11       5.93     112.49
                      -25.30     -19.74      28.68     809.65
                      -23.30     -21.40      31.78     928.54
                      -23.40     -24.62      37.13    1110.84

   1    2 12          -13.48       2.11       1.27       8.06
                      -21.58       4.78       4.37      53.32
                      -16.08      10.06      14.09     374.42
                      -25.30      -0.41      -3.53     -27.98
                      -23.44      -3.13       1.31       2.11
                      -23.01      -6.83       7.55     286.19

   2    2 22          -13.48       2.11       1.27       8.06
                      -21.58       4.78       4.37      53.32
                      -16.08      10.06      14.09     374.42
                      -25.30      -0.41      -3.53     -27.98
                      -23.44      -3.13       1.31       2.11
                      -23.01      -6.83       7.55     286.19

   2    3 23          -13.48      12.33      18.30     534.31
                      -21.77      15.72      22.57     625.09
                      -16.68      22.81      35.24    1092.63
                      -25.30      15.20      21.12     553.94
                      -23.44      11.20      14.76     353.70
                      -22.12       6.32       6.85     114.12

   3    3 33          -13.48      12.33      18.30     534.31
                      -21.77      15.72      22.57     625.09
                      -16.68      22.81      35.24    1092.63
                      -25.30      15.20      21.12     553.94
                      -23.44      11.20      14.76     353.70
                      -22.12       6.32       6.85     114.12

   3    4 34          -13.48      19.65      30.50     952.67
                      -22.02      23.78      35.96    1080.26
                      -17.06      31.76      50.09    1600.88
                      -25.30      26.25      39.53    1179.97
                      -23.30      21.53      32.00     935.94
                      -21.63      14.66      20.83     567.00

   4    4 44          -13.48      19.65      30.50     952.67
                      -22.02      23.78      35.96    1080.26
                      -17.06      31.76      50.09    1600.88
                      -25.30      26.25      39.53    1179.97
                      -23.30      21.53      32.00     935.94
                      -21.63      14.66      20.83     567.00
```

| | | | | | |
|---|---|---|---|---|---|
| 4 | 5 | 45 | -13.48 | 24.07 | 37.87 | 1206.11 |
| | | | -22.32 | 28.70 | 44.11 | 1357.74 |
| | | | -17.20 | 36.83 | 58.52 | 1890.08 |
| | | | -25.30 | 32.75 | 50.37 | 1551.50 |
| | | | -23.00 | 27.87 | 42.62 | 1301.59 |
| | | | -21.65 | 19.82 | 29.43 | 859.11 |
| 5 | 5 | 55 | -13.48 | 24.07 | 37.87 | 1206.11 |
| | | | -22.32 | 28.70 | 44.11 | 1357.74 |
| | | | -17.20 | 36.83 | 58.52 | 1890.08 |
| | | | -25.30 | 32.75 | 50.37 | 1551.50 |
| | | | -23.00 | 27.87 | 42.62 | 1301.59 |
| | | | -21.65 | 19.82 | 29.43 | 859.11 |
| 5 | 6 | 56 | -13.48 | 25.58 | 40.39 | 1292.76 |
| | | | -22.63 | 30.19 | 46.55 | 1439.07 |
| | | | -15.48 | 38.45 | 61.50 | 2005.62 |
| | | | -25.30 | 34.67 | 53.57 | 1661.42 |
| | | | -22.63 | 30.22 | 46.60 | 1440.78 |
| | | | -23.38 | 21.57 | 32.05 | 937.22 |
| 111 | 111 | 111111 | -38.92 | -28.25 | 29.03 | 952.20 |
| | | | -49.62 | -21.80 | 19.61 | 497.96 |
| | | | -41.14 | -17.57 | 15.64 | 388.83 |
| | | | -53.07 | -23.70 | 21.44 | 551.02 |
| | | | -39.04 | -30.56 | 31.84 | 1070.28 |
| | | | -50.86 | -35.67 | 36.41 | 1179.96 |
| 111 | 112 | 111112 | -37.29 | -12.57 | 10.07 | 353.35 |
| | | | -47.99 | -17.70 | 14.82 | 600.45 |
| | | | -39.49 | -7.00 | 2.93 | 22.47 |
| | | | -51.44 | -14.15 | 9.98 | 232.77 |
| | | | -37.41 | -14.56 | 12.48 | 545.27 |
| | | | -47.77 | -25.77 | 24.73 | 1489.53 |
| 112 | 112 | 112112 | -37.29 | -12.57 | 10.07 | 353.35 |
| | | | -47.99 | -17.70 | 14.82 | 600.45 |
| | | | -39.49 | -7.00 | 2.93 | 22.47 |
| | | | -51.44 | -14.15 | 9.98 | 232.77 |
| | | | -37.41 | -14.56 | 12.48 | 545.27 |
| | | | -47.77 | -25.77 | 24.73 | 1489.53 |
| 112 | 113 | 112113 | -35.65 | -4.13 | -0.04 | -6.33 |
| | | | -46.36 | -18.00 | 15.42 | 671.25 |
| | | | -36.76 | -2.13 | -2.64 | -22.46 |
| | | | -49.80 | -11.18 | 6.58 | 94.19 |
| | | | -35.78 | -5.81 | 2.00 | 11.28 |
| | | | -47.23 | -21.88 | 20.05 | 1064.93 |
| 113 | 113 | 113113 | -35.65 | -4.13 | -0.04 | -6.33 |
| | | | -46.36 | -18.00 | 15.42 | 671.25 |
| | | | -36.76 | -2.13 | -2.64 | -22.46 |
| | | | -49.80 | -11.18 | 6.58 | 94.19 |
| | | | -35.78 | -5.81 | 2.00 | 11.28 |
| | | | -47.23 | -21.88 | 20.05 | 1064.93 |
| 113 | 114 | 113114 | -34.02 | -2.13 | -2.25 | -19.60 |
| | | | -44.72 | -14.03 | 10.79 | 332.19 |
| | | | -35.13 | -1.82 | -2.79 | -23.08 |
| | | | -48.17 | -14.00 | 10.26 | 270.26 |
| | | | -34.14 | -11.60 | 9.33 | 331.94 |
| | | | -45.59 | -23.70 | 22.51 | 1319.05 |
| 114 | 114 | 114114 | -34.02 | -2.13 | -2.25 | -19.60 |
| | | | -44.72 | -14.03 | 10.79 | 332.19 |
| | | | -35.13 | -1.82 | -2.79 | -23.08 |
| | | | -48.17 | -14.00 | 10.26 | 270.26 |
| | | | -34.14 | -11.60 | 9.33 | 331.94 |
| | | | -45.59 | -23.70 | 22.51 | 1319.05 |
| 114 | 115 | 114115 | -32.39 | -5.74 | 2.40 | 15.33 |
| | | | -43.09 | -22.60 | 21.52 | 521.93 |
| | | | -32.40 | -5.65 | 2.29 | 14.00 |
| | | | -46.54 | -21.78 | 20.02 | 455.60 |
| | | | -32.51 | -13.80 | 12.25 | 261.52 |
| | | | -44.39 | -30.46 | 30.96 | 841.43 |
| 115 | 115 | 115115 | -32.39 | -5.74 | 2.40 | 15.33 |
| | | | -43.09 | -22.60 | 21.52 | 521.93 |
| | | | -32.40 | -5.65 | 2.29 | 14.00 |
| | | | -46.54 | -21.78 | 20.02 | 455.60 |
| | | | -32.51 | -13.80 | 12.25 | 261.52 |
| | | | -44.39 | -30.46 | 30.96 | 841.43 |



| | | | | | | |
|---|---|---|---|---|---|---|
| 115 | 116 | 115116 | -30.75 | -14.16 | 12.95 | 291.68 |
| | | | -41.46 | -35.32 | 37.33 | 1082.53 |
| | | | -30.75 | -14.15 | 12.93 | 291.27 |
| | | | -44.90 | -33.72 | 34.88 | 976.25 |
| | | | -30.88 | -19.41 | 19.36 | 509.34 |
| | | | -41.50 | -40.25 | 43.36 | 1296.67 |
| 116 | 116 | 116116 | -30.75 | -14.16 | 12.95 | 291.68 |
| | | | -41.46 | -35.32 | 37.33 | 1082.53 |
| | | | -30.75 | -14.15 | 12.93 | 291.27 |
| | | | -44.90 | -33.72 | 34.88 | 976.25 |
| | | | -30.88 | -19.41 | 19.36 | 509.34 |
| | | | -41.50 | -40.25 | 43.36 | 1296.67 |
| 116 | 117 | 116117 | -29.12 | -26.57 | 28.38 | 836.95 |
| | | | -38.73 | -46.03 | 50.83 | 1580.48 |
| | | | -29.12 | -26.55 | 28.35 | 836.08 |
| | | | -43.27 | -48.98 | 53.79 | 1658.58 |
| | | | -30.33 | -33.23 | 36.36 | 1114.31 |
| | | | -39.89 | -52.49 | 58.58 | 1850.79 |
| 210 | 117 | 210117 | -29.12 | -26.57 | 28.38 | 836.95 |
| | | | -38.73 | -46.03 | 50.83 | 1580.48 |
| | | | -29.12 | -26.55 | 28.35 | 836.08 |
| | | | -43.27 | -48.98 | 53.79 | 1658.58 |
| | | | -30.33 | -33.23 | 36.36 | 1114.31 |
| | | | -39.89 | -52.49 | 58.58 | 1850.79 |
| 210 | 211 | 210211 | -28.62 | -29.86 | 10.18 | 411.64 |
| | | | -38.23 | -50.13 | 17.90 | 794.41 |
| | | | -28.63 | -29.81 | 10.15 | 410.36 |
| | | | -42.77 | -52.83 | 18.66 | 810.60 |
| | | | -29.83 | -35.45 | 12.43 | 531.92 |
| | | | -39.39 | -55.57 | 20.10 | 913.01 |
| 211 | 211 | 211211 | -28.62 | -29.86 | 10.18 | 411.64 |
| | | | -38.23 | -50.13 | 17.90 | 794.41 |
| | | | -28.63 | -29.81 | 10.15 | 410.36 |
| | | | -42.77 | -52.83 | 18.66 | 810.60 |
| | | | -29.83 | -35.45 | 12.43 | 531.92 |
| | | | -39.39 | -55.57 | 20.10 | 913.01 |
| 211 | 212 | 211212 | -27.86 | -33.32 | 5.82 | 299.00 |
| | | | -37.48 | -54.39 | 9.98 | 577.90 |
| | | | -27.87 | -32.24 | 5.57 | 279.45 |
| | | | -42.01 | -56.83 | 10.26 | 571.18 |
| | | | -29.08 | -37.75 | 6.74 | 366.17 |
| | | | -38.63 | -59.73 | 11.12 | 664.13 |
| 212 | 212 | 212212 | -16.56 | -37.62 | 20.92 | 1010.86 |
| | | | -21.89 | -33.45 | 17.88 | 808.71 |
| | | | -17.00 | -32.24 | 17.64 | 830.69 |
| | | | -27.63 | -53.54 | 29.36 | 1387.08 |
| | | | -22.21 | -55.55 | 31.11 | 1521.30 |
| | | | -27.14 | -59.73 | 33.12 | 1594.16 |
| 212 | 213 | 212213 | -16.60 | -29.22 | 15.87 | 737.88 |
| | | | -22.48 | -25.91 | 13.30 | 559.11 |
| | | | -17.56 | -24.14 | 12.73 | 561.91 |
| | | | -28.21 | -42.18 | 22.49 | 1012.26 |
| | | | -22.32 | -44.07 | 24.21 | 1147.08 |
| | | | -27.45 | -48.65 | 26.45 | 1230.90 |
| 213 | 213 | 213213 | -16.62 | -29.22 | 15.87 | 737.63 |
| | | | -22.49 | -25.91 | 13.30 | 558.99 |
| | | | -17.58 | -24.14 | 12.73 | 561.66 |
| | | | -28.23 | -42.18 | 22.48 | 1012.01 |
| | | | -22.35 | -44.07 | 24.21 | 1146.70 |
| | | | -27.48 | -48.65 | 26.44 | 1230.52 |
| 213 | 214 | 213214 | -16.71 | -18.81 | 15.55 | 568.81 |
| | | | -23.24 | -16.78 | 12.83 | 408.83 |
| | | | -18.41 | -14.25 | 11.06 | 362.38 |
| | | | -29.07 | -28.46 | 23.05 | 814.59 |
| | | | -22.52 | -30.49 | 25.77 | 978.50 |
| | | | -27.70 | -35.74 | 30.04 | 1130.77 |
| 214 | 214 | 214214 | -16.71 | -18.81 | 15.55 | 568.81 |
| | | | -23.24 | -16.78 | 12.83 | 408.83 |
| | | | -18.41 | -14.25 | 11.06 | 362.38 |
| | | | -29.07 | -28.46 | 23.05 | 814.59 |
| | | | -22.52 | -30.49 | 25.77 | 978.50 |
| | | | -27.70 | -35.74 | 30.04 | 1130.77 |
| 214 | 1 | 2141 | -16.85 | -9.73 | 13.41 | 346.98 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | -24.07 | -8.94 | 10.89 | 226.26 |
| | | | -19.17 | -5.11 | 5.32 | 82.34 |
| | | | -29.91 | -17.85 | 24.77 | 648.19 |
| | | | -22.66 | -18.64 | 27.29 | 779.58 |
| | | | -27.84 | -24.62 | 36.39 | 1055.44 |
| 310 | 310 | 310310 | -39.62 | -47.29 | 52.25 | 1938.43 |
| | | | -50.32 | -28.73 | 27.99 | 832.17 |
| | | | -41.84 | -26.46 | 26.42 | 822.63 |
| | | | -53.77 | -37.04 | 37.67 | 1212.91 |
| | | | -39.74 | -49.88 | 55.40 | 2073.14 |
| | | | -51.56 | -53.55 | 58.21 | 2102.55 |
| 310 | 311 | 310311 | -39.62 | -37.39 | 40.12 | 1418.65 |
| | | | -50.32 | -25.03 | 23.46 | 647.23 |
| | | | -41.84 | -21.99 | 20.95 | 596.62 |
| | | | -53.77 | -30.02 | 29.08 | 854.95 |
| | | | -39.74 | -39.84 | 43.11 | 1545.34 |
| | | | -51.56 | -44.02 | 46.54 | 1603.91 |
| 311 | 311 | 311311 | -39.62 | -37.39 | 40.12 | 1418.65 |
| | | | -50.32 | -25.03 | 23.46 | 647.23 |
| | | | -41.84 | -21.99 | 20.95 | 596.62 |
| | | | -53.77 | -30.02 | 29.08 | 854.95 |
| | | | -39.74 | -39.84 | 43.11 | 1545.34 |
| | | | -51.56 | -44.02 | 46.54 | 1603.91 |
| 311 | 312 | 311312 | -39.27 | -32.64 | 34.36 | 1175.37 |
| | | | -49.97 | -23.29 | 21.38 | 565.97 |
| | | | -41.49 | -19.87 | 18.40 | 495.90 |
| | | | -53.42 | -26.69 | 25.05 | 692.93 |
| | | | -39.39 | -35.01 | 37.24 | 1297.35 |
| | | | -51.21 | -39.45 | 40.99 | 1370.89 |
| 312 | 312 | 312312 | -39.27 | -32.64 | 34.36 | 1175.37 |
| | | | -49.97 | -23.29 | 21.38 | 565.97 |
| | | | -41.49 | -19.87 | 18.40 | 495.90 |
| | | | -53.42 | -26.69 | 25.05 | 692.93 |
| | | | -39.39 | -35.01 | 37.24 | 1297.35 |
| | | | -51.21 | -39.45 | 40.99 | 1370.89 |
| 312 | 111 | 312111 | -38.92 | -28.25 | 29.03 | 952.20 |
| | | | -49.62 | -21.80 | 19.61 | 497.96 |
| | | | -41.14 | -17.57 | 15.64 | 388.83 |
| | | | -53.07 | -23.70 | 21.44 | 551.02 |
| | | | -39.04 | -30.56 | 31.84 | 1070.28 |
| | | | -50.86 | -35.67 | 36.41 | 1179.96 |
| 510 | 310 | 510310 | -4.96 | 1.04 | 0.36 | 2.49 |
| | | | -4.96 | 1.26 | 0.56 | 5.91 |
| | | | -4.96 | 1.26 | 0.56 | 5.91 |
| | | | -8.04 | 0.62 | -0.42 | -3.62 |
| | | | -8.04 | -0.40 | -0.63 | -5.19 |
| | | | -8.04 | -0.40 | -0.63 | -5.19 |
| 510 | 511 | 510511 | -4.96 | 0.00 | -0.63 | -4.38 |
| | | | -4.96 | 0.03 | -0.59 | -4.16 |
| | | | -4.96 | 0.03 | -0.59 | -4.16 |
| | | | -8.04 | -0.07 | -0.94 | -7.04 |
| | | | -8.04 | -0.21 | -0.81 | -6.25 |
| | | | -8.04 | -0.21 | -0.81 | -6.25 |
| 511 | 511 | 511511 | -4.96 | 0.00 | -0.63 | -4.38 |
| | | | -4.96 | 0.03 | -0.59 | -4.16 |
| | | | -4.96 | 0.03 | -0.59 | -4.16 |
| | | | -8.04 | -0.07 | -0.94 | -7.04 |
| | | | -8.04 | -0.21 | -0.81 | -6.25 |
| | | | -8.04 | -0.21 | -0.81 | -6.25 |
| 511 | 512 | 511512 | -4.96 | -0.01 | -0.63 | -4.38 |
| | | | -4.96 | 0.01 | -0.61 | -4.28 |
| | | | -4.96 | 0.01 | -0.61 | -4.28 |
| | | | -8.04 | -0.05 | -0.96 | -7.15 |
| | | | -8.04 | -0.12 | -0.89 | -6.76 |
| | | | -8.04 | -0.12 | -0.89 | -6.76 |
| 512 | 512 | 512512 | -4.96 | -0.01 | -0.63 | -4.38 |
| | | | -4.96 | 0.01 | -0.61 | -4.28 |
| | | | -4.96 | 0.01 | -0.61 | -4.28 |
| | | | -8.04 | -0.05 | -0.96 | -7.15 |
| | | | -8.04 | -0.12 | -0.89 | -6.76 |
| | | | -8.04 | -0.12 | -0.89 | -6.76 |
| 512 | 513 | 512513 | -4.96 | 0.00 | -0.63 | -4.38 |
| | | | -4.96 | 0.00 | -0.61 | -4.28 |



| | | | | | | |
|---|---|---|---|---|---|---|
| | | | -4.96 | 0.00 | -0.61 | -4.28 |
| | | | -8.04 | -0.02 | -1.02 | -7.12 |
| | | | -8.04 | -0.05 | -0.96 | -7.15 |
| | | | -8.04 | -0.05 | -0.96 | -7.15 |
| 513 | 513 | 513513 | -4.96 | 0.00 | -0.63 | -4.38 |
| | | | -4.96 | 0.00 | -0.61 | -4.28 |
| | | | -4.96 | 0.00 | -0.61 | -4.28 |
| | | | -8.04 | -0.02 | -1.02 | -7.12 |
| | | | -8.04 | -0.05 | -0.96 | -7.15 |
| | | | -8.04 | -0.05 | -0.96 | -7.15 |
| 513 | 514 | 513514 | -4.96 | 0.00 | -0.63 | -4.38 |
| | | | -4.96 | 0.00 | -0.61 | -4.28 |
| | | | -7.44 | 0.00 | -0.92 | -6.44 |
| | | | -8.04 | 0.00 | -1.01 | -7.06 |
| | | | -8.04 | -0.01 | -1.01 | -7.06 |
| | | | -8.04 | -0.01 | -1.01 | -7.06 |
| 514 | 514 | 514514 | -4.96 | 0.00 | -0.63 | -4.38 |
| | | | -4.96 | 0.00 | -0.61 | -4.28 |
| | | | -7.44 | 0.00 | -0.92 | -6.44 |
| | | | -8.04 | 0.00 | -1.01 | -7.06 |
| | | | -8.04 | -0.01 | -1.01 | -7.06 |
| | | | -8.04 | -0.01 | -1.01 | -7.06 |
| 514 | 515 | 514515 | -4.96 | 0.00 | -0.63 | -4.52 |
| | | | -4.96 | 0.00 | -0.63 | -4.52 |
| | | | -8.04 | 0.00 | -1.01 | -7.29 |
| | | | -8.04 | 0.00 | -1.01 | -7.29 |
| | | | -8.04 | 0.00 | -1.01 | -7.29 |
| | | | -8.04 | 0.00 | -1.01 | -7.29 |
| 410 | 310 | 410310 | -14.21 | 29.56 | 25.94 | 1040.96 |
| | | | -30.13 | 47.63 | 40.89 | 1584.41 |
| | | | -31.86 | 54.04 | 46.68 | 1827.33 |
| | | | -33.14 | 49.51 | 42.27 | 1623.79 |
| | | | -18.21 | 35.37 | 30.88 | 1229.97 |
| | | | -16.13 | 26.89 | 23.19 | 905.73 |
| 410 | 411 | 410411 | -14.21 | 14.65 | 11.96 | 425.53 |
| | | | -30.13 | 31.48 | 25.75 | 919.33 |
| | | | -31.96 | 38.56 | 32.16 | 1187.28 |
| | | | -33.14 | 36.54 | 30.11 | 1089.67 |
| | | | -18.21 | 23.22 | 19.49 | 727.90 |
| | | | -14.35 | 14.13 | 11.45 | 402.56 |
| 411 | 411 | 411411 | -14.21 | 14.65 | 11.96 | 425.53 |
| | | | -31.85 | 38.46 | 32.08 | 1184.54 |
| | | | -31.96 | 38.56 | 32.16 | 1187.28 |
| | | | -33.14 | 36.54 | 30.11 | 1089.67 |
| | | | -16.35 | 15.93 | 12.89 | 451.74 |
| | | | -14.35 | 14.13 | 11.45 | 402.56 |
| 411 | 412 | 411412 | -14.21 | -16.29 | 13.50 | 839.79 |
| | | | -31.72 | 3.92 | -0.29 | -6.68 |
| | | | -32.97 | 9.02 | 4.33 | 77.72 |
| | | | -33.14 | 7.28 | 2.68 | 25.89 |
| | | | -16.32 | -9.29 | 6.67 | 303.31 |
| | | | -14.58 | -16.89 | 14.01 | 874.21 |
| 412 | 412 | 412412 | -14.21 | -16.29 | 13.50 | 839.79 |
| | | | -31.53 | 2.37 | -1.72 | -15.61 |
| | | | -32.97 | 9.02 | 4.33 | 77.72 |
| | | | -33.14 | 7.28 | 2.68 | 25.89 |
| | | | -16.23 | -10.37 | 7.69 | 378.49 |
| | | | -14.58 | -16.89 | 14.01 | 874.21 |
| 412 | 413 | 412413 | -14.21 | -36.76 | 32.69 | 1192.00 |
| | | | -31.28 | -20.97 | 15.75 | 435.38 |
| | | | -32.77 | -11.68 | 6.85 | 118.17 |
| | | | -33.14 | -15.21 | 10.12 | 222.60 |
| | | | -16.22 | -26.80 | 23.10 | 803.63 |
| | | | -14.82 | -39.26 | 34.95 | 1277.08 |
| 413 | 413 | 413413 | -14.21 | -36.76 | 32.69 | 1192.00 |
| | | | -31.53 | -23.88 | 18.45 | 536.00 |
| | | | -32.77 | -11.68 | 6.85 | 118.17 |
| | | | -33.14 | -15.21 | 10.12 | 222.60 |
| | | | -16.16 | -28.07 | 24.30 | 850.87 |
| | | | -14.82 | -39.26 | 34.95 | 1277.08 |
| 413 | 414 | 413414 | -14.21 | -48.50 | 43.69 | 1624.10 |
| | | | -31.53 | -41.81 | 35.26 | 1185.59 |
| | | | -32.70 | -25.99 | 20.28 | 599.59 |

| | | | | | |
|---|---|---|---|---|---|
| | | -33.14 | -31.52 | 25.41 | 794.07 |
| | | -16.16 | -37.50 | 33.14 | 1197.26 |
| | | -14.98 | -53.90 | 48.66 | 1814.18 |
| 414 | 414 414414 | -14.21 | -48.50 | 43.69 | 1624.10 |
| | | -31.72 | -34.98 | 28.83 | 934.52 |
| | | -32.70 | -25.99 | 20.28 | 599.59 |
| | | -33.14 | -31.52 | 25.41 | 794.07 |
| | | -16.21 | -40.61 | 36.05 | 1311.07 |
| | | -14.98 | -53.90 | 48.66 | 1814.18 |
| 414 | 415 414415 | -14.21 | -53.34 | 48.23 | 1802.33 |
| | | -31.69 | -47.52 | 40.59 | 1392.72 |
| | | -32.68 | -35.13 | 28.85 | 929.78 |
| | | -33.14 | -42.08 | 35.31 | 1178.02 |
| | | -16.22 | -44.30 | 39.50 | 1446.71 |
| | | -14.99 | -61.51 | 55.79 | 2094.34 |
| 415 | 415 415415 | -14.21 | -53.34 | 48.23 | 1802.33 |
| | | -31.60 | -45.14 | 38.37 | 1306.59 |
| | | -32.68 | -35.13 | 28.85 | 929.78 |
| | | -33.14 | -42.08 | 35.31 | 1178.02 |
| | | -15.67 | -51.68 | 46.49 | 1724.58 |
| | | -14.99 | -61.51 | 55.79 | 2094.34 |
| 415 | 400 415400 | -14.21 | -54.26 | 49.09 | 1836.22 |
| | | -31.58 | -52.20 | 44.99 | 1565.41 |
| | | -30.97 | -39.20 | 32.88 | 1096.34 |
| | | -33.14 | -47.11 | 40.02 | 1361.86 |
| | | -15.69 | -49.98 | 44.90 | 1661.77 |
| | | -16.72 | -63.09 | 57.06 | 2132.78 |

Unidades de Tensiones [kp/cm2]

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.2.* | Fecha JUNIO-*2002* | Página de

# COMPROBACIÓN DE LA FISURACIÓN.

PROYECTO: L.A.V. TRAMO: MARTORELL-LLEIDA
ELEMENTO: ODT300.2
*MARCOS-ALEPH Ver. 4.2.1*

***CÁLCULO DE TENSIONES EN LARMADURA***

Tensión de referencia **2200**

| | Elemento | Nudo | Seccion | X | Y | Arm. Flex Dispuesta As+,flex | As-,flex | Canto h | N | Mz | $\sigma_{sh}$ | $\sigma_{se,max}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | [cm2] | [cm2] | [m] | [Tn] | [mTn] | [kp/cm$^2$] | [kp/cm$^2$] |
| Zapata | | | | | | | | | | | | |
| Talón | 514 | 515 | ZAP | -5.53 | 0.400 | 10.05 | 19.63 | 0.800 | -4.96 | 0.00 | -0.63 | -4.52 |
| | 514 | 514 | ZAP | -5.48 | 0.400 | 34.59 | 19.63 | 0.800 | -4.96 | 0.00 | -0.61 | -4.28 |
| | 513 | 514 | ZAP | -5.48 | 0.400 | 34.59 | 19.63 | 0.800 | -4.96 | 0.00 | -0.61 | -4.28 |
| | 513 | 513 | ZAP | -5.43 | 0.400 | 34.59 | 19.63 | 0.800 | -4.96 | 0.00 | -0.61 | -4.28 |
| | 512 | 513 | ZAP | -5.43 | 0.400 | 34.59 | 19.63 | 0.800 | -4.96 | 0.00 | -0.61 | -4.28 |
| | 512 | 512 | ZAP | -5.38 | 0.400 | 34.59 | 19.63 | 0.800 | -4.96 | 0.01 | -0.61 | -4.28 |
| | 511 | 512 | ZAP | -5.38 | 0.400 | 34.59 | 19.63 | 0.800 | -4.96 | 0.01 | -0.61 | -4.28 |
| | 511 | 511 | ZAP | -5.33 | 0.400 | 34.59 | 19.63 | 0.800 | -4.96 | 0.03 | -0.59 | -4.16 |
| | 510 | 511 | ZAP | -5.33 | 0.400 | 34.59 | 19.63 | 0.800 | -4.96 | 0.03 | -0.59 | -4.16 |
| | 510 | 310 | ZAP | -4.98 | 0.400 | 34.59 | 19.63 | 0.800 | -4.96 | 1.26 | 0.56 | 5.91 |
| Puntera | 410 | 310 | ZAP | -4.98 | 0.400 | 34.59 | 19.63 | 0.800 | -31.86 | 54.04 | 46.68 | 1827.33 |
| | 410 | 411 | ZAP | -4.63 | 0.400 | 34.59 | 19.63 | 0.800 | -31.96 | 38.56 | 32.16 | 1187.28 |
| | 411 | 411 | ZAP | -4.63 | 0.400 | 34.59 | 19.63 | 0.800 | -31.96 | 38.56 | 32.16 | 1187.28 |
| | 411 | 412 | ZAP | -3.70 | 0.400 | 10.05 | 19.63 | 0.800 | -14.58 | -16.89 | 14.01 | 874.21 |
| | 412 | 412 | ZAP | -3.70 | 0.400 | 10.05 | 19.63 | 0.800 | -14.58 | -16.89 | 14.01 | 874.21 |
| | 412 | 413 | ZAP | -2.78 | 0.400 | 10.05 | 39.26 | 0.800 | -14.82 | -39.26 | 34.95 | 1277.08 |
| | 413 | 413 | ZAP | -2.78 | 0.400 | 10.05 | 39.26 | 0.800 | -14.82 | -39.26 | 34.95 | 1277.08 |
| | 413 | 414 | ZAP | -1.85 | 0.400 | 10.05 | 39.26 | 0.800 | -14.98 | -53.90 | 48.66 | 1814.18 |
| | 414 | 414 | ZAP | -1.85 | 0.400 | 10.05 | 39.26 | 0.800 | -14.98 | -53.90 | 48.66 | 1814.18 |
| | 414 | 415 | ZAP | -0.93 | 0.400 | 10.05 | 39.26 | 0.800 | -14.99 | -61.51 | 55.79 | 2094.34 |
| | 415 | 415 | ZAP | -0.93 | 0.400 | 10.05 | 39.26 | 0.800 | -14.99 | -61.51 | 55.79 | 2094.34 |
| | 415 | 400 | ZAP | 0.00 | 0.400 | 10.05 | 39.26 | 0.800 | -16.72 | -63.09 | 57.06 | 2132.78 |
| Hastial | | | | | | | | | | | | |
| Cartela Inf. | 310 | 310 | CI-1 | -4.98 | 0.400 | 10.05 | 31.40 | 0.700 | -51.56 | -53.55 | 58.21 | 2102.55 |
| | 310 | 311 | CI-1 | -4.98 | 0.800 | 10.05 | 31.40 | 0.700 | -51.56 | -44.02 | 46.54 | 1603.91 |
| | 311 | 311 | CI-1 | -4.98 | 0.800 | 10.05 | 31.40 | 0.700 | -51.56 | -44.02 | 46.54 | 1603.91 |
| | 311 | 312 | CI-2 | -4.98 | 1.000 | 10.05 | 31.40 | 0.700 | -51.21 | -39.45 | 40.99 | 1370.89 |
| | 312 | 312 | CI-2 | -4.98 | 1.000 | 10.05 | 31.40 | 0.700 | -51.21 | -39.45 | 40.99 | 1370.89 |
| | 312 | 111 | H-1 | -4.98 | 1.200 | 10.05 | 31.40 | 0.700 | -50.86 | -35.67 | 36.41 | 1179.96 |
| Fuste | 111 | 111 | H-1 | -4.98 | 1.200 | 10.05 | 31.40 | 0.700 | -50.86 | -35.67 | 36.41 | 1179.96 |
| | 111 | 112 | H-2 | -4.98 | 2.133 | 10.05 | 13.40 | 0.700 | -47.77 | -25.77 | 24.73 | 1489.53 |
| | 112 | 112 | H-2 | -4.98 | 2.133 | 10.05 | 13.40 | 0.700 | -47.77 | -25.77 | 24.73 | 1489.53 |
| | 112 | 113 | H-3 | -4.98 | 3.067 | 10.05 | 13.40 | 0.700 | -47.23 | -21.88 | 20.05 | 1064.93 |
| | 113 | 113 | H-3 | -4.98 | 3.067 | 10.05 | 13.40 | 0.700 | -47.23 | -21.88 | 20.05 | 1064.93 |
| | 113 | 114 | H-4 | -4.98 | 4.000 | 10.05 | 13.40 | 0.700 | -45.59 | -23.70 | 22.51 | 1319.05 |
| | 114 | 114 | H-4 | -4.98 | 4.000 | 10.05 | 13.40 | 0.700 | -45.59 | -23.70 | 22.51 | 1319.05 |
| | 114 | 115 | H-5 | -4.98 | 4.933 | 10.05 | 37.94 | 0.700 | -44.39 | -30.46 | 30.96 | 841.43 |
| | 115 | 115 | H-5 | -4.98 | 4.933 | 10.05 | 37.94 | 0.700 | -44.39 | -30.46 | 30.96 | 841.43 |
| | 115 | 116 | H-6 | -4.98 | 5.867 | 10.05 | 37.94 | 0.700 | -41.50 | -40.25 | 43.36 | 1296.67 |
| | 116 | 116 | H-6 | -4.98 | 5.867 | 10.05 | 37.94 | 0.700 | -41.50 | -40.25 | 43.36 | 1296.67 |
| | 116 | 117 | H-7 | -4.98 | 6.800 | 10.05 | 37.94 | 0.700 | -39.89 | -52.49 | 58.58 | 1850.79 |
| Cartela Sup. | 210 | 117 | H-7 | -4.98 | 6.800 | 10.05 | 37.94 | 0.700 | -39.89 | -52.49 | 58.58 | 1850.79 |
| | 210 | 211 | CS-1 | -4.98 | 7.012 | 10.05 | 37.94 | 1.194 | -39.39 | -55.57 | 20.10 | 913.01 |
| | 211 | 211 | CS-1 | -4.98 | 7.012 | 10.05 | 37.94 | 1.194 | -39.39 | -55.57 | 20.10 | 913.01 |
| | 211 | 212 | CS-2 | -4.98 | 7.225 | 10.05 | 34.59 | 1.630 | -38.63 | -59.73 | 11.12 | 664.13 |
| Dintel | | | | | | | | | | | | |
| Cartela Sup. | 212 | 212 | CS-3 | -4.98 | 7.225 | 10.05 | 34.59 | 1.000 | -27.14 | -59.73 | 33.12 | 1594.16 |
| | 212 | 213 | CS-3 | -4.63 | 7.300 | 10.05 | 34.59 | 1.000 | -27.45 | -48.65 | 26.45 | 1230.90 |
| | 213 | 213 | CS-3 | -4.63 | 7.300 | 10.05 | 34.59 | 1.000 | -27.48 | -48.65 | 26.44 | 1230.52 |
| | 213 | 214 | CS-4 | -4.17 | 7.400 | 10.05 | 34.59 | 0.800 | -27.70 | -35.74 | 30.04 | 1130.77 |
| | 214 | 214 | CS-4 | -4.17 | 7.400 | 10.05 | 34.59 | 0.800 | -27.70 | -35.74 | 30.04 | 1130.77 |
| | 214 | 1 | DINTEL | -3.70 | 7.500 | 10.05 | 34.59 | 0.600 | -27.84 | -24.62 | 36.39 | 1055.44 |
| Losa | 1 | 1 | DINTEL | -3.70 | 7.500 | 10.05 | 34.59 | 0.600 | -23.40 | -24.62 | 37.13 | 1110.84 |
| | 1 | 2 | DINTEL | -2.96 | 7.500 | 34.59 | 10.05 | 0.600 | -16.08 | 10.06 | 14.09 | 374.42 |
| | 2 | 2 | DINTEL | -2.96 | 7.500 | 34.59 | 10.05 | 0.600 | -16.08 | 10.06 | 14.09 | 374.42 |
| | 2 | 3 | DINTEL | -2.22 | 7.500 | 34.59 | 10.05 | 0.600 | -16.68 | 22.81 | 35.24 | 1092.63 |
| | 3 | 3 | DINTEL | -2.22 | 7.500 | 34.59 | 10.05 | 0.600 | -16.68 | 22.81 | 35.24 | 1092.63 |
| | 3 | 4 | DINTEL | -1.48 | 7.500 | 34.59 | 10.05 | 0.600 | -17.06 | 31.76 | 50.09 | 1600.88 |
| | 4 | 4 | DINTEL | -1.48 | 7.500 | 34.59 | 10.05 | 0.600 | -17.06 | 31.76 | 50.09 | 1600.88 |
| | 4 | 5 | DINTEL | -0.74 | 7.500 | 34.59 | 10.05 | 0.600 | -17.20 | 36.83 | 58.52 | 1890.08 |
| | 5 | 5 | DINTEL | -0.74 | 7.500 | 34.59 | 10.05 | 0.600 | -17.20 | 36.83 | 58.52 | 1890.08 |
| | 5 | 6 | DINTEL | 0.00 | 7.500 | 34.59 | 10.05 | 0.600 | -15.48 | 38.45 | 61.50 | 2005.62 |

TABLAS: FISURACIÓN

Con la tensión máxima obtenida inferior a 2600 Kp/cm², no es necesario el control de la apertura de fisura.

ALEPH consultores

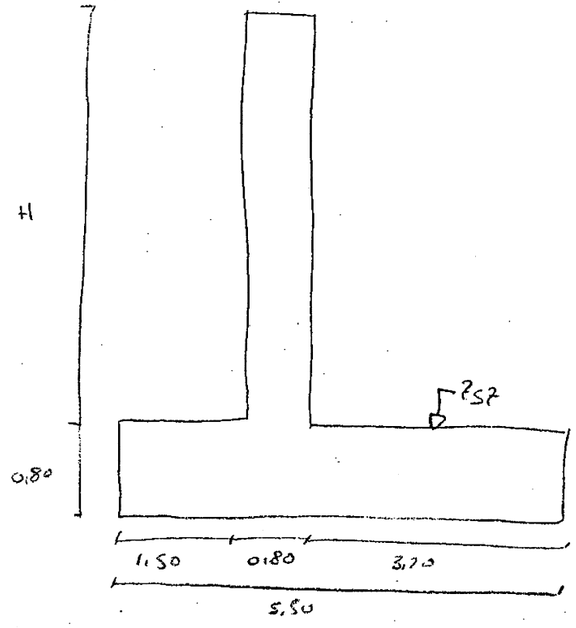
Asunto LAV-MARTORELL. ODT 300.2. | Fecha JUNIO-2002 | Página de

## 9.4. EMBOCADURAS

Tras el encaje geométrico previo se obtiene las siguientes dimensiones básicas:

| Elemento | H (m) | Hz (m) | Zsz | T (m) | Ef (m) | P (m) |
|---|---|---|---|---|---|---|
| E-1 | 7.50-5.92 | 0.80 | 68.08 | 3.20 | 0.80 | 1.50 |
| E-2.1 | 7.50-7.42 | 0.80 | 68.08 | 3.20 | 0.80 | 1.50 |
| E-2.2 | 3.50-6.50 | 0.80 | 72.00 | 3.20 | 0.80 | 1.50 |
| M-1 | 7.50-7.50 | 0.80 | 68.08 | 3.20 | 0.80 | 1.50 |
| S-1 | 7.50-3.12 | 0.80 | 68.08 | 3.20 | 0.80 | 1.50 |
| S-2 | 8.90-8.90 | 0.80 | 68.08 | 3.20 | 0.80 | 1.50 |
| M-2 | 7.50-7.50 | 0.80 | 68.08 | 3.20 | 0.80 | 1.50 |

Se ha considerado como Tensión admisible del terreno 2.0 Kp/cm². Y su ángulo de rozamiento es de 30º



ACCIONES:

- Terreno: $\gamma$=2.00 T/m²; $\phi$= 30º; Sobre carga terraplen= 3.0 T/m²

CONTROL DE ESTABILIDAD Y ESFUERZOS DE ARMADO

Según la combinación de aciones que se muestra en las hojas siguientes se obtienen los resultados pésimos siguientes:

**Control de Estabilidad**

| $\gamma$ deslizamiento | $\gamma$ vuelco | $\sigma$ máxima (T/m²) | $\sigma$ media (T/m²) |
|---|---|---|---|
| 1.52 | 2.97 | 24.02 | 13.45 |

**Esfuerzos de Armado**

| Arranque Fuste | | | Talón | | Puntera |
|---|---|---|---|---|---|
| Vd(T) | Nd(T) | Md(mT) | Vd(T) | Md(mT) | $\sigma$(T/m²) |
| 39.38 | 22.50 | 112.50 | 40.75 | 78.35 | 30.44 |

**Calculo de Esfuerzos en Muros:**

Proyecto: **LAV. MARTORELL.**

Elemento: **ODT300.2. Muro central**

**Geometría**

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | 7.50 | 0.80 | Zapata | 3.20 | 1.50 | 0.80 |
| eso especif. | 2.50 | | | 2.50 | | |

**Terreno**

| | Densidad [tm/m³] | $\phi$ [º] | $\delta$ [º] | $\beta$ [º] | $\alpha$ [º] |
|---|---|---|---|---|---|
| Relleno | 2.00 | 30.00 | 0.00 | 0.00 | 0.00 |

| | $\sigma$ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | 2.00 | 1.30 | 0.57 |

**Hipótesis de cálculo**

| | | | Cargas Tablero | | | | Sismo | |
|---|---|---|---|---|---|---|---|---|
| Hip | $\gamma$f | SC terraplén [tm/m²] | Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | ac horiz. [1/g] | ac vert. [1/g] |
| 1 | 1.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 1.50 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Control Estabilidad**

| Hip | $\gamma$des | $\gamma$vuelco | $\sigma$min | $\sigma$max | $\sigma$med | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 1.84 | 3.99 | 9.27 | 17.64 | 13.45 | 5.50 |
| 2 | 1.52 | 2.97 | 6.38 | 24.02 | 15.20 | 5.50 |

**Esfuerzos de Armado**

| | Arranque Fuste | | | Talón | | Puntera | | |
|---|---|---|---|---|---|---|---|---|
| Hip | Vd | Nd | Md | Vd | Md | Vd | Md | |
| 1 | 28.13 | 22.50 | 70.31 | -25.41 | -46.89 | 24.79 | 29.16 | Tipo I |
| 2 | 39.38 | 22.50 | 112.50 | -40.75 | -78.35 | 33.55 | 39.94 | Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.2. Muro central: FUSTE**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

### SECCION

| | |
|---|---|
| Título | |
| Ancho | **1.000** m |
| Canto | **0.800** m |
| C, util | **0.725** m |

### ESFUERZOS

| | |
|---|---|
| Título | |
| Mserv | **75.00** mtm |
| Md | **112.50** mtm |
| Vd | **39.38** tm |
| min geo | **0.90** /mil |

### ARMADO

| | |
|---|---|
| diam | **25.00** mm |
| sep | **10.00** cm |
| recub, c | **3.00** cm |
| wk | 0.26 mm |

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 7.2 | |
| As, calc | 38.13 cm2 | **49.09** cm2 |
| num. | 7.77 | |
| sep. | 12.87 cm | |

### CONTROL CORTANTE

| | |
|---|---|
| Vcu | 46.80 tm |
| Vu2a | 31.32 tm |
| coef. | **0.80** |

Cuantía de cercos necesaria 8.13 cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1027.08 tm |
| 0.35*Uc*d | 260.62 mtm |
| Us | 169.09 tm |
| Usmin,0 | 53.33 tm |
| alpha | -0.09 |
| Us | 169.09 tm |
| As | 38.13 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 10.00 cm |
| hef,0 | 23.00 cm |
| hef | 20.00 cm |
| sm | 130.93 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 979.59 kp/cm2 |
| sig, s | 2634.29 kp/cm2 |
| k red | 0.93 |
| eps sm | 1167.69 *10^6 |
| wk | 0.26 mm |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.2. Muro central: TALON**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

### SECCION

| | |
|---|---|
| Título | |
| Ancho | **1.000** m |
| Canto | **0.800** m |
| C, util | **0.700** m |

### ESFUERZOS

| | |
|---|---|
| Título | |
| Mserv | **52.23** mtm |
| Md | **78.35** mtm |
| Vd | **40.75** tm |
| min geo | **0.90** /mil |

### ARMADO

| | |
|---|---|
| diam | **25.00** mm |
| sep | **12.50** cm |
| recub, c | **3.50** cm |
| wk | 0.26 mm |

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 7.2 | |
| As, calc | 26.85 cm2 | **39.27** cm2 |
| num. | 5.47 | |
| sep. | 18.28 cm | |

### CONTROL CORTANTE

| | |
|---|---|
| Vcu | 45.18 tm |
| Vu2a | 28.93 tm |
| coef. | **0.71** |

Cuantía de cercos necesaria 8.13 cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 991.67 tm |
| 0.35*Uc*d | 242.96 mtm |
| Us | 119.07 tm |
| Usmin,0 | 53.33 tm |
| alpha | 0.38 |
| Us | 119.07 tm |
| As | 26.85 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 12.50 cm |
| hef,0 | 23.50 cm |
| hef | 20.00 cm |
| sm | 158.66 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 1268.22 kp/cm2 |
| sig, s | 2375.07 kp/cm2 |
| k red | 0.86 |
| eps sm | 969.75 *10^6 |
| wk | 0.26 mm |

PROYECTO **LAV. MARTORELL.**
ZAPATA **ODT300.2. Muro central: PUNTERA**

CALCULO DE ZAPATAS RIGIDAS SEGÚN EHE-98

**DIMENSIONES**

| | LONG | TRANS | CANTO | UTIL | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Pilar | **0.80** | **1.00** | | | [m] | | | | |
| Zapata | **3.80** | **1.00** | **0.80** | **0.70** | [m] | | | | |

**HORMIGON**

| | | |
|---|---|---|
| fkc | **250** | [kp/cm2] |
| gamma,c | **1.5** | |

**ACERO**

| | | |
|---|---|---|
| fyk | **4080** | [kp/cm2] |
| gamma,s | **1** | |

**TENSIONES TERRENO**
(Descontado el peso de la Zapata)

| | LONG | TRANS | |
|---|---|---|---|
| Tensión | **30.44** | **30.44** | [tm/m2] |
| gamma,f | **1.00** | | |

**COMPROBACION A FLEXION**

| | LONG | TRANS | |
|---|---|---|---|
| vd | 1.70 | 0.25 | [m] |
| z max | 0.68 | 0.70 | [m] |
| z | **0.60** | **0.60** | [m] |
| Armadura | 17.87 | 0.00 | [cm2] |
| | 18.12 | 1.49 | |

| ontrol zapata alargada | LONG Zona Pilar | LONG Resto | TRANS Zona Pilar | TRANS Resto | |
|---|---|---|---|---|---|
| dimensión | 1.00 | 0.00 | 2.40 | 1.40 | [m] |
| Armadura | 17.87 | 0.00 | 0.00 | 0.00 | [cm2] |
| Mínima mecánica | 17.87 | 0.00 | 0.00 | 0.00 | [cm2] |
| Mínima geométrica | 14.40 | 0.00 | 34.56 | 20.16 | [cm2] |
| Armadura inferior | **17.87** | **0.00** | **7.20** | **7.20** | [cm2/m] |
| Armadura superior | **4.80** | **0.00** | **7.20** | **7.20** | [cm2/m] |

**COMPROBACION A CORTANTE**

| | LONG | | | TRANS | | | |
|---|---|---|---|---|---|---|---|
| Zona comprimida | | 0.21 | | | 0.21 | | [m] |
| Reacción total | 45.656702 | 45.656702 | | 0.00 | 0.00 | | [tm] |
| | α | β | θ | α | β | θ | |
| Ángulos | 27.70 | 30.24 | 32.06 | 22.78 | 0.01 | 67.21 | [°] |
| | Ancho | Canto | | Ancho | Canto | | |
| Biela, horizontal | 1.00 | 0.21 | | 1.01 | 0.21 | | [m] |
| Biela, superior | 1.00 | 0.39 | | 1.01 | 0.54 | | [m] |
| Bilea, Inferior | 1.00 | 0.80 | | 2.40 | 0.00 | | [m] |

| Control validez | Tensión | Admisible | | Tensión | Admisible | |
|---|---|---|---|---|---|---|
| Horizontal | 347.13 | 1666.67 | **CUMPLE** | 0.00 | 1666.67 | **CUMPLE** |
| Superior | 220.38 | 1666.67 | **CUMPLE** | 0.00 | 1666.67 | **CUMPLE** |
| Inferior | 108.03 | 1166.67 | **CUMPLE** | 0.00 | 1166.67 | **CUMPLE** |

## Calculo de Esfuerzos en Muros:

Proyecto: **LAV. MARTORELL.**
Elemento: **ODT300.2. Muro central**
Corte de armado.

**Geometría**

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | **5.70** | **0.80** | Zapata | **3.20** | **1.50** | **0.80** |
| eso especif. | **2.50** | | | **2.50** | | |

**Terreno**

| | Densidad [tm/m³] | ϕ [°] | δ [°] | β [°] | α [°] |
|---|---|---|---|---|---|
| Relleno | **2.00** | **30.00** | **0.00** | **0.00** | **0.00** |

| | σ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | **2.00** | **1.30** | **0.57** |

**Hipótesis de cálculo**

| Hip | γf | SC terraplén [tm/m²] | Cargas Tablero Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | Sismo ac horiz. [1/g] | ac vert. [1/g] |
|---|---|---|---|---|---|---|---|---|
| 1 | **1.50** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |
| 2 | **1.50** | **3.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Control Estabilidad**

| Hip | γdes | γvuelco | σmin | σmax | σmed | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 2.38 | 6.61 | 11.05 | 10.36 | 10.71 | 5.50 |
| 2 | 1.90 | 4.63 | 10.80 | 14.10 | 12.45 | 5.50 |

**Esfuerzos de Armado**

| Hip | Arranque Fuste Vd | Nd | Md | Talón Vd | Md | Puntera Vd | Md | |
|---|---|---|---|---|---|---|---|---|
| 1 | 16.25 | 17.10 | 30.87 | -12.24 | -19.06 | 14.46 | 16.59 | Tipo I |
| 2 | 24.80 | 17.10 | 55.23 | -22.27 | -38.10 | 19.93 | 23.19 | Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.2. Muro central: FUSTE**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

### SECCION

| | |
|---|---|
| Título | |
| Ancho | **1.000** m |
| Canto | **0.800** m |
| C, util | **0.725** m |

| ESFUERZOS | | ARMADO | |
|---|---|---|---|
| Título | | | |
| Mserv | **36.82** mtm | diam | **25.00** mm |
| Md | **55.23** mtm | sep | **20.00** cm |
| Vd | **24.80** tm | recub, c | **3.00** cm |
| min geo | **0.90** /mil | wk | 0.30 mm |

| CONTROL FLEXION | | | CONTROL CORTANTE | |
|---|---|---|---|---|
| | Cálculo | Dispuesto | | |
| min geom | 7.2 | | Vcu | 46.80 tm |
| As, calc | 17.87 cm2 | **24.54** cm2 | Vu2a | 27.36 tm |
| num. | 3.64 | | coef. | 1.10 |
| sep. | 27.47 cm | Cuantía de cercos necesaria | | cm2/m |

### CALCULO ARMARURA AGOTAMIENTO

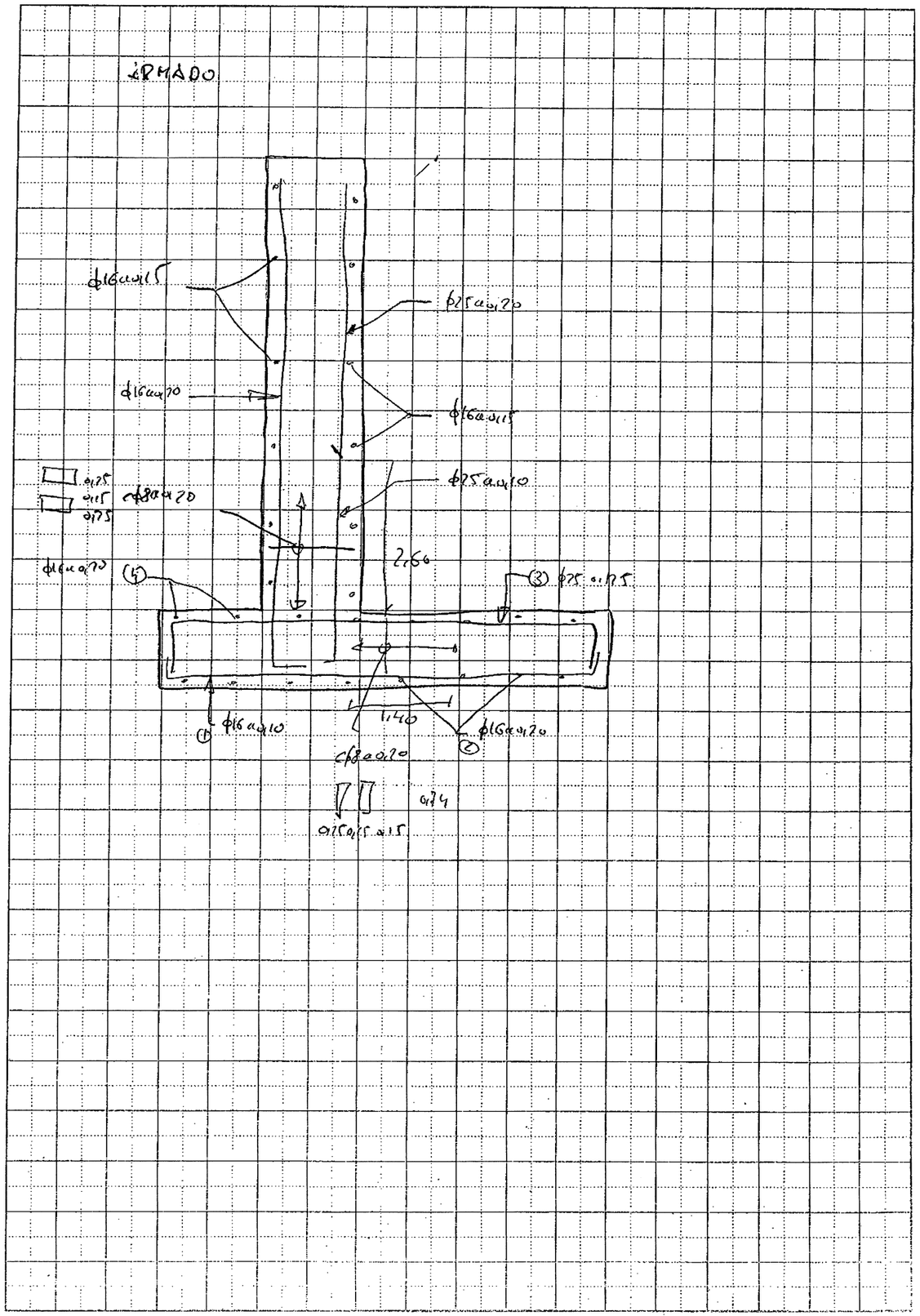
| | |
|---|---|
| Uc | 1027.08 tm |
| 0.35*Uc*d | 260.62 mtm |
| Us | 79.24 tm |
| Usmin,0 | 53.33 tm |
| alpha | 0.76 |
| Us | 79.24 tm |
| As | 17.87 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 20.00 cm |
| hef,0 | 23.00 cm |
| hef | 20.00 cm |
| sm | 201.86 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 1959.17 kp/cm2 |
| sig, s | 2586.66 kp/cm2 |
| k red | 0.71 |
| eps sm | 878.43 *10^6 |
| wk | 0.30 mm |





# ESTRUCTURA SINGULAR. TÚNEL ARTIFICIAL TRAMO CUBIERTO. CRUCE CON O.D.T- 300.2

# LINEA DE ALTA VELOCIDAD. MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA

## TRAMO: SANT ESTEVE SESROVIRES-MARTORELL

**ANEJO DE CALCULO:**

**ESTRUCTURA SINGULAR. TUNEL ARTIFICIAL TRAMO CUBIERTO CRUCE CON ODT-300.2**

## INDICE


1.- INTRODUCCIÓN
2.- BASES DE CÁLCULO
3.- INSTRUCCIONES Y NORMAS APLICADAS
4.- DESCRIPCIÓN DE LOS PROGRAMAS DE ORDENADOR UTILIZADOS
5.- MATERIALES Y COEFICIENTES DE PONDERACIÓN.
6.- ACCIONES
  Acción Permanente (G): Peso Propio
  Acción Permanente de Valor No Constante (G*): Acciones Debidas al Terreno
  Acción Variable (Q): Sobrecargas de uso
  Acciones Accidentales (A)
    Acciones Sísmicas
7.- HIPÓTESIS DE CARGA Y COEFICIENTES DE MAYORACIÓN
  7.1.- Valores representativos de las acciones.
  7.2.- Valores de cálculo de las acciones.
  7.3.- Combinación de acciones.
8.- MODELO DE CÁLCULO
9.- CÁLCULO LONGITUDINAL
10.- CÁLCULO TRANSVERSAL

## 1.- INTRODUCCIÓN

Su sección transversal es idéntica a la del marco, pero sin la losa inferior. La altura de los hastiales será tal que no apoyen en la obra de drenaje inferior. La viga se apoyará en unos zunchos de 2x2 $m^2$ transversales al trazado del L.A.V. que estarán cimentados mediante pilotes de 1.80 m de diámetro coincidentes con los ejes de los hastiales. La longitud de la viga depende del esviaje de cada Obra de Drenaje. Como en este caso se trata de dos marcos unicelulares separados entre sí, se colocará un zuncho intermedio, parcialmente esviado soportado por otro par de pilotes, convirtiendo la viga en continua de 2 vanos. Las longitudes totales entre eje de pilotes serán las siguientes:

Entre P.K. 300+252.751 al .300+298.011. Longitud: 45.26m, la longitud entre ejes de pilotes será de 22.74+20.52 en el hastial derecho, y de 20.52+22.74 en el hastial izquierdo.

Aunque la viga no apoye en el dintel de las obras de drenaje, si que tendrá coartado su movimiento transversal, por medio de unos muretes guía que irán sobre el dintel de la obra de drenaje.. Debido al esviaje de las obras de drenaje respecto al tronco de la L.A.V, y como los zunchos de atado, salvo el zuncho intermedio de la ODT 300.2, son ortogonales a la obra de drenaje, aparece una zona exenta de dintel. Para solucionar el problema de contención lateral de la viga, se construirán unos voladizos en las obras de drenaje en donde se colocarán los muretes guía. Para evitar que estos voladizos sean demasiado grandes, se compensa con una losa apoyada en el relleno del trasdós de la obra de drenaje por donde continuarán estos muretes guía hasta llegar a los zunchos de atado.

Madrid, Mayo de 2002



## 2.- BASES DE CÁLCULO

El dimensionamiento de las estructuras se ha realizado según los principios de mecánica racional, con su adaptación al diseño estructural, establecida por la práctica ingenieril. Se han tenido en cuenta las normas de obligado cumplimiento en el territorio español, así como las recomendaciones y la normativa internacional de aplicación, cuando proceda. De acuerdo con ellas, el cálculo se ha realizado siguiendo el principio de los Estados Límites, que establece que la seguridad de la estructura en conjunto, o cualquiera de sus partes, se garantiza comprobando que la solicitación no supera la respuesta última de las mismas. Este formato de seguridad se expresa sintéticamente mediante la siguiente desigualdad:

$$\mathbf{Sd \leq Rd}$$

Donde Sd representa la solicitación de cálculo aplicable en cada caso, y Rd la respuesta última de la sección o elemento.

Para la aplicación de este criterio de seguridad, se consideran tanto situaciones de servicio, como de agotamiento, esto es, Estados Límites de Servicio (ELS) y de Agotamiento (ELU), de acuerdo con las definiciones dadas para los mismos en las normativas de referencia. En principio, los Estados Límites Ultimos están asociados a la Rotura de las secciones o elementos. Para ellos, se evalúan las solicitaciones mediante la mayoración de los valores representativos de las acciones (en general característicos) utilizando los oportunos coeficientes parciales que luego se detallan. Las resistencias de las secciones o elementos se estiman mediante las características geométricas, y las resistencias minoradas de los materiales.

Por el contrario, los Estados Límites de Servicio están asociados a la pérdida de funcionalidad de la estructura. Las solicitaciones se evalúan mediante sus valores representativos, en general sin mayorar, afectados de los oportunos coeficientes de combinación, para tener en cuenta la probabilidad de ocurrencia simultanea de varias acciones. Las resistencias se estiman a partir de los valores nominales de las dimensiones y resistencias de los elementos o secciones de la estructura, sin minorar.

Los cálculos se realizará mediante programas informáticas de aplicación general al cálculo de estructuras, así como mediante programas propios de diseño de elementos particulares. Los cálculos por ordenador se justifican mediante los oportunos listados de datos y resultados incluidos en el presente anejo. Adicionalmente, cuando sea preciso para la correcta comprensión de los resultados, así como para su oportuno chequeo, se realizarán comprobaciones manuales aproximadas, que justifiquen los órdenes de magnitud.

## 3.- INSTRUCCIONES Y NORMAS APLICADAS

El dimensionamiento general de las estructuras se ha realizado conforme a las instrucciones principales siguientes:

| | |
|---|---|
| Acciones : | IAP-98 |
| Hormigón Armado: | EHE-98 |
| Estructura Metálica y Mixta: | NBE-EA-95,RPM-95,RPX-95 |

No obstante, para realizar el dimensionamiento completo, se han considerado una lista de normas e instrucciones de referencia más amplia, que se detallan a continuación.

* EHE-98, Instrucción de Hormigón Estructural. Real Decreto 2661/1998, de 11 de Diciembre.
* Instrucción relativa a las acciones a considerar en el Proyecto de Puentes de Ferrocarril, aprobada por Orden de 25 de Junio de 1975.
* IAP-98, Instrucción sobre las acciones a considerar en el Proyecto de puentes de carretera
  * Instrucción para el proyecto y ejecución de las obras de hormigón en masa o armado, EH-91, aprobada por Real Decreto 1039/1991 de 28 de Junio.
  * Instrucción para el proyecto y la ejecución de obras de hormigón pretensado, EP-93, aprobada por Real Decreto 805/1993, de 28 de Mayo.
* Norma de Construcción Sismorresistente NCSE-94: Parte General y Edificación.
* Norma sismorresistente PDS-1 (1974), aprobada por Decreto 3209/1974, de 30 de Agosto.
* Recomendaciones para el proyecto y ejecución de pruebas de carga en puentes de carreteras, publicadas en 1988 por el MOPU.
* Recomendaciones para el proyecto y ejecución de pruebas de carga en puentes de ferrocarril.
* Instrucción EM-62 para Estructuras de Acero. Instituto Eduardo Torroja.
* Cálculo de Estructuras de Acero Laminado en Edificación. NB-MV-103/72.
* European Recomendations for Steel Construction. ECCS/CECM/EKS. 1.978.
* Recomendaciones para el cálculo de Estructuras Mixtas de la Comisión Conjunta IABSE-CEB-FIP-CECM(1975).
* Eurocódigos
  ENV 1991 : EC1 - Bases de diseño y acciones
  ENV 1992 : EC2 - Estructuras de Hormigón
  ENV 1993 : EC3 - Estructuras Metálicas
  ENV 1994 : EC4 - Estructuras Mixtas.
* Código Modelo CEB-FIP para Estructuras de Hormigón MC-90 .
* Recomendaciones para el Proyecto de Puentes Metálicos de Carretera. RPM-95. Ministerio de Fomento.
* Recomendaciones para el Proyecto de Puentes Mixtos de Carretera. RPX-95. Ministerio de Fomento.
* Recomendaciones CIRIA para el diseño de bloques de anclaje de pretensado.
* Recomendaciones para el cálculo de apoyos del Ministerio de Fomento.



## 4.- DESCRIPCIÓN DE LOS PROGRAMAS DE ORDENADOR UTILIZADOS

Para el desarrollo de los cálculos estructurales se han empleado fundamentalmente dos programas comerciales, suficientemente conocidos y sancionados por la práctica:

1. GT-Strudl:
   Cálculo matricial de estructuras de barras, por el método de los elementos finitos.
   Cálculo tridimensional.

2. FAGUS-2/3:
   Control de secciones de hormigón armado o pretensado, implementando los diagramas tensión-deformación y dominios de rotura que se establecen en la Instrucción EHE

Adicionalmente se emplean programas propios de preprocesamiento y postproceso de los anteriores, cuya única misión es la de agilizar la manipulación de datos y resultados.

## 5.- MATERIALES Y COEFICIENTES DE PONDERACIÓN.

Las características de los materiales que se consideran en el presente Anejo son las detalladas en la siguiente tabla:

**Hormigones:**

Según EHE, control de ejecución Intenso para el tablero y normal para el resto:

| ELEMENTO | HORMIGON | $\gamma_c$ | *Recubrimiento [mm]* | $E_c$ *[kp/cm²]* |
|---|---|---|---|---|
| CIMENTACIONES | HA-25/P/20/IIa | 1.50 | 30 | 278 000 |
| ALZADOS | HA-25/P/20/IIa | 1.50 | 30 | 278 000 |
| DINTELES | HA-25/P/20/IIa | 1.50 | 30 | 278 000 |
| NIVELACION Y LIMPIEZA | HM-15 | | No estructural | |

**Acero Pasivo:**

Todos los elementos serán del tipo: **B 500-S**, de acuerdo con EHE

El límite elástico del acero será

$f_y = 5100$ kp/cm²

El coeficiente de minoración del acero adoptado es $\gamma_s = 1.15$



## 6.- ACCIONES

Las acciones consideradas en el dimensionamiento del Marco se expresan a continuación:

### ACCIÓN PERMANENTE (G): PESO PROPIO

Peso Propio: Según sección, con $\gamma$=2.50 Tn/m³

### ACCIÓN PERMANENTE DE VALOR NO CONSTANTE (G*): ACCIONES DEBIDAS AL TERRENO

Carga vertical:

Se considera el peso propio de las tierras con un recubrimiento de 1.00 m, y con un $\gamma$ =2.00 T/m³.

Carga horizontal:

Se considera el empuje al reposo del relleno con un $\phi$ de 30º.

En el caso de la carga horizontal se supondrá dos hipótesis de carga:

Una con relleno hasta la misma altura en los dos lados,

Y otra con una diferencia de relleno de n tercio de la altura, en previsión de posibles cargas asimétricas.

### ACCIÓN VARIABLE (Q): SOBRECARGAS DE USO

Se consideran dos situaciones en cuanto a las sobrecargas:

*Viento:*

Se considera un empuje de viento equivalente a 0.21 T/m². calculado según IAP-98

*Carga uniforme:*

Se considera una carga vertical uniforme de 0.40 T/m². sobre el dintel según IAP-98

### ACCIONES ACCIDENTALES (A)

ACCIONES SÍSMICAS

Según las Bases de Cálculo y la norma NCSE-94, los parámetros a considerar son los siguientes:

- $a_b < 0.04 \cdot g$ (aceleración sísmica máxima en el tramo).

El coeficiente de nivel de daño, $\gamma_i = 1.0$ (Período de retorno de 50 años)

- $a_c = \gamma_i \cdot a_b = 0.04 \cdot g$ (aceleración sísmica de cálculo).

***No es necesario considerar esta acción por ser $a_c = \gamma_i \cdot a_b < 0.06g$***

ALEPH consultores

Asunto LAV-MARTORELL. ESTRUCTURA SINGULAR DE CRUCE CON ODT 300.2. Fecha JUNIO-2002 Página de

# 7.- HIPÓTESIS DE CARGA Y COEFICIENTES DE MAYORACIÓN

## 7.1.- VALORES REPRESENTATIVOS DE LAS ACCIONES.

Según EHE: Acciones Variables; Coeficientes de Combinación.

| | $\Psi_{0,i}$ (Valor de Combinación) | $\Psi_{1,i}$ (Valor Frecuente) | $\Psi_{2,i}$ (Valor Cuasi-Permanente) |
|---|---|---|---|
| Sobrecargas. | 0.60 | 0.50 | 0.20 |

## 7.2.- VALORES DE CÁLCULO DE LAS ACCIONES.

De acuerdo con EHE, para control de ejecución Intenso

ESTADO LÍMITE ÚLTIMO:

| | $\gamma_{desfavorable}$ | | $\gamma_{favorable}$ | |
|---|---|---|---|---|
| | Construcción | Servicio | Construcción | Servicio |
| Permanentes. | 1.35 | 1.35 | 1.00 | 1.00 |
| Peso y Empuje de Tierras. | 1.35 | 1.50 | 1.00 | 1.00 |
| Sobrecargas. | 1.35 | 1.50 | 0.00 | 0.00 |

Nota: Para el empuje de tierras se toma siempre el empuje más desfavorable entre el activo y el reposo

ESTADO LÍMITE SERVICIO :

| | $\gamma_{desfavorable}$ | $\gamma_{favorable}$ |
|---|---|---|
| Permanentes. | 1.00 | 1.00 |
| Peso y Empuje de Tierras. | 1.00 | 1.00 |
| Sobrecargas. | 1.00 | 0.00 |

Nota: Para el empuje de tierras se toma siempre el empuje más desfavorable entre el activo y el reposo

## 7.3.- COMBINACIÓN DE ACCIONES.

ESTADO LÍMITE ÚLTIMO:

Según EHE:

$$\sum_{j\geq 1}\gamma_{G,j}\cdot G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\gamma_{Q,1}\cdot Q_{K,1}+\sum_{i>1}\gamma_{Q,i}\cdot\Psi_{0,i}\cdot Q_{K,i}$$

Donde:

$G_{K,j}$ = *Valor Representativo de cada Acción Permanente.*

$G^*_{K,j}$ = *Valor Representativo de cada Acción Permanente de Valor no Constante.*

$P_K$ = *Valor Representativo de la Acción del Pretensado.*

$Q_{K,1}$ = *Valor Representativo (Valor Característico) de la Acción Variable Dominante.*

$\Psi_{0,i}\cdot Q_{K,i}$ = *Valor Representativos (Valores de Combinación) de las Acciones Variables Concomitantes con la Acción Variable Dominante.*

- *Si la Acción de Sobrecarga es considerada como Dominante, se tomará ésta con su Valor Representativo y la Acción del Viento con su Valor Reducido (reducción del 50%), aplicándose además los coeficientes $\psi_i$ pertinentes.*

- *Si la Acción del Viento es considerada como Dominante, se tomará ésta con su Valor Representativo y NO se considerará la actuación simultanea de la Acción de la Sobrecarga de Uso.*

ALEPH consultores

Asunto *LAV-MARTORELL. ESTRUCTURA SINGULAR DE CRUCE CON ODT 300.2.* Fecha JUNIO-2002 Página de

ESTADO LÍMITE DE SERVICIO:

Según EHE:

- *Combinación Característica.(poco probable o rara)*

$$\sum_{j\geq 1}G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\gamma_{Q,1}\cdot Q_{K,1}+\sum_{i>1}\gamma_{Q,i}\cdot\Psi_{0,i}\cdot Q_{K,i}$$

- *Combinación Frecuente.*

$$\sum_{j\geq 1}G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\gamma_{Q,1}\cdot\Psi_{1,1}\cdot Q_{K,1}+\sum_{i>1}\gamma_{Q,i}\cdot\Psi_{2,i}\cdot Q_{K,i}$$

- *Combinación Cuasi-Permanente.*

$$\sum_{j\geq 1}G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\sum_{i\geq 1}\gamma_{Q,i}\cdot\Psi_{2,i}\cdot Q_{K,i}$$

En cuanto al Viento, es de aplicación lo dicho para el Estado Límite Último.

# 8.- MODELO DE CÁLCULO

El cálculo se realiza mediante dos modelos de cálculo:

Calculo longitudinal:

En el que únicamente se introducirán las acciones verticales. En el modelo de cálculo se utilizará media sección. En el calculo longitudinal se colocan tambien los pilotes de apoyo de diámetro 1.80 m, debido a la importante rigidez de la estructura singular los pilotes casi no reciben momento. En cualquier caso se han adoptado los parámetros geotécnicos dictados por el informe geotécnico:

Relleno artificial constituido por material granula tratado con cemento: 2200 T/m$^3$

Depositos aluviales: 4000 T/m$^3$

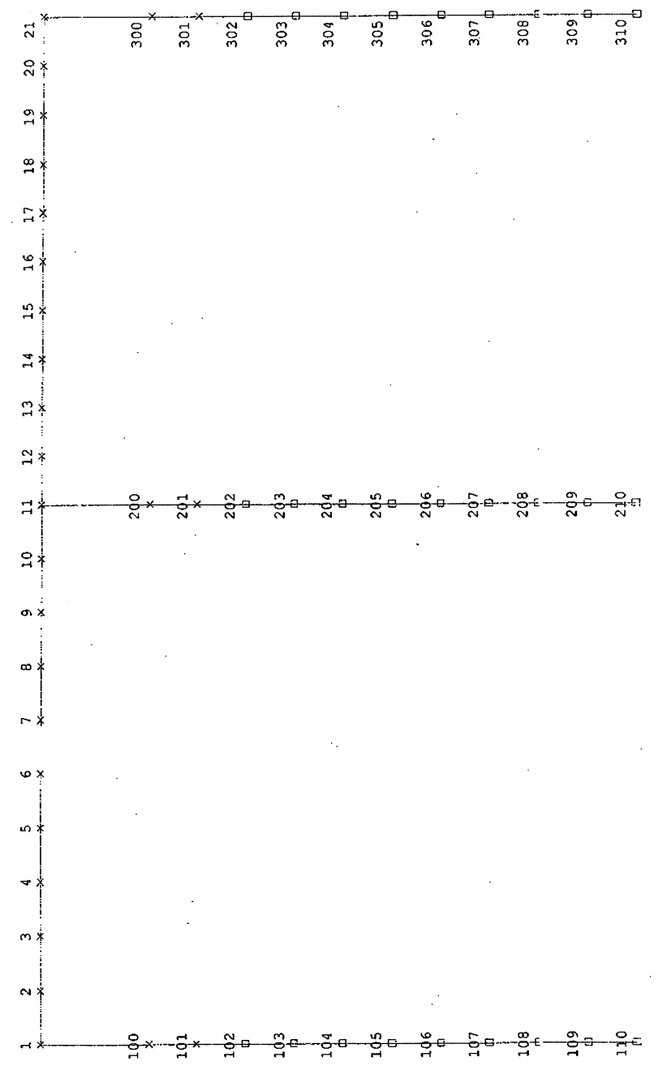
Lutitas y areniscas: 15000 T/m$^3$

Calculo transversal:

Se considera un portico solicitado tanto vertical como horizontalmente. El portico se considera biarticulado en su base, debido al impedimento que ofrecen los muretes guia que existen en cima de la obra de drenaje.

En las paginas siguientes se muestra los modelos de cálculo tanto longitudinal como transversal.

ODT 300.2.
Modelo de calculo (longitudinal.



```
 STRUDL  'LAV MARTORELL. TUNEL ARTIFICIAL TRAMO CUBIERTO' ' CRUCE CON ODT300.2. MODELO LONGITUDINAL'

 UNIT M MTON RADIANS CENTIGRADE SECONDS
$ COORDENADAS
 JOINT COORDINATES
$ Nudo X Y  Z

 1 0.000 4.525 0.000
 2 2.274 4.525 0.000
 3 4.548 4.525 0.000
 4 6.822 4.525 0.000
 5 9.096 4.525 0.000
 6 11.370 4.525 0.000
 7 13.644 4.525 0.000
 8 15.918 4.525 0.000
 9 18.192 4.525 0.000
 10 20.466 4.525 0.000
 11 22.740 4.525 0.000
 12 24.792 4.525 0.000
 13 26.844 4.525 0.000
 14 28.896 4.525 0.000
 15 30.948 4.525 0.000
 16 33.000 4.525 0.000
 17 35.052 4.525 0.000
 18 37.104 4.525 0.000
 19 39.156 4.525 0.000
 20 41.208 4.525 0.000
 21 43.260 4.525 0.000
 100 0.000 0.000 0.000
 101 0.000 -2.030 0.000
 102 0.000 -4.060 0.000
 103 0.000 -6.090 0.000
 104 0.000 -8.120 0.000
 105 0.000 -10.150 0.000
 106 0.000 -12.180 0.000
 107 0.000 -14.210 0.000
 108 0.000 -16.240 0.000
 109 0.000 -18.270 0.000
 110 0.000 -20.300 0.000
 200 22.740 0.000 0.000
 201 22.740 -2.030 0.000
 202 22.740 -4.060 0.000
 203 22.740 -6.090 0.000
 204 22.740 -8.120 0.000
 205 22.740 -10.150 0.000
 206 22.740 -12.180 0.000
 207 22.740 -14.210 0.000
 208 22.740 -16.240 0.000
 209 22.740 -18.270 0.000
 210 22.740 -20.300 0.000
 300 43.260 0.000 0.000
 301 43.260 -2.030 0.000
 302 43.260 -4.060 0.000
 303 43.260 -6.090 0.000
 304 43.260 -8.120 0.000
 305 43.260 -10.150 0.000
 306 43.260 -12.180 0.000
 307 43.260 -14.210 0.000
 308 43.260 -16.240 0.000
 309 43.260 -18.270 0.000
 310 43.260 -20.300 0.000
$  TIPO DE ELEMENTOS SUBSIGUIENTES
  TYPE SPACE FRAME
```



```
$ CONECTIVIDAD DE ELEMENTOS
 GENERATE  20 MEMBERS ID 1 1 FORM 1 1 TO 2 1
 GENERATE  10 MEMBERS ID 110 -1 FORM 110 -1 TO 109 -1
 GENERATE  10 MEMBERS ID 210 -1 FORM 210 -1 TO 209 -1
 GENERATE  10 MEMBERS ID 310 -1 FORM 310 -1 TO 309 -1

 MEMBER INCI
 100 100 1
 200 200 11
 300 300 21

$ CARACTERISTICAS MECANICAS DE LOS ELEMENTOS
 UNIT M MTON RADIANS CENTIGRADE SECONDS
 MEMBER PROP

 1 TO 20 PRIS AX 12.9450 IX 1.0000 IY 1.0000 IZ 27.678 YC 4.525 YD 9.050
 100 200 300 PRIS AX 100.0000 IX 1.0000 IY 1.0000 IZ 100.000 YC 0.900 YD 1.800
 101 TO  110 PRIS AX 2.5447 IX 1.0000 IY 1.0000 IZ 0.515 YC 0.900 YD 1.800
 201 TO  210 PRIS AX 2.5447 IX 1.0000 IY 1.0000 IZ 0.515 YC 0.900 YD 1.800
 301 TO  310 PRIS AX 2.5447 IX 1.0000 IY 1.0000 IZ 0.515 YC 0.900 YD 1.800

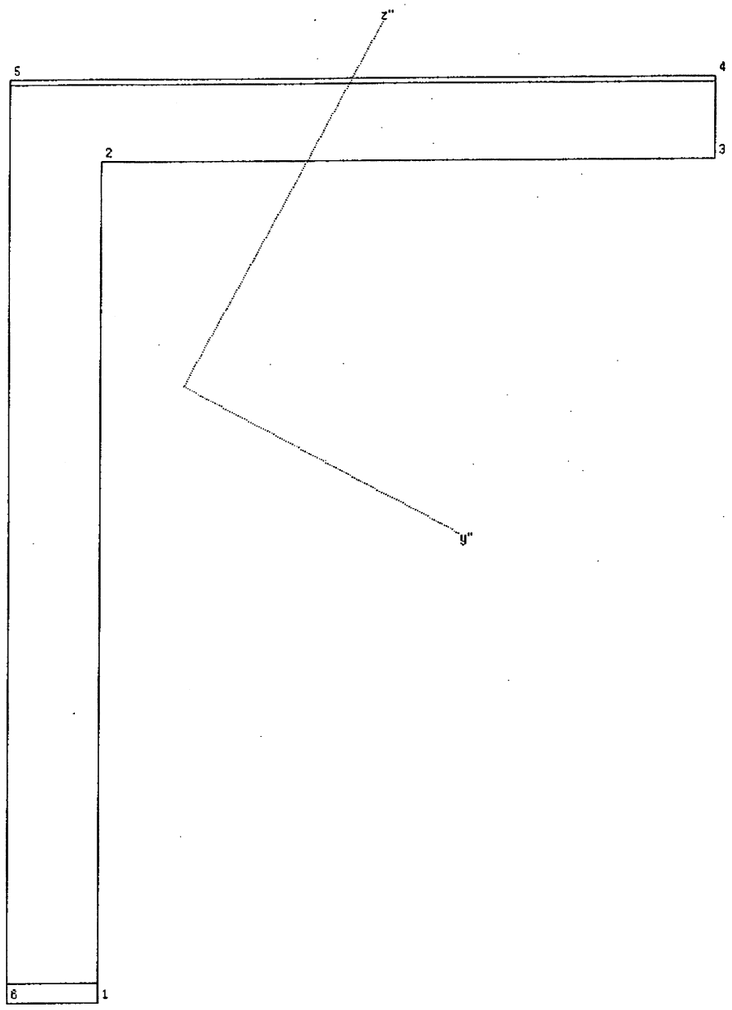
$ CARACTERISTICAS DE LOS MATERIALES
 UNIT M MTON RADIANS CENTIGRADE SECONDS
 CONST
$ TABLERO
 E  2.78E+06 ALL MEMBERS
 G  1158333.3 ALL MEMBERS
 CTE  1.00E-05 ALL MEMBERS

$ DEFINICION DE APOYOS
 STATUS SUPPORT JOINTS  102 TO 110 202 TO 210 302 TO 310

$ LIBERACION DE APOYOS
$ Kh1 2200 Kh2 4000 kh3 15000
 JOINT RELEASES
 102 202 302 FOR Y MOMENT X Y Z  KFX 8038.8 KFZ 8038.8
 103 TO 105 FOR Y MOMENT  X Y Z  KFX 14616 KFZ 14616
 203 TO 205 FOR Y MOMENT  X Y Z  KFX 14616 KFZ 14616
 303 TO 305 FOR Y MOMENT  X Y Z  KFX 14616 KFZ 14616
 106 TO 109 FOR Y MOMENT  X Y Z  KFX 54810 KFZ 54810
 206 TO 209 FOR Y MOMENT  X Y Z  KFX 54810 KFZ 54810
 306 TO 309 FOR Y MOMENT  X Y Z  KFX 54810 KFZ 54810
 110 210 310 MOMENT  X Y Z  KFX 54810 KFZ 54810
```

SEMI - SECCION ESTRUCTURA SINGULAR

tb. 1 : 60.0




cción :"SEMIVIGA" Armadura :"B1"
po : tipo viga/ Genérico Unidades :[cm]

cción parcial 1: Hormigón = H250

| o | Coord-Y | Coord-Z | Pto | Coord-Y | Coord-Z |
|---|---|---|---|---|---|
| 1 | 90.00 | 0.00 | 2 | 90.00 | 825.00 |
| 3 | 690.00 | 825.00 | 4 | 690.00 | 905.00 |
| 5 | 0.00 | 905.00 | 6 | 0.00 | 0.00 |

racterísticas mecánicas de la sección:
ea : Ax= 12.945 [m2]
mentos de inercia :
es princ. de inercia: Iy= 130.457 [m4] Iz= 27.678 [m4] Phi=-28.38 Grados



Ejes (yse,zse) : Iy= 107.237 [m4] Iz= 50.897 [m4] Iyz= 42.981
Inercia a torsión : Ix= 26.670 [m4] (de un círculo del mismo área)

Posición del centro de gravedad: ys= 1.729 [m] zs= 6.055 [m]

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| izq. | Iz | -2.945 | -9.398 | 0.610 |
| dch. | Iz | 3.506 | 7.895 | -0.726 |
| abajo | Iy | -6.149 | -21.216 | 1.979 |
| arriba | Iy | 5.093 | 25.614 | -1.639 |

Armadura: "B1"

| Nº | Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|---|
| 1 | AEH500 | (2) | 0.01 | 0.00 | 20.00 | 90.00 | 20.00 |
| 2 | AEH500 | (2) | 0.01 | 0.00 | 900.00 | 690.00 | 900.00 |
| | Total: | | 0.02 | Cuantía de armadura: 0.000 [o/o] | | | |

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

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

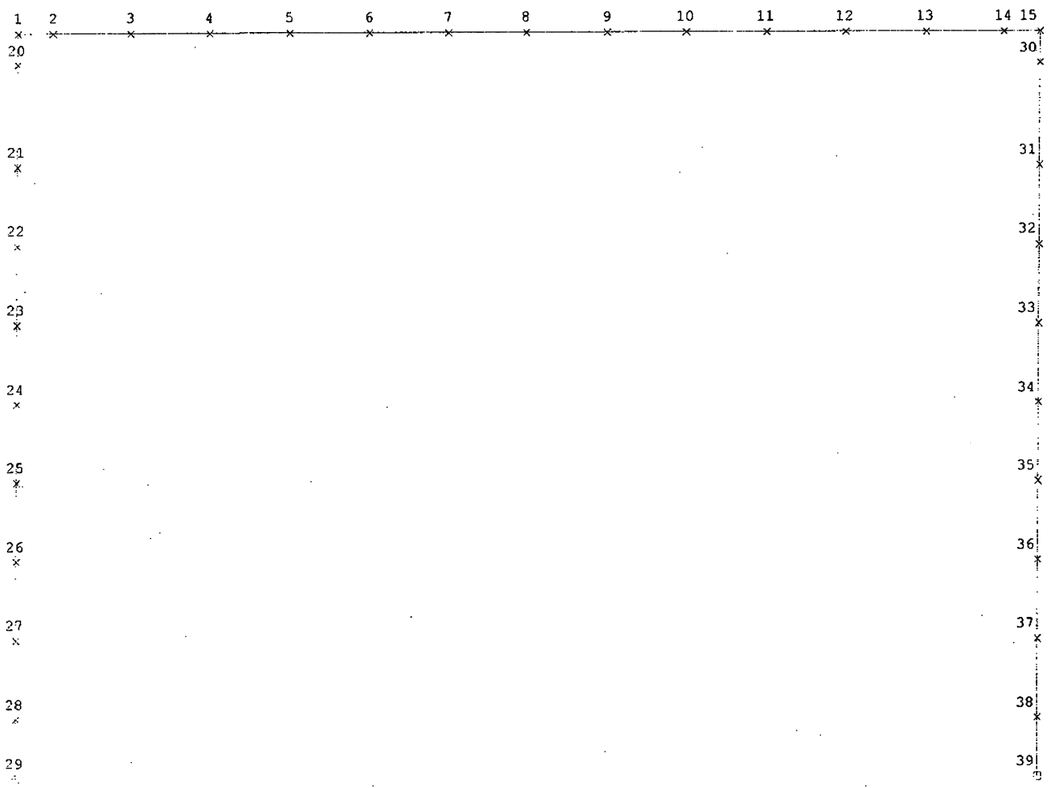
Características del material:

| Nom.Mat. | Módulo E [ kp/cm2] | 0.85*fcd,fyd [ kp/cm2] | eps-fc [o/oo] | fct [ kp/cm2] | fcv [ kp/cm2] | fcw,mín [ kp/cm2] |
|---|---|---|---|---|---|---|
| "H250" | 278000.0 | -141.600 | -2.000 | 0.0 | 6.460 | 250.000 |
| "AEH500" | 2.10E+06 | 4434.700 | | | | |

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

ODT 300.2.

MODELO TRANSVERSAL.




rs Metric Tons



```
 STRUDL  'LAV MARTORELL. TUNEL ARTIFICIAL TRAMO CUBIERTO' ' CRUCE CON ODT300.2. MODELO TRANSVERSAL'

 UNIT M MTON RADIANS CENTIGRADE SECONDS
$ COORDENADAS
 JOINT COORDINATES
$ Nudo X Y  Z

 1 0.000 9.450 0.000
 2 0.450 9.450 0.000
 3 1.450 9.450 0.000
 4 2.450 9.450 0.000
 5 3.450 9.450 0.000
 6 4.450 9.450 0.000
 7 5.450 9.450 0.000
 8 6.450 9.450 0.000
 9 7.450 9.450 0.000
 10 8.450 9.450 0.000
 11 9.450 9.450 0.000
 12 10.450 9.450 0.000
 13 11.450 9.450 0.000
 14 12.450 9.450 0.000
 15 12.900 9.450 0.000
 20 0.000 9.050 0.000
 21 0.000 7.750 0.000
 22 0.000 6.750 0.000
 23 0.000 5.750 0.000
 24 0.000 4.750 0.000
 25 0.000 3.750 0.000
 26 0.000 2.750 0.000
 27 0.000 1.750 0.000
 28 0.000 0.750 0.000
 29 0.000 0.000 0.000
 30 12.900 9.050 0.000
 31 12.900 7.750 0.000
 32 12.900 6.750 0.000
 33 12.900 5.750 0.000
 34 12.900 4.750 0.000
 35 12.900 3.750 0.000
 36 12.900 2.750 0.000
 37 12.900 1.750 0.000
 38 12.900 0.750 0.000
 39 12.900 0.000 0.000
$  TIPO DE ELEMENTOS SUBSIGUIENTES
   TYPE SPACE FRAME
$ CONECTIVIDAD DE ELEMENTOS
 GENERATE  14 MEMBERS ID 1 1 FORM 1 1 TO 2 1
 GENERATE  9 MEMBERS ID 21 1 FORM 20 1 TO 21 1
 GENERATE  9 MEMBERS ID 31 1 FORM 30 1 TO 31 1

 MEMBER INCI
 20 20 1
 30 30 15

$ CARACTERISTICAS MECANICAS DE LOS ELEMENTOS
 UNIT M MTON RADIANS CENTIGRADE SECONDS
 MEMBER PROP

 3 TO 12 PRIS AX 0.8000 IX 1.0000 IY 1.0000 IZ 0.043 YC 0.400 YD 0.800
 2  13 PRIS AX 1.0500 IX 1.0000 IY 1.0000 IZ 0.113 YC 0.525 YD 1.050
 1  14 PRIS AX 1.3000 IX 1.0000 IY 1.0000 IZ 0.183 YC 0.650 YD 1.300
 22 TO  29 PRIS AX 0.9000 IX 1.0000 IY 1.0000 IZ 0.061 YC 0.450 YD 0.900
 32 TO  39 PRIS AX 0.9000 IX 1.0000 IY 1.0000 IZ 0.061 YC 0.450 YD 0.900
 21  31 PRIS AX 1.1500 IX 1.0000 IY 1.0000 IZ 0.145 YC 0.575 YD 1.150
```

```
 20  30 PRIS AX 1.4000 IX 1.0000 IY 1.0000 IZ 0.229 YC 0.700 YD 1.400

$ CARACTERISTICAS DE LOS MATERIALES
 UNIT M MTON RADIANS CENTIGRADE SECONDS
 CONST
$ TABLERO
 E  2.78E+06 ALL MEMBERS
 G  1158333.3 ALL MEMBERS
 CTE  1.00E-05 ALL MEMBERS

$ DEFINICION DE APOYOS
 STATUS SUPPORT JOINTS  29 39

$ LIBERACION DE APOYOS
 JOINT RELEASES
 29 39   MOMENT X Y Z
```



## 9.- CÁLCULO LONGITUDINAL

En las páginas siguientes se muestra los listados de las cargas, envolventes y esfuerzos para el cálculo longitudinal.

A continuación se muestra un resumen de esfuerzos:

| Pto | abcisa (m) | Md (mT) | Vd (mT) |
|---|---|---|---|
| 1 | 0.000 | -573.98 | -719.64 |
| 2 | 2.274 | 879.92 | -559.07 |
| 3 | 4.548 | 1968.68 | 398.51 |
| 4 | 6.822 | 2692.93 | 237.94 |
| 5 | 9.096 | 3050.84 | 77.38 |
| 6 | 11.370 | 3044.23 | 83.19 |
| 7 | 13.644 | 2672.49 | 243.76 |
| 8 | 15.918 | 1935.63 | 404.32 |
| 9 | 18.192 | 833.63 | 564.89 |
| 10 | 20.466 | -633.49 | 725.45 |
| Pila:11 | 22.740 | -2382.45 | 816.73 |
| 12 | 24.792 | -854.97 | 671.84 |
| 13 | 26.844 | 375.00 | 526.95 |
| 14 | 28.896 | 1307.63 | 382.06 |
| 15 | 30.948 | 1942.96 | 237.17 |
| 16 | 33.000 | 2280.97 | 92.18 |
| 17 | 35.052 | 2321.67 | 52.61 |
| 18 | 37.104 | 2065.05 | 197.50 |
| 19 | 39.156 | 1511.11 | 342.40 |
| 20 | 41.208 | 659.86 | 487.28 |
| 21 | 43.260 | -488.70 | 632.17 |

En el dimensionanamiento a flexión no consideraremos del lado de la seguridad el Axil de compresión que se produce en la viga.

```
CINPUT 'PUENTE.GEO'


LOAD 1 'P.P.'
$ Peso propio seccion semi-u
MEMBER LOAD
  1 TO 20   FOR Y GLO PRO UNI  -32.37

LOAD 2 'P.T.'
$ Peso propio relleno
MEMBER LOAD
  1 TO 20   FOR Y GLO PRO UNI  -15.18

LOAD 3 'scu'
$ sc
MEMBER LOAD
  1 TO 20   FOR Y GLO PRO UNI  -2.76

UNIT M MTON RADIANS CENTIGRADE SECONDS

STIFFNESS ANALYSIS

$ IMPRESION DE ESFUERZOS

LOAD LIST ALL

PRINT JOINT RELEASES
PRINT APPLIED JOINT LOADS
OUTPUT DECIMAL 3
LIST FORCES
OUTPUT DECIMAL 6
LIST DISP
OUTPUT DECIMAL 3
LIST REAC
$FINISH
```



```
* TIT
LAV-MARTORELL: TUNEL ARTIFICIAL TRAMO CUBIERTO. CRUCE CON ODT300.2
Modelo longitudinal

* SDF PUENTE
* DIRESF ESF


* EC

" ---- ESTADOS DE CARGA SIN COEFICIENTE DE EXCENTRICIDAD -----
  1 carga001     0   PESO PROPIO semi-viga
  2 carga002     0   PESO PROPIO relleno
  3 carga003     0   scu 0.40 t/m2

$<
  10  CP    1   ENVOLVENTE CP
  20  ENCSER     1   ENVOLVENTE CAR. SERVICIO
  21  ENFSER     1   ENVOLVENTE FRE. SERVICIO
  22  ENROT     1   ENVOLVENTE ROTURA
>$

"$<
* ENV
  10  CP    1   ENVOLVENTE CP
  ec1  1.00  1.00
  ec2  1.00  1.00

  20  ENCSER     1   ENVOLVENTE CAR. SERVICIO
  ec10   1.00  1.00   " CP
  ec3    0.00  1.00   " SC

  21  ENFSER     1   ENVOLVENTE FRE. SERVICIO
  ec10   1.00  1.00   " CP
  ec3    0.00  0.50   " SC

  22  ENROT     1   ENVOLVENTE ROTURA
  ec1    1.00  1.35   " PP
  ec2    1.00  1.50   " TIERRAS
  ec3    0.00  1.50   " SC


">$
* SELECT
  mbdesel todos
  nddesel todos

  mbsel i 1 a 20
  mbsel d 20

  ndsel 1 a 20

  ressel E D

* PRINT
  output -r elemen.lst
  grupos si
  tit Listados de estados de carga elementales
  ec(1 a 3) y+ y- zz+ zz-

* PRINT
  output -r env.lst
  grupos si
```

```
  tit Listados de envolventes
  ec(10 20 21 22) y+ y- zz+ zz-


* SELECT
  mbdesel todos
  nddesel todos

  mbsel i 100 a 110
  mbsel d 100 101 110
  mbsel i 200 a 210
  mbsel d 200 201 210
  mbsel i 300 a 310
  mbsel d 300 301 310

  ndsel 100 a 110
  ndsel 200 a 310
  ndsel 300 a 310

  ressel E D R

* PRINT
  output -r pilotes.lst
  grupos si
  tit Listados de estados de carga elementales
  ec(1 a 3 10 20 22) y+ y- zz+ zz-
```



LISTADO DE ESTADOS DE CARGA
Fecha : 10.05.2002 20:03:30
Título: LAV-MARTORELL: TUNEL ARTIFICIAL TRAMO CUBIERTO. CR
Coment: Modelo longitudinal
Titlst: Listados de estados de carga elementales

Tabla de estados de carga a listar

| ec | Fichero | tipo | Título |
|---|---|---|---|
| 1 | carga001 | 0 | [PESO PROPIO semi-viga ] |
| 2 | carga002 | 0 | [PESO PROPIO relleno ] |
| 3 | carga003 | 0 | [scu 0.40 t/m2 ] |

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Fz | Tx | My | Mz |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | | -25.82 | -329.91 | 0.00 | 0.00 | 0.00 | -263.13 |
| | | 2 | | -12.11 | -154.71 | 0.00 | 0.00 | 0.00 | -123.40 |
| | | 3 | | -2.20 | -28.13 | 0.00 | 0.00 | 0.00 | -22.44 |
| 2 | 2 | 1 | | -25.82 | -256.30 | 0.00 | 0.00 | 0.00 | 403.39 |
| | | 2 | | -12.11 | -120.19 | 0.00 | 0.00 | 0.00 | 189.17 |
| | | 3 | | -2.20 | -21.85 | 0.00 | 0.00 | 0.00 | 34.39 |
| 3 | 3 | 1 | | -25.82 | -182.69 | 0.00 | 0.00 | 0.00 | 902.52 |
| | | 2 | | -12.11 | -85.67 | 0.00 | 0.00 | 0.00 | 423.24 |
| | | 3 | | -2.20 | -15.58 | 0.00 | 0.00 | 0.00 | 76.95 |
| 4 | 4 | 1 | | -25.82 | -109.08 | 0.00 | 0.00 | 0.00 | 1234.26 |
| | | 2 | | -12.11 | -51.15 | 0.00 | 0.00 | 0.00 | 578.81 |
| | | 3 | | -2.20 | -9.30 | 0.00 | 0.00 | 0.00 | 105.24 |
| 5 | 5 | 1 | | -25.82 | -35.47 | 0.00 | 0.00 | 0.00 | 1398.62 |
| | | 2 | | -12.11 | -16.64 | 0.00 | 0.00 | 0.00 | 655.89 |
| | | 3 | | -2.20 | -3.02 | 0.00 | 0.00 | 0.00 | 119.25 |
| 6 | 6 | 1 | | -25.82 | 38.14 | 0.00 | 0.00 | 0.00 | 1395.59 |
| | | 2 | | -12.11 | 17.89 | 0.00 | 0.00 | 0.00 | 654.47 |
| | | 3 | | -2.20 | 3.25 | 0.00 | 0.00 | 0.00 | 118.99 |
| 7 | 7 | 1 | | -25.82 | 111.75 | 0.00 | 0.00 | 0.00 | 1225.17 |
| | | 2 | | -12.11 | 52.40 | 0.00 | 0.00 | 0.00 | 574.55 |
| | | 3 | | -2.20 | 9.53 | 0.00 | 0.00 | 0.00 | 104.46 |
| 8 | 8 | 1 | | -25.82 | 185.36 | 0.00 | 0.00 | 0.00 | 887.36 |
| | | 2 | | -12.11 | 86.92 | 0.00 | 0.00 | 0.00 | 416.13 |
| | | 3 | | -2.20 | 15.80 | 0.00 | 0.00 | 0.00 | 75.66 |
| 9 | 9 | 1 | | -25.82 | 258.97 | 0.00 | 0.00 | 0.00 | 382.17 |
| | | 2 | | -12.11 | 121.44 | 0.00 | 0.00 | 0.00 | 179.22 |
| | | 3 | | -2.20 | 22.08 | 0.00 | 0.00 | 0.00 | 32.59 |
| 10 | 10 | 1 | | -25.82 | 332.58 | 0.00 | 0.00 | 0.00 | -290.41 |
| | | 2 | | -12.11 | 155.96 | 0.00 | 0.00 | 0.00 | -136.19 |
| | | 3 | | -2.20 | 28.36 | 0.00 | 0.00 | 0.00 | -24.76 |
| 11 | 11 | 1 | | -22.03 | -374.42 | 0.00 | 0.00 | 0.00 | -1092.11 |
| | | 2 | | -10.33 | -175.59 | 0.00 | 0.00 | 0.00 | -512.15 |
| | | 3 | | -1.88 | -31.93 | 0.00 | 0.00 | 0.00 | -93.12 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12 | 12 | 1 | -22.03 | -308.00 | 0.00 | 0.00 | 0.00 | -391.95 |
| | | 2 | -10.33 | -144.44 | 0.00 | 0.00 | 0.00 | -183.81 |
| | | 3 | -1.88 | -26.26 | 0.00 | 0.00 | 0.00 | -33.42 |
| 13 | 13 | 1 | -22.03 | -241.57 | 0.00 | 0.00 | 0.00 | 171.91 |
| | | 2 | -10.33 | -113.29 | 0.00 | 0.00 | 0.00 | 80.62 |
| | | 3 | -1.88 | -20.60 | 0.00 | 0.00 | 0.00 | 14.66 |
| 14 | 14 | 1 | -22.03 | -175.15 | 0.00 | 0.00 | 0.00 | 599.47 |
| | | 2 | -10.33 | -82.14 | 0.00 | 0.00 | 0.00 | 281.12 |
| | | 3 | -1.88 | -14.93 | 0.00 | 0.00 | 0.00 | 51.11 |
| 15 | 15 | 1 | -22.03 | -108.73 | 0.00 | 0.00 | 0.00 | 890.72 |
| | | 2 | -10.33 | -50.99 | 0.00 | 0.00 | 0.00 | 417.71 |
| | | 3 | -1.88 | -9.27 | 0.00 | 0.00 | 0.00 | 75.95 |
| 16 | 16 | 1 | -22.03 | -42.30 | 0.00 | 0.00 | 0.00 | 1045.68 |
| | | 2 | -10.33 | -19.84 | 0.00 | 0.00 | 0.00 | 490.38 |
| | | 3 | -1.88 | -3.61 | 0.00 | 0.00 | 0.00 | 89.16 |
| 17 | 17 | 1 | -22.03 | 24.12 | 0.00 | 0.00 | 0.00 | 1064.34 |
| | | 2 | -10.33 | 11.31 | 0.00 | 0.00 | 0.00 | 499.12 |
| | | 3 | -1.88 | 2.06 | 0.00 | 0.00 | 0.00 | 90.75 |
| 18 | 18 | 1 | -22.03 | 90.54 | 0.00 | 0.00 | 0.00 | 946.70 |
| | | 2 | -10.33 | 42.46 | 0.00 | 0.00 | 0.00 | 443.96 |
| | | 3 | -1.88 | 7.72 | 0.00 | 0.00 | 0.00 | 80.72 |
| 19 | 19 | 1 | -22.03 | 156.97 | 0.00 | 0.00 | 0.00 | 692.75 |
| | | 2 | -10.33 | 73.61 | 0.00 | 0.00 | 0.00 | 324.87 |
| | | 3 | -1.88 | 13.38 | 0.00 | 0.00 | 0.00 | 59.07 |
| 20 | 20 | 1 | -22.03 | 223.39 | 0.00 | 0.00 | 0.00 | 302.51 |
| | | 2 | -10.33 | 104.76 | 0.00 | 0.00 | 0.00 | 141.86 |
| | | 3 | -1.88 | 19.05 | 0.00 | 0.00 | 0.00 | 25.79 |
| 20 | 21 | 1 | -22.03 | 289.81 | 0.00 | 0.00 | 0.00 | -224.04 |
| | | 2 | -10.33 | 135.91 | 0.00 | 0.00 | 0.00 | -105.06 |
| | | 3 | -1.88 | 24.71 | 0.00 | 0.00 | 0.00 | -19.10 |

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | uz | θx | θy | θz |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | | 0.000030 | -0.000952 | 0.000000 | 0.000000 | 0.000000 | -0.000182 |
| | 2 | | 0.000014 | -0.000446 | 0.000000 | 0.000000 | 0.000000 | -0.000085 |
| | 3 | | 0.000003 | -0.000081 | 0.000000 | 0.000000 | 0.000000 | -0.000015 |
| 2 | 1 | | 0.000029 | -0.001366 | 0.000000 | 0.000000 | 0.000000 | -0.000179 |
| | 2 | | 0.000014 | -0.000641 | 0.000000 | 0.000000 | 0.000000 | -0.000084 |
| | 3 | | 0.000002 | -0.000116 | 0.000000 | 0.000000 | 0.000000 | -0.000015 |
| 3 | 1 | | 0.000027 | -0.001754 | 0.000000 | 0.000000 | 0.000000 | -0.000160 |
| | 2 | | 0.000013 | -0.000823 | 0.000000 | 0.000000 | 0.000000 | -0.000075 |
| | 3 | | 0.000002 | -0.000150 | 0.000000 | 0.000000 | 0.000000 | -0.000014 |
| 4 | 1 | | 0.000026 | -0.002082 | 0.000000 | 0.000000 | 0.000000 | -0.000128 |
| | 2 | | 0.000012 | -0.000977 | 0.000000 | 0.000000 | 0.000000 | -0.000060 |
| | 3 | | 0.000002 | -0.000178 | 0.000000 | 0.000000 | 0.000000 | -0.000011 |
| 5 | 1 | | 0.000024 | -0.002329 | 0.000000 | 0.000000 | 0.000000 | -0.000088 |
| | 2 | | 0.000011 | -0.001092 | 0.000000 | 0.000000 | 0.000000 | -0.000041 |
| | 3 | | 0.000002 | -0.000199 | 0.000000 | 0.000000 | 0.000000 | -0.000008 |
| 6 | 1 | | 0.000022 | -0.002482 | 0.000000 | 0.000000 | 0.000000 | -0.000047 |
| | 2 | | 0.000010 | -0.001164 | 0.000000 | 0.000000 | 0.000000 | -0.000022 |
| | 3 | | 0.000002 | -0.000212 | 0.000000 | 0.000000 | 0.000000 | -0.000004 |
| 7 | 1 | | 0.000021 | -0.002542 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 2 | | 0.000010 | -0.001192 | 0.000000 | 0.000000 | 0.000000 | -0.000003 |
| | 3 | | 0.000002 | -0.000217 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| 8 | 1 | | 0.000019 | -0.002521 | 0.000000 | 0.000000 | 0.000000 | 0.000024 |
| | 2 | | 0.000009 | -0.001182 | 0.000000 | 0.000000 | 0.000000 | 0.000011 |
| | 3 | | 0.000002 | -0.000215 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| 9 | 1 | | 0.000017 | -0.002441 | 0.000000 | 0.000000 | 0.000000 | 0.000043 |
| | 2 | | 0.000008 | -0.001145 | 0.000000 | 0.000000 | 0.000000 | 0.000020 |
| | 3 | | 0.000001 | -0.000208 | 0.000000 | 0.000000 | 0.000000 | 0.000004 |
| 10 | 1 | | 0.000016 | -0.002337 | 0.000000 | 0.000000 | 0.000000 | 0.000045 |
| | 2 | | 0.000007 | -0.001096 | 0.000000 | 0.000000 | 0.000000 | 0.000021 |
| | 3 | | 0.000001 | -0.000199 | 0.000000 | 0.000000 | 0.000000 | 0.000004 |
| 11 | 1 | | 0.000014 | -0.002253 | 0.000000 | 0.000000 | 0.000000 | 0.000025 |
| | 2 | | 0.000007 | -0.001056 | 0.000000 | 0.000000 | 0.000000 | 0.000012 |
| | 3 | | 0.000001 | -0.000192 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| 12 | 1 | | 0.000013 | -0.002225 | 0.000000 | 0.000000 | 0.000000 | 0.000005 |
| | 2 | | 0.000006 | -0.001044 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 3 | | 0.000001 | -0.000190 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 13 | 1 | | 0.000012 | -0.002220 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 2 | | 0.000005 | -0.001041 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 3 | | 0.000001 | -0.000189 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 14 | 1 | | 0.000010 | -0.002206 | 0.000000 | 0.000000 | 0.000000 | 0.000013 |
| | 2 | | 0.000005 | -0.001035 | 0.000000 | 0.000000 | 0.000000 | 0.000006 |
| | 3 | | 0.000001 | -0.000188 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| 15 | 1 | | 0.000009 | -0.002160 | 0.000000 | 0.000000 | 0.000000 | 0.000033 |
| | 2 | | 0.000004 | -0.001013 | 0.000000 | 0.000000 | 0.000000 | 0.000016 |
| | 3 | | 0.000001 | -0.000184 | 0.000000 | 0.000000 | 0.000000 | 0.000003 |
| 16 | 1 | | 0.000008 | -0.002066 | 0.000000 | 0.000000 | 0.000000 | 0.000059 |
| | 2 | | 0.000004 | -0.000969 | 0.000000 | 0.000000 | 0.000000 | 0.000028 |
| | 3 | | 0.000001 | -0.000176 | 0.000000 | 0.000000 | 0.000000 | 0.000005 |
| 17 | 1 | | 0.000007 | -0.001915 | 0.000000 | 0.000000 | 0.000000 | 0.000088 |
| | 2 | | 0.000003 | -0.000898 | 0.000000 | 0.000000 | 0.000000 | 0.000041 |
| | 3 | | 0.000001 | -0.000163 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| 18 | 1 | | 0.000005 | -0.001706 | 0.000000 | 0.000000 | 0.000000 | 0.000115 |
| | 2 | | 0.000002 | -0.000800 | 0.000000 | 0.000000 | 0.000000 | 0.000054 |
| | 3 | | 0.000000 | -0.000145 | 0.000000 | 0.000000 | 0.000000 | 0.000010 |
| 19 | 1 | | 0.000004 | -0.001446 | 0.000000 | 0.000000 | 0.000000 | 0.000137 |
| | 2 | | 0.000002 | -0.000678 | 0.000000 | 0.000000 | 0.000000 | 0.000064 |
| | 3 | | 0.000000 | -0.000123 | 0.000000 | 0.000000 | 0.000000 | 0.000012 |
| 20 | 1 | | 0.000003 | -0.001149 | 0.000000 | 0.000000 | 0.000000 | 0.000151 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 0.000001 | -0.000539 | 0.000000 | 0.000000 | 0.000000 | 0.000071 |
| 3 | 0.000000 | -0.000098 | 0.000000 | 0.000000 | 0.000000 | 0.000013 |



LISTADO DE ESTADOS DE CARGA
Fecha : 10.05.2002 20:03:30
Título: LAV-MARTORELL: TUNEL ARTIFICIAL TRAMO CUBIERTO. CR
Coment: Modelo longitudinal
Titlst: Listados de envolventes

Tabla de estados de carga a listar

| ec | Fichero | tipo | Título | |
|---|---|---|---|---|
| 10 | CP | 1 | [ENVOLVENTE CP | ] |
| 20 | ENCSER | 1 | [ENVOLVENTE CAR. SERVICIO | ] |
| 21 | ENFSER | 1 | [ENVOLVENTE FRE. SERVICIO | ] |
| 22 | ENROT | 1 | [ENVOLVENTE ROTURA | ] |

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Fz | Tx | My | Mz |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 10 | Fy+ | -37.93 | -484.62 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 10 | Mz+ | -37.93 | -484.62 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 10 | Fy- | -37.93 | -484.62 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 10 | Mz- | -37.93 | -484.62 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 20 | Fy+ | -37.93 | -484.62 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 20 | Mz+ | -37.93 | -484.62 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 20 | Fy- | -40.13 | -512.75 | 0.00 | 0.00 | 0.00 | -408.97 |
| | | 20 | Mz- | -40.13 | -512.75 | 0.00 | 0.00 | 0.00 | -408.97 |
| | | 21 | Fy+ | -37.93 | -484.62 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 21 | Mz+ | -37.93 | -484.62 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 21 | Fy- | -39.03 | -498.68 | 0.00 | 0.00 | 0.00 | -397.75 |
| | | 21 | Mz- | -39.03 | -498.68 | 0.00 | 0.00 | 0.00 | -397.75 |
| | | 22 | Fy+ | -37.93 | -484.62 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 22 | Mz+ | -37.93 | -484.62 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 22 | Fy- | -56.32 | -719.64 | 0.00 | 0.00 | 0.00 | -573.98 |
| | | 22 | Mz- | -56.32 | -719.64 | 0.00 | 0.00 | 0.00 | -573.98 |
| 2 | 2 | 10 | Fy+ | -37.93 | -376.49 | 0.00 | 0.00 | 0.00 | 592.56 |
| | | 10 | Mz+ | -37.93 | -376.49 | 0.00 | 0.00 | 0.00 | 592.56 |
| | | 10 | Fy- | -37.93 | -376.49 | 0.00 | 0.00 | 0.00 | 592.56 |
| | | 10 | Mz- | -37.93 | -376.49 | 0.00 | 0.00 | 0.00 | 592.56 |
| | | 20 | Fy+ | -37.93 | -376.49 | 0.00 | 0.00 | 0.00 | 592.56 |
| | | 20 | Mz+ | -40.13 | -398.34 | 0.00 | 0.00 | 0.00 | 626.95 |
| | | 20 | Fy- | -40.13 | -398.34 | 0.00 | 0.00 | 0.00 | 626.95 |
| | | 20 | Mz- | -37.93 | -376.49 | 0.00 | 0.00 | 0.00 | 592.56 |
| | | 21 | Fy+ | -37.93 | -376.49 | 0.00 | 0.00 | 0.00 | 592.56 |
| | | 21 | Mz+ | -39.03 | -387.42 | 0.00 | 0.00 | 0.00 | 609.76 |
| | | 21 | Fy- | -39.03 | -387.42 | 0.00 | 0.00 | 0.00 | 609.76 |
| | | 21 | Mz- | -37.93 | -376.49 | 0.00 | 0.00 | 0.00 | 592.56 |
| | | 22 | Fy+ | -37.93 | -376.49 | 0.00 | 0.00 | 0.00 | 592.56 |
| | | 22 | Mz+ | -56.32 | -559.07 | 0.00 | 0.00 | 0.00 | 879.92 |
| | | 22 | Fy- | -56.32 | -559.07 | 0.00 | 0.00 | 0.00 | 879.92 |
| | | 22 | Mz- | -37.93 | -376.49 | 0.00 | 0.00 | 0.00 | 592.56 |
| 3 | 3 | 10 | Fy+ | -37.93 | -268.36 | 0.00 | 0.00 | 0.00 | 1325.76 |
| | | 10 | Mz+ | -37.93 | -268.36 | 0.00 | 0.00 | 0.00 | 1325.76 |
| | | 10 | Fy- | -37.93 | -268.36 | 0.00 | 0.00 | 0.00 | 1325.76 |
| | | 10 | Mz- | -37.93 | -268.36 | 0.00 | 0.00 | 0.00 | 1325.76 |
| | | 20 | Fy+ | -37.93 | -268.36 | 0.00 | 0.00 | 0.00 | 1325.76 |
| | | 20 | Mz+ | -40.13 | -283.94 | 0.00 | 0.00 | 0.00 | 1402.71 |
| | | 20 | Fy- | -40.13 | -283.94 | 0.00 | 0.00 | 0.00 | 1402.71 |
| | | 20 | Mz- | -37.93 | -268.36 | 0.00 | 0.00 | 0.00 | 1325.76 |
| | | 21 | Fy+ | -37.93 | -268.36 | 0.00 | 0.00 | 0.00 | 1325.76 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 11 | 11 | 10 | Fy+ | -32.36 | -550.01 | 0.00 | 0.00 | 0.00 | -1604.26 |
| | | 10 | Mz+ | -32.36 | -550.01 | 0.00 | 0.00 | 0.00 | -1604.26 |
| | | 10 | Fy- | -32.36 | -550.01 | 0.00 | 0.00 | 0.00 | -1604.26 |
| | | 10 | Mz- | -32.36 | -550.01 | 0.00 | 0.00 | 0.00 | -1604.26 |
| | | 20 | Fy+ | -32.36 | -550.01 | 0.00 | 0.00 | 0.00 | -1604.26 |
| | | 20 | Mz+ | -32.36 | -550.01 | 0.00 | 0.00 | 0.00 | -1604.26 |
| | | 20 | Fy- | -34.24 | -581.93 | 0.00 | 0.00 | 0.00 | -1697.38 |
| | | 20 | Mz- | -34.24 | -581.93 | 0.00 | 0.00 | 0.00 | -1697.38 |
| | | 21 | Fy+ | -32.36 | -550.01 | 0.00 | 0.00 | 0.00 | -1604.26 |
| | | 21 | Mz+ | -32.36 | -550.01 | 0.00 | 0.00 | 0.00 | -1604.26 |
| | | 21 | Fy- | -33.30 | -565.97 | 0.00 | 0.00 | 0.00 | -1650.82 |
| | | 21 | Mz- | -33.30 | -565.97 | 0.00 | 0.00 | 0.00 | -1650.82 |
| | | 22 | Fy+ | -32.36 | -550.01 | 0.00 | 0.00 | 0.00 | -1604.26 |
| | | 22 | Mz+ | -32.36 | -550.01 | 0.00 | 0.00 | 0.00 | -1604.26 |
| | | 22 | Fy- | -48.06 | -816.73 | 0.00 | 0.00 | 0.00 | -2382.25 |
| | | 22 | Mz- | -48.06 | -816.73 | 0.00 | 0.00 | 0.00 | -2382.25 |
| 12 | 12 | 10 | Fy+ | -32.36 | -452.43 | 0.00 | 0.00 | 0.00 | -575.76 |
| | | 10 | Mz+ | -32.36 | -452.43 | 0.00 | 0.00 | 0.00 | -575.76 |
| | | 10 | Fy- | -32.36 | -452.43 | 0.00 | 0.00 | 0.00 | -575.76 |
| | | 10 | Mz- | -32.36 | -452.43 | 0.00 | 0.00 | 0.00 | -575.76 |
| | | 20 | Fy+ | -32.36 | -452.43 | 0.00 | 0.00 | 0.00 | -575.76 |
| | | 20 | Mz+ | -32.36 | -452.43 | 0.00 | 0.00 | 0.00 | -575.76 |
| | | 20 | Fy- | -34.24 | -478.69 | 0.00 | 0.00 | 0.00 | -609.18 |
| | | 20 | Mz- | -34.24 | -478.69 | 0.00 | 0.00 | 0.00 | -609.18 |
| | | 21 | Fy+ | -32.36 | -452.43 | 0.00 | 0.00 | 0.00 | -575.76 |
| | | 21 | Mz+ | -32.36 | -452.43 | 0.00 | 0.00 | 0.00 | -575.76 |
| | | 21 | Fy- | -33.30 | -465.56 | 0.00 | 0.00 | 0.00 | -592.47 |
| | | 21 | Mz- | -33.30 | -465.56 | 0.00 | 0.00 | 0.00 | -592.47 |
| | | 22 | Fy+ | -32.36 | -452.43 | 0.00 | 0.00 | 0.00 | -575.76 |
| | | 22 | Mz+ | -32.36 | -452.43 | 0.00 | 0.00 | 0.00 | -575.76 |
| | | 22 | Fy- | -48.06 | -671.84 | 0.00 | 0.00 | 0.00 | -854.97 |
| | | 22 | Mz- | -48.06 | -671.84 | 0.00 | 0.00 | 0.00 | -854.97 |
| 13 | 13 | 10 | Fy+ | -32.36 | -354.86 | 0.00 | 0.00 | 0.00 | 252.53 |
| | | 10 | Mz+ | -32.36 | -354.86 | 0.00 | 0.00 | 0.00 | 252.53 |
| | | 10 | Fy- | -32.36 | -354.86 | 0.00 | 0.00 | 0.00 | 252.53 |
| | | 10 | Mz- | -32.36 | -354.86 | 0.00 | 0.00 | 0.00 | 252.53 |
| | | 20 | Fy+ | -32.36 | -354.86 | 0.00 | 0.00 | 0.00 | 252.53 |
| | | 20 | Mz+ | -34.24 | -375.46 | 0.00 | 0.00 | 0.00 | 267.19 |
| | | 20 | Fy- | -34.24 | -375.46 | 0.00 | 0.00 | 0.00 | 267.19 |
| | | 20 | Mz- | -32.36 | -354.86 | 0.00 | 0.00 | 0.00 | 252.53 |
| | | 21 | Fy+ | -32.36 | -354.86 | 0.00 | 0.00 | 0.00 | 252.53 |
| | | 21 | Mz+ | -33.30 | -365.16 | 0.00 | 0.00 | 0.00 | 259.86 |
| | | 21 | Fy- | -33.30 | -365.16 | 0.00 | 0.00 | 0.00 | 259.86 |
| | | 21 | Mz- | -32.36 | -354.86 | 0.00 | 0.00 | 0.00 | 252.53 |
| | | 22 | Fy+ | -32.36 | -354.86 | 0.00 | 0.00 | 0.00 | 252.53 |
| | | 22 | Mz+ | -48.06 | -526.95 | 0.00 | 0.00 | 0.00 | 374.99 |
| | | 22 | Fy- | -48.06 | -526.95 | 0.00 | 0.00 | 0.00 | 374.99 |
| | | 22 | Mz- | -32.36 | -354.86 | 0.00 | 0.00 | 0.00 | 252.53 |
| 14 | 14 | 10 | Fy+ | -32.36 | -257.29 | 0.00 | 0.00 | 0.00 | 880.59 |
| | | 10 | Mz+ | -32.36 | -257.29 | 0.00 | 0.00 | 0.00 | 880.59 |
| | | 10 | Fy- | -32.36 | -257.29 | 0.00 | 0.00 | 0.00 | 880.59 |
| | | 10 | Mz- | -32.36 | -257.29 | 0.00 | 0.00 | 0.00 | 880.59 |
| | | 20 | Fy+ | -32.36 | -257.29 | 0.00 | 0.00 | 0.00 | 880.59 |
| | | 20 | Mz+ | -34.24 | -272.22 | 0.00 | 0.00 | 0.00 | 931.70 |
| | | 20 | Fy- | -34.24 | -272.22 | 0.00 | 0.00 | 0.00 | 931.70 |
| | | 20 | Mz- | -32.36 | -257.29 | 0.00 | 0.00 | 0.00 | 880.59 |
| | | 21 | Fy+ | -32.36 | -257.29 | 0.00 | 0.00 | 0.00 | 880.59 |
| | | 21 | Mz+ | -33.30 | -264.76 | 0.00 | 0.00 | 0.00 | 906.15 |
| | | 21 | Fy- | -33.30 | -264.76 | 0.00 | 0.00 | 0.00 | 906.15 |

ENV.LST Sábado, 18 Mayo 2002 6:18am

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 21 | Mz- | -32.36 | -257.29 | 0.00 | 0.00 | 0.00 | 880.59 |
| | | 22 | Fy+ | -32.36 | -257.29 | 0.00 | 0.00 | 0.00 | 880.59 |
| | | 22 | Mz+ | -48.06 | -382.06 | 0.00 | 0.00 | 0.00 | 1307.63 |
| | | 22 | Fy- | -48.06 | -382.06 | 0.00 | 0.00 | 0.00 | 1307.63 |
| | | 22 | Mz- | -32.36 | -257.29 | 0.00 | 0.00 | 0.00 | 880.59 |
| 15 | 15 | 10 | Fy+ | -32.36 | -159.72 | 0.00 | 0.00 | 0.00 | 1308.43 |
| | | 10 | Mz+ | -32.36 | -159.72 | 0.00 | 0.00 | 0.00 | 1308.43 |
| | | 10 | Fy- | -32.36 | -159.72 | 0.00 | 0.00 | 0.00 | 1308.43 |
| | | 10 | Mz- | -32.36 | -159.72 | 0.00 | 0.00 | 0.00 | 1308.43 |
| | | 20 | Fy+ | -32.36 | -159.72 | 0.00 | 0.00 | 0.00 | 1308.43 |
| | | 20 | Mz+ | -34.24 | -168.99 | 0.00 | 0.00 | 0.00 | 1384.38 |
| | | 20 | Fy- | -34.24 | -168.99 | 0.00 | 0.00 | 0.00 | 1384.38 |
| | | 20 | Mz- | -32.36 | -159.72 | 0.00 | 0.00 | 0.00 | 1308.43 |
| | | 21 | Fy+ | -32.36 | -159.72 | 0.00 | 0.00 | 0.00 | 1308.43 |
| | | 21 | Mz+ | -33.30 | -164.36 | 0.00 | 0.00 | 0.00 | 1346.40 |
| | | 21 | Fy- | -33.30 | -164.36 | 0.00 | 0.00 | 0.00 | 1346.40 |
| | | 21 | Mz- | -32.36 | -159.72 | 0.00 | 0.00 | 0.00 | 1308.43 |
| | | 22 | Fy+ | -32.36 | -159.72 | 0.00 | 0.00 | 0.00 | 1308.43 |
| | | 22 | Mz+ | -48.06 | -237.17 | 0.00 | 0.00 | 0.00 | 1942.96 |
| | | 22 | Fy- | -48.06 | -237.17 | 0.00 | 0.00 | 0.00 | 1942.96 |
| | | 22 | Mz- | -32.36 | -159.72 | 0.00 | 0.00 | 0.00 | 1308.43 |
| 16 | 16 | 10 | Fy+ | -32.36 | -62.14 | 0.00 | 0.00 | 0.00 | 1536.06 |
| | | 10 | Mz+ | -32.36 | -62.14 | 0.00 | 0.00 | 0.00 | 1536.06 |
| | | 10 | Fy- | -32.36 | -62.14 | 0.00 | 0.00 | 0.00 | 1536.06 |
| | | 10 | Mz- | -32.36 | -62.14 | 0.00 | 0.00 | 0.00 | 1536.06 |
| | | 20 | Fy+ | -32.36 | -62.14 | 0.00 | 0.00 | 0.00 | 1536.06 |
| | | 20 | Mz+ | -34.24 | -65.75 | 0.00 | 0.00 | 0.00 | 1625.22 |
| | | 20 | Fy- | -34.24 | -65.75 | 0.00 | 0.00 | 0.00 | 1625.22 |
| | | 20 | Mz- | -32.36 | -62.14 | 0.00 | 0.00 | 0.00 | 1536.06 |
| | | 21 | Fy+ | -32.36 | -62.14 | 0.00 | 0.00 | 0.00 | 1536.06 |
| | | 21 | Mz+ | -33.30 | -63.94 | 0.00 | 0.00 | 0.00 | 1580.64 |
| | | 21 | Fy- | -33.30 | -63.94 | 0.00 | 0.00 | 0.00 | 1580.64 |
| | | 21 | Mz- | -32.36 | -62.14 | 0.00 | 0.00 | 0.00 | 1536.06 |
| | | 22 | Fy+ | -32.36 | -62.14 | 0.00 | 0.00 | 0.00 | 1536.06 |
| | | 22 | Mz+ | -48.06 | -92.28 | 0.00 | 0.00 | 0.00 | 2280.97 |
| | | 22 | Fy- | -48.06 | -92.28 | 0.00 | 0.00 | 0.00 | 2280.97 |
| | | 22 | Mz- | -32.36 | -62.14 | 0.00 | 0.00 | 0.00 | 1536.06 |
| 17 | 17 | 10 | Fy+ | -32.36 | 35.43 | 0.00 | 0.00 | 0.00 | 1563.46 |
| | | 10 | Mz+ | -32.36 | 35.43 | 0.00 | 0.00 | 0.00 | 1563.46 |
| | | 10 | Fy- | -32.36 | 35.43 | 0.00 | 0.00 | 0.00 | 1563.46 |
| | | 10 | Mz- | -32.36 | 35.43 | 0.00 | 0.00 | 0.00 | 1563.46 |
| | | 20 | Fy+ | -34.24 | 37.49 | 0.00 | 0.00 | 0.00 | 1654.21 |
| | | 20 | Mz+ | -34.24 | 37.49 | 0.00 | 0.00 | 0.00 | 1654.21 |
| | | 20 | Fy- | -32.36 | 35.43 | 0.00 | 0.00 | 0.00 | 1563.46 |
| | | 20 | Mz- | -32.36 | 35.43 | 0.00 | 0.00 | 0.00 | 1563.46 |
| | | 21 | Fy+ | -33.30 | 36.46 | 0.00 | 0.00 | 0.00 | 1608.84 |
| | | 21 | Mz+ | -33.30 | 36.46 | 0.00 | 0.00 | 0.00 | 1608.84 |
| | | 21 | Fy- | -32.36 | 35.43 | 0.00 | 0.00 | 0.00 | 1563.46 |
| | | 21 | Mz- | -32.36 | 35.43 | 0.00 | 0.00 | 0.00 | 1563.46 |
| | | 22 | Fy+ | -48.06 | 52.61 | 0.00 | 0.00 | 0.00 | 2321.67 |
| | | 22 | Mz+ | -48.06 | 52.61 | 0.00 | 0.00 | 0.00 | 2321.67 |
| | | 22 | Fy- | -32.36 | 35.43 | 0.00 | 0.00 | 0.00 | 1563.46 |
| | | 22 | Mz- | -32.36 | 35.43 | 0.00 | 0.00 | 0.00 | 1563.46 |
| 18 | 18 | 10 | Fy+ | -32.36 | 133.00 | 0.00 | 0.00 | 0.00 | 1390.65 |
| | | 10 | Mz+ | -32.36 | 133.00 | 0.00 | 0.00 | 0.00 | 1390.65 |
| | | 10 | Fy- | -32.36 | 133.00 | 0.00 | 0.00 | 0.00 | 1390.65 |
| | | 10 | Mz- | -32.36 | 133.00 | 0.00 | 0.00 | 0.00 | 1390.65 |
| | | 20 | Fy+ | -34.24 | 140.72 | 0.00 | 0.00 | 0.00 | 1471.37 |
| | | 20 | Mz+ | -34.24 | 140.72 | 0.00 | 0.00 | 0.00 | 1471.37 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 20 | Fy- | -32.36 | 133.00 | 0.00 | 0.00 | 0.00 | 1390.65 |
| | | 20 | Mz- | -32.36 | 133.00 | 0.00 | 0.00 | 0.00 | 1390.65 |
| | | 21 | Fy+ | -33.30 | 136.86 | 0.00 | 0.00 | 0.00 | 1431.01 |
| | | 21 | Mz+ | -33.30 | 136.86 | 0.00 | 0.00 | 0.00 | 1431.01 |
| | | 21 | Fy- | -32.36 | 133.00 | 0.00 | 0.00 | 0.00 | 1390.65 |
| | | 21 | Mz- | -32.36 | 133.00 | 0.00 | 0.00 | 0.00 | 1390.65 |
| | | 22 | Fy+ | -48.06 | 197.50 | 0.00 | 0.00 | 0.00 | 2065.05 |
| | | 22 | Mz+ | -48.06 | 197.50 | 0.00 | 0.00 | 0.00 | 2065.05 |
| | | 22 | Fy- | -32.36 | 133.00 | 0.00 | 0.00 | 0.00 | 1390.65 |
| | | 22 | Mz- | -32.36 | 133.00 | 0.00 | 0.00 | 0.00 | 1390.65 |
| 19 | 19 | 10 | Fy+ | -32.36 | 230.58 | 0.00 | 0.00 | 0.00 | 1017.62 |
| | | 10 | Mz+ | -32.36 | 230.58 | 0.00 | 0.00 | 0.00 | 1017.62 |
| | | 10 | Fy- | -32.36 | 230.58 | 0.00 | 0.00 | 0.00 | 1017.62 |
| | | 10 | Mz- | -32.36 | 230.58 | 0.00 | 0.00 | 0.00 | 1017.62 |
| | | 20 | Fy+ | -34.24 | 243.96 | 0.00 | 0.00 | 0.00 | 1076.69 |
| | | 20 | Mz+ | -34.24 | 243.96 | 0.00 | 0.00 | 0.00 | 1076.69 |
| | | 20 | Fy- | -32.36 | 230.58 | 0.00 | 0.00 | 0.00 | 1017.62 |
| | | 20 | Mz- | -32.36 | 230.58 | 0.00 | 0.00 | 0.00 | 1017.62 |
| | | 21 | Fy+ | -33.30 | 237.27 | 0.00 | 0.00 | 0.00 | 1047.15 |
| | | 21 | Mz+ | -33.30 | 237.27 | 0.00 | 0.00 | 0.00 | 1047.15 |
| | | 21 | Fy- | -32.36 | 230.58 | 0.00 | 0.00 | 0.00 | 1017.62 |
| | | 21 | Mz- | -32.36 | 230.58 | 0.00 | 0.00 | 0.00 | 1017.62 |
| | | 22 | Fy+ | -48.06 | 342.40 | 0.00 | 0.00 | 0.00 | 1511.11 |
| | | 22 | Mz+ | -48.06 | 342.40 | 0.00 | 0.00 | 0.00 | 1511.11 |
| | | 22 | Fy- | -32.36 | 230.58 | 0.00 | 0.00 | 0.00 | 1017.62 |
| | | 22 | Mz- | -32.36 | 230.58 | 0.00 | 0.00 | 0.00 | 1017.62 |
| 20 | 20 | 10 | Fy+ | -32.36 | 328.15 | 0.00 | 0.00 | 0.00 | 444.37 |
| | | 10 | Mz+ | -32.36 | 328.15 | 0.00 | 0.00 | 0.00 | 444.37 |
| | | 10 | Fy- | -32.36 | 328.15 | 0.00 | 0.00 | 0.00 | 444.37 |
| | | 10 | Mz- | -32.36 | 328.15 | 0.00 | 0.00 | 0.00 | 444.37 |
| | | 20 | Fy+ | -34.24 | 347.20 | 0.00 | 0.00 | 0.00 | 470.16 |
| | | 20 | Mz+ | -34.24 | 347.20 | 0.00 | 0.00 | 0.00 | 470.16 |
| | | 20 | Fy- | -32.36 | 328.15 | 0.00 | 0.00 | 0.00 | 444.37 |
| | | 20 | Mz- | -32.36 | 328.15 | 0.00 | 0.00 | 0.00 | 444.37 |
| | | 21 | Fy+ | -33.30 | 337.67 | 0.00 | 0.00 | 0.00 | 457.27 |
| | | 21 | Mz+ | -33.30 | 337.67 | 0.00 | 0.00 | 0.00 | 457.27 |
| | | 21 | Fy- | -32.36 | 328.15 | 0.00 | 0.00 | 0.00 | 444.37 |
| | | 21 | Mz- | -32.36 | 328.15 | 0.00 | 0.00 | 0.00 | 444.37 |
| | | 22 | Fy+ | -48.06 | 487.28 | 0.00 | 0.00 | 0.00 | 659.86 |
| | | 22 | Mz+ | -48.06 | 487.28 | 0.00 | 0.00 | 0.00 | 659.86 |
| | | 22 | Fy- | -32.36 | 328.15 | 0.00 | 0.00 | 0.00 | 444.37 |
| | | 22 | Mz- | -32.36 | 328.15 | 0.00 | 0.00 | 0.00 | 444.37 |
| 20 | 21 | 10 | Fy+ | -32.36 | 425.72 | 0.00 | 0.00 | 0.00 | -329.10 |
| | | 10 | Mz+ | -32.36 | 425.72 | 0.00 | 0.00 | 0.00 | -329.10 |
| | | 10 | Fy- | -32.36 | 425.72 | 0.00 | 0.00 | 0.00 | -329.10 |
| | | 10 | Mz- | -32.36 | 425.72 | 0.00 | 0.00 | 0.00 | -329.10 |
| | | 20 | Fy+ | -34.24 | 450.43 | 0.00 | 0.00 | 0.00 | -348.20 |
| | | 20 | Mz+ | -32.36 | 425.72 | 0.00 | 0.00 | 0.00 | -329.10 |
| | | 20 | Fy- | -32.36 | 425.72 | 0.00 | 0.00 | 0.00 | -329.10 |
| | | 20 | Mz- | -34.24 | 450.43 | 0.00 | 0.00 | 0.00 | -348.20 |
| | | 21 | Fy+ | -33.30 | 438.08 | 0.00 | 0.00 | 0.00 | -338.65 |
| | | 21 | Mz+ | -32.36 | 425.72 | 0.00 | 0.00 | 0.00 | -329.10 |
| | | 21 | Fy- | -32.36 | 425.72 | 0.00 | 0.00 | 0.00 | -329.10 |
| | | 21 | Mz- | -33.30 | 438.08 | 0.00 | 0.00 | 0.00 | -338.65 |
| | | 22 | Fy+ | -48.06 | 632.17 | 0.00 | 0.00 | 0.00 | -488.70 |
| | | 22 | Mz+ | -32.36 | 425.72 | 0.00 | 0.00 | 0.00 | -329.10 |
| | | 22 | Fy- | -32.36 | 425.72 | 0.00 | 0.00 | 0.00 | -329.10 |
| | | 22 | Mz- | -48.06 | 632.17 | 0.00 | 0.00 | 0.00 | -488.70 |



DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | uz | Θx | Θy | Θz |
|---|---|---|---|---|---|---|---|---|
| 1 | 10 | uy+ | 0.000044 | -0.001398 | 0.000000 | 0.000000 | 0.000000 | -0.000267 |
| | 10 | Θz+ | 0.000044 | -0.001398 | 0.000000 | 0.000000 | 0.000000 | -0.000267 |
| | 10 | uy- | 0.000044 | -0.001398 | 0.000000 | 0.000000 | 0.000000 | -0.000267 |
| | 10 | Θz- | 0.000044 | -0.001398 | 0.000000 | 0.000000 | 0.000000 | -0.000267 |
| | 20 | uy+ | 0.000044 | -0.001398 | 0.000000 | 0.000000 | 0.000000 | -0.000267 |
| | 20 | Θz+ | 0.000044 | -0.001398 | 0.000000 | 0.000000 | 0.000000 | -0.000267 |
| | 20 | uy- | 0.000047 | -0.001479 | 0.000000 | 0.000000 | 0.000000 | -0.000282 |
| | 20 | Θz- | 0.000047 | -0.001479 | 0.000000 | 0.000000 | 0.000000 | -0.000282 |
| | 21 | uy+ | 0.000044 | -0.001398 | 0.000000 | 0.000000 | 0.000000 | -0.000267 |
| | 21 | Θz+ | 0.000044 | -0.001398 | 0.000000 | 0.000000 | 0.000000 | -0.000267 |
| | 21 | uy- | 0.000046 | -0.001439 | 0.000000 | 0.000000 | 0.000000 | -0.000275 |
| | 21 | Θz- | 0.000046 | -0.001439 | 0.000000 | 0.000000 | 0.000000 | -0.000275 |
| | 22 | uy+ | 0.000044 | -0.001398 | 0.000000 | 0.000000 | 0.000000 | -0.000267 |
| | 22 | Θz+ | 0.000044 | -0.001398 | 0.000000 | 0.000000 | 0.000000 | -0.000267 |
| | 22 | uy- | 0.000066 | -0.002076 | 0.000000 | 0.000000 | 0.000000 | -0.000396 |
| | 22 | Θz- | 0.000066 | -0.002076 | 0.000000 | 0.000000 | 0.000000 | -0.000396 |
| 2 | 10 | uy+ | 0.000043 | -0.002007 | 0.000000 | 0.000000 | 0.000000 | -0.000263 |
| | 10 | Θz+ | 0.000043 | -0.002007 | 0.000000 | 0.000000 | 0.000000 | -0.000263 |
| | 10 | uy- | 0.000043 | -0.002007 | 0.000000 | 0.000000 | 0.000000 | -0.000263 |
| | 10 | Θz- | 0.000043 | -0.002007 | 0.000000 | 0.000000 | 0.000000 | -0.000263 |
| | 20 | uy+ | 0.000043 | -0.002007 | 0.000000 | 0.000000 | 0.000000 | -0.000263 |
| | 20 | Θz+ | 0.000043 | -0.002007 | 0.000000 | 0.000000 | 0.000000 | -0.000263 |
| | 20 | uy- | 0.000045 | -0.002123 | 0.000000 | 0.000000 | 0.000000 | -0.000278 |
| | 20 | Θz- | 0.000045 | -0.002123 | 0.000000 | 0.000000 | 0.000000 | -0.000278 |
| | 21 | uy+ | 0.000043 | -0.002007 | 0.000000 | 0.000000 | 0.000000 | -0.000263 |
| | 21 | Θz+ | 0.000043 | -0.002007 | 0.000000 | 0.000000 | 0.000000 | -0.000263 |
| | 21 | uy- | 0.000044 | -0.002065 | 0.000000 | 0.000000 | 0.000000 | -0.000271 |
| | 21 | Θz- | 0.000044 | -0.002065 | 0.000000 | 0.000000 | 0.000000 | -0.000271 |
| | 22 | uy+ | 0.000043 | -0.002007 | 0.000000 | 0.000000 | 0.000000 | -0.000263 |
| | 22 | Θz+ | 0.000043 | -0.002007 | 0.000000 | 0.000000 | 0.000000 | -0.000263 |
| | 22 | uy- | 0.000063 | -0.002980 | 0.000000 | 0.000000 | 0.000000 | -0.000390 |
| | 22 | Θz- | 0.000063 | -0.002980 | 0.000000 | 0.000000 | 0.000000 | -0.000390 |
| 3 | 10 | uy+ | 0.000040 | -0.002577 | 0.000000 | 0.000000 | 0.000000 | -0.000235 |
| | 10 | Θz+ | 0.000040 | -0.002577 | 0.000000 | 0.000000 | 0.000000 | -0.000235 |
| | 10 | uy- | 0.000040 | -0.002577 | 0.000000 | 0.000000 | 0.000000 | -0.000235 |
| | 10 | Θz- | 0.000040 | -0.002577 | 0.000000 | 0.000000 | 0.000000 | -0.000235 |
| | 20 | uy+ | 0.000040 | -0.002577 | 0.000000 | 0.000000 | 0.000000 | -0.000235 |
| | 20 | Θz+ | 0.000040 | -0.002577 | 0.000000 | 0.000000 | 0.000000 | -0.000235 |
| | 20 | uy- | 0.000042 | -0.002727 | 0.000000 | 0.000000 | 0.000000 | -0.000249 |
| | 20 | Θz- | 0.000042 | -0.002727 | 0.000000 | 0.000000 | 0.000000 | -0.000249 |
| | 21 | uy+ | 0.000040 | -0.002577 | 0.000000 | 0.000000 | 0.000000 | -0.000235 |
| | 21 | Θz+ | 0.000040 | -0.002577 | 0.000000 | 0.000000 | 0.000000 | -0.000235 |
| | 21 | uy- | 0.000041 | -0.002652 | 0.000000 | 0.000000 | 0.000000 | -0.000242 |
| | 21 | Θz- | 0.000041 | -0.002652 | 0.000000 | 0.000000 | 0.000000 | -0.000242 |
| | 22 | uy+ | 0.000040 | -0.002577 | 0.000000 | 0.000000 | 0.000000 | -0.000235 |
| | 22 | Θz+ | 0.000040 | -0.002577 | 0.000000 | 0.000000 | 0.000000 | -0.000235 |
| | 22 | uy- | 0.000059 | -0.003827 | 0.000000 | 0.000000 | 0.000000 | -0.000350 |
| | 22 | Θz- | 0.000059 | -0.003827 | 0.000000 | 0.000000 | 0.000000 | -0.000350 |
| 4 | 10 | uy+ | 0.000038 | -0.003059 | 0.000000 | 0.000000 | 0.000000 | -0.000188 |
| | 10 | Θz+ | 0.000038 | -0.003059 | 0.000000 | 0.000000 | 0.000000 | -0.000188 |
| | 10 | uy- | 0.000038 | -0.003059 | 0.000000 | 0.000000 | 0.000000 | -0.000188 |
| | 10 | Θz- | 0.000038 | -0.003059 | 0.000000 | 0.000000 | 0.000000 | -0.000188 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 20 | uy+ | 0.000038 | -0.003059 | 0.000000 | 0.000000 | 0.000000 | -0.000188 |
| | 20 | θz+ | 0.000038 | -0.003059 | 0.000000 | 0.000000 | 0.000000 | -0.000188 |
| | 20 | uy- | 0.000040 | -0.003237 | 0.000000 | 0.000000 | 0.000000 | -0.000199 |
| | 20 | θz- | 0.000040 | -0.003237 | 0.000000 | 0.000000 | 0.000000 | -0.000199 |
| | 21 | uy+ | 0.000038 | -0.003059 | 0.000000 | 0.000000 | 0.000000 | -0.000188 |
| | 21 | θz+ | 0.000038 | -0.003059 | 0.000000 | 0.000000 | 0.000000 | -0.000188 |
| | 21 | uy- | 0.000039 | -0.003148 | 0.000000 | 0.000000 | 0.000000 | -0.000194 |
| | 21 | θz- | 0.000039 | -0.003148 | 0.000000 | 0.000000 | 0.000000 | -0.000194 |
| | 22 | uy+ | 0.000038 | -0.003059 | 0.000000 | 0.000000 | 0.000000 | -0.000188 |
| | 22 | θz+ | 0.000038 | -0.003059 | 0.000000 | 0.000000 | 0.000000 | -0.000188 |
| | 22 | uy- | 0.000056 | -0.004543 | 0.000000 | 0.000000 | 0.000000 | -0.000279 |
| | 22 | θz- | 0.000056 | -0.004543 | 0.000000 | 0.000000 | 0.000000 | -0.000279 |
| 5 | 10 | uy+ | 0.000035 | -0.003421 | 0.000000 | 0.000000 | 0.000000 | -0.000129 |
| | 10 | θz+ | 0.000035 | -0.003421 | 0.000000 | 0.000000 | 0.000000 | -0.000129 |
| | 10 | uy- | 0.000035 | -0.003421 | 0.000000 | 0.000000 | 0.000000 | -0.000129 |
| | 10 | θz- | 0.000035 | -0.003421 | 0.000000 | 0.000000 | 0.000000 | -0.000129 |
| | 20 | uy+ | 0.000035 | -0.003421 | 0.000000 | 0.000000 | 0.000000 | -0.000129 |
| | 20 | θz+ | 0.000035 | -0.003421 | 0.000000 | 0.000000 | 0.000000 | -0.000129 |
| | 20 | uy- | 0.000037 | -0.003620 | 0.000000 | 0.000000 | 0.000000 | -0.000137 |
| | 20 | θz- | 0.000037 | -0.003620 | 0.000000 | 0.000000 | 0.000000 | -0.000137 |
| | 21 | uy+ | 0.000035 | -0.003421 | 0.000000 | 0.000000 | 0.000000 | -0.000129 |
| | 21 | θz+ | 0.000035 | -0.003421 | 0.000000 | 0.000000 | 0.000000 | -0.000129 |
| | 21 | uy- | 0.000036 | -0.003521 | 0.000000 | 0.000000 | 0.000000 | -0.000133 |
| | 21 | θz- | 0.000036 | -0.003521 | 0.000000 | 0.000000 | 0.000000 | -0.000133 |
| | 22 | uy+ | 0.000035 | -0.003421 | 0.000000 | 0.000000 | 0.000000 | -0.000129 |
| | 22 | θz+ | 0.000035 | -0.003421 | 0.000000 | 0.000000 | 0.000000 | -0.000129 |
| | 22 | uy- | 0.000052 | -0.005081 | 0.000000 | 0.000000 | 0.000000 | -0.000192 |
| | 22 | θz- | 0.000052 | -0.005081 | 0.000000 | 0.000000 | 0.000000 | -0.000192 |
| 6 | 10 | uy+ | 0.000032 | -0.003646 | 0.000000 | 0.000000 | 0.000000 | -0.000069 |
| | 10 | θz+ | 0.000032 | -0.003646 | 0.000000 | 0.000000 | 0.000000 | -0.000069 |
| | 10 | uy- | 0.000032 | -0.003646 | 0.000000 | 0.000000 | 0.000000 | -0.000069 |
| | 10 | θz- | 0.000032 | -0.003646 | 0.000000 | 0.000000 | 0.000000 | -0.000069 |
| | 20 | uy+ | 0.000032 | -0.003646 | 0.000000 | 0.000000 | 0.000000 | -0.000069 |
| | 20 | θz+ | 0.000032 | -0.003646 | 0.000000 | 0.000000 | 0.000000 | -0.000069 |
| | 20 | uy- | 0.000034 | -0.003858 | 0.000000 | 0.000000 | 0.000000 | -0.000073 |
| | 20 | θz- | 0.000034 | -0.003858 | 0.000000 | 0.000000 | 0.000000 | -0.000073 |
| | 21 | uy+ | 0.000032 | -0.003646 | 0.000000 | 0.000000 | 0.000000 | -0.000069 |
| | 21 | θz+ | 0.000032 | -0.003646 | 0.000000 | 0.000000 | 0.000000 | -0.000069 |
| | 21 | uy- | 0.000033 | -0.003752 | 0.000000 | 0.000000 | 0.000000 | -0.000071 |
| | 21 | θz- | 0.000033 | -0.003752 | 0.000000 | 0.000000 | 0.000000 | -0.000071 |
| | 22 | uy+ | 0.000032 | -0.003646 | 0.000000 | 0.000000 | 0.000000 | -0.000069 |
| | 22 | θz+ | 0.000032 | -0.003646 | 0.000000 | 0.000000 | 0.000000 | -0.000069 |
| | 22 | uy- | 0.000048 | -0.005415 | 0.000000 | 0.000000 | 0.000000 | -0.000102 |
| | 22 | θz- | 0.000048 | -0.005415 | 0.000000 | 0.000000 | 0.000000 | -0.000102 |
| 7 | 10 | uy+ | 0.000031 | -0.003734 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 10 | θz+ | 0.000031 | -0.003734 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 10 | uy- | 0.000031 | -0.003734 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 10 | θz- | 0.000031 | -0.003734 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 20 | uy+ | 0.000031 | -0.003734 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 20 | θz+ | 0.000031 | -0.003734 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 20 | uy- | 0.000033 | -0.003951 | 0.000000 | 0.000000 | 0.000000 | -0.000011 |
| | 20 | θz- | 0.000033 | -0.003951 | 0.000000 | 0.000000 | 0.000000 | -0.000011 |
| | 21 | uy+ | 0.000031 | -0.003734 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 21 | θz+ | 0.000031 | -0.003734 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 21 | uy- | 0.000032 | -0.003843 | 0.000000 | 0.000000 | 0.000000 | -0.000011 |
| | 21 | θz- | 0.000032 | -0.003843 | 0.000000 | 0.000000 | 0.000000 | -0.000011 |
| | 22 | uy+ | 0.000031 | -0.003734 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 22 | θz+ | 0.000031 | -0.003734 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 22 | uy- | 0.000046 | -0.005545 | 0.000000 | 0.000000 | 0.000000 | -0.000015 |
| | 22 | θz- | 0.000046 | -0.005545 | 0.000000 | 0.000000 | 0.000000 | -0.000015 |

ENV.LST Sábado, 18 Mayo 2002 6:18am

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 8 | 10 | uy+ | 0.000028 | -0.003703 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 10 | θz+ | 0.000028 | -0.003703 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 10 | uy- | 0.000028 | -0.003703 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 10 | θz- | 0.000028 | -0.003703 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 20 | uy+ | 0.000028 | -0.003703 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 20 | θz+ | 0.000030 | -0.003918 | 0.000000 | 0.000000 | 0.000000 | 0.000037 |
| | 20 | uy- | 0.000030 | -0.003918 | 0.000000 | 0.000000 | 0.000000 | 0.000037 |
| | 20 | θz- | 0.000028 | -0.003703 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 21 | uy+ | 0.000028 | -0.003703 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 21 | θz+ | 0.000029 | -0.003811 | 0.000000 | 0.000000 | 0.000000 | 0.000036 |
| | 21 | uy- | 0.000029 | -0.003811 | 0.000000 | 0.000000 | 0.000000 | 0.000036 |
| | 21 | θz- | 0.000028 | -0.003703 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 22 | uy+ | 0.000028 | -0.003703 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 22 | θz+ | 0.000042 | -0.005499 | 0.000000 | 0.000000 | 0.000000 | 0.000052 |
| | 22 | uy- | 0.000042 | -0.005499 | 0.000000 | 0.000000 | 0.000000 | 0.000052 |
| | 22 | θz- | 0.000028 | -0.003703 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| 9 | 10 | uy+ | 0.000025 | -0.003586 | 0.000000 | 0.000000 | 0.000000 | 0.000063 |
| | 10 | θz+ | 0.000025 | -0.003586 | 0.000000 | 0.000000 | 0.000000 | 0.000063 |
| | 10 | uy- | 0.000025 | -0.003586 | 0.000000 | 0.000000 | 0.000000 | 0.000063 |
| | 10 | θz- | 0.000025 | -0.003586 | 0.000000 | 0.000000 | 0.000000 | 0.000063 |
| | 20 | uy+ | 0.000025 | -0.003586 | 0.000000 | 0.000000 | 0.000000 | 0.000063 |
| | 20 | θz+ | 0.000026 | -0.003794 | 0.000000 | 0.000000 | 0.000000 | 0.000067 |
| | 20 | uy- | 0.000026 | -0.003794 | 0.000000 | 0.000000 | 0.000000 | 0.000067 |
| | 20 | θz- | 0.000025 | -0.003586 | 0.000000 | 0.000000 | 0.000000 | 0.000063 |
| | 21 | uy+ | 0.000025 | -0.003586 | 0.000000 | 0.000000 | 0.000000 | 0.000063 |
| | 21 | θz+ | 0.000026 | -0.003690 | 0.000000 | 0.000000 | 0.000000 | 0.000065 |
| | 21 | uy- | 0.000026 | -0.003690 | 0.000000 | 0.000000 | 0.000000 | 0.000065 |
| | 21 | θz- | 0.000025 | -0.003586 | 0.000000 | 0.000000 | 0.000000 | 0.000063 |
| | 22 | uy+ | 0.000025 | -0.003586 | 0.000000 | 0.000000 | 0.000000 | 0.000063 |
| | 22 | θz+ | 0.000036 | -0.005325 | 0.000000 | 0.000000 | 0.000000 | 0.000094 |
| | 22 | uy- | 0.000036 | -0.005325 | 0.000000 | 0.000000 | 0.000000 | 0.000094 |
| | 22 | θz- | 0.000025 | -0.003586 | 0.000000 | 0.000000 | 0.000000 | 0.000063 |
| 10 | 10 | uy+ | 0.000023 | -0.003433 | 0.000000 | 0.000000 | 0.000000 | 0.000066 |
| | 10 | θz+ | 0.000023 | -0.003433 | 0.000000 | 0.000000 | 0.000000 | 0.000066 |
| | 10 | uy- | 0.000023 | -0.003433 | 0.000000 | 0.000000 | 0.000000 | 0.000066 |
| | 10 | θz- | 0.000023 | -0.003433 | 0.000000 | 0.000000 | 0.000000 | 0.000066 |
| | 20 | uy+ | 0.000023 | -0.003433 | 0.000000 | 0.000000 | 0.000000 | 0.000066 |
| | 20 | θz+ | 0.000024 | -0.003632 | 0.000000 | 0.000000 | 0.000000 | 0.000070 |
| | 20 | uy- | 0.000024 | -0.003632 | 0.000000 | 0.000000 | 0.000000 | 0.000070 |
| | 20 | θz- | 0.000023 | -0.003433 | 0.000000 | 0.000000 | 0.000000 | 0.000066 |
| | 21 | uy+ | 0.000023 | -0.003433 | 0.000000 | 0.000000 | 0.000000 | 0.000066 |
| | 21 | θz+ | 0.000024 | -0.003533 | 0.000000 | 0.000000 | 0.000000 | 0.000068 |
| | 21 | uy- | 0.000024 | -0.003533 | 0.000000 | 0.000000 | 0.000000 | 0.000068 |
| | 21 | θz- | 0.000023 | -0.003433 | 0.000000 | 0.000000 | 0.000000 | 0.000066 |
| | 22 | uy+ | 0.000023 | -0.003433 | 0.000000 | 0.000000 | 0.000000 | 0.000066 |
| | 22 | θz+ | 0.000034 | -0.005097 | 0.000000 | 0.000000 | 0.000000 | 0.000098 |
| | 22 | uy- | 0.000034 | -0.005097 | 0.000000 | 0.000000 | 0.000000 | 0.000098 |
| | 22 | θz- | 0.000023 | -0.003433 | 0.000000 | 0.000000 | 0.000000 | 0.000066 |
| 11 | 10 | uy+ | 0.000021 | -0.003309 | 0.000000 | 0.000000 | 0.000000 | 0.000037 |
| | 10 | θz+ | 0.000021 | -0.003309 | 0.000000 | 0.000000 | 0.000000 | 0.000037 |
| | 10 | uy- | 0.000021 | -0.003309 | 0.000000 | 0.000000 | 0.000000 | 0.000037 |
| | 10 | θz- | 0.000021 | -0.003309 | 0.000000 | 0.000000 | 0.000000 | 0.000037 |
| | 20 | uy+ | 0.000021 | -0.003309 | 0.000000 | 0.000000 | 0.000000 | 0.000037 |
| | 20 | θz+ | 0.000022 | -0.003501 | 0.000000 | 0.000000 | 0.000000 | 0.000039 |
| | 20 | uy- | 0.000022 | -0.003501 | 0.000000 | 0.000000 | 0.000000 | 0.000039 |
| | 20 | θz- | 0.000021 | -0.003309 | 0.000000 | 0.000000 | 0.000000 | 0.000037 |
| | 21 | uy+ | 0.000021 | -0.003309 | 0.000000 | 0.080000 | 0.000000 | 0.000037 |
| | 21 | θz+ | 0.000021 | -0.003405 | 0.000000 | 0.000000 | 0.000000 | 0.000038 |
| | 21 | uy- | 0.000021 | -0.003405 | 0.000000 | 0.000000 | 0.000000 | 0.000038 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 21 | θz- | 0.000021 | -0.003309 | 0.000000 | 0.000000 | 0.000037 |
| | 22 | uy+ | 0.000021 | -0.003309 | 0.000000 | 0.000000 | 0.000037 |
| | 22 | θz+ | 0.000031 | -0.004914 | 0.000000 | 0.000000 | 0.000055 |
| | 22 | uy- | 0.000031 | -0.004914 | 0.000000 | 0.000000 | 0.000055 |
| | 22 | θz- | 0.000021 | -0.003309 | 0.000000 | 0.000000 | 0.000037 |
| 12 | 10 | uy+ | 0.000019 | -0.003269 | 0.000000 | 0.000000 | 0.000007 |
| | 10 | θz+ | 0.000019 | -0.003269 | 0.000000 | 0.000000 | 0.000007 |
| | 10 | uy- | 0.000019 | -0.003269 | 0.000000 | 0.000000 | 0.000007 |
| | 10 | θz- | 0.000019 | -0.003269 | 0.000000 | 0.000000 | 0.000007 |
| | 20 | uy+ | 0.000019 | -0.003269 | 0.000000 | 0.000000 | 0.000007 |
| | 20 | θz+ | 0.000020 | -0.003459 | 0.000000 | 0.000000 | 0.000007 |
| | 20 | uy- | 0.000020 | -0.003459 | 0.000000 | 0.000000 | 0.000007 |
| | 20 | θz- | 0.000020 | -0.003459 | 0.000000 | 0.000000 | 0.000007 |
| | 21 | uy+ | 0.000019 | -0.003269 | 0.000000 | 0.000000 | 0.000007 |
| | 21 | θz+ | 0.000020 | -0.003364 | 0.000000 | 0.000000 | 0.000007 |
| | 21 | uy- | 0.000020 | -0.003364 | 0.000000 | 0.000000 | 0.000007 |
| | 21 | θz- | 0.000020 | -0.003364 | 0.000000 | 0.000000 | 0.000007 |
| | 22 | uy+ | 0.000019 | -0.003269 | 0.000000 | 0.000000 | 0.000007 |
| | 22 | θz+ | 0.000028 | -0.004855 | 0.000000 | 0.000000 | 0.000010 |
| | 22 | uy- | 0.000028 | -0.004855 | 0.000000 | 0.000000 | 0.000010 |
| | 22 | θz- | 0.000021 | -0.003554 | 0.000000 | 0.000000 | 0.000007 |
| 13 | 10 | uy+ | 0.000017 | -0.003261 | 0.000000 | 0.000000 | 0.000003 |
| | 10 | θz+ | 0.000017 | -0.003261 | 0.000000 | 0.000000 | 0.000003 |
| | 10 | uy- | 0.000017 | -0.003261 | 0.000000 | 0.000000 | 0.000003 |
| | 10 | θz- | 0.000017 | -0.003261 | 0.000000 | 0.000000 | 0.000003 |
| | 20 | uy+ | 0.000017 | -0.003261 | 0.000000 | 0.000000 | 0.000003 |
| | 20 | θz+ | 0.000018 | -0.003450 | 0.000000 | 0.000000 | 0.000003 |
| | 20 | uy- | 0.000018 | -0.003450 | 0.000000 | 0.000000 | 0.000003 |
| | 20 | θz- | 0.000018 | -0.003450 | 0.000000 | 0.000000 | 0.000003 |
| | 21 | uy+ | 0.000017 | -0.003261 | 0.000000 | 0.000000 | 0.000003 |
| | 21 | θz+ | 0.000018 | -0.003356 | 0.000000 | 0.000000 | 0.000003 |
| | 21 | uy- | 0.000018 | -0.003356 | 0.000000 | 0.000000 | 0.000003 |
| | 21 | θz- | 0.000018 | -0.003356 | 0.000000 | 0.000000 | 0.000003 |
| | 22 | uy+ | 0.000017 | -0.003261 | 0.000000 | 0.000000 | 0.000003 |
| | 22 | θz+ | 0.000025 | -0.004842 | 0.000000 | 0.000000 | 0.000004 |
| | 22 | uy- | 0.000025 | -0.004842 | 0.000000 | 0.000000 | 0.000004 |
| | 22 | θz- | 0.000019 | -0.003545 | 0.000000 | 0.000000 | 0.000003 |
| 14 | 10 | uy+ | 0.000015 | -0.003241 | 0.000000 | 0.000000 | 0.000019 |
| | 10 | θz+ | 0.000015 | -0.003241 | 0.000000 | 0.000000 | 0.000019 |
| | 10 | uy- | 0.000015 | -0.003241 | 0.000000 | 0.000000 | 0.000019 |
| | 10 | θz- | 0.000015 | -0.003241 | 0.000000 | 0.000000 | 0.000019 |
| | 20 | uy+ | 0.000015 | -0.003241 | 0.000000 | 0.000000 | 0.000019 |
| | 20 | θz+ | 0.000016 | -0.003429 | 0.000000 | 0.000000 | 0.000020 |
| | 20 | uy- | 0.000016 | -0.003429 | 0.000000 | 0.000000 | 0.000020 |
| | 20 | θz- | 0.000015 | -0.003241 | 0.000000 | 0.000000 | 0.000019 |
| | 21 | uy+ | 0.000015 | -0.003241 | 0.000000 | 0.000000 | 0.000019 |
| | 21 | θz+ | 0.000016 | -0.003335 | 0.000000 | 0.000000 | 0.000020 |
| | 21 | uy- | 0.000016 | -0.003335 | 0.000000 | 0.000000 | 0.000020 |
| | 21 | θz- | 0.000015 | -0.003241 | 0.000000 | 0.000000 | 0.000019 |
| | 22 | uy+ | 0.000015 | -0.003241 | 0.000000 | 0.000000 | 0.000019 |
| | 22 | θz+ | 0.000023 | -0.004813 | 0.000000 | 0.000000 | 0.000028 |
| | 22 | uy- | 0.000023 | -0.004813 | 0.000000 | 0.000000 | 0.000028 |
| | 22 | θz- | 0.000015 | -0.003241 | 0.000000 | 0.000000 | 0.000019 |
| 15 | 10 | uy+ | 0.000013 | -0.003173 | 0.000000 | 0.000000 | 0.000049 |
| | 10 | θz+ | 0.000013 | -0.003173 | 0.000000 | 0.000000 | 0.000049 |
| | 10 | uy- | 0.000013 | -0.003173 | 0.000000 | 0.000000 | 0.000049 |
| | 10 | θz- | 0.000013 | -0.003173 | 0.000000 | 0.000000 | 0.000049 |
| | 20 | uy+ | 0.000013 | -0.003173 | 0.000000 | 0.000000 | 0.000049 |
| | 20 | θz+ | 0.000014 | -0.003357 | 0.000000 | 0.000000 | 0.000052 |

ENV.LST Sábado, 18 Mayo 2002 6:18am

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 20 | uy- | 0.000014 | -0.003357 | 0.000000 | 0.000000 | 0.000052 |
| | 20 | θz- | 0.000013 | -0.003173 | 0.000000 | 0.000000 | 0.000049 |
| | 21 | uy+ | 0.000013 | -0.003173 | 0.000000 | 0.000000 | 0.000049 |
| | 21 | θz+ | 0.000014 | -0.003265 | 0.000000 | 0.000000 | 0.000051 |
| | 21 | uy- | 0.000014 | -0.003265 | 0.000000 | 0.000000 | 0.000051 |
| | 21 | θz- | 0.000013 | -0.003173 | 0.000000 | 0.000000 | 0.000049 |
| | 22 | uy+ | 0.000013 | -0.003173 | 0.000000 | 0.000000 | 0.000049 |
| | 22 | θz+ | 0.000020 | -0.004712 | 0.000000 | 0.000000 | 0.000073 |
| | 22 | uy- | 0.000020 | -0.004712 | 0.000000 | 0.000000 | 0.000073 |
| | 22 | θz- | 0.000013 | -0.003173 | 0.000000 | 0.000000 | 0.000049 |
| 16 | 10 | uy+ | 0.000012 | -0.003035 | 0.000000 | 0.000000 | 0.000087 |
| | 10 | θz+ | 0.000012 | -0.003035 | 0.000000 | 0.000000 | 0.000087 |
| | 10 | uy- | 0.000012 | -0.003035 | 0.000000 | 0.000000 | 0.000087 |
| | 10 | θz- | 0.000012 | -0.003035 | 0.000000 | 0.000000 | 0.000087 |
| | 20 | uy+ | 0.000012 | -0.003035 | 0.000000 | 0.000000 | 0.000087 |
| | 20 | θz+ | 0.000013 | -0.003211 | 0.000000 | 0.000000 | 0.000092 |
| | 20 | uy- | 0.000013 | -0.003211 | 0.000000 | 0.000000 | 0.000092 |
| | 20 | θz- | 0.000012 | -0.003035 | 0.000000 | 0.000000 | 0.000087 |
| | 21 | uy+ | 0.000012 | -0.003035 | 0.000000 | 0.000000 | 0.000087 |
| | 21 | θz+ | 0.000013 | -0.003123 | 0.000000 | 0.000000 | 0.000090 |
| | 21 | uy- | 0.000013 | -0.003123 | 0.000000 | 0.000000 | 0.000090 |
| | 21 | θz- | 0.000012 | -0.003035 | 0.000000 | 0.000000 | 0.000087 |
| | 22 | uy+ | 0.000012 | -0.003035 | 0.000000 | 0.000000 | 0.000087 |
| | 22 | θz+ | 0.000018 | -0.004507 | 0.000000 | 0.000000 | 0.000129 |
| | 22 | uy- | 0.000018 | -0.004507 | 0.000000 | 0.000000 | 0.000129 |
| | 22 | θz- | 0.000012 | -0.003035 | 0.000000 | 0.000000 | 0.000087 |
| 17 | 10 | uy+ | 0.000010 | -0.002813 | 0.000000 | 0.000000 | 0.000129 |
| | 10 | θz+ | 0.000010 | -0.002813 | 0.000000 | 0.000000 | 0.000129 |
| | 10 | uy- | 0.000010 | -0.002813 | 0.000000 | 0.000000 | 0.000129 |
| | 10 | θz- | 0.000010 | -0.002813 | 0.000000 | 0.000000 | 0.000129 |
| | 20 | uy+ | 0.000010 | -0.002813 | 0.000000 | 0.000000 | 0.000129 |
| | 20 | θz+ | 0.000011 | -0.002976 | 0.000000 | 0.000000 | 0.000136 |
| | 20 | uy- | 0.000011 | -0.002976 | 0.000000 | 0.000000 | 0.000136 |
| | 20 | θz- | 0.000010 | -0.002813 | 0.000000 | 0.000000 | 0.000129 |
| | 21 | uy+ | 0.000010 | -0.002813 | 0.000000 | 0.000000 | 0.000129 |
| | 21 | θz+ | 0.000011 | -0.002895 | 0.000000 | 0.000000 | 0.000132 |
| | 21 | uy- | 0.000011 | -0.002895 | 0.000000 | 0.000000 | 0.000132 |
| | 21 | θz- | 0.000010 | -0.002813 | 0.000000 | 0.000000 | 0.000129 |
| | 22 | uy+ | 0.000010 | -0.002813 | 0.000000 | 0.000000 | 0.000129 |
| | 22 | θz+ | 0.000015 | -0.004177 | 0.000000 | 0.000000 | 0.000191 |
| | 22 | uy- | 0.000015 | -0.004177 | 0.000000 | 0.000000 | 0.000191 |
| | 22 | θz- | 0.000010 | -0.002813 | 0.000000 | 0.000000 | 0.000129 |
| 18 | 10 | uy+ | 0.000007 | -0.002506 | 0.000000 | 0.000000 | 0.000169 |
| | 10 | θz+ | 0.000007 | -0.002506 | 0.000000 | 0.000000 | 0.000169 |
| | 10 | uy- | 0.000007 | -0.002506 | 0.000000 | 0.000000 | 0.000169 |
| | 10 | θz- | 0.000007 | -0.002506 | 0.000000 | 0.000000 | 0.000169 |
| | 20 | uy+ | 0.000007 | -0.002506 | 0.000000 | 0.000000 | 0.000169 |
| | 20 | θz+ | 0.000007 | -0.002651 | 0.000000 | 0.000000 | 0.000179 |
| | 20 | uy- | 0.000007 | -0.002651 | 0.000000 | 0.000000 | 0.000179 |
| | 20 | θz- | 0.000007 | -0.002506 | 0.000000 | 0.000000 | 0.000169 |
| | 21 | uy+ | 0.000007 | -0.002506 | 0.000000 | 0.000000 | 0.000169 |
| | 21 | θz+ | 0.000007 | -0.002579 | 0.000000 | 0.000000 | 0.000174 |
| | 21 | uy- | 0.000007 | -0.002579 | 0.000000 | 0.000000 | 0.000174 |
| | 21 | θz- | 0.000007 | -0.002506 | 0.000000 | 0.000000 | 0.000169 |
| | 22 | uy+ | 0.000007 | -0.002506 | 0.000000 | 0.000000 | 0.000169 |
| | 22 | θz+ | 0.000010 | -0.003721 | 0.000000 | 0.000000 | 0.000251 |
| | 22 | uy- | 0.000010 | -0.003721 | 0.000000 | 0.000000 | 0.000251 |
| | 22 | θz- | 0.000007 | -0.002506 | 0.000000 | 0.000000 | 0.000169 |
| 19 | 10 | uy+ | 0.000006 | -0.002124 | 0.000000 | 0.000000 | 0.000201 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 10 | θz+ | 0.000006 | -0.002124 | 0.000000 | 0.000000 | 0.000000 | 0.000201 |
| | 10 | uy- | 0.000006 | -0.002124 | 0.000000 | 0.000000 | 0.000000 | 0.000201 |
| | 10 | θz- | 0.000006 | -0.002124 | 0.000000 | 0.000000 | 0.000000 | 0.000201 |
| | 20 | uy+ | 0.000006 | -0.002124 | 0.000000 | 0.000000 | 0.000000 | 0.000201 |
| | 20 | θz+ | 0.000006 | -0.002247 | 0.000000 | 0.000000 | 0.000000 | 0.000213 |
| | 20 | uy- | 0.000006 | -0.002247 | 0.000000 | 0.000000 | 0.000000 | 0.000213 |
| | 20 | θz- | 0.000006 | -0.002124 | 0.000000 | 0.000000 | 0.000000 | 0.000201 |
| | 21 | uy+ | 0.000006 | -0.002124 | 0.000000 | 0.000000 | 0.000000 | 0.000201 |
| | 21 | θz+ | 0.000006 | -0.002186 | 0.000000 | 0.000000 | 0.000000 | 0.000207 |
| | 21 | uy- | 0.000006 | -0.002186 | 0.000000 | 0.000000 | 0.000000 | 0.000207 |
| | 21 | θz- | 0.000006 | -0.002124 | 0.000000 | 0.000000 | 0.000000 | 0.000201 |
| | 22 | uy+ | 0.000006 | -0.002124 | 0.000000 | 0.000000 | 0.000000 | 0.000201 |
| | 22 | θz+ | 0.000008 | -0.003154 | 0.000000 | 0.000000 | 0.000000 | 0.000299 |
| | 22 | uy- | 0.000008 | -0.003154 | 0.000000 | 0.000000 | 0.000000 | 0.000299 |
| | 22 | θz- | 0.000006 | -0.002124 | 0.000000 | 0.000000 | 0.000000 | 0.000201 |
| 20 | 10 | uy+ | 0.000004 | -0.001688 | 0.000000 | 0.000000 | 0.000000 | 0.000222 |
| | 10 | θz+ | 0.000004 | -0.001688 | 0.000000 | 0.000000 | 0.000000 | 0.000222 |
| | 10 | uy- | 0.000004 | -0.001688 | 0.000000 | 0.000000 | 0.000000 | 0.000222 |
| | 10 | θz- | 0.000004 | -0.001688 | 0.000000 | 0.000000 | 0.000000 | 0.000222 |
| | 20 | uy+ | 0.000004 | -0.001688 | 0.000000 | 0.000000 | 0.000000 | 0.000222 |
| | 20 | θz+ | 0.000004 | -0.001786 | 0.000000 | 0.000000 | 0.000000 | 0.000235 |
| | 20 | uy- | 0.000004 | -0.001786 | 0.000000 | 0.000000 | 0.000000 | 0.000235 |
| | 20 | θz- | 0.000004 | -0.001688 | 0.000000 | 0.000000 | 0.000000 | 0.000222 |
| | 21 | uy+ | 0.000004 | -0.001688 | 0.000000 | 0.000000 | 0.000000 | 0.000222 |
| | 21 | θz+ | 0.000004 | -0.001737 | 0.000000 | 0.000000 | 0.000000 | 0.000229 |
| | 21 | uy- | 0.000004 | -0.001737 | 0.000000 | 0.000000 | 0.000000 | 0.000229 |
| | 21 | θz- | 0.000004 | -0.001688 | 0.000000 | 0.000000 | 0.000000 | 0.000222 |
| | 22 | uy+ | 0.000004 | -0.001688 | 0.000000 | 0.000000 | 0.000000 | 0.000222 |
| | 22 | θz+ | 0.000006 | -0.002507 | 0.000000 | 0.000000 | 0.000000 | 0.000330 |
| | 22 | uy- | 0.000006 | -0.002507 | 0.000000 | 0.000000 | 0.000000 | 0.000330 |
| | 22 | θz- | 0.000004 | -0.001688 | 0.000000 | 0.000000 | 0.000000 | 0.000222 |



ARMADO.

Del cálculo con los esfuerzos anteriores se llega al siguiente esquema de armado

Armadura Superior:

Apoyos exteriores φ16c@15

Apoyo Intermedio φ16c@10

Centro de vano φ16c@20

Armadura Inferior

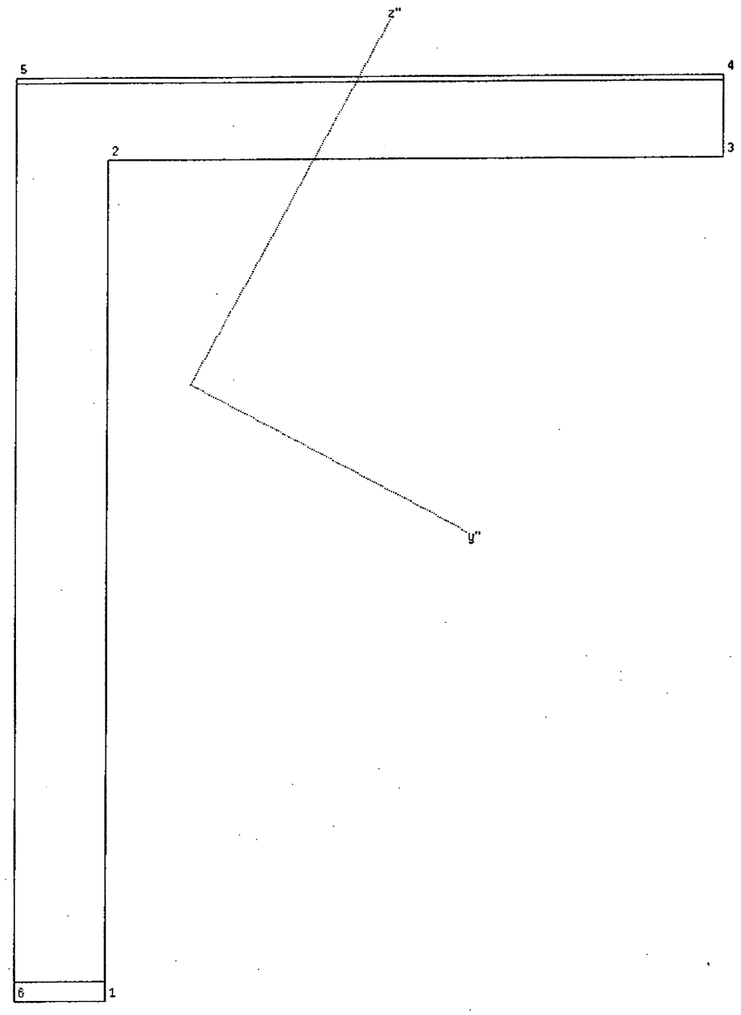
Centro de Vanos 3 filas de 10φ25

Apoyo Intermedio 2 filas de 10φ16

Apoyos Exteriores 2 filas de 10 φ20

La justificación de las armaduras se observa en las páginas siguientes

tb. 1 : 60.0




:ción :"SEMIVIGA" Armadura :"B1"
)o : tipo viga/ Genérico Unidades :[cm]

:ción parcial 1: Hormigón = H250

| ) | Coord-Y | Coord-Z | Pto | Coord-Y | Coord-Z |
|---|---|---|---|---|---|
| | 90.00 | 0.00 | 2 | 90.00 | 825.00 |
| 3 | 690.00 | 825.00 | 4 | 690.00 | 905.00 |
| ; | 0.00 | 905.00 | 6 | 0.00 | 0.00 |

-acterísticas mecánicas de la sección:
ea : Ax= 12.945 [m2]
mentos de inercia :
es princ. de inercia: Iy= 130.457 [m4] Iz= 27.678 [m4] Phi=-28.38 Grados

es (yse,zse) : Iy= 107.237 [m4] Iz= 50.897 [m4] Iyz= 42.981
ercia a torsión : Ix= 26.670 [m4] (de un círculo del mismo área)

sición del centro de gravedad: ys= 1.729 [m] zs= 6.055 [m]

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| q. | Iz | -2.945 | -9.398 | 0.610 |
| h. | Iz | 3.506 | 7.895 | -0.726 |
| ajo | Iy | -6.149 | -21.216 | 1.979 |
| riba | Iy | 5.093 | 25.614 | -1.639 |

madura: "B1"

| | Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|---|
| 1 | AEH500 | (2) | 0.01 | 0.00 | 20.00 | 90.00 | 20.00 |
| 2 | AEH500 | (2) | 0.01 | 0.00 | 900.00 | 690.00 | 900.00 |
| | Total: | | 0.02 | Cuantía de armadura: 0.000 [o/o] | | | |

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

o se han definido valores para el cálculo a cortante!

racterísticas del material:

| m.Mat. | Módulo E [ kp/cm2] | 0.85*fcd,fyd [ kp/cm2] | eps-fc [o/oo] | fct [ kp/cm2] | fcv [ kp/cm2] | fcw,mín [ kp/cm2] |
|---|---|---|---|---|---|---|
| 250" | 278000.0 | -141.600 | -2.000 | 0.0 | 6.460 | 250.000 |
| EH500" | 2.10E+06 | 4434.700 | | | | |

yenda:
d,fyd resistencia de cálculo del hormigón,acero
s-fc deformación al final de la parábola (fig.2.3, cap.2.2)
t resistencia de cálculo a tracción del hormigón
v resistencia virtual de cálculo del hormigón a esfuerzo cortante



Dimensionamiento : Viga "SEMIVIGA"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| | | | | 3050.840 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "AEH500" | 0.0 | 20.0 | 90.0 | 20.0 | 0.01 | 79.86 | 79.86 |
| 2 "AEH500" | 0.0 | 900.0 | 690.0 | 900.0 | 0.01 | - | 0.01 |
| | | | | Cuantía arm. 0.06 [o/o] | | Suma | 79.87 |

Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | 0.00 | 905.00 | -1.088 | -112.142 | "H250" |
| Armadura-Min | -0.00 | 900.00 | -1.028 | -2159.432 | "AEH500" |
| Hormigón-Max | 90.00 | 0.00 | 10.238 | 0.000 | "H250" |
| Armadura-Max | 90.00 | 20.00 | 10.000 | 4434.700 | "AEH500" |

Fibra neutra zn 839.84 cm yn 50.20 cm Angulo 27.64

Dimensionamiento : Viga "SEMIVIGA"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| | | | | 2692.930 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "AEH500" | 0.0 | 20.0 | 90.0 | 20.0 | 0.01 | 70.36 | 70.36 |
| 2 "AEH500" | 0.0 | 900.0 | 690.0 | 900.0 | 0.01 | - | 0.01 |
| | | | | Cuantía arm. 0.05 [o/o] | | Suma | 70.37 |

formaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| rmigón-Min | -0.00 | 905.00 | -1.013 | -107.082 | "H250" |
| madura-Min | -0.00 | 900.00 | -0.953 | -2001.841 | "AEH500" |
| rmigón-Max | 90.00 | -0.00 | 10.237 | 0.000 | "H250" |
| madura-Max | 90.00 | 20.00 | 10.000 | 4434.700 | "AEH500" |

bra neutra zn 846.57 cm yn 55.31 cm Angulo 26.00

mensionamiento : Viga "SEMIVIGA"/"B1"

fuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| | | | | 1968.700 | | 45.0 |

| madura ngitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| "AEH500" | 0.0 | 20.0 | 90.0 | 20.0 | 0.01 | 51.24 | 51.24 |
| "AEH500" | 0.0 | 900.0 | 690.0 | 900.0 | 0.01 | - | 0.01 |

Cuantía arm. 0.04 [o/o] Suma 51.25
==========

formaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| rmigón-Min | 0.00 | 905.00 | -0.853 | -95.008 | "H250" |
| madura-Min | 0.00 | 900.00 | -0.794 | -1667.216 | "AEH500" |
| rmigón-Max | 90.00 | 0.00 | 10.235 | 0.000 | "H250" |
| madura-Max | 90.00 | 20.00 | 10.000 | 4434.700 | "AEH500" |

bra neutra zn 860.51 cm yn 67.94 cm Angulo 22.37



Dimensionamiento : Viga "SEMIVIGA"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| | | | | 880.000 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "AEH500" | 0.0 | 20.0 | 90.0 | 20.0 | 0.01 | 22.73 | 22.73 |
| 2 "AEH500" | 0.0 | 900.0 | 690.0 | 900.0 | 0.01 | - | 0.01 |

Cuantía arm. 0.02 [o/o] Suma 22.74
==========

Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | -0.00 | 905.00 | -0.548 | -67.007 | "H250" |
| Armadura-Min | -0.00 | 900.00 | -0.490 | -1029.780 | "AEH500" |
| Hormigón-Max | 90.00 | -0.00 | 10.232 | 0.000 | "H250" |
| Armadura-Max | 90.00 | 20.00 | 10.000 | 4434.700 | "AEH500" |

Fibra neutra zn 884.02 cm yn 98.99 cm Angulo 14.86

Dimensionamiento : Viga "SEMIVIGA"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| | | | | -2382.450 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "AEH500" | 0.0 | 20.0 | 90.0 | 20.0 | 0.01 | - | 0.01 |
| 2 "AEH500" | 0.0 | 900.0 | 690.0 | 900.0 | 0.01 | 112.05 | 112.05 |

Cuantía arm. 0.09 [o/o] Suma 112.06
==========

formaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| rmigón-Min | 90.00 | 0.00 | -1.302 | -124.366 | "H250" |
| madura-Min | 90.00 | 20.00 | -1.081 | -2269.870 | "AEH500" |
| rmigón-Max | 0.00 | 905.00 | 10.055 | 0.000 | "H250" |
| madura-Max | 0.00 | 900.00 | 10.000 | 4434.700 | "AEH500" |

bra neutra zn 471.68 cm yn 353.00 cm Angulo 53.39

mensionamiento : Viga "SEMIVIGA"/"B1"

fuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| | | | | -573.980 | | 45.0 |

| madura ngitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| "AEH500" | 0.0 | 20.0 | 90.0 | 20.0 | 0.01 | - | 0.01 |
| "AEH500" | 0.0 | 900.0 | 690.0 | 900.0 | 0.01 | 25.65 | 25.65 |
| | | | | Cuantía arm. 0.02 [o/o] | | Suma | 25.66 |

==========

formaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| rmigón-Min | 90.00 | 0.00 | -0.763 | -87.407 | "H250" |
| madura-Min | 90.00 | 20.00 | -0.552 | -1159.510 | "AEH500" |
| rmigón-Max | 0.00 | 905.00 | 10.053 | 0.000 | "H250" |
| madura-Max | 0.00 | 900.00 | 10.000 | 4434.700 | "AEH500" |

bra neutra zn 457.72 cm yn 373.61 cm Angulo 53.64



## 10.- CÁLCULO TRANSVERSAL

En las páginas siguientes se muestra los listados de las cargas, envolventes y esfuerzos para el cálculo longitudinal.

A continuación se muestra un resumen de esfuerzos:

| Seccion | Nd (T) | Md (mT) |
|---|---|---|
| Dintel | -39.88 | 37.47 |
| Dintel | -40.25 | -48.58 |
| Cartela dintel | -40.00 | -102.80 |
| Cartela hastial | -44.45 | -110.92 |
| Hastial | -45.85 | 67.72 |
| Hastial | -47.03 | 72.92 |

```
CINPUT 'U.GEO'
$
$ Proyecto:L.A.V.MARTORELL. TUNEL ARTIFICIAL TRAMO CUBIERTO
$ Elemento: Cruce con ODT-300. Calculo transversal.
$ Cliente:INOCSA
$
$ Creado por ALEPH-MARCOS 4.2.1
$
$ Aplicacion de Cargas Elementales.

LOAD 1 'PESO PROPIO'
MEMB LOAD
$ dintel
3 TO  12  FOR Y GLO LIN     -2.00 -2.00
2   13  FOR Y GLO LIN     -2.63 -2.63
1   14  FOR Y GLO LIN     -3.25 -3.25
$ hastiales
22  TO  29  FOR Y GLO LIN     -2.25 -2.25
32  TO  39  FOR Y GLO LIN     -2.25 -2.25
21    31  FOR Y GLO LIN     -2.88 -2.88

LOAD 2 'TIERRAS. REC:1.00 M'
MEMB LOAD
$ Pp tierras
1 TO  14  FOR Y GLO LIN     -2.20 -2.20
$ Empuje hastial derecho
  20    FOR X GLO LIN     2.60  2.20
  21    FOR X GLO LIN     2.60  3.10
  22    FOR X GLO LIN     3.10  4.10
  23    FOR X GLO LIN     4.10  5.10
  24    FOR X GLO LIN     5.10  6.10
  25    FOR X GLO LIN     6.10  7.10
  26    FOR X GLO LIN     7.10  8.10
  27    FOR X GLO LIN     8.10  9.10
  28    FOR X GLO LIN     9.10  10.10
  29    FOR X GLO LIN     10.10 10.85
$ Empuje hastial izquierdo
  30    FOR X GLO LIN     -2.60 -2.20
  31    FOR X GLO LIN     -2.60 -3.10
  32    FOR X GLO LIN     -3.10 -4.10
  33    FOR X GLO LIN     -4.10 -5.10
  34    FOR X GLO LIN     -5.10 -6.10
  35    FOR X GLO LIN     -6.10 -7.10
  36    FOR X GLO LIN     -7.10 -8.10
  37    FOR X GLO LIN     -8.10 -9.10
  38    FOR X GLO LIN     -9.10 -10.10
  39    FOR X GLO LIN     -10.10  -10.85

LOAD 3 'TIERRAS.ASIMETRICA Y1:5.75; Y2:0.00 M'
MEMB LOAD
$ Empuje hastial derecho
  24    FOR X GLO LIN     0.00  1.00
  25    FOR X GLO LIN     1.00  2.00
  26    FOR X GLO LIN     2.00  3.00
  27    FOR X GLO LIN     3.00  4.00
  28    FOR X GLO LIN     4.00  5.00
  29    FOR X GLO LIN     5.00  5.75

LOAD 4 'EMPUJE DE VIENTO M'
MEMB LOAD
20  TO  29  FOR X GLO LIN     0.21  0.21

LOAD 5 'SCU 0.40 T/M2 SOBRE DINTEL'
```

CARGA.GTI Sábado, 18 Mayo 2002 6:46am

```
MEMB LOAD
1 TO  14  FOR Y GLO LIN     -0.40 -0.40


STIFFNESS ANALYSIS
PRINT JOINT RELEASES
PRINT APPLIED JOINT LOADS
OUTPUT DECIMAL 3
LIST FORCES ALL
OUTPUT DECIMAL 6
LIST DISP   ALL
OUTPUT DECIMAL 3
LIST REAC ALL
$FINISH
```

LISTADO DE ESTADOS DE CARGA
Fecha : 16.05.2002 13:18:17
Título: LAV-MARTORELL: TUENL ARTIFICIAL TRAMO CUBIERTO. CR
Coment: Aplicacion de coeficientes de excentricidad
Titlst: Listados de estados de carga elementales

Tabla de estados de carga a listar

| ec | Fichero | tipo | Título |
|---|---|---|---|
| 1 | carga001 | 0 | [PESO PROPIO ] |
| 2 | carga002 | 0 | [TIERRAS REC:1.00 ] |
| 3 | carga003 | 0 | [TIERRAS.ASIMETRICA Y1:5.75; Y2:0.00 M ] |
| 4 | carga004 | 0 | [EMPUJE DE VIENTO M ] |
| 5 | carga005 | 0 | [SCU 0.40 T/M2 SOBRE DINTEL ] |

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Mz |
|---|---|---|---|---|---|---|
| 1 | 1 | 1 | | -2.61 | -14.09 | -24.65 |
| | | 2 | | -27.08 | -14.19 | -45.29 |
| | | 3 | | -1.90 | 2.46 | 13.77 |
| | | 4 | | -0.53 | 0.73 | 4.36 |
| | | 5 | | -0.51 | -2.58 | -4.82 |
| 2 | 2 | 1 | | -2.61 | -12.63 | -18.64 |
| | | 2 | | -27.08 | -13.20 | -39.13 |
| | | 3 | | -1.90 | 2.46 | 12.67 |
| | | 4 | | -0.53 | 0.73 | 4.03 |
| | | 5 | | -0.51 | -2.40 | -3.70 |
| 3 | 3 | 1 | | -2.61 | -10.00 | -7.32 |
| | | 2 | | -27.08 | -11.00 | -27.03 |
| | | 3 | | -1.90 | 2.46 | 10.21 |
| | | 4 | | -0.53 | 0.73 | 3.30 |
| | | 5 | | -0.51 | -2.00 | -1.50 |
| 4 | 4 | 1 | | -2.61 | -8.00 | 1.68 |
| | | 2 | | -27.08 | -8.80 | -17.13 |
| | | 3 | | -1.90 | 2.46 | 7.75 |
| | | 4 | | -0.53 | 0.73 | 2.58 |
| | | 5 | | -0.51 | -1.60 | 0.30 |
| 5 | 5 | 1 | | -2.61 | -6.00 | 8.68 |
| | | 2 | | -27.08 | -6.60 | -9.43 |
| | | 3 | | -1.90 | 2.46 | 5.30 |
| | | 4 | | -0.53 | 0.73 | 1.85 |
| | | 5 | | -0.51 | -1.20 | 1.70 |
| 6 | 6 | 1 | | -2.61 | -4.00 | 13.68 |
| | | 2 | | -27.08 | -4.40 | -3.93 |
| | | 3 | | -1.90 | 2.46 | 2.84 |
| | | 4 | | -0.53 | 0.73 | 1.12 |
| | | 5 | | -0.51 | -0.80 | 2.70 |
| 7 | 7 | 1 | | -2.61 | -2.00 | 16.68 |
| | | 2 | | -27.08 | -2.20 | -0.63 |
| | | 3 | | -1.90 | 2.46 | 0.38 |
| | | 4 | | -0.53 | 0.73 | 0.40 |
| | | 5 | | -0.51 | -0.40 | 3.30 |

ELEMEN.LST Sábado, 18 Mayo 2002 6:46am

| | | | | | |
|---|---|---|---|---|---|
| 8 | 8 | 1 | -2.61 | 0.00 | 17.68 |
| | | 2 | -27.08 | 0.00 | 0.47 |
| | | 3 | -1.90 | 2.46 | -2.07 |
| | | 4 | -0.53 | 0.73 | -0.33 |
| | | 5 | -0.51 | 0.00 | 3.50 |
| 9 | 9 | 1 | -2.61 | 2.00 | 16.68 |
| | | 2 | -27.08 | 2.20 | -0.63 |
| | | 3 | -1.90 | 2.46 | -4.53 |
| | | 4 | -0.53 | 0.73 | -1.06 |
| | | 5 | -0.51 | 0.40 | 3.30 |
| 10 | 10 | 1 | -2.61 | 4.00 | 13.68 |
| | | 2 | -27.08 | 4.40 | -3.93 |
| | | 3 | -1.90 | 2.46 | -6.98 |
| | | 4 | -0.53 | 0.73 | -1.79 |
| | | 5 | -0.51 | 0.80 | 2.70 |
| 11 | 11 | 1 | -2.61 | 6.00 | 8.68 |
| | | 2 | -27.08 | 6.60 | -9.43 |
| | | 3 | -1.90 | 2.46 | -9.44 |
| | | 4 | -0.53 | 0.73 | -2.51 |
| | | 5 | -0.51 | 1.20 | 1.70 |
| 12 | 12 | 1 | -2.61 | 8.00 | 1.68 |
| | | 2 | -27.08 | 8.80 | -17.13 |
| | | 3 | -1.90 | 2.46 | -11.90 |
| | | 4 | -0.53 | 0.73 | -3.24 |
| | | 5 | -0.51 | 1.60 | 0.30 |
| 13 | 13 | 1 | -2.61 | 10.00 | -7.32 |
| | | 2 | -27.08 | 11.00 | -27.03 |
| | | 3 | -1.90 | 2.46 | -14.35 |
| | | 4 | -0.53 | 0.73 | -3.97 |
| | | 5 | -0.51 | 2.00 | -1.50 |
| 14 | 14 | 1 | -2.61 | 12.63 | -18.64 |
| | | 2 | -27.08 | 13.20 | -39.13 |
| | | 3 | -1.90 | 2.46 | -16.81 |
| | | 4 | -0.53 | 0.73 | -4.69 |
| | | 5 | -0.51 | 2.40 | -3.70 |
| 14 | 15 | 1 | -2.61 | 14.09 | -24.65 |
| | | 2 | -27.08 | 14.19 | -45.29 |
| | | 3 | -1.90 | 2.46 | -17.91 |
| | | 4 | -0.53 | 0.73 | -5.02 |
| | | 5 | -0.51 | 2.58 | -4.82 |
| 21 | 20 | 1 | -14.09 | 2.61 | 23.61 |
| | | 2 | -14.19 | 26.12 | 34.65 |
| | | 3 | 2.46 | 1.90 | -14.53 |
| | | 4 | 0.73 | 0.45 | -4.55 |
| | | 5 | -2.58 | 0.51 | 4.62 |
| 22 | 21 | 1 | -17.84 | 2.61 | 20.22 |
| | | 2 | -14.19 | 22.41 | 3.03 |
| | | 3 | 2.46 | 1.90 | -16.99 |
| | | 4 | 0.73 | 0.17 | -4.96 |
| | | 5 | -2.58 | 0.51 | 3.95 |
| 23 | 22 | 1 | -20.09 | 2.61 | 17.61 |
| | | 2 | -14.19 | 18.81 | -17.67 |
| | | 3 | 2.46 | 1.90 | -18.89 |

| | | | | | |
|---|---|---|---|---|---|
| | | 4 | 0.73 | -0.04 | -5.03 |
| | | 5 | -2.58 | 0.51 | 3.44 |
| 24 | 23 | 1 | -22.34 | 2.61 | 15.00 |
| | | 2 | -14.19 | 14.21 | -34.26 |
| | | 3 | 2.46 | 1.90 | -20.79 |
| | | 4 | 0.73 | -0.25 | -4.89 |
| | | 5 | -2.58 | 0.51 | 2.93 |
| 25 | 24 | 1 | -24.59 | 2.61 | 12.39 |
| | | 2 | -14.19 | 8.61 | -45.76 |
| | | 3 | 2.46 | 1.40 | -22.51 |
| | | 4 | 0.73 | -0.46 | -4.53 |
| | | 5 | -2.58 | 0.51 | 2.42 |
| 26 | 25 | 1 | -26.84 | 2.61 | 9.78 |
| | | 2 | -14.19 | 2.01 | -51.16 |
| | | 3 | 2.46 | -0.10 | -23.24 |
| | | 4 | 0.73 | -0.67 | -3.97 |
| | | 5 | -2.58 | 0.51 | 1.91 |
| 27 | 26 | 1 | -29.09 | 2.61 | 7.17 |
| | | 2 | -14.19 | -5.59 | -49.46 |
| | | 3 | 2.46 | -2.60 | -21.97 |
| | | 4 | 0.73 | -0.88 | -3.20 |
| | | 5 | -2.58 | 0.51 | 1.40 |
| 28 | 27 | 1 | -31.34 | 2.61 | 4.57 |
| | | 2 | -14.19 | -14.19 | -39.65 |
| | | 3 | 2.46 | -6.10 | -17.70 |
| | | 4 | 0.73 | -1.09 | -2.22 |
| | | 5 | -2.58 | 0.51 | 0.89 |
| 29 | 28 | 1 | -33.59 | 2.61 | 1.96 |
| | | 2 | -14.19 | -23.79 | -20.75 |
| | | 3 | 2.46 | -10.60 | -9.43 |
| | | 4 | 0.73 | -1.30 | -1.03 |
| | | 5 | -2.58 | 0.51 | 0.38 |
| 29 | 29 | 1 | -35.27 | 2.61 | 0.00 |
| | | 2 | -14.19 | -31.64 | 0.00 |
| | | 3 | 2.46 | -14.64 | 0.00 |
| | | 4 | 0.73 | -1.45 | 0.00 |
| | | 5 | -2.58 | 0.51 | 0.00 |
| 31 | 30 | 1 | -14.09 | -2.61 | -23.61 |
| | | 2 | -14.19 | -26.12 | -34.65 |
| | | 3 | -2.46 | -1.90 | -17.16 |
| | | 4 | -0.73 | -0.53 | -4.81 |
| | | 5 | -2.58 | -0.51 | -4.62 |
| 32 | 31 | 1 | -17.84 | -2.61 | -20.22 |
| | | 2 | -14.19 | -22.41 | -3.03 |
| | | 3 | -2.46 | -1.90 | -14.69 |
| | | 4 | -0.73 | -0.53 | -4.12 |
| | | 5 | -2.58 | -0.51 | -3.95 |
| 33 | 32 | 1 | -20.09 | -2.61 | -17.61 |
| | | 2 | -14.19 | -18.81 | 17.67 |
| | | 3 | -2.46 | -1.90 | -12.80 |
| | | 4 | -0.73 | -0.53 | -3.59 |
| | | 5 | -2.58 | -0.51 | -3.44 |

ELEMEN.LST Sábado, 18 Mayo 2002 6:46am

| | | | | | |
|---|---|---|---|---|---|
| 34 | 33 | 1 | -22.34 | -2.61 | -15.00 |
| | | 2 | -14.19 | -14.21 | 34.26 |
| | | 3 | -2.46 | -1.90 | -10.90 |
| | | 4 | -0.73 | -0.53 | -3.06 |
| | | 5 | -2.58 | -0.51 | -2.93 |
| 35 | 34 | 1 | -24.59 | -2.61 | -12.39 |
| | | 2 | -14.19 | -8.61 | 45.76 |
| | | 3 | -2.46 | -1.90 | -9.01 |
| | | 4 | -0.73 | -0.53 | -2.52 |
| | | 5 | -2.58 | -0.51 | -2.42 |
| 36 | 35 | 1 | -26.84 | -2.61 | -9.78 |
| | | 2 | -14.19 | -2.01 | 51.16 |
| | | 3 | -2.46 | -1.90 | -7.11 |
| | | 4 | -0.73 | -0.53 | -1.99 |
| | | 5 | -2.58 | -0.51 | -1.91 |
| 37 | 36 | 1 | -29.09 | -2.61 | -7.17 |
| | | 2 | -14.19 | 5.59 | 49.46 |
| | | 3 | -2.46 | -1.90 | -5.21 |
| | | 4 | -0.73 | -0.53 | -1.46 |
| | | 5 | -2.58 | -0.51 | -1.40 |
| 38 | 37 | 1 | -31.34 | -2.61 | -4.57 |
| | | 2 | -14.19 | 14.19 | 39.65 |
| | | 3 | -2.46 | -1.90 | -3.32 |
| | | 4 | -0.73 | -0.53 | -0.93 |
| | | 5 | -2.58 | -0.51 | -0.89 |
| 39 | 38 | 1 | -33.59 | -2.61 | -1.96 |
| | | 2 | -14.19 | 23.79 | 20.75 |
| | | 3 | -2.46 | -1.90 | -1.42 |
| | | 4 | -0.73 | -0.53 | -0.40 |
| | | 5 | -2.58 | -0.51 | -0.38 |
| 39 | 39 | 1 | -35.27 | -2.61 | 0.00 |
| | | 2 | -14.19 | 31.64 | 0.00 |
| | | 3 | -2.46 | -1.90 | 0.00 |
| | | 4 | -0.73 | -0.53 | 0.00 |
| | | 5 | -2.58 | -0.51 | 0.00 |
| 20 | 20 | 1 | -14.09 | 2.61 | -23.61 |
| | | 2 | -14.19 | 26.12 | -34.65 |
| | | 3 | 2.46 | 1.90 | 14.53 |
| | | 4 | 0.73 | 0.45 | 4.55 |
| | | 5 | -2.58 | 0.51 | -4.62 |
| 20 | 1 | 1 | -14.09 | 2.61 | -24.65 |
| | | 2 | -14.19 | 27.08 | -45.29 |
| | | 3 | 2.46 | 1.90 | 13.77 |
| | | 4 | 0.73 | 0.53 | 4.36 |
| | | 5 | -2.58 | 0.51 | -4.82 |
| 30 | 30 | 1 | -14.09 | -2.61 | 23.61 |
| | | 2 | -14.19 | -26.12 | 34.65 |
| | | 3 | -2.46 | -1.90 | 17.16 |
| | | 4 | -0.73 | -0.53 | 4.81 |
| | | 5 | -2.58 | -0.51 | 4.62 |
| 30 | 15 | 1 | -14.09 | -2.61 | 24.65 |
| | | 2 | -14.19 | -27.08 | 45.29 |
| | | 3 | -2.46 | -1.90 | 17.91 |

| | | | |
|---|---|---|---|
| 4 | -0.73 | -0.53 | 5.02 |
| 5 | -2.58 | -0.51 | 4.82 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 29 | 1 | | 2.61 | 35.27 | 0.00 |
| | 2 | | -31.64 | 14.19 | 0.00 |
| | 3 | | -14.64 | -2.46 | 0.00 |
| | 4 | | -1.45 | -0.73 | 0.00 |
| | 5 | | 0.51 | 2.58 | 0.00 |
| 39 | 1 | | -2.61 | 35.27 | 0.00 |
| | 2 | | 31.64 | 14.19 | 0.00 |
| | 3 | | -1.90 | 2.46 | 0.00 |
| | 4 | | -0.53 | 0.73 | 0.00 |
| | 5 | | -0.51 | 2.58 | 0.00 |



LISTADO DE ESTADOS DE CARGA
Fecha : 16.05.2002 13:18:18
Título: LAV-MARTORELL: TUENL ARTIFICIAL TRAMO CUBIERTO. CR
Coment: Aplicacion de coeficientes de excentricidad
Titlst: Listados de envolventes de rotura

Tabla de estados de carga a listar

| ec | Fichero | tipo | Título |
|---|---|---|---|
| 22 | ROT1 | 1 | [ENVOLVENTE CAR. ROTURA ] |
| 28 | ROT2 | 1 | [ENVOLVENTE CAR. ROTURA ASIMETRICO ] |

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Mz |
|---|---|---|---|---|---|---|
| 1 | 1 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | -44.67 | -44.51 | -110.41 |
| | | 22 | Mz- | -44.67 | -44.51 | -110.41 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | -6.25 | -9.32 | 2.54 |
| | | 28 | Fy- | -5.94 | -20.77 | -28.70 |
| | | 28 | Mz- | -5.94 | -20.77 | -28.70 |
| 2 | 2 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | -44.67 | -40.78 | -91.22 |
| | | 22 | Mz- | -43.57 | -39.02 | -91.56 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | -6.25 | -7.86 | 6.40 |
| | | 28 | Fy- | -5.94 | -18.52 | -19.86 |
| | | 28 | Mz- | -4.85 | -16.77 | -20.20 |
| 3 | 3 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | -44.67 | -33.33 | -54.17 |
| | | 22 | Mz- | -43.57 | -31.99 | -56.06 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | -6.25 | -5.23 | 12.94 |
| | | 28 | Fy- | -5.94 | -14.37 | -3.41 |
| | | 28 | Mz- | -4.85 | -13.03 | -5.31 |
| 4 | 4 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | -44.67 | -26.73 | -24.14 |
| | | 22 | Mz- | -42.43 | -22.29 | -27.88 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | -7.39 | -6.75 | 17.89 |
| | | 28 | Fy- | -5.94 | -11.07 | 9.31 |
| | | 28 | Mz- | 0.00 | 0.00 | 0.00 |
| 5 | 5 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -31.63 | -14.15 | 5.82 |
| | | 22 | Fy- | -44.67 | -20.13 | -0.71 |
| | | 22 | Mz- | -42.43 | -16.99 | -8.24 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | -7.39 | -3.87 | 23.20 |
| | | 28 | Fy- | -5.94 | -7.77 | 18.73 |
| | | 28 | Mz- | 0.00 | 0.00 | 0.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | 6 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -31.61 | -10.67 | 19.09 |
| | | 22 | Fy- | -44.67 | -13.53 | 16.12 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | -6.25 | 0.77 | 19.62 |
| | | 28 | Mz+ | -7.37 | -2.59 | 27.28 |
| | | 28 | Fy- | -5.94 | -4.47 | 24.85 |
| | | 28 | Mz- | 0.00 | 0.00 | 0.00 |
| 7 | 7 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -31.61 | -5.17 | 27.01 |
| | | 22 | Fy- | -43.57 | -7.27 | 22.46 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | -6.25 | 2.77 | 17.85 |
| | | 28 | Mz+ | -7.37 | 0.71 | 28.22 |
| | | 28 | Fy- | -4.85 | -1.51 | 23.79 |
| | | 28 | Mz- | 0.00 | 0.00 | 0.00 |
| 8 | 8 | 22 | Fy+ | -45.17 | 1.09 | 25.65 |
| | | 22 | Mz+ | -44.67 | -0.33 | 29.97 |
| | | 22 | Fy- | -43.57 | -1.09 | 26.64 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | -7.39 | 4.77 | 21.83 |
| | | 28 | Mz+ | -5.94 | 2.13 | 27.19 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | 0.00 | 0.00 | 0.00 |
| 9 | 9 | 22 | Fy+ | -45.17 | 7.27 | 21.47 |
| | | 22 | Mz+ | -31.13 | 5.17 | 27.31 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | -7.39 | 7.65 | 15.62 |
| | | 28 | Mz+ | -5.94 | 5.43 | 23.41 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | 0.00 | 0.00 | 0.00 |
| 10 | 10 | 22 | Fy+ | -45.14 | 13.53 | 15.82 |
| | | 22 | Mz+ | -31.13 | 10.67 | 19.39 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | -7.37 | 10.61 | 11.23 |
| | | 28 | Mz+ | -5.94 | 8.73 | 16.33 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | 0.00 | 0.00 | 0.00 |
| 11 | 11 | 22 | Fy+ | -45.14 | 20.13 | -1.01 |
| | | 22 | Mz+ | -30.03 | 14.15 | 6.82 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -44.02 | 16.99 | -9.24 |
| | | 28 | Fy+ | -7.37 | 13.91 | -1.03 |
| | | 28 | Mz+ | -4.85 | 10.01 | 6.81 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -6.25 | 10.77 | -9.25 |
| 12 | 12 | 22 | Fy+ | -45.14 | 26.73 | -24.44 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -44.02 | 22.29 | -28.88 |
| | | 28 | Fy+ | -7.37 | 17.21 | -16.59 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -6.25 | 12.77 | -21.03 |

ENVR.LST Sábado, 18 Mayo 2002 6:46am

| | | | | | | |
|---|---|---|---|---|---|---|
| 13 | 13 | 22 | Fy+ | -45.14 | 33.33 | -54.46 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -45.17 | 31.99 | -57.05 |
| | | 28 | Fy+ | -7.37 | 20.51 | -35.45 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -7.39 | 19.17 | -38.04 |
| 14 | 14 | 22 | Fy+ | -45.14 | 40.78 | -91.52 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -45.17 | 39.02 | -92.56 |
| | | 28 | Fy+ | -7.37 | 24.66 | -58.04 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -7.39 | 22.91 | -59.08 |
| 14 | 15 | 22 | Fy+ | -45.14 | 44.51 | -110.71 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -45.17 | 42.56 | -110.92 |
| | | 28 | Fy+ | -7.37 | 26.91 | -69.64 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -7.39 | 24.96 | -69.85 |
| 21 | 20 | 22 | Fy+ | -43.85 | 43.67 | 88.72 |
| | | 22 | Mz+ | -44.51 | 43.26 | 92.81 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | -18.88 | 7.33 | 14.95 |
| | | 28 | Mz+ | -20.77 | 5.98 | 26.31 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -9.32 | 6.12 | -5.01 |
| 22 | 21 | 22 | Fy+ | -48.91 | 37.99 | 35.54 |
| | | 22 | Mz+ | -47.62 | 37.11 | 41.05 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | -23.94 | 7.21 | 5.50 |
| | | 28 | Mz+ | -23.88 | 5.39 | 19.51 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -13.06 | 5.71 | -12.71 |
| 23 | 22 | 22 | Fy+ | -52.60 | 32.52 | 4.70 |
| | | 22 | Mz+ | -43.56 | 22.62 | 15.19 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -40.28 | 30.78 | -16.43 |
| | | 28 | Fy+ | -27.63 | 7.15 | 2.86 |
| | | 28 | Mz+ | -26.91 | 5.70 | 13.97 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -15.31 | 5.40 | -18.26 |
| 24 | 23 | 22 | Fy+ | -55.64 | 25.72 | -24.55 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -42.53 | 23.56 | -43.72 |
| | | 28 | Fy+ | -30.67 | 7.24 | -4.33 |
| | | 28 | Mz+ | -29.95 | 6.02 | 8.11 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -17.56 | 5.08 | -23.51 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 25 | 24 | 22 | Fy+ | -58.67 | 17.41 | -46.24 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -44.78 | 14.85 | -63.05 |
| | | 28 | Fy+ | -33.71 | 6.59 | -11.37 |
| | | 28 | Mz+ | -32.99 | 5.83 | 2.11 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -19.81 | 4.02 | -28.18 |
| 26 | 25 | 22 | Fy+ | -59.77 | 7.77 | -56.71 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -47.03 | 4.63 | -72.92 |
| | | 28 | Fy+ | -36.03 | 4.65 | -3.22 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -22.06 | 1.45 | -31.04 |
| 27 | 26 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | -49.28 | -7.08 | -71.81 |
| | | 22 | Mz- | -49.28 | -7.08 | -71.81 |
| | | 28 | Fy+ | -39.06 | 2.46 | -6.85 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | -24.31 | -2.61 | -30.59 |
| | | 28 | Mz- | -24.31 | -2.61 | -30.59 |
| 28 | 27 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | -51.53 | -20.30 | -58.25 |
| | | 22 | Mz- | -51.53 | -20.30 | -58.25 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | -26.56 | -8.18 | -25.32 |
| | | 28 | Mz- | -26.56 | -8.18 | -25.32 |
| 29 | 28 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | -53.78 | -35.01 | -30.72 |
| | | 22 | Mz- | -53.78 | -35.01 | -30.72 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | -28.81 | -15.24 | -13.74 |
| | | 28 | Mz- | -28.81 | -15.24 | -13.74 |
| 29 | 29 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -72.45 | -43.83 | 0.00 |
| | | 22 | Fy- | -55.47 | -47.03 | 0.00 |
| | | 22 | Mz- | -72.45 | -43.83 | 0.00 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | -47.48 | -18.32 | 0.00 |
| | | 28 | Fy- | -30.50 | -21.52 | 0.00 |
| | | 28 | Mz- | -47.48 | -18.32 | 0.00 |
| 31 | 30 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | -42.56 | -43.73 | -93.13 |
| | | 22 | Mz- | -42.56 | -43.73 | -93.13 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | -24.96 | -7.39 | -66.89 |
| | | 28 | Mz- | -24.96 | -7.39 | -66.89 |

ENVR.LST Sábado, 18 Mayo 2002 6:46am

| | | | | | | |
|---|---|---|---|---|---|---|
| 32 | 31 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | -47.62 | -38.17 | -39.79 |
| | | 22 | Mz- | -47.62 | -38.17 | -39.79 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | -30.02 | -7.39 | -57.28 |
| | | 28 | Mz- | -30.02 | -7.39 | -57.28 |
| 33 | 32 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -40.28 | -30.03 | 14.27 |
| | | 22 | Fy- | -50.65 | -32.77 | -4.20 |
| | | 22 | Mz- | -43.56 | -23.36 | -13.03 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | -33.05 | -7.39 | -49.89 |
| | | 28 | Mz- | -33.05 | -7.39 | -49.89 |
| 34 | 33 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -42.53 | -23.13 | 40.98 |
| | | 22 | Fy- | -53.69 | -25.87 | 25.25 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | -36.09 | -7.39 | -42.50 |
| | | 28 | Mz- | -36.09 | -7.39 | -42.50 |
| 35 | 34 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -44.78 | -14.73 | 60.04 |
| | | 22 | Fy- | -56.73 | -17.47 | 47.04 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | -39.13 | -7.39 | -35.11 |
| | | 28 | Mz- | -39.13 | -7.39 | -35.11 |
| 36 | 35 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -47.03 | -4.83 | 69.94 |
| | | 22 | Fy- | -59.77 | -7.57 | 59.68 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | -42.17 | -7.39 | -27.72 |
| | | 28 | Mz- | -42.17 | -7.39 | -27.72 |
| 37 | 36 | 22 | Fy+ | -49.28 | 6.57 | 69.20 |
| | | 22 | Mz+ | -49.28 | 6.57 | 69.20 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | -45.20 | -7.39 | -20.33 |
| | | 28 | Mz- | -45.20 | -7.39 | -20.33 |
| 38 | 37 | 22 | Fy+ | -51.53 | 19.47 | 56.31 |
| | | 22 | Mz+ | -51.53 | 19.47 | 56.31 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | -48.24 | -7.39 | -12.94 |
| | | 28 | Mz- | -48.24 | -7.39 | -12.94 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 39 | 38 | 22 | Fy+ | -53.78 | 33.87 | 29.77 |
| | | 22 | Mz+ | -53.78 | 33.87 | 29.77 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy- | -51.28 | -7.39 | -5.54 |
| | | 28 | Mz- | -51.28 | -7.39 | -5.54 |
| 39 | 39 | 22 | Fy+ | -55.47 | 45.65 | 0.00 |
| | | 22 | Mz+ | -73.10 | 42.94 | 0.00 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -73.10 | 42.94 | 0.00 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | -55.50 | -7.37 | 0.00 |
| | | 28 | Fy- | -53.56 | -7.39 | 0.00 |
| | | 28 | Mz- | -55.50 | -7.37 | 0.00 |
| 20 | 20 | 22 | Fy+ | -43.85 | 43.67 | -88.72 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -44.51 | 43.26 | -92.81 |
| | | 28 | Fy+ | -18.88 | 7.33 | -14.95 |
| | | 28 | Mz+ | -9.32 | 6.12 | 5.01 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -20.77 | 5.98 | -26.31 |
| 20 | 1 | 22 | Fy+ | -40.38 | 45.17 | -96.85 |
| | | 22 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -44.51 | 44.67 | -110.41 |
| | | 28 | Fy+ | -15.41 | 7.39 | -8.26 |
| | | 28 | Mz+ | -9.32 | 6.25 | 2.54 |
| | | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz- | -20.77 | 5.94 | -28.70 |
| 30 | 30 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -42.56 | -43.73 | 93.13 |
| | | 22 | Fy- | -42.56 | -43.73 | 93.13 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | -24.96 | -7.39 | 66.89 |
| | | 28 | Fy- | -24.96 | -7.39 | 66.89 |
| | | 28 | Mz- | 0.00 | 0.00 | 0.00 |
| 30 | 15 | 22 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -42.56 | -45.17 | 110.92 |
| | | 22 | Fy- | -42.56 | -45.17 | 110.92 |
| | | 22 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 28 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 28 | Mz+ | -24.96 | -7.39 | 69.85 |
| | | 28 | Fy- | -24.96 | -7.39 | 69.85 |
| | | 28 | Mz- | 0.00 | 0.00 | 0.00 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|

ENVR.LST Sábado, 18 Mayo 2002 6:46am

| | | | | | | |
|---|---|---|---|---|---|---|
| 29 | 22 | Fy+ | -42.52 | 73.10 | 0.00 |
| | 22 | Mz+ | -43.83 | 72.45 | 0.00 |
| | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -43.83 | 72.45 | 0.00 |
| | 28 | Fy+ | -9.70 | 49.36 | 0.00 |
| | 28 | Mz+ | -18.32 | 47.48 | 0.00 |
| | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | 28 | Mz- | -18.32 | 47.48 | 0.00 |
| 39 | 22 | Fy+ | 42.94 | 73.10 | 0.00 |
| | 22 | Mz+ | 42.94 | 73.10 | 0.00 |
| | 22 | Fy- | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | 42.94 | 73.10 | 0.00 |
| | 28 | Fy+ | -7.37 | 55.50 | 0.00 |
| | 28 | Mz+ | -7.37 | 55.50 | 0.00 |
| | 28 | Fy- | 0.00 | 0.00 | 0.00 |
| | 28 | Mz- | -7.37 | 55.50 | 0.00 |

LISTADO DE ESTADOS DE CARGA
Fecha : 16.05.2002 13:18:17
Título: LAV-MARTORELL: TUENL ARTIFICIAL TRAMO CUBIERTO. CR
Coment: Aplicacion de coeficientes de excentricidad
Titlst: Listados de envolventes de servicio

Tabla de estados de carga a listar

| ec | Fichero | tipo | Título | |
|---|---|---|---|---|
| 12 | SER1 | 1 | [ENVOLVENTE CAR. SERVICIO | ] |
| 18 | SER2 | 1 | [ENVOLVENTE CAR. SERVICIO ASIMETRICA | ] |

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Mz |
|---|---|---|---|---|---|---|
| 1 | 1 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | -30.04 | -31.08 | -76.07 |
| | | 12 | Mz- | -30.04 | -31.08 | -76.07 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -4.86 | -14.43 | -17.01 |
| | | 18 | Mz- | -4.86 | -14.43 | -17.01 |
| 2 | 2 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | -30.04 | -28.45 | -62.68 |
| | | 12 | Mz- | -29.31 | -27.28 | -62.91 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -4.86 | -12.79 | -10.88 |
| | | 18 | Mz- | -4.13 | -11.62 | -11.11 |
| 3 | 3 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | -30.04 | -23.22 | -36.84 |
| | | 12 | Mz- | -29.31 | -22.33 | -38.10 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | -5.04 | -6.82 | 6.19 |
| | | 18 | Fy- | -4.86 | -9.76 | 0.40 |
| | | 18 | Mz- | -4.13 | -8.87 | -0.87 |
| 4 | 4 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | -30.04 | -18.62 | -15.92 |
| | | 12 | Mz- | -29.16 | -17.53 | -18.03 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | -5.19 | -5.30 | 12.10 |
| | | 18 | Fy- | -4.86 | -7.36 | 8.96 |
| | | 18 | Mz- | 0.00 | 0.00 | 0.00 |
| 5 | 5 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | -30.37 | -12.23 | 1.61 |
| | | 12 | Fy- | -30.04 | -14.02 | 0.39 |
| | | 12 | Mz- | -29.16 | -13.33 | -2.60 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | -5.19 | -3.18 | 16.33 |
| | | 18 | Fy- | -4.86 | -4.96 | 15.12 |
| | | 18 | Mz- | 0.00 | 0.00 | 0.00 |
| 6 | 6 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | -30.36 | -8.98 | 12.78 |
| | | 12 | Fy- | -30.04 | -9.42 | 12.11 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | -5.17 | -2.13 | 19.55 |
| | | 18 | Fy- | -4.86 | -2.56 | 18.88 |
| | | 18 | Mz- | 0.00 | 0.00 | 0.00 |
| 7 | 7 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | -30.36 | -4.38 | 19.47 |
| | | 12 | Fy- | -29.31 | -5.05 | 16.64 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | -5.04 | 1.18 | 17.46 |
| | | 18 | Mz+ | -5.17 | 0.27 | 20.48 |
| | | 18 | Fy- | -4.13 | -0.39 | 17.66 |
| | | 18 | Mz- | 0.00 | 0.00 | 0.00 |
| 8 | 8 | 12 | Fy+ | -30.37 | 0.73 | 18.87 |
| | | 12 | Mz+ | -30.04 | -0.22 | 21.75 |
| | | 12 | Fy- | -29.31 | -0.73 | 19.53 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | -5.19 | 3.18 | 16.32 |
| | | 18 | Mz+ | -4.86 | 2.24 | 19.20 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | 0.00 | 0.00 | 0.00 |
| 9 | 9 | 12 | Fy+ | -30.37 | 5.05 | 15.98 |
| | | 12 | Mz+ | -30.04 | 4.38 | 19.67 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | -5.19 | 5.30 | 12.08 |
| | | 18 | Mz+ | -4.86 | 4.64 | 15.77 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | 0.00 | 0.00 | 0.00 |
| 10 | 10 | 12 | Fy+ | -30.36 | 9.42 | 11.91 |
| | | 12 | Mz+ | -30.04 | 8.98 | 12.98 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | -5.17 | 7.47 | 8.86 |
| | | 18 | Mz+ | -4.86 | 7.04 | 9.93 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | 0.00 | 0.00 | 0.00 |
| 11 | 11 | 12 | Fy+ | -30.36 | 14.02 | 0.19 |
| | | 12 | Mz+ | -29.31 | 12.23 | 2.27 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | -30.22 | 13.33 | -3.27 |
| | | 18 | Fy+ | -5.17 | 9.87 | 0.18 |
| | | 18 | Mz+ | -4.13 | 8.09 | 2.26 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | -5.04 | 9.18 | -3.28 |
| 12 | 12 | 12 | Fy+ | -30.36 | 18.62 | -16.12 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | -30.22 | 17.53 | -18.69 |
| | | 18 | Fy+ | -5.17 | 12.27 | -10.89 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | -5.04 | 11.18 | -13.46 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13 | 13 | 12 | Fy+ | -30.36 | 23.22 | -37.04 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | -30.37 | 22.33 | -38.77 |
| | | 18 | Fy+ | -5.17 | 14.67 | -24.37 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | -5.19 | 13.78 | -26.09 |
| 14 | 14 | 12 | Fy+ | -30.36 | 28.45 | -62.87 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | -30.37 | 27.28 | -63.57 |
| | | 18 | Fy+ | -5.17 | 17.70 | -40.55 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | -5.19 | 16.53 | -41.25 |
| 14 | 15 | 12 | Fy+ | -30.36 | 31.08 | -76.27 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | -30.37 | 29.78 | -76.41 |
| | | 18 | Fy+ | -5.17 | 19.35 | -48.89 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | -5.19 | 18.05 | -49.03 |
| 21 | 20 | 12 | Fy+ | -30.64 | 29.37 | 61.51 |
| | | 12 | Mz+ | -31.08 | 29.10 | 64.24 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | -14.00 | 5.15 | 12.33 |
| | | 18 | Mz+ | -14.43 | 4.88 | 15.06 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | 0.00 | 0.00 | 0.00 |
| 22 | 21 | 12 | Fy+ | -34.39 | 25.59 | 25.71 |
| | | 12 | Mz+ | -33.53 | 25.00 | 29.39 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | -17.74 | 5.07 | 5.69 |
| | | 18 | Mz+ | -16.88 | 4.48 | 9.36 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | -14.65 | 4.68 | -1.73 |
| 23 | 22 | 12 | Fy+ | -37.08 | 21.94 | 4.89 |
| | | 12 | Mz+ | -35.78 | 21.61 | 6.00 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | -33.55 | 21.39 | -5.08 |
| | | 18 | Fy+ | -20.43 | 5.03 | 3.67 |
| | | 18 | Mz+ | -19.13 | 4.69 | 4.78 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | -16.90 | 4.47 | -6.31 |
| 24 | 23 | 12 | Fy+ | -39.33 | 17.41 | -14.87 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | -35.80 | 16.58 | -24.15 |
| | | 18 | Fy+ | -22.68 | 5.09 | -1.39 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | -19.15 | 4.26 | -10.67 |

ENVS.LST Sábado, 18 Mayo 2002 6:46am

| | | | | | | |
|---|---|---|---|---|---|---|
| 25 | 24 | 12 | Fy+ | -41.58 | 11.87 | -29.59 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | -38.05 | 10.77 | -37.90 |
| | | 18 | Fy+ | -24.93 | 4.65 | -6.34 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | -21.40 | 3.55 | -14.66 |
| 26 | 25 | 12 | Fy+ | -42.53 | 5.44 | -36.83 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | -40.30 | 3.96 | -45.35 |
| | | 18 | Fy+ | -25.88 | 3.32 | -8.91 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | -23.65 | 1.84 | -17.43 |
| 27 | 26 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | -42.55 | -3.85 | -45.48 |
| | | 12 | Mz- | -42.55 | -3.85 | -45.48 |
| | | 18 | Fy+ | -28.13 | 1.03 | -11.18 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -25.90 | -0.87 | -18.00 |
| | | 18 | Mz- | -25.90 | -0.87 | -18.00 |
| 28 | 27 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | -44.80 | -12.66 | -37.31 |
| | | 12 | Mz- | -44.80 | -12.66 | -37.31 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -28.15 | -4.58 | -15.36 |
| | | 18 | Mz- | -28.15 | -4.58 | -15.36 |
| 29 | 28 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | -47.05 | -22.47 | -19.82 |
| | | 12 | Mz- | -47.05 | -22.47 | -19.82 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -30.40 | -9.29 | -8.51 |
| | | 18 | Mz- | -30.40 | -9.29 | -8.51 |
| 29 | 29 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | -51.83 | -28.96 | 0.00 |
| | | 12 | Fy- | -48.74 | -30.49 | 0.00 |
| | | 12 | Mz- | -51.83 | -28.96 | 0.00 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | -35.18 | -11.95 | 0.00 |
| | | 18 | Fy- | -32.09 | -13.48 | 0.00 |
| | | 18 | Mz- | -35.18 | -11.95 | 0.00 |
| 31 | 30 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | -29.78 | -29.41 | -64.45 |
| | | 12 | Mz- | -29.78 | -29.41 | -64.45 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -18.05 | -5.19 | -46.96 |
| | | 18 | Mz- | -18.05 | -5.19 | -46.96 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 32 | 31 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | -33.53 | -25.71 | -28.55 |
| | | 12 | Mz- | -33.53 | -25.71 | -28.55 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -21.79 | -5.19 | -40.21 |
| | | 18 | Mz- | -21.79 | -5.19 | -40.21 |
| 33 | 32 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | -33.55 | -20.89 | 3.65 |
| | | 12 | Fy- | -35.78 | -22.11 | -4.56 |
| | | 12 | Mz- | -35.78 | -22.11 | -4.56 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -24.04 | -5.19 | -35.02 |
| | | 18 | Mz- | -24.04 | -5.19 | -35.02 |
| 34 | 33 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | -35.80 | -16.29 | 22.32 |
| | | 12 | Fy- | -38.03 | -17.51 | 15.33 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -26.29 | -5.19 | -29.83 |
| | | 18 | Mz- | -26.29 | -5.19 | -29.83 |
| 35 | 34 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | -38.05 | -10.69 | 35.89 |
| | | 12 | Fy- | -40.28 | -11.91 | 30.12 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -28.54 | -5.19 | -24.65 |
| | | 18 | Mz- | -28.54 | -5.19 | -24.65 |
| 36 | 35 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | -40.30 | -4.09 | 43.37 |
| | | 12 | Fy- | -42.53 | -5.31 | 38.81 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -30.79 | -5.19 | -19.46 |
| | | 18 | Mz- | -30.79 | -5.19 | -19.46 |
| 37 | 36 | 12 | Fy+ | -42.55 | 3.51 | 43.74 |
| | | 12 | Mz+ | -42.55 | 3.51 | 43.74 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -33.04 | -5.19 | -14.27 |
| | | 18 | Mz- | -33.04 | -5.19 | -14.27 |
| 38 | 37 | 12 | Fy+ | -44.80 | 12.11 | 36.02 |
| | | 12 | Mz+ | -44.80 | 12.11 | 36.02 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -35.29 | -5.19 | -9.08 |
| | | 18 | Mz- | -35.29 | -5.19 | -9.08 |

ENVS.LST Sábado, 18 Mayo 2002 6:46am

| | | | | | | |
|---|---|---|---|---|---|---|
| 39 | 38 | 12 | Fy+ | -47.05 | 21.71 | 19.19 |
| | | 12 | Mz+ | -47.05 | 21.71 | 19.19 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | -37.54 | -5.19 | -3.89 |
| | | 18 | Mz- | -37.54 | -5.19 | -3.89 |
| 39 | 39 | 12 | Fy+ | -48.74 | 29.56 | 0.00 |
| | | 12 | Mz+ | -52.26 | 28.36 | 0.00 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | -52.26 | 28.36 | 0.00 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | -40.53 | -5.17 | 0.00 |
| | | 18 | Fy- | -39.23 | -5.19 | 0.00 |
| | | 18 | Mz- | -40.53 | -5.17 | 0.00 |
| 20 | 20 | 12 | Fy+ | -30.64 | 29.37 | -61.51 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | -31.08 | 29.10 | -64.24 |
| | | 18 | Fy+ | -14.00 | 5.15 | -12.33 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | -14.43 | 4.88 | -15.06 |
| 20 | 1 | 12 | Fy+ | -28.33 | 30.37 | -67.03 |
| | | 12 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz- | -31.08 | 30.04 | -76.07 |
| | | 18 | Fy+ | -11.68 | 5.19 | -7.97 |
| | | 18 | Mz+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz- | -14.43 | 4.86 | -17.01 |
| 30 | 30 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | -29.78 | -29.41 | 64.45 |
| | | 12 | Fy- | -29.78 | -29.41 | 64.45 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | -18.05 | -5.19 | 46.96 |
| | | 18 | Fy- | -18.05 | -5.19 | 46.96 |
| | | 18 | Mz- | 0.00 | 0.00 | 0.00 |
| 30 | 15 | 12 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 12 | Mz+ | -29.78 | -30.37 | 76.41 |
| | | 12 | Fy- | -29.78 | -30.37 | 76.41 |
| | | 12 | Mz- | 0.00 | 0.00 | 0.00 |
| | | 18 | Fy+ | 0.00 | 0.00 | 0.00 |
| | | 18 | Mz+ | -18.05 | -5.19 | 49.03 |
| | | 18 | Fy- | -18.05 | -5.19 | 49.03 |
| | | 18 | Mz- | 0.00 | 0.00 | 0.00 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

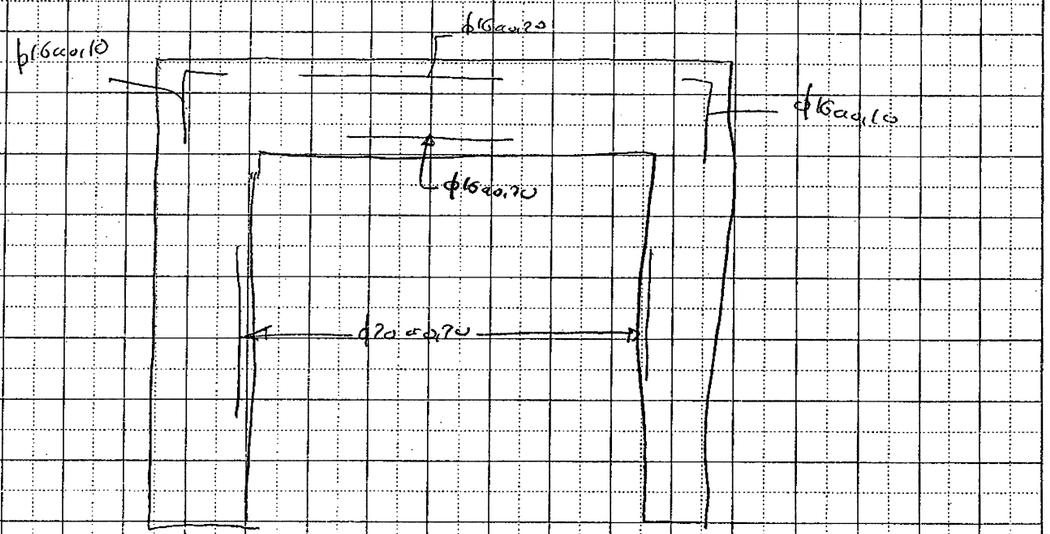
| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| 29 | 12 | Fy+ | -28.09 | 52.26 | 0.00 |
| | 12 | Mz+ | -28.96 | 51.83 | 0.00 |
| | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | 12 | Mz- | -28.96 | 51.83 | 0.00 |
| | 18 | Fy+ | -11.08 | 35.62 | 0.00 |
| | 18 | Mz+ | -11.95 | 35.18 | 0.00 |
| | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | 18 | Mz- | -11.95 | 35.18 | 0.00 |
| 39 | 12 | Fy+ | 28.36 | 52.26 | 0.00 |
| | 12 | Mz+ | 28.36 | 52.26 | 0.00 |
| | 12 | Fy- | 0.00 | 0.00 | 0.00 |
| | 12 | Mz- | 28.36 | 52.26 | 0.00 |
| | 18 | Fy+ | -5.17 | 40.53 | 0.00 |
| | 18 | Mz+ | -5.17 | 40.53 | 0.00 |
| | 18 | Fy- | 0.00 | 0.00 | 0.00 |
| | 18 | Mz- | -5.17 | 40.53 | 0.00 |



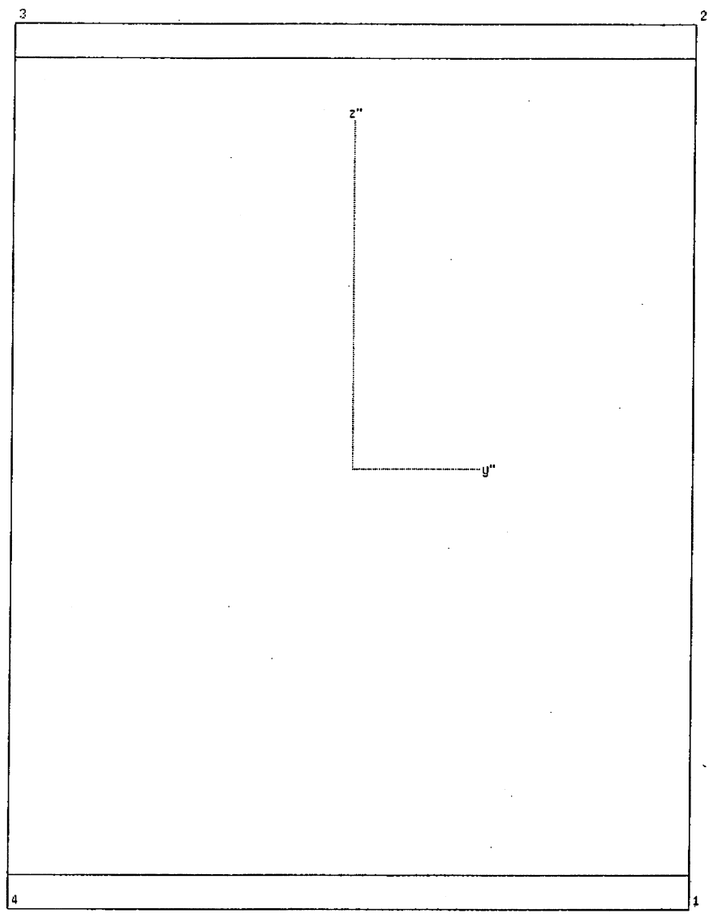
ARMADO TRANSVERSAL

De los esfuerzos anteriores se llega al siguiente esquema de armado tal y como se muestra en las Páginas siguientes




El resto de la armadura viene por viñeta y por el cálculo longitudinal

tb. 1 : 9.0




ción :"CARDINT" Armadura :"B1"
o : tipo viga/ Rectángulo Unidades :[cm]
erial :"H250"

ho = 100.00 cm Canto = 130.00 cm

acterísticas mecánicas de la sección:
a : Ax= 1.300 [m2]
entos de inercia : Iy= 0.183083 [m4] Iz= 0.108333 [m4]
rcia a torsión : Ix= 0.229402 [m4]

ición del centro de gravedad: ys= 0.000 [m] zs= 0.650000 [m]

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| . | Iz | -0.500 | -0.216667 | 0.167 |
| . | Iz | 0.500 | 0.216667 | -0.167 |
| jo | Iy | -0.650 | -0.281666 | 0.217 |
| iba | Iy | 0.650 | 0.281666 | -0.217 |



Armadura: "B1"

| Nº | Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|---|
| 1 | AEH500 | (2) | 0.01 | -50.00 | 5.00 | 50.00 | 5.00 |
| 2 | AEH500 | (2) | 0.01 | -50.00 | 125.00 | 50.00 | 125.00 |

Total: 0.02 Cuantía de armadura: 0.000 [o/o]

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

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

| Cortante | Area mín.cercos | Ancho alma ideal | Canto útil | Incl.bielas |
|---|---|---|---|---|
| Vz | 0.00 [cm2/m] | 100.00 [cm] | 126.00 [cm] | 0.00 |
| Vy | 0.00 [cm2/m] | 130.00 [cm] | 96.00 [cm] | 0.00 |

Características del material:

| Nom.Mat. | Módulo E [ kp/cm2] | 0.85*fcd,fyd [ kp/cm2] | eps-fc [o/oo] | fct [ kp/cm2] | fcv [ kp/cm2] | fcw,mín [ kp/cm2] |
|---|---|---|---|---|---|---|
| "H250" | 278000.0 | -141.600 | -2.000 | 0.0 | 6.460 | 250.000 |
| "AEH500" | 2.10E+06 | 4434.700 | | | | |

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

imensionamiento : Viga "CARDINT"/"B1"

ifuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -40.320 | | | | -102.800 | | 45.0 |

| madura ngitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| "AEH500" | -50.0 | 5.0 | 50.0 | 5.0 | 0.01 | - | 0.01 |
| "AEH500" | -50.0 | 125.0 | 50.0 | 125.0 | 0.01 | 14.81 | 14.81 |
| | | | | Cuantía arm. 0.11 [o/o] | | Suma | 14.82 |

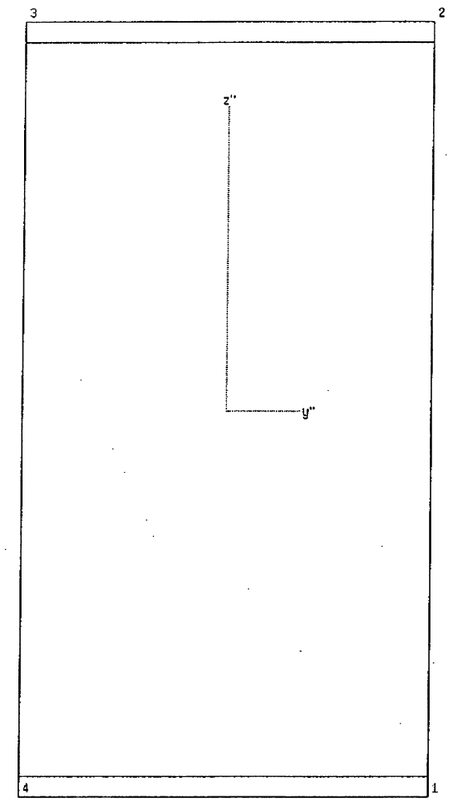
formaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| rmigón-Min | 50.00 | 0.00 | -1.318 | -125.155 | "H250" |
| nadura-Min | 50.00 | 5.00 | -0.866 | -1817.932 | "AEH500" |
| rmigón-Max | -50.00 | 130.00 | 10.453 | 0.000 | "H250" |
| nadura-Max | -50.00 | 125.00 | 10.000 | 4434.700 | "AEH500" |

| | | | | | |
|---|---|---|---|---|---|
| ora neutra | zn | 14.56 cm | yn | 0.00 cm | Angulo 0.0 |
| cho zona comprim. | | 14.56 cm | Zona comprimida/Canto útil | | 0.12 |



Mstb. 1 : 15.0




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

Ancho = 100.00 cm Canto = 190.00 cm

Características mecánicas de la sección:
Area : Ax= 1.900 [m2]
Momentos de inercia : Iy= 0.571583 [m4] Iz= 0.158333 [m4]
Inercia a torsión : Ix= 0.424663 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.950000 [m]

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| izq. | Iz | -0.500 | -0.316667 | 0.167 |
| dch. | Iz | 0.500 | 0.316667 | -0.167 |
| abajo | Iy | -0.950 | -0.601666 | 0.317 |
| arriba | Iy | 0.950 | 0.601666 | -0.317 |

rmadura: "B1"

| º | Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|---|
| 1 | AEH500 | (2) | 0.01 | -50.00 | 5.00 | 50.00 | 5.00 |
| 2 | AEH500 | (2) | 0.01 | -50.00 | 185.00 | 50.00 | 185.00 |

Total: 0.02 Cuantía de armadura: 0.000 [o/o]

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

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

| ortante | Area mín.cercos | Ancho alma ideal | Canto útil | Incl.bielas |
|---|---|---|---|---|
| /z | 0.00 [cm2/m] | 100.00 [cm] | 186.00 [cm] | 0.00 |
| /y | 0.00 [cm2/m] | 190.00 [cm] | 96.00 [cm] | 0.00 |

aracterísticas del material:

| m.Mat. | Módulo E [ kp/cm2] | 0.85*fcd,fyd [ kp/cm2] | eps-fc [o/oo] | fct [ kp/cm2] | fcv [ kp/cm2] | fcw,mín [ kp/cm2] |
|---|---|---|---|---|---|---|
| 250" | 278000.0 | -141.600 | -2.000 | 0.0 | 6.460 | 250.000 |
| EH500" | 2.10E+06 | 4434.700 | | | | |

yenda:
d,fyd resistencia de cálculo del hormigón,acero
s-fc deformación al final de la parábola (fig.2.3, cap.2.2)
t resistencia de cálculo a tracción del hormigón
v resistencia virtual de cálculo del hormigón a esfuerzo cortante



Dimensionamiento : Viga "CASHAST"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -44.450 | | | | -110.920 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. As [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "AEH500" | -50.0 | 5.0 | 50.0 | 5.0 | 0.01 | - | 0.01 |
| 2 "AEH500" | -50.0 | 185.0 | 50.0 | 185.0 | 0.01 | 8.92 | 8.92 |

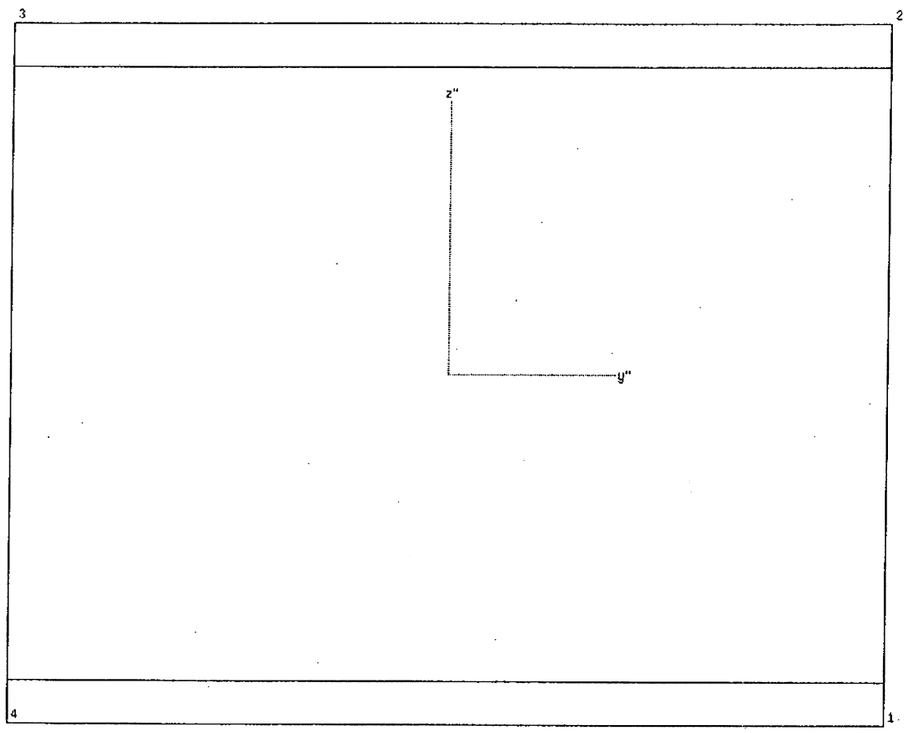
Cuantía arm. 0.05 [o/o] Suma 8.93

Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | 50.00 | 0.00 | -0.908 | -99.401 | "H250" |
| Armadura-Min | 50.00 | 5.00 | -0.613 | -1288.063 | "AEH500" |
| Hormigón-Max | -50.00 | 190.00 | 10.295 | 0.000 | "H250" |
| Armadura-Max | -50.00 | 185.00 | 10.000 | 4434.700 | "AEH500" |

Fibra neutra zn 15.40 cm yn 0.00 cm Angulo 0.0
Ancho zona comprim. 15.40 cm Zona comprimida/Canto útil 0.08

stb. 1 : 7.0




cción :"DINTEL" Armadura :"B1"
po : tipo viga/ Rectángulo Unidades :[cm]
terial :"H250"

cho = 100.00 cm Canto = 80.00 cm

racterísticas mecánicas de la sección:
ea : Ax= 0.800000 [m2]
ientos de inercia : Iy= 0.042667 [m4] Iz= 0.066667 [m4]
ercia a torsión : Ix= 0.087559 [m4]

ición del centro de gravedad: ys= 0.000 [m] zs= 0.400000 [m]

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| . | Iz | -0.500 | -0.133333 | 0.167 |
| . | Iz | 0.500 | 0.133333 | -0.167 |
| ajo | Iy | -0.400 | -0.106667 | 0.133 |
| riba | Iy | 0.400 | 0.106667 | -0.133 |

adura: "B1"

| Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|
| AEH500 | (2) | 0.01 | -50.00 | 5.00 | 50.00 | 5.00 |



| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | AEH500 | (2) | 0.01 | -50.00 | 75.00 | 50.00 | 75.00 |

Total: 0.02 Cuantía de armadura: 0.000 [o/o]

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

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

| Cortante | Area mín.cercos | Ancho alma ideal | Canto útil | Incl.bielas |
|---|---|---|---|---|
| Vz | 0.00 [cm2/m] | 100.00 [cm] | 76.00 [cm] | 0.00 |
| Vy | 0.00 [cm2/m] | 80.00 [cm] | 96.00 [cm] | 0.00 |

Características del material:

| Nom.Mat. | Módulo E [ kp/cm2] | 0.85*fcd,fyd [ kp/cm2] | eps-fc [o/oo] | fct [ kp/cm2] | fcv [ kp/cm2] | fcw,mín [ kp/cm2] |
|---|---|---|---|---|---|---|
| "H250" | 278000.0 | -141.600 | -2.000 | 0.0 | 6.460 | 250.000 |
| "AEH500" | 2.10E+06 | 4434.700 | | | | |

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

mensionamiento : Viga "DINTEL"/"B1"

fuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -39.880 | | | | 37.470 | | 45.0 |

| madura ngitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| "AEH500" | -50.0 | 5.0 | 50.0 | 5.0 | 0.01 | 7.19 | 7.19 |
| "AEH500" | -50.0 | 75.0 | 50.0 | 75.0 | 0.01 | - | 0.01 |
| | | | | Cuantía arm. 0.09 [o/o] | | Suma | 7.20 |

formaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| rmigón-Min | -50.00 | 80.00 | -1.424 | -129.860 | "H250" |
| nadura-Min | -50.00 | 75.00 | -0.663 | -1391.283 | "AEH500" |
| rmigón-Max | 50.00 | 0.00 | 10.762 | 0.000 | "H250" |
| nadura-Max | 50.00 | 5.00 | 10.000 | 4434.700 | "AEH500" |

ora neutra zn 70.65 cm yn -0.00 cm Angulo 0.0
cho zona comprim. 9.35 cm Zona comprimida/Canto útil 0.12

mensionamiento : Viga "DINTEL"/"B1"

uerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -40.250 | | | | -48.580 | | 45.0 |

| adura gitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| "AEH500" | -50.0 | 5.0 | 50.0 | 5.0 | 0.01 | - | 0.01 |
| "AEH500" | -50.0 | 75.0 | 50.0 | 75.0 | 0.01 | 10.78 | 10.78 |
| | | | | Cuantía arm. 0.13 [o/o] | | Suma | 10.79 |

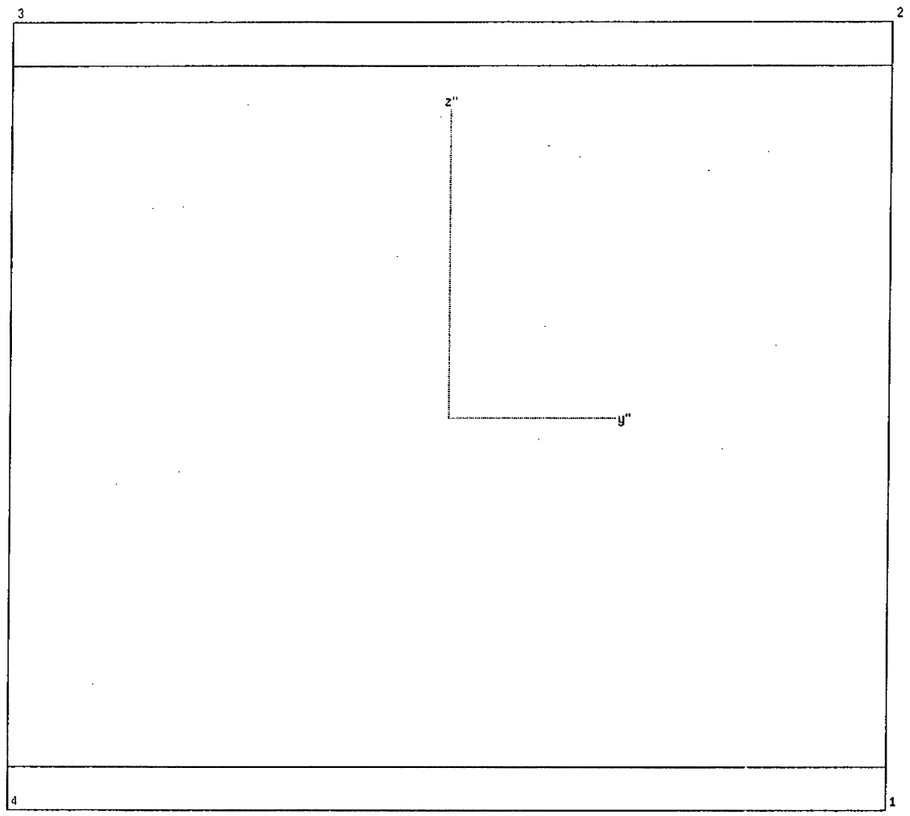


Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | 50.00 | 0.00 | -1.628 | -136.706 | "H250" |
| Armadura-Min | 50.00 | 5.00 | -0.853 | -1791.207 | "AEH500" |
| Hormigón-Max | -50.00 | 80.00 | 10.775 | 0.000 | "H250" |
| Armadura-Max | -50.00 | 75.00 | 10.000 | 4434.700 | "AEH500" |

Fibra neutra zn 10.50 cm yn 0.00 cm Angulo 0.0
Ancho zona comprim. 10.50 cm Zona comprimida/Canto útil 0.14

stb. 1 : 7.0




cción :"HASTIAL" Armadura :"B1"
po : tipo viga/ Rectángulo Unidades :[cm]
terial :"H250"

cho = 100.00 cm Canto = 90.00 cm

racterísticas mecánicas de la sección:
ea : Ax= 0.900000 [m2]
mentos de inercia : Iy= 0.060750 [m4] Iz= 0.075000 [m4]
ercia a torsión : Ix= 0.112680 [m4]

sición del centro de gravedad: ys= 0.000 [m] zs= 0.450000 [m]

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| g. | Iz | -0.500 | -0.150000 | 0.167 |
| d. | Iz | 0.500 | 0.150000 | -0.167 |
| ajo | Iy | -0.450 | -0.135000 | 0.150 |
| riba | Iy | 0.450 | 0.135000 | -0.150 |



Armadura: "B1"

| Nº | Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|---|
| 1 | AEH500 | (2) | 0.01 | -50.00 | 5.00 | 50.00 | 5.00 |
| 2 | AEH500 | (2) | 0.01 | -50.00 | 85.00 | 50.00 | 85.00 |
| | Total: | | 0.02 | Cuantía de armadura: 0.000 [o/o] | | | |

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

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

| Cortante | Area mín.cercos | Ancho alma ideal | Canto útil | Incl.bielas |
|---|---|---|---|---|
| Vz | 0.00 [cm2/m] | 100.00 [cm] | 86.00 [cm] | 0.00 |
| Vy | 0.00 [cm2/m] | 90.00 [cm] | 96.00 [cm] | 0.00 |

Características del material:

| Nom.Mat. | Módulo E [ kp/cm2] | 0.85*fcd,fyd [ kp/cm2] | eps-fc [o/oo] | fct [ kp/cm2] | fcv [ kp/cm2] | fcw,mín [ kp/cm2] |
|---|---|---|---|---|---|---|
| "H250" | 278000.0 | -141.600 | -2.000 | 0.0 | 6.460 | 250.000 |
| "AEH500" | 2.10E+06 | 4434.700 | | | | |

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

mensionamiento : Viga "HASTIAL"/"B1"

fuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -45.850 | | | | 67.720 | | 45.0 |

| madura ngitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| "AEH500" | -50.0 | 5.0 | 50.0 | 5.0 | 0.01 | 13.78 | 13.78 |
| "AEH500" | -50.0 | 85.0 | 50.0 | 85.0 | 0.01 | - | 0.01 |
| | | | | Cuantía arm. 0.15 [o/o] | | Suma | 13.79 |

formaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| rmigón-Min | -50.00 | 90.00 | -1.707 | -138.556 | "H250" |
| madura-Min | -50.00 | 85.00 | -1.018 | -2138.072 | "AEH500" |
| rmigón-Max | 50.00 | 0.00 | 10.689 | 0.000 | "H250" |
| madura-Max | 50.00 | 5.00 | 10.000 | 4434.700 | "AEH500" |

bra neutra zn 77.61 cm yn -0.00 cm Angulo 0.0
cho zona comprim. 12.39 cm Zona comprimida/Canto útil 0.15

mensionamiento : Viga "HASTIAL"/"B1"

fuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -47.030 | | | | 72.920 | | 45.0 |

| madura ngitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| "AEH500" | -50.0 | 5.0 | 50.0 | 5.0 | 0.01 | 15.17 | 15.17 |
| "AEH500" | -50.0 | 85.0 | 50.0 | 85.0 | 0.01 | - | 0.01 |
| | | | | Cuantía arm. 0.17 [o/o] | | Suma | 15.18 |



Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | -50.00 | 90.00 | -1.787 | -139.988 | "H250" |
| Armadura-Min | -50.00 | 85.00 | -1.093 | -2295.947 | "AEH500" |
| Hormigón-Max | 50.00 | 0.00 | 10.693 | 0.000 | "H250" |
| Armadura-Max | 50.00 | 5.00 | 10.000 | 4434.700 | "AEH500" |

Fibra neutra zn 77.12 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 12.88 cm Zona comprimida/Canto útil 0.15

11 PILOTES.

| | | N_ax | M_ax | N acdc | Δ |
|---|---|---|---|---|---|
| Ext | 1 | 511,75 | -719,64 | -319,13 | min |
| Gutal | 2 | 1213,28 | -1446,67 | 19,75 | min |
| Ext | 3 | 450,48 | -632,17 | 271,24 | — |

σ =

Ext 20,10 OK

Gal 47,69 ⇒ No sirve para considerar

Ext

Peso Propio de tierras encima

mi scu

Para Sólo Ppropio Dintel, como es el caso de

001300 2 m

N_ax = 780,60 t ⇒ σ = 30,50 Kp/cm² ok

As_i = 34 ϕ 20 = 0,4 %

En las Paginas siguientes se vuelcan los resultados de los casos

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

LISTADO DE ESTADOS DE CARGA
Fecha : 10.05.2002 20:03:33
Título: LAV-MARTORELL: TUNEL ARTIFICIAL TRAMO CUBIERTO. CR
Coment: Modelo longitudinal
Titlst: Listados de estados de carga elementales

Tabla de estados de carga a listar

| ec | Fichero | tipo | Título |
|---|---|---|---|
| 1 | carga001 | 0 | [PESO PROPIO semi-viga ] |
| 2 | carga002 | 0 | [PESO PROPIO relleno ] |
| 3 | carga003 | 0 | [scu 0.40 t/m2 ] |
| 10 | CP | 1 | [ENVOLVENTE CP ] |
| 20 | ENCSER | 1 | [ENVOLVENTE CAR. SERVICIO ] |
| 22 | ENROT | 1 | [ENVOLVENTE ROTURA ] |

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Fz | Tx | My | Mz |
|---|---|---|---|---|---|---|---|---|---|
| 110 | 110 | 1 | | -329.91 | -1.18 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 2 | | -154.71 | -0.55 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 3 | | -28.13 | -0.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 10 | Fy+ | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 10 | Mz+ | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 10 | Fy- | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 10 | Mz- | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 20 | Fy+ | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 20 | Mz+ | -512.75 | -1.84 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 20 | Fy- | -512.75 | -1.84 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 20 | Mz- | -512.75 | -1.84 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy+ | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -719.64 | -2.58 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | -719.64 | -2.58 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -719.64 | -2.58 | 0.00 | 0.00 | 0.00 | 0.00 |
| 110 | 109 | 1 | | -329.91 | -1.18 | 0.00 | 0.00 | 0.00 | 2.40 |
| | | 2 | | -154.71 | -0.55 | 0.00 | 0.00 | 0.00 | 1.13 |
| | | 3 | | -28.13 | -0.10 | 0.00 | 0.00 | 0.00 | 0.20 |
| | | 10 | Fy+ | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 10 | Mz+ | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 10 | Fy- | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 10 | Mz- | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 20 | Fy+ | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 20 | Mz+ | -512.75 | -1.84 | 0.00 | 0.00 | 0.00 | 3.73 |
| | | 20 | Fy- | -512.75 | -1.84 | 0.00 | 0.00 | 0.00 | 3.73 |
| | | 20 | Mz- | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 22 | Fy+ | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 22 | Mz+ | -719.64 | -2.58 | 0.00 | 0.00 | 0.00 | 5.23 |
| | | 22 | Fy- | -719.64 | -2.58 | 0.00 | 0.00 | 0.00 | 5.23 |
| | | 22 | Mz- | -484.62 | -1.74 | 0.00 | 0.00 | 0.00 | 3.52 |
| 109 | 109 | 1 | | -329.91 | -2.65 | 0.00 | 0.00 | 0.00 | 2.40 |
| | | 2 | | -154.71 | -1.24 | 0.00 | 0.00 | 0.00 | 1.13 |
| | | 3 | | -28.13 | -0.23 | 0.00 | 0.00 | 0.00 | 0.20 |
| | | 10 | Fy+ | -484.62 | -3.89 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 10 | Mz+ | -484.62 | -3.89 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 10 | Fy- | -484.62 | -3.89 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 10 | Mz- | -484.62 | -3.89 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 20 | Fy+ | -484.62 | -3.89 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 20 | Mz+ | -512.75 | -4.12 | 0.00 | 0.00 | 0.00 | 3.73 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 20 | Fy- | -512.75 | -4.12 | 0.00 | 0.00 | 0.00 | 3.73 |
| | | 20 | Mz- | -484.62 | -3.89 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 22 | Fy+ | -484.62 | -3.89 | 0.00 | 0.00 | 0.00 | 3.52 |
| | | 22 | Mz+ | -719.64 | -5.78 | 0.00 | 0.00 | 0.00 | 5.23 |
| | | 22 | Fy- | -719.64 | -5.78 | 0.00 | 0.00 | 0.00 | 5.23 |
| | | 22 | Mz- | -484.62 | -3.89 | 0.00 | 0.00 | 0.00 | 3.52 |
| 108 | 108 | 1 | | -329.91 | -3.95 | 0.00 | 0.00 | 0.00 | 7.78 |
| | | 2 | | -154.71 | -1.85 | 0.00 | 0.00 | 0.00 | 3.65 |
| | | 3 | | -28.13 | -0.34 | 0.00 | 0.00 | 0.00 | 0.66 |
| | | 10 | Fy+ | -484.62 | -5.80 | 0.00 | 0.00 | 0.00 | 11.43 |
| | | 10 | Mz+ | -484.62 | -5.80 | 0.00 | 0.00 | 0.00 | 11.43 |
| | | 10 | Fy- | -484.62 | -5.80 | 0.00 | 0.00 | 0.00 | 11.43 |
| | | 10 | Mz- | -484.62 | -5.80 | 0.00 | 0.00 | 0.00 | 11.43 |
| | | 20 | Fy+ | -484.62 | -5.80 | 0.00 | 0.00 | 0.00 | 11.43 |
| | | 20 | Mz+ | -512.75 | -6.14 | 0.00 | 0.00 | 0.00 | 12.09 |
| | | 20 | Fy- | -512.75 | -6.14 | 0.00 | 0.00 | 0.00 | 12.09 |
| | | 20 | Mz- | -484.62 | -5.80 | 0.00 | 0.00 | 0.00 | 11.43 |
| | | 22 | Fy+ | -484.62 | -5.80 | 0.00 | 0.00 | 0.00 | 11.43 |
| | | 22 | Mz+ | -719.64 | -8.62 | 0.00 | 0.00 | 0.00 | 16.97 |
| | | 22 | Fy- | -719.64 | -8.62 | 0.00 | 0.00 | 0.00 | 16.97 |
| | | 22 | Mz- | -484.62 | -5.80 | 0.00 | 0.00 | 0.00 | 11.43 |
| 107 | 107 | 1 | | -329.91 | -3.78 | 0.00 | 0.00 | 0.00 | 15.80 |
| | | 2 | | -154.71 | -1.77 | 0.00 | 0.00 | 0.00 | 7.41 |
| | | 3 | | -28.13 | -0.32 | 0.00 | 0.00 | 0.00 | 1.35 |
| | | 10 | Fy+ | -484.62 | -5.56 | 0.00 | 0.00 | 0.00 | 23.21 |
| | | 10 | Mz+ | -484.62 | -5.56 | 0.00 | 0.00 | 0.00 | 23.21 |
| | | 10 | Fy- | -484.62 | -5.56 | 0.00 | 0.00 | 0.00 | 23.21 |
| | | 10 | Mz- | -484.62 | -5.56 | 0.00 | 0.00 | 0.00 | 23.21 |
| | | 20 | Fy+ | -484.62 | -5.56 | 0.00 | 0.00 | 0.00 | 23.21 |
| | | 20 | Mz+ | -512.75 | -5.88 | 0.00 | 0.00 | 0.00 | 24.56 |
| | | 20 | Fy- | -512.75 | -5.88 | 0.00 | 0.00 | 0.00 | 24.56 |
| | | 20 | Mz- | -484.62 | -5.56 | 0.00 | 0.00 | 0.00 | 23.21 |
| | | 22 | Fy+ | -484.62 | -5.56 | 0.00 | 0.00 | 0.00 | 23.21 |
| | | 22 | Mz+ | -719.64 | -8.25 | 0.00 | 0.00 | 0.00 | 34.46 |
| | | 22 | Fy- | -719.64 | -8.25 | 0.00 | 0.00 | 0.00 | 34.46 |
| | | 22 | Mz- | -484.62 | -5.56 | 0.00 | 0.00 | 0.00 | 23.21 |
| 106 | 106 | 1 | | -329.91 | 0.34 | 0.00 | 0.00 | 0.00 | 23.48 |
| | | 2 | | -154.71 | 0.16 | 0.00 | 0.00 | 0.00 | 11.01 |
| | | 3 | | -28.13 | 0.03 | 0.00 | 0.00 | 0.00 | 2.00 |
| | | 10 | Fy+ | -484.62 | 0.49 | 0.00 | 0.00 | 0.00 | 34.49 |
| | | 10 | Mz+ | -484.62 | 0.49 | 0.00 | 0.00 | 0.00 | 34.49 |
| | | 10 | Fy- | -484.62 | 0.49 | 0.00 | 0.00 | 0.00 | 34.49 |
| | | 10 | Mz- | -484.62 | 0.49 | 0.00 | 0.00 | 0.00 | 34.49 |
| | | 20 | Fy+ | -512.75 | 0.52 | 0.00 | 0.00 | 0.00 | 36.49 |
| | | 20 | Mz+ | -512.75 | 0.52 | 0.00 | 0.00 | 0.00 | 36.49 |
| | | 20 | Fy- | -484.62 | 0.49 | 0.00 | 0.00 | 0.00 | 34.49 |
| | | 20 | Mz- | -484.62 | 0.49 | 0.00 | 0.00 | 0.00 | 34.49 |
| | | 22 | Fy+ | -719.64 | 0.73 | 0.00 | 0.00 | 0.00 | 51.21 |
| | | 22 | Mz+ | -719.64 | 0.73 | 0.00 | 0.00 | 0.00 | 51.21 |
| | | 22 | Fy- | -484.62 | 0.49 | 0.00 | 0.00 | 0.00 | 34.49 |
| | | 22 | Mz- | -484.62 | 0.49 | 0.00 | 0.00 | 0.00 | 34.49 |
| 105 | 105 | 1 | | -329.91 | 3.42 | 0.00 | 0.00 | 0.00 | 22.80 |
| | | 2 | | -154.71 | 1.60 | 0.00 | 0.00 | 0.00 | 10.69 |
| | | 3 | | -28.13 | 0.29 | 0.00 | 0.00 | 0.00 | 1.94 |
| | | 10 | Fy+ | -484.62 | 5.02 | 0.00 | 0.00 | 0.00 | 33.49 |
| | | 10 | Mz+ | -484.62 | 5.02 | 0.00 | 0.00 | 0.00 | 33.49 |
| | | 10 | Fy- | -484.62 | 5.02 | 0.00 | 0.00 | 0.00 | 33.49 |
| | | 10 | Mz- | -484.62 | 5.02 | 0.00 | 0.00 | 0.00 | 33.49 |
| | | 20 | Fy+ | -512.75 | 5.31 | 0.00 | 0.00 | 0.00 | 35.43 |

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 20 | Mz+ | -512.75 | 5.31 | 0.00 | 0.00 | 0.00 | 35.43 |
| | | 20 | Fy- | -484.62 | 5.02 | 0.00 | 0.00 | 0.00 | 33.49 |
| | | 20 | Mz- | -484.62 | 5.02 | 0.00 | 0.00 | 0.00 | 33.49 |
| | | 22 | Fy+ | -719.64 | 7.45 | 0.00 | 0.00 | 0.00 | 49.73 |
| | | 22 | Mz+ | -719.64 | 7.45 | 0.00 | 0.00 | 0.00 | 49.73 |
| | | 22 | Fy- | -484.62 | 5.02 | 0.00 | 0.00 | 0.00 | 33.49 |
| | | 22 | Mz- | -484.62 | 5.02 | 0.00 | 0.00 | 0.00 | 33.49 |
| 104 | 104 | 1 | | -329.91 | 9.39 | 0.00 | 0.00 | 0.00 | 15.87 |
| | | 2 | | -154.71 | 4.41 | 0.00 | 0.00 | 0.00 | 7.44 |
| | | 3 | | -28.13 | 0.80 | 0.00 | 0.00 | 0.00 | 1.35 |
| | | 10 | Fy+ | -484.62 | 13.80 | 0.00 | 0.00 | 0.00 | 23.31 |
| | | 10 | Mz+ | -484.62 | 13.80 | 0.00 | 0.00 | 0.00 | 23.31 |
| | | 10 | Fy- | -484.62 | 13.80 | 0.00 | 0.00 | 0.00 | 23.31 |
| | | 10 | Mz- | -484.62 | 13.80 | 0.00 | 0.00 | 0.00 | 23.31 |
| | | 20 | Fy+ | -512.75 | 14.60 | 0.00 | 0.00 | 0.00 | 24.66 |
| | | 20 | Mz+ | -512.75 | 14.60 | 0.00 | 0.00 | 0.00 | 24.66 |
| | | 20 | Fy- | -484.62 | 13.80 | 0.00 | 0.00 | 0.00 | 23.31 |
| | | 20 | Mz- | -484.62 | 13.80 | 0.00 | 0.00 | 0.00 | 23.31 |
| | | 22 | Fy+ | -719.64 | 20.49 | 0.00 | 0.00 | 0.00 | 34.61 |
| | | 22 | Mz+ | -719.64 | 20.49 | 0.00 | 0.00 | 0.00 | 34.61 |
| | | 22 | Fy- | -484.62 | 13.80 | 0.00 | 0.00 | 0.00 | 23.31 |
| | | 22 | Mz- | -484.62 | 13.80 | 0.00 | 0.00 | 0.00 | 23.31 |
| 103 | 103 | 1 | | -329.91 | 18.85 | 0.00 | 0.00 | 0.00 | -3.20 |
| | | 2 | | -154.71 | 8.84 | 0.00 | 0.00 | 0.00 | -1.50 |
| | | 3 | | -28.13 | 1.61 | 0.00 | 0.00 | 0.00 | -0.27 |
| | | 10 | Fy+ | -484.62 | 27.69 | 0.00 | 0.00 | 0.00 | -4.71 |
| | | 10 | Mz+ | -484.62 | 27.69 | 0.00 | 0.00 | 0.00 | -4.71 |
| | | 10 | Fy- | -484.62 | 27.69 | 0.00 | 0.00 | 0.00 | -4.71 |
| | | 10 | Mz- | -484.62 | 27.69 | 0.00 | 0.00 | 0.00 | -4.71 |
| | | 20 | Fy+ | -512.75 | 29.30 | 0.00 | 0.00 | 0.00 | -4.98 |
| | | 20 | Mz+ | -484.62 | 27.69 | 0.00 | 0.00 | 0.00 | -4.71 |
| | | 20 | Fy- | -484.62 | 27.69 | 0.00 | 0.00 | 0.00 | -4.71 |
| | | 20 | Mz- | -512.75 | 29.30 | 0.00 | 0.00 | 0.00 | -4.98 |
| | | 22 | Fy+ | -719.64 | 41.12 | 0.00 | 0.00 | 0.00 | -6.99 |
| | | 22 | Mz+ | -484.62 | 27.69 | 0.00 | 0.00 | 0.00 | -4.71 |
| | | 22 | Fy- | -484.62 | 27.69 | 0.00 | 0.00 | 0.00 | -4.71 |
| | | 22 | Mz- | -719.64 | 41.12 | 0.00 | 0.00 | 0.00 | -6.99 |
| 102 | 102 | 1 | | -329.91 | 25.82 | 0.00 | 0.00 | 0.00 | -41.47 |
| | | 2 | | -154.71 | 12.11 | 0.00 | 0.00 | 0.00 | -19.45 |
| | | 3 | | -28.13 | 2.20 | 0.00 | 0.00 | 0.00 | -3.54 |
| | | 10 | Fy+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -60.92 |
| | | 10 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -60.92 |
| | | 10 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -60.92 |
| | | 10 | Mz- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -60.92 |
| | | 20 | Fy+ | -512.75 | 40.13 | 0.00 | 0.00 | 0.00 | -64.46 |
| | | 20 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -60.92 |
| | | 20 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -60.92 |
| | | 20 | Mz- | -512.75 | 40.13 | 0.00 | 0.00 | 0.00 | -64.46 |
| | | 22 | Fy+ | -719.64 | 56.32 | 0.00 | 0.00 | 0.00 | -90.46 |
| | | 22 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -60.92 |
| | | 22 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -60.92 |
| | | 22 | Mz- | -719.64 | 56.32 | 0.00 | 0.00 | 0.00 | -90.46 |
| 101 | 101 | 1 | | -329.91 | 25.82 | 0.00 | 0.00 | 0.00 | -93.89 |
| | | 2 | | -154.71 | 12.11 | 0.00 | 0.00 | 0.00 | -44.03 |
| | | 3 | | -28.13 | 2.20 | 0.00 | 0.00 | 0.00 | -8.01 |
| | | 10 | Fy+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -137.91 |
| | | 10 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -137.91 |
| | | 10 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -137.91 |
| | | 10 | Mz- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -137.91 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 20 | Fy+ | -512.75 | 40.13 | 0.00 | 0.00 | 0.00 | -145.91 |
| | | 20 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -137.91 |
| | | 20 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -137.91 |
| | | 20 | Mz- | -512.75 | 40.13 | 0.00 | 0.00 | 0.00 | -145.91 |
| | | 22 | Fy+ | -719.64 | 56.32 | 0.00 | 0.00 | 0.00 | -204.80 |
| | | 22 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -137.91 |
| | | 22 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -137.91 |
| | | 22 | Mz- | -719.64 | 56.32 | 0.00 | 0.00 | 0.00 | -204.80 |
| 101 | 100 | 1 | | -329.91 | 25.82 | 0.00 | 0.00 | 0.00 | -146.30 |
| | | 2 | | -154.71 | 12.11 | 0.00 | 0.00 | 0.00 | -68.61 |
| | | 3 | | -28.13 | 2.20 | 0.00 | 0.00 | 0.00 | -12.47 |
| | | 10 | Fy+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 10 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 10 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 10 | Mz- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 20 | Fy+ | -512.75 | 40.13 | 0.00 | 0.00 | 0.00 | -227.38 |
| | | 20 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 20 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 20 | Mz- | -512.75 | 40.13 | 0.00 | 0.00 | 0.00 | -227.38 |
| | | 22 | Fy+ | -719.64 | 56.32 | 0.00 | 0.00 | 0.00 | -319.13 |
| | | 22 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 22 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 22 | Mz- | -719.64 | 56.32 | 0.00 | 0.00 | 0.00 | -319.13 |
| 210 | 210 | 1 | | -780.60 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 2 | | -366.07 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 3 | | -66.56 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 10 | Fy+ | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 10 | Mz+ | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 10 | Fy- | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 10 | Mz- | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 20 | Fy+ | -1213.23 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 20 | Mz+ | -1213.23 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 20 | Fy- | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 20 | Mz- | -1213.23 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy+ | -1702.75 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -1702.75 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -1702.75 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 |
| 210 | 209 | 1 | | -780.60 | 0.17 | 0.00 | 0.00 | 0.00 | -0.35 |
| | | 2 | | -366.07 | 0.08 | 0.00 | 0.00 | 0.00 | -0.16 |
| | | 3 | | -66.56 | 0.02 | 0.00 | 0.00 | 0.00 | -0.03 |
| | | 10 | Fy+ | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 10 | Mz+ | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 10 | Fy- | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 10 | Mz- | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 20 | Fy+ | -1213.23 | 0.27 | 0.00 | 0.00 | 0.00 | -0.54 |
| | | 20 | Mz+ | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 20 | Fy- | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 20 | Mz- | -1213.23 | 0.27 | 0.00 | 0.00 | 0.00 | -0.54 |
| | | 22 | Fy+ | -1702.75 | 0.37 | 0.00 | 0.00 | 0.00 | -0.76 |
| | | 22 | Mz+ | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 22 | Fy- | -1146.67 | 0.25 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 22 | Mz- | -1702.75 | 0.37 | 0.00 | 0.00 | 0.00 | -0.76 |
| 209 | 209 | 1 | | -780.60 | 0.39 | 0.00 | 0.00 | 0.00 | -0.35 |
| | | 2 | | -366.07 | 0.18 | 0.00 | 0.00 | 0.00 | -0.16 |
| | | 3 | | -66.56 | 0.03 | 0.00 | 0.00 | 0.00 | -0.03 |
| | | 10 | Fy+ | -1146.67 | 0.57 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 10 | Mz+ | -1146.67 | 0.57 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 10 | Fy- | -1146.67 | 0.57 | 0.00 | 0.00 | 0.00 | -0.51 |

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 10 | Mz- | -1146.67 | 0.57 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 20 | Fy+ | -1213.23 | 0.60 | 0.00 | 0.00 | 0.00 | -0.54 |
| | | 20 | Mz+ | -1146.67 | 0.57 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 20 | Fy- | -1146.67 | 0.57 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 20 | Mz- | -1213.23 | 0.60 | 0.00 | 0.00 | 0.00 | -0.54 |
| | | 22 | Fy+ | -1702.75 | 0.85 | 0.00 | 0.00 | 0.00 | -0.76 |
| | | 22 | Mz+ | -1146.67 | 0.57 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 22 | Fy- | -1146.67 | 0.57 | 0.00 | 0.00 | 0.00 | -0.51 |
| | | 22 | Mz- | -1702.75 | 0.85 | 0.00 | 0.00 | 0.00 | -0.76 |
| 208 | 208 | 1 | | -780.60 | 0.59 | 0.00 | 0.00 | 0.00 | -1.13 |
| | | 2 | | -366.07 | 0.28 | 0.00 | 0.00 | 0.00 | -0.53 |
| | | 3 | | -66.56 | 0.05 | 0.00 | 0.00 | 0.00 | -0.10 |
| | | 10 | Fy+ | -1146.67 | 0.86 | 0.00 | 0.00 | 0.00 | -1.67 |
| | | 10 | Mz+ | -1146.67 | 0.86 | 0.00 | 0.00 | 0.00 | -1.67 |
| | | 10 | Fy- | -1146.67 | 0.86 | 0.00 | 0.00 | 0.00 | -1.67 |
| | | 10 | Mz- | -1146.67 | 0.86 | 0.00 | 0.00 | 0.00 | -1.67 |
| | | 20 | Fy+ | -1213.23 | 0.91 | 0.00 | 0.00 | 0.00 | -1.77 |
| | | 20 | Mz+ | -1146.67 | 0.86 | 0.00 | 0.00 | 0.00 | -1.67 |
| | | 20 | Fy- | -1146.67 | 0.86 | 0.00 | 0.00 | 0.00 | -1.67 |
| | | 20 | Mz- | -1213.23 | 0.91 | 0.00 | 0.00 | 0.00 | -1.77 |
| | | 22 | Fy+ | -1702.75 | 1.28 | 0.00 | 0.00 | 0.00 | -2.47 |
| | | 22 | Mz+ | -1146.67 | 0.86 | 0.00 | 0.00 | 0.00 | -1.67 |
| | | 22 | Fy- | -1146.67 | 0.86 | 0.00 | 0.00 | 0.00 | -1.67 |
| | | 22 | Mz- | -1702.75 | 1.28 | 0.00 | 0.00 | 0.00 | -2.47 |
| 207 | 207 | 1 | | -780.60 | 0.57 | 0.00 | 0.00 | 0.00 | -2.32 |
| | | 2 | | -366.07 | 0.27 | 0.00 | 0.00 | 0.00 | -1.09 |
| | | 3 | | -66.56 | 0.05 | 0.00 | 0.00 | 0.00 | -0.20 |
| | | 10 | Fy+ | -1146.67 | 0.84 | 0.00 | 0.00 | 0.00 | -3.41 |
| | | 10 | Mz+ | -1146.67 | 0.84 | 0.00 | 0.00 | 0.00 | -3.41 |
| | | 10 | Fy- | -1146.67 | 0.84 | 0.00 | 0.00 | 0.00 | -3.41 |
| | | 10 | Mz- | -1146.67 | 0.84 | 0.00 | 0.00 | 0.00 | -3.41 |
| | | 20 | Fy+ | -1213.23 | 0.89 | 0.00 | 0.00 | 0.00 | -3.61 |
| | | 20 | Mz+ | -1146.67 | 0.84 | 0.00 | 0.00 | 0.00 | -3.41 |
| | | 20 | Fy- | -1146.67 | 0.84 | 0.00 | 0.00 | 0.00 | -3.41 |
| | | 20 | Mz- | -1213.23 | 0.89 | 0.00 | 0.00 | 0.00 | -3.61 |
| | | 22 | Fy+ | -1702.75 | 1.25 | 0.00 | 0.00 | 0.00 | -5.07 |
| | | 22 | Mz+ | -1146.67 | 0.84 | 0.00 | 0.00 | 0.00 | -3.41 |
| | | 22 | Fy- | -1146.67 | 0.84 | 0.00 | 0.00 | 0.00 | -3.41 |
| | | 22 | Mz- | -1702.75 | 1.25 | 0.00 | 0.00 | 0.00 | -5.07 |
| 206 | 206 | 1 | | -780.60 | -0.01 | 0.00 | 0.00 | 0.00 | -3.49 |
| | | 2 | | -366.07 | -0.01 | 0.00 | 0.00 | 0.00 | -1.64 |
| | | 3 | | -66.56 | -0.00 | 0.00 | 0.00 | 0.00 | -0.30 |
| | | 10 | Fy+ | -1146.67 | -0.02 | 0.00 | 0.00 | 0.00 | -5.12 |
| | | 10 | Mz+ | -1146.67 | -0.02 | 0.00 | 0.00 | 0.00 | -5.12 |
| | | 10 | Fy- | -1146.67 | -0.02 | 0.00 | 0.00 | 0.00 | -5.12 |
| | | 10 | Mz- | -1146.67 | -0.02 | 0.00 | 0.00 | 0.00 | -5.12 |
| | | 20 | Fy+ | -1146.67 | -0.02 | 0.00 | 0.00 | 0.00 | -5.12 |
| | | 20 | Mz+ | -1146.67 | -0.02 | 0.00 | 0.00 | 0.00 | -5.12 |
| | | 20 | Fy- | -1213.23 | -0.02 | 0.00 | 0.00 | 0.00 | -5.42 |
| | | 20 | Mz- | -1213.23 | -0.02 | 0.00 | 0.00 | 0.00 | -5.42 |
| | | 22 | Fy+ | -1146.67 | -0.02 | 0.00 | 0.00 | 0.00 | -5.12 |
| | | 22 | Mz+ | -1146.67 | -0.02 | 0.00 | 0.00 | 0.00 | -5.12 |
| | | 22 | Fy- | -1702.75 | -0.03 | 0.00 | 0.00 | 0.00 | -7.61 |
| | | 22 | Mz- | -1702.75 | -0.03 | 0.00 | 0.00 | 0.00 | -7.61 |
| 205 | 205 | 1 | | -780.60 | -0.46 | 0.00 | 0.00 | 0.00 | -3.46 |
| | | 2 | | -366.07 | -0.22 | 0.00 | 0.00 | 0.00 | -1.63 |
| | | 3 | | -66.56 | -0.04 | 0.00 | 0.00 | 0.00 | -0.30 |
| | | 10 | Fy+ | -1146.67 | -0.68 | 0.00 | 0.00 | 0.00 | -5.09 |
| | | 10 | Mz+ | -1146.67 | -0.68 | 0.00 | 0.00 | 0.00 | -5.09 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 10 | Fy- | -1146.67 | -0.68 | 0.00 | 0.00 | 0.00 | -5.09 |
| | | 10 | Mz- | -1146.67 | -0.68 | 0.00 | 0.00 | 0.00 | -5.09 |
| | | 20 | Fy+ | -1146.67 | -0.68 | 0.00 | 0.00 | 0.00 | -5.09 |
| | | 20 | Mz+ | -1146.67 | -0.68 | 0.00 | 0.00 | 0.00 | -5.09 |
| | | 20 | Fy- | -1213.23 | -0.72 | 0.00 | 0.00 | 0.00 | -5.38 |
| | | 20 | Mz- | -1213.23 | -0.72 | 0.00 | 0.00 | 0.00 | -5.38 |
| | | 22 | Fy+ | -1146.67 | -0.68 | 0.00 | 0.00 | 0.00 | -5.09 |
| | | 22 | Mz+ | -1146.67 | -0.68 | 0.00 | 0.00 | 0.00 | -5.09 |
| | | 22 | Fy- | -1702.75 | -1.00 | 0.00 | 0.00 | 0.00 | -7.56 |
| | | 22 | Mz- | -1702.75 | -1.00 | 0.00 | 0.00 | 0.00 | -7.56 |
| 204 | 204 | 1 | | -780.60 | -1.34 | 0.00 | 0.00 | 0.00 | -2.53 |
| | | 2 | | -366.07 | -0.63 | 0.00 | 0.00 | 0.00 | -1.19 |
| | | 3 | | -66.56 | -0.11 | 0.00 | 0.00 | 0.00 | -0.22 |
| | | 10 | Fy+ | -1146.67 | -1.97 | 0.00 | 0.00 | 0.00 | -3.72 |
| | | 10 | Mz+ | -1146.67 | -1.97 | 0.00 | 0.00 | 0.00 | -3.72 |
| | | 10 | Fy- | -1146.67 | -1.97 | 0.00 | 0.00 | 0.00 | -3.72 |
| | | 10 | Mz- | -1146.67 | -1.97 | 0.00 | 0.00 | 0.00 | -3.72 |
| | | 20 | Fy+ | -1146.67 | -1.97 | 0.00 | 0.00 | 0.00 | -3.72 |
| | | 20 | Mz+ | -1146.67 | -1.97 | 0.00 | 0.00 | 0.00 | -3.72 |
| | | 20 | Fy- | -1213.23 | -2.08 | 0.00 | 0.00 | 0.00 | -3.94 |
| | | 20 | Mz- | -1213.23 | -2.08 | 0.00 | 0.00 | 0.00 | -3.94 |
| | | 22 | Fy+ | -1146.67 | -1.97 | 0.00 | 0.00 | 0.00 | -3.72 |
| | | 22 | Mz+ | -1146.67 | -1.97 | 0.00 | 0.00 | 0.00 | -3.72 |
| | | 22 | Fy- | -1702.75 | -2.92 | 0.00 | 0.00 | 0.00 | -5.52 |
| | | 22 | Mz- | -1702.75 | -2.92 | 0.00 | 0.00 | 0.00 | -5.52 |
| 203 | 203 | 1 | | -780.60 | -2.74 | 0.00 | 0.00 | 0.00 | 0.19 |
| | | 2 | | -366.07 | -1.29 | 0.00 | 0.00 | 0.00 | 0.09 |
| | | 3 | | -66.56 | -0.23 | 0.00 | 0.00 | 0.00 | 0.02 |
| | | 10 | Fy+ | -1146.67 | -4.03 | 0.00 | 0.00 | 0.00 | 0.27 |
| | | 10 | Mz+ | -1146.67 | -4.03 | 0.00 | 0.00 | 0.00 | 0.27 |
| | | 10 | Fy- | -1146.67 | -4.03 | 0.00 | 0.00 | 0.00 | 0.27 |
| | | 10 | Mz- | -1146.67 | -4.03 | 0.00 | 0.00 | 0.00 | 0.27 |
| | | 20 | Fy+ | -1146.67 | -4.03 | 0.00 | 0.00 | 0.00 | 0.27 |
| | | 20 | Mz+ | -1213.23 | -4.26 | 0.00 | 0.00 | 0.00 | 0.29 |
| | | 20 | Fy- | -1213.23 | -4.26 | 0.00 | 0.00 | 0.00 | 0.29 |
| | | 20 | Mz- | -1146.67 | -4.03 | 0.00 | 0.00 | 0.00 | 0.27 |
| | | 22 | Fy+ | -1146.67 | -4.03 | 0.00 | 0.00 | 0.00 | 0.27 |
| | | 22 | Mz+ | -1702.75 | -5.98 | 0.00 | 0.00 | 0.00 | 0.41 |
| | | 22 | Fy- | -1702.75 | -5.98 | 0.00 | 0.00 | 0.00 | 0.41 |
| | | 22 | Mz- | -1146.67 | -4.03 | 0.00 | 0.00 | 0.00 | 0.27 |
| 202 | 202 | 1 | | -780.60 | -3.79 | 0.00 | 0.00 | 0.00 | 5.75 |
| | | 2 | | -366.07 | -1.78 | 0.00 | 0.00 | 0.00 | 2.70 |
| | | 3 | | -66.56 | -0.32 | 0.00 | 0.00 | 0.00 | 0.49 |
| | | 10 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 8.45 |
| | | 10 | Mz+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 8.45 |
| | | 10 | Fy- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 8.45 |
| | | 10 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 8.45 |
| | | 20 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 8.45 |
| | | 20 | Mz+ | -1213.23 | -5.88 | 0.00 | 0.00 | 0.00 | 8.94 |
| | | 20 | Fy- | -1213.23 | -5.88 | 0.00 | 0.00 | 0.00 | 8.94 |
| | | 20 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 8.45 |
| | | 22 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 8.45 |
| | | 22 | Mz+ | -1702.75 | -8.26 | 0.00 | 0.00 | 0.00 | 12.55 |
| | | 22 | Fy- | -1702.75 | -8.26 | 0.00 | 0.00 | 0.00 | 12.55 |
| | | 22 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 8.45 |
| 201 | 201 | 1 | | -780.60 | -3.79 | 0.00 | 0.00 | 0.00 | 13.44 |
| | | 2 | | -366.07 | -1.78 | 0.00 | 0.00 | 0.00 | 6.30 |
| | | 3 | | -66.56 | -0.32 | 0.00 | 0.00 | 0.00 | 1.15 |
| | | 10 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 19.75 |

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 10 | Mz+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 19.75 |
| | | 10 | Fy- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 19.75 |
| | | 10 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 19.75 |
| | | 20 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 19.75 |
| | | 20 | Mz+ | -1213.23 | -5.88 | 0.00 | 0.00 | 0.00 | 20.90 |
| | | 20 | Fy- | -1213.23 | -5.88 | 0.00 | 0.00 | 0.00 | 20.90 |
| | | 20 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 19.75 |
| | | 22 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 19.75 |
| | | 22 | Mz+ | -1702.75 | -8.26 | 0.00 | 0.00 | 0.00 | 29.32 |
| | | 22 | Fy- | -1702.75 | -8.26 | 0.00 | 0.00 | 0.00 | 29.32 |
| | | 22 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 19.75 |
| 201 | 200 | 1 | | -780.60 | -3.79 | 0.00 | 0.00 | 0.00 | 21.13 |
| | | 2 | | -366.07 | -1.78 | 0.00 | 0.00 | 0.00 | 9.91 |
| | | 3 | | -66.56 | -0.32 | 0.00 | 0.00 | 0.00 | 1.80 |
| | | 10 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 10 | Mz+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 10 | Fy- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 10 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 20 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 20 | Mz+ | -1213.23 | -5.88 | 0.00 | 0.00 | 0.00 | 32.84 |
| | | 20 | Fy- | -1213.23 | -5.88 | 0.00 | 0.00 | 0.00 | 32.84 |
| | | 20 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 22 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 22 | Mz+ | -1702.75 | -8.26 | 0.00 | 0.00 | 0.00 | 46.10 |
| | | 22 | Fy- | -1702.75 | -8.26 | 0.00 | 0.00 | 0.00 | 46.10 |
| | | 22 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| 310 | 310 | 1 | | -289.81 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 2 | | -135.91 | 0.47 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 3 | | -24.71 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 10 | Fy+ | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 10 | Mz+ | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 10 | Fy- | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 10 | Mz- | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 20 | Fy+ | -450.43 | 1.57 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 20 | Mz+ | -450.43 | 1.57 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 20 | Fy- | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 20 | Mz- | -450.43 | 1.57 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy+ | -632.17 | 2.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz+ | -632.17 | 2.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 22 | Fy- | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 22 | Mz- | -632.17 | 2.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| 310 | 309 | 1 | | -289.81 | 1.00 | 0.00 | 0.00 | 0.00 | -2.04 |
| | | 2 | | -135.91 | 0.47 | 0.00 | 0.00 | 0.00 | -0.96 |
| | | 3 | | -24.71 | 0.09 | 0.00 | 0.00 | 0.00 | -0.17 |
| | | 10 | Fy+ | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 10 | Mz+ | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 10 | Fy- | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 10 | Mz- | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 20 | Fy+ | -450.43 | 1.57 | 0.00 | 0.00 | 0.00 | -3.17 |
| | | 20 | Mz+ | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 20 | Fy- | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 20 | Mz- | -450.43 | 1.57 | 0.00 | 0.00 | 0.00 | -3.17 |
| | | 22 | Fy+ | -632.17 | 2.19 | 0.00 | 0.00 | 0.00 | -4.45 |
| | | 22 | Mz+ | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 22 | Fy- | -425.72 | 1.48 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 22 | Mz- | -632.17 | 2.19 | 0.00 | 0.00 | 0.00 | -4.45 |
| 309 | 309 | 1 | | -289.81 | 2.26 | 0.00 | 0.00 | 0.00 | -2.04 |
| | | 2 | | -135.91 | 1.06 | 0.00 | 0.00 | 0.00 | -0.96 |
| | | 3 | | -24.71 | 0.19 | 0.00 | 0.00 | 0.00 | -0.17 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 10 | Fy+ | -425.72 | 3.32 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 10 | Mz+ | -425.72 | 3.32 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 10 | Fy- | -425.72 | 3.32 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 10 | Mz- | -425.72 | 3.32 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 20 | Fy+ | -450.43 | 3.51 | 0.00 | 0.00 | 0.00 | -3.17 |
| | | 20 | Mz+ | -425.72 | 3.32 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 20 | Fy- | -425.72 | 3.32 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 20 | Mz- | -450.43 | 3.51 | 0.00 | 0.00 | 0.00 | -3.17 |
| | | 22 | Fy+ | -632.17 | 4.93 | 0.00 | 0.00 | 0.00 | -4.45 |
| | | 22 | Mz+ | -425.72 | 3.32 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 22 | Fy- | -425.72 | 3.32 | 0.00 | 0.00 | 0.00 | -3.00 |
| | | 22 | Mz- | -632.17 | 4.93 | 0.00 | 0.00 | 0.00 | -4.45 |
| 308 | 308 | 1 | | -289.81 | 3.38 | 0.00 | 0.00 | 0.00 | -6.63 |
| | | 2 | | -135.91 | 1.58 | 0.00 | 0.00 | 0.00 | -3.11 |
| | | 3 | | -24.71 | 0.29 | 0.00 | 0.00 | 0.00 | -0.57 |
| | | 10 | Fy+ | -425.72 | 4.96 | 0.00 | 0.00 | 0.00 | -9.73 |
| | | 10 | Mz+ | -425.72 | 4.96 | 0.00 | 0.00 | 0.00 | -9.73 |
| | | 10 | Fy- | -425.72 | 4.96 | 0.00 | 0.00 | 0.00 | -9.73 |
| | | 10 | Mz- | -425.72 | 4.96 | 0.00 | 0.00 | 0.00 | -9.73 |
| | | 20 | Fy+ | -450.43 | 5.25 | 0.00 | 0.00 | 0.00 | -10.30 |
| | | 20 | Mz+ | -425.72 | 4.96 | 0.00 | 0.00 | 0.00 | -9.73 |
| | | 20 | Fy- | -425.72 | 4.96 | 0.00 | 0.00 | 0.00 | -9.73 |
| | | 20 | Mz- | -450.43 | 5.25 | 0.00 | 0.00 | 0.00 | -10.30 |
| | | 22 | Fy+ | -632.17 | 7.37 | 0.00 | 0.00 | 0.00 | -14.46 |
| | | 22 | Mz+ | -425.72 | 4.96 | 0.00 | 0.00 | 0.00 | -9.73 |
| | | 22 | Fy- | -425.72 | 4.96 | 0.00 | 0.00 | 0.00 | -9.73 |
| | | 22 | Mz- | -632.17 | 7.37 | 0.00 | 0.00 | 0.00 | -14.46 |
| 307 | 307 | 1 | | -289.81 | 3.26 | 0.00 | 0.00 | 0.00 | -13.49 |
| | | 2 | | -135.91 | 1.53 | 0.00 | 0.00 | 0.00 | -6.33 |
| | | 3 | | -24.71 | 0.28 | 0.00 | 0.00 | 0.00 | -1.15 |
| | | 10 | Fy+ | -425.72 | 4.78 | 0.00 | 0.00 | 0.00 | -19.81 |
| | | 10 | Mz+ | -425.72 | 4.78 | 0.00 | 0.00 | 0.00 | -19.81 |
| | | 10 | Fy- | -425.72 | 4.78 | 0.00 | 0.00 | 0.00 | -19.81 |
| | | 10 | Mz- | -425.72 | 4.78 | 0.00 | 0.00 | 0.00 | -19.81 |
| | | 20 | Fy+ | -450.43 | 5.06 | 0.00 | 0.00 | 0.00 | -20.96 |
| | | 20 | Mz+ | -425.72 | 4.78 | 0.00 | 0.00 | 0.00 | -19.81 |
| | | 20 | Fy- | -425.72 | 4.78 | 0.00 | 0.00 | 0.00 | -19.81 |
| | | 20 | Mz- | -450.43 | 5.06 | 0.00 | 0.00 | 0.00 | -20.96 |
| | | 22 | Fy+ | -632.17 | 7.10 | 0.00 | 0.00 | 0.00 | -29.42 |
| | | 22 | Mz+ | -425.72 | 4.78 | 0.00 | 0.00 | 0.00 | -19.81 |
| | | 22 | Fy- | -425.72 | 4.78 | 0.00 | 0.00 | 0.00 | -19.81 |
| | | 22 | Mz- | -632.17 | 7.10 | 0.00 | 0.00 | 0.00 | -29.42 |
| 306 | 306 | 1 | | -289.81 | -0.23 | 0.00 | 0.00 | 0.00 | -20.10 |
| | | 2 | | -135.91 | -0.11 | 0.00 | 0.00 | 0.00 | -9.43 |
| | | 3 | | -24.71 | -0.02 | 0.00 | 0.00 | 0.00 | -1.71 |
| | | 10 | Fy+ | -425.72 | -0.34 | 0.00 | 0.00 | 0.00 | -29.52 |
| | | 10 | Mz+ | -425.72 | -0.34 | 0.00 | 0.00 | 0.00 | -29.52 |
| | | 10 | Fy- | -425.72 | -0.34 | 0.00 | 0.00 | 0.00 | -29.52 |
| | | 10 | Mz- | -425.72 | -0.34 | 0.00 | 0.00 | 0.00 | -29.52 |
| | | 20 | Fy+ | -425.72 | -0.34 | 0.00 | 0.00 | 0.00 | -29.52 |
| | | 20 | Mz+ | -425.72 | -0.34 | 0.00 | 0.00 | 0.00 | -29.52 |
| | | 20 | Fy- | -450.43 | -0.36 | 0.00 | 0.00 | 0.00 | -31.23 |
| | | 20 | Mz- | -450.43 | -0.36 | 0.00 | 0.00 | 0.00 | -31.23 |
| | | 22 | Fy+ | -425.72 | -0.34 | 0.00 | 0.00 | 0.00 | -29.52 |
| | | 22 | Mz+ | -425.72 | -0.34 | 0.00 | 0.00 | 0.00 | -29.52 |
| | | 22 | Fy- | -632.17 | -0.50 | 0.00 | 0.00 | 0.00 | -43.84 |
| | | 22 | Mz- | -632.17 | -0.50 | 0.00 | 0.00 | 0.00 | -43.84 |
| 305 | 305 | 1 | | -289.81 | -2.85 | 0.00 | 0.00 | 0.00 | -19.63 |
| | | 2 | | -135.91 | -1.34 | 0.00 | 0.00 | 0.00 | -9.21 |

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 3 | | -24.71 | -0.24 | 0.00 | 0.00 | 0.00 | -1.67 |
| | | 10 | Fy+ | -425.72 | -4.19 | 0.00 | 0.00 | 0.00 | -28.84 |
| | | 10 | Mz+ | -425.72 | -4.19 | 0.00 | 0.00 | 0.00 | -28.84 |
| | | 10 | Fy- | -425.72 | -4.19 | 0.00 | 0.00 | 0.00 | -28.84 |
| | | 10 | Mz- | -425.72 | -4.19 | 0.00 | 0.00 | 0.00 | -28.84 |
| | | 20 | Fy+ | -425.72 | -4.19 | 0.00 | 0.00 | 0.00 | -28.84 |
| | | 20 | Mz+ | -425.72 | -4.19 | 0.00 | 0.00 | 0.00 | -28.84 |
| | | 20 | Fy- | -450.43 | -4.43 | 0.00 | 0.00 | 0.00 | -30.51 |
| | | 20 | Mz- | -450.43 | -4.43 | 0.00 | 0.00 | 0.00 | -30.51 |
| | | 22 | Fy+ | -425.72 | -4.19 | 0.00 | 0.00 | 0.00 | -28.84 |
| | | 22 | Mz+ | -425.72 | -4.19 | 0.00 | 0.00 | 0.00 | -28.84 |
| | | 22 | Fy- | -632.17 | -6.22 | 0.00 | 0.00 | 0.00 | -42.82 |
| | | 22 | Mz- | -632.17 | -6.22 | 0.00 | 0.00 | 0.00 | -42.82 |
| 304 | 304 | 1 | | -289.81 | -7.96 | 0.00 | 0.00 | 0.00 | -13.84 |
| | | 2 | | -135.91 | -3.73 | 0.00 | 0.00 | 0.00 | -6.49 |
| | | 3 | | -24.71 | -0.68 | 0.00 | 0.00 | 0.00 | -1.18 |
| | | 10 | Fy+ | -425.72 | -11.69 | 0.00 | 0.00 | 0.00 | -20.33 |
| | | 10 | Mz+ | -425.72 | -11.69 | 0.00 | 0.00 | 0.00 | -20.33 |
| | | 10 | Fy- | -425.72 | -11.69 | 0.00 | 0.00 | 0.00 | -20.33 |
| | | 10 | Mz- | -425.72 | -11.69 | 0.00 | 0.00 | 0.00 | -20.33 |
| | | 20 | Fy+ | -425.72 | -11.69 | 0.00 | 0.00 | 0.00 | -20.33 |
| | | 20 | Mz+ | -425.72 | -11.69 | 0.00 | 0.00 | 0.00 | -20.33 |
| | | 20 | Fy- | -450.43 | -12.37 | 0.00 | 0.00 | 0.00 | -21.51 |
| | | 20 | Mz- | -450.43 | -12.37 | 0.00 | 0.00 | 0.00 | -21.51 |
| | | 22 | Fy+ | -425.72 | -11.69 | 0.00 | 0.00 | 0.00 | -20.33 |
| | | 22 | Mz+ | -425.72 | -11.69 | 0.00 | 0.00 | 0.00 | -20.33 |
| | | 22 | Fy- | -632.17 | -17.36 | 0.00 | 0.00 | 0.00 | -30.19 |
| | | 22 | Mz- | -632.17 | -17.36 | 0.00 | 0.00 | 0.00 | -30.19 |
| 303 | 303 | 1 | | -289.81 | -16.05 | 0.00 | 0.00 | 0.00 | 2.31 |
| | | 2 | | -135.91 | -7.53 | 0.00 | 0.00 | 0.00 | 1.08 |
| | | 3 | | -24.71 | -1.37 | 0.00 | 0.00 | 0.00 | 0.20 |
| | | 10 | Fy+ | -425.72 | -23.58 | 0.00 | 0.00 | 0.00 | 3.40 |
| | | 10 | Mz+ | -425.72 | -23.58 | 0.00 | 0.00 | 0.00 | 3.40 |
| | | 10 | Fy- | -425.72 | -23.58 | 0.00 | 0.00 | 0.00 | 3.40 |
| | | 10 | Mz- | -425.72 | -23.58 | 0.00 | 0.00 | 0.00 | 3.40 |
| | | 20 | Fy+ | -425.72 | -23.58 | 0.00 | 0.00 | 0.00 | 3.40 |
| | | 20 | Mz+ | -450.43 | -24.95 | 0.00 | 0.00 | 0.00 | 3.60 |
| | | 20 | Fy- | -450.43 | -24.95 | 0.00 | 0.00 | 0.00 | 3.60 |
| | | 20 | Mz- | -425.72 | -23.58 | 0.00 | 0.00 | 0.00 | 3.40 |
| | | 22 | Fy+ | -425.72 | -23.58 | 0.00 | 0.00 | 0.00 | 3.40 |
| | | 22 | Mz+ | -632.17 | -35.01 | 0.00 | 0.00 | 0.00 | 5.04 |
| | | 22 | Fy- | -632.17 | -35.01 | 0.00 | 0.00 | 0.00 | 5.04 |
| | | 22 | Mz- | -425.72 | -23.58 | 0.00 | 0.00 | 0.00 | 3.40 |
| 302 | 302 | 1 | | -289.81 | -22.03 | 0.00 | 0.00 | 0.00 | 34.90 |
| | | 2 | | -135.91 | -10.33 | 0.00 | 0.00 | 0.00 | 16.37 |
| | | 3 | | -24.71 | -1.88 | 0.00 | 0.00 | 0.00 | 2.98 |
| | | 10 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 51.26 |
| | | 10 | Mz+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 51.26 |
| | | 10 | Fy- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 51.26 |
| | | 10 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 51.26 |
| | | 20 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 51.26 |
| | | 20 | Mz+ | -450.43 | -34.24 | 0.00 | 0.00 | 0.00 | 54.24 |
| | | 20 | Fy- | -450.43 | -34.24 | 0.00 | 0.00 | 0.00 | 54.24 |
| | | 20 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 51.26 |
| | | 22 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 51.26 |
| | | 22 | Mz+ | -632.17 | -48.06 | 0.00 | 0.00 | 0.00 | 76.12 |
| | | 22 | Fy- | -632.17 | -48.06 | 0.00 | 0.00 | 0.00 | 76.12 |
| | | 22 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 51.26 |
| 301 | 301 | 1 | | -289.81 | -22.03 | 0.00 | 0.00 | 0.00 | 79.62 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 2 | | -135.91 | -10.33 | 0.00 | 0.00 | 0.00 | 37.34 |
| | | 3 | | -24.71 | -1.88 | 0.00 | 0.00 | 0.00 | 6.79 |
| | | 10 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 116.96 |
| | | 10 | Mz+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 116.96 |
| | | 10 | Fy- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 116.96 |
| | | 10 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 116.96 |
| | | 20 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 116.96 |
| | | 20 | Mz+ | -450.43 | -34.24 | 0.00 | 0.00 | 0.00 | 123.75 |
| | | 20 | Fy- | -450.43 | -34.24 | 0.00 | 0.00 | 0.00 | 123.75 |
| | | 20 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 116.96 |
| | | 22 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 116.96 |
| | | 22 | Mz+ | -632.17 | -48.06 | 0.00 | 0.00 | 0.00 | 173.68 |
| | | 22 | Fy- | -632.17 | -48.06 | 0.00 | 0.00 | 0.00 | 173.68 |
| | | 22 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 116.96 |
| 301 | 300 | 1 | | -289.81 | -22.03 | 0.00 | 0.00 | 0.00 | 124.35 |
| | | 2 | | -135.91 | -10.33 | 0.00 | 0.00 | 0.00 | 58.31 |
| | | 3 | | -24.71 | -1.88 | 0.00 | 0.00 | 0.00 | 10.60 |
| | | 10 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 10 | Mz+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 10 | Fy- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 10 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 20 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 20 | Mz+ | -450.43 | -34.24 | 0.00 | 0.00 | 0.00 | 193.26 |
| | | 20 | Fy- | -450.43 | -34.24 | 0.00 | 0.00 | 0.00 | 193.26 |
| | | 20 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 22 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 22 | Mz+ | -632.17 | -48.06 | 0.00 | 0.00 | 0.00 | 271.24 |
| | | 22 | Fy- | -632.17 | -48.06 | 0.00 | 0.00 | 0.00 | 271.24 |
| | | 22 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| 100 | 100 | 1 | | -329.91 | 25.82 | 0.00 | 0.00 | 0.00 | -146.30 |
| | | 2 | | -154.71 | 12.11 | 0.00 | 0.00 | 0.00 | -68.61 |
| | | 3 | | -28.13 | 2.20 | 0.00 | 0.00 | 0.00 | -12.47 |
| | | 10 | Fy+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 10 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 10 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 10 | Mz- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 20 | Fy+ | -512.75 | 40.13 | 0.00 | 0.00 | 0.00 | -227.38 |
| | | 20 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 20 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 20 | Mz- | -512.75 | 40.13 | 0.00 | 0.00 | 0.00 | -227.38 |
| | | 22 | Fy+ | -719.64 | 56.32 | 0.00 | 0.00 | 0.00 | -319.13 |
| | | 22 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 22 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -214.91 |
| | | 22 | Mz- | -719.64 | 56.32 | 0.00 | 0.00 | 0.00 | -319.13 |
| 100 | 1 | 1 | | -329.91 | 25.82 | 0.00 | 0.00 | 0.00 | -263.13 |
| | | 2 | | -154.71 | 12.11 | 0.00 | 0.00 | 0.00 | -123.40 |
| | | 3 | | -28.13 | 2.20 | 0.00 | 0.00 | 0.00 | -22.44 |
| | | 10 | Fy+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 10 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 10 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 10 | Mz- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 20 | Fy+ | -512.75 | 40.13 | 0.00 | 0.00 | 0.00 | -408.97 |
| | | 20 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 20 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 20 | Mz- | -512.75 | 40.13 | 0.00 | 0.00 | 0.00 | -408.97 |
| | | 22 | Fy+ | -719.64 | 56.32 | 0.00 | 0.00 | 0.00 | -573.98 |
| | | 22 | Mz+ | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 22 | Fy- | -484.62 | 37.93 | 0.00 | 0.00 | 0.00 | -386.53 |
| | | 22 | Mz- | -719.64 | 56.32 | 0.00 | 0.00 | 0.00 | -573.98 |

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 200 | 200 | 1 | | -780.60 | -3.79 | 0.00 | 0.00 | 0.00 | 21.13 |
| | | 2 | | -366.07 | -1.78 | 0.00 | 0.00 | 0.00 | 9.91 |
| | | 3 | | -66.56 | -0.32 | 0.00 | 0.00 | 0.00 | 1.80 |
| | | 10 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 10 | Mz+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 10 | Fy- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 10 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 20 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 20 | Mz+ | -1213.23 | -5.88 | 0.00 | 0.00 | 0.00 | 32.84 |
| | | 20 | Fy- | -1213.23 | -5.88 | 0.00 | 0.00 | 0.00 | 32.84 |
| | | 20 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 22 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| | | 22 | Mz+ | -1702.75 | -8.26 | 0.00 | 0.00 | 0.00 | 46.10 |
| | | 22 | Fy- | -1702.75 | -8.26 | 0.00 | 0.00 | 0.00 | 46.10 |
| | | 22 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 31.04 |
| 200 | 11 | 1 | | -780.60 | -3.79 | 0.00 | 0.00 | 0.00 | 38.27 |
| | | 2 | | -366.07 | -1.78 | 0.00 | 0.00 | 0.00 | 17.95 |
| | | 3 | | -66.56 | -0.32 | 0.00 | 0.00 | 0.00 | 3.26 |
| | | 10 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 56.22 |
| | | 10 | Mz+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 56.22 |
| | | 10 | Fy- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 56.22 |
| | | 10 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 56.22 |
| | | 20 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 56.22 |
| | | 20 | Mz+ | -1213.23 | -5.88 | 0.00 | 0.00 | 0.00 | 59.48 |
| | | 20 | Fy- | -1213.23 | -5.88 | 0.00 | 0.00 | 0.00 | 59.48 |
| | | 20 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 56.22 |
| | | 22 | Fy+ | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 56.22 |
| | | 22 | Mz+ | -1702.75 | -8.26 | 0.00 | 0.00 | 0.00 | 83.48 |
| | | 22 | Fy- | -1702.75 | -8.26 | 0.00 | 0.00 | 0.00 | 83.48 |
| | | 22 | Mz- | -1146.67 | -5.56 | 0.00 | 0.00 | 0.00 | 56.22 |
| 300 | 300 | 1 | | -289.81 | -22.03 | 0.00 | 0.00 | 0.00 | 124.35 |
| | | 2 | | -135.91 | -10.33 | 0.00 | 0.00 | 0.00 | 58.31 |
| | | 3 | | -24.71 | -1.88 | 0.00 | 0.00 | 0.00 | 10.60 |
| | | 10 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 10 | Mz+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 10 | Fy- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 10 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 20 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 20 | Mz+ | -450.43 | -34.24 | 0.00 | 0.00 | 0.00 | 193.26 |
| | | 20 | Fy- | -450.43 | -34.24 | 0.00 | 0.00 | 0.00 | 193.26 |
| | | 20 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 22 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| | | 22 | Mz+ | -632.17 | -48.06 | 0.00 | 0.00 | 0.00 | 271.24 |
| | | 22 | Fy- | -632.17 | -48.06 | 0.00 | 0.00 | 0.00 | 271.24 |
| | | 22 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 182.66 |
| 300 | 21 | 1 | | -289.81 | -22.03 | 0.00 | 0.00 | 0.00 | 224.04 |
| | | 2 | | -135.91 | -10.33 | 0.00 | 0.00 | 0.00 | 105.06 |
| | | 3 | | -24.71 | -1.88 | 0.00 | 0.00 | 0.00 | 19.10 |
| | | 10 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 329.10 |
| | | 10 | Mz+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 329.10 |
| | | 10 | Fy- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 329.10 |
| | | 10 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 329.10 |
| | | 20 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 329.10 |
| | | 20 | Mz+ | -450.43 | -34.24 | 0.00 | 0.00 | 0.00 | 348.20 |
| | | 20 | Fy- | -450.43 | -34.24 | 0.00 | 0.00 | 0.00 | 348.20 |
| | | 20 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 329.10 |
| | | 22 | Fy+ | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 329.10 |
| | | 22 | Mz+ | -632.17 | -48.06 | 0.00 | 0.00 | 0.00 | 488.70 |
| | | 22 | Fy- | -632.17 | -48.06 | 0.00 | 0.00 | 0.00 | 488.70 |
| | | 22 | Mz- | -425.72 | -32.36 | 0.00 | 0.00 | 0.00 | 329.10 |

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | uz | Θx | Θy | Θz |
|---|---|---|---|---|---|---|---|---|
| 100 | 1 | | -0.000784 | -0.000947 | 0.000000 | 0.000000 | 0.000000 | -0.000178 |
| | 2 | | -0.000367 | -0.000444 | 0.000000 | 0.000000 | 0.000000 | -0.000084 |
| | 3 | | -0.000067 | -0.000081 | 0.000000 | 0.000000 | 0.000000 | -0.000015 |
| | 10 | uy+ | -0.001151 | -0.001391 | 0.000000 | 0.000000 | 0.000000 | -0.000262 |
| | 10 | Θz+ | -0.001151 | -0.001391 | 0.000000 | 0.000000 | 0.000000 | -0.000262 |
| | 10 | uy- | -0.001151 | -0.001391 | 0.000000 | 0.000000 | 0.000000 | -0.000262 |
| | 10 | Θz- | -0.001151 | -0.001391 | 0.000000 | 0.000000 | 0.000000 | -0.000262 |
| | 20 | uy+ | -0.001151 | -0.001391 | 0.000000 | 0.000000 | 0.000000 | -0.000262 |
| | 20 | Θz+ | -0.001151 | -0.001391 | 0.000000 | 0.000000 | 0.000000 | -0.000262 |
| | 20 | uy- | -0.001218 | -0.001472 | 0.000000 | 0.000000 | 0.000000 | -0.000277 |
| | 20 | Θz- | -0.001218 | -0.001472 | 0.000000 | 0.000000 | 0.000000 | -0.000277 |
| | 22 | uy+ | -0.001151 | -0.001391 | 0.000000 | 0.000000 | 0.000000 | -0.000262 |
| | 22 | Θz+ | -0.001151 | -0.001391 | 0.000000 | 0.000000 | 0.000000 | -0.000262 |
| | 22 | uy- | -0.001709 | -0.002066 | 0.000000 | 0.000000 | 0.000000 | -0.000389 |
| | 22 | Θz- | -0.001709 | -0.002066 | 0.000000 | 0.000000 | 0.000000 | -0.000389 |
| 101 | 1 | | -0.000960 | -0.000852 | 0.000000 | 0.000000 | 0.000000 | -0.000008 |
| | 2 | | -0.000450 | -0.000400 | 0.000000 | 0.000000 | 0.000000 | -0.000004 |
| | 3 | | -0.000082 | -0.000073 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 10 | uy+ | -0.001410 | -0.001252 | 0.000000 | 0.000000 | 0.000000 | -0.000012 |
| | 10 | Θz+ | -0.001410 | -0.001252 | 0.000000 | 0.000000 | 0.000000 | -0.000012 |
| | 10 | uy- | -0.001410 | -0.001252 | 0.000000 | 0.000000 | 0.000000 | -0.000012 |
| | 10 | Θz- | -0.001410 | -0.001252 | 0.000000 | 0.000000 | 0.000000 | -0.000012 |
| | 20 | uy+ | -0.001410 | -0.001252 | 0.000000 | 0.000000 | 0.000000 | -0.000012 |
| | 20 | Θz+ | -0.001410 | -0.001252 | 0.000000 | 0.000000 | 0.000000 | -0.000012 |
| | 20 | uy- | -0.001492 | -0.001325 | 0.000000 | 0.000000 | 0.000000 | -0.000013 |
| | 20 | Θz- | -0.001492 | -0.001325 | 0.000000 | 0.000000 | 0.000000 | -0.000013 |
| | 22 | uy+ | -0.001410 | -0.001252 | 0.000000 | 0.000000 | 0.000000 | -0.000012 |
| | 22 | Θz+ | -0.001410 | -0.001252 | 0.000000 | 0.000000 | 0.000000 | -0.000012 |
| | 22 | uy- | -0.002094 | -0.001860 | 0.000000 | 0.000000 | 0.000000 | -0.000018 |
| | 22 | Θz- | -0.002094 | -0.001860 | 0.000000 | 0.000000 | 0.000000 | -0.000018 |
| 102 | 1 | | -0.000867 | -0.000757 | 0.000000 | 0.000000 | 0.000000 | 0.000088 |
| | 2 | | -0.000406 | -0.000355 | 0.000000 | 0.000000 | 0.000000 | 0.000041 |
| | 3 | | -0.000074 | -0.000065 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| | 10 | uy+ | -0.001273 | -0.001112 | 0.000000 | 0.000000 | 0.000000 | 0.000129 |
| | 10 | Θz+ | -0.001273 | -0.001112 | 0.000000 | 0.000000 | 0.000000 | 0.000129 |
| | 10 | uy- | -0.001273 | -0.001112 | 0.000000 | 0.000000 | 0.000000 | 0.000129 |
| | 10 | Θz- | -0.001273 | -0.001112 | 0.000000 | 0.000000 | 0.000000 | 0.000129 |
| | 20 | uy+ | -0.001273 | -0.001112 | 0.000000 | 0.000000 | 0.000000 | 0.000129 |
| | 20 | Θz+ | -0.001347 | -0.001177 | 0.000000 | 0.000000 | 0.000000 | 0.000136 |
| | 20 | uy- | -0.001347 | -0.001177 | 0.000000 | 0.000000 | 0.000000 | 0.000136 |
| | 20 | Θz- | -0.001273 | -0.001112 | 0.000000 | 0.000000 | 0.000000 | 0.000129 |
| | 22 | uy+ | -0.001273 | -0.001112 | 0.000000 | 0.000000 | 0.000000 | 0.000129 |
| | 22 | Θz+ | -0.001890 | -0.001652 | 0.000000 | 0.000000 | 0.000000 | 0.000191 |
| | 22 | uy- | -0.001890 | -0.001652 | 0.000000 | 0.000000 | 0.000000 | 0.000191 |
| | 22 | Θz- | -0.001273 | -0.001112 | 0.000000 | 0.000000 | 0.000000 | 0.000129 |
| 103 | 1 | | -0.000647 | -0.000663 | 0.000000 | 0.000000 | 0.000000 | 0.000120 |
| | 2 | | -0.000303 | -0.000311 | 0.000000 | 0.000000 | 0.000000 | 0.000056 |
| | 3 | | -0.000055 | -0.000057 | 0.000000 | 0.000000 | 0.000000 | 0.000010 |
| | 10 | uy+ | -0.000950 | -0.000974 | 0.000000 | 0.000000 | 0.000000 | 0.000176 |
| | 10 | Θz+ | -0.000950 | -0.000974 | 0.000000 | 0.000000 | 0.000000 | 0.000176 |

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 10 | uy- | -0.000950 | -0.000974 | 0.000000 | 0.000000 | 0.000000 | 0.000176 |
| | 10 | Θz- | -0.000950 | -0.000974 | 0.000000 | 0.000000 | 0.000000 | 0.000176 |
| | 20 | uy+ | -0.000950 | -0.000974 | 0.000000 | 0.000000 | 0.000000 | 0.000176 |
| | 20 | Θz+ | -0.001005 | -0.001031 | 0.000000 | 0.000000 | 0.000000 | 0.000186 |
| | 20 | uy- | -0.001005 | -0.001031 | 0.000000 | 0.000000 | 0.000000 | 0.000186 |
| | 20 | Θz- | -0.000950 | -0.000974 | 0.000000 | 0.000000 | 0.000000 | 0.000176 |
| | 22 | uy+ | -0.000950 | -0.000974 | 0.000000 | 0.000000 | 0.000000 | 0.000176 |
| | 22 | Θz+ | -0.001410 | -0.001447 | 0.000000 | 0.000000 | 0.000000 | 0.000261 |
| | 22 | uy- | -0.001410 | -0.001447 | 0.000000 | 0.000000 | 0.000000 | 0.000261 |
| | 22 | Θz- | -0.000950 | -0.000974 | 0.000000 | 0.000000 | 0.000000 | 0.000176 |
| 104 | 1 | | -0.000409 | -0.000568 | 0.000000 | 0.000000 | 0.000000 | 0.000111 |
| | 2 | | -0.000192 | -0.000266 | 0.000000 | 0.000000 | 0.000000 | 0.000052 |
| | 3 | | -0.000035 | -0.000048 | 0.000000 | 0.000000 | 0.000000 | 0.000009 |
| | 10 | uy+ | -0.000601 | -0.000834 | 0.000000 | 0.000000 | 0.000000 | 0.000163 |
| | 10 | Θz+ | -0.000601 | -0.000834 | 0.000000 | 0.000000 | 0.000000 | 0.000163 |
| | 10 | uy- | -0.000601 | -0.000834 | 0.000000 | 0.000000 | 0.000000 | 0.000163 |
| | 10 | Θz- | -0.000601 | -0.000834 | 0.000000 | 0.000000 | 0.000000 | 0.000163 |
| | 20 | uy+ | -0.000601 | -0.000834 | 0.000000 | 0.000000 | 0.000000 | 0.000163 |
| | 20 | Θz+ | -0.000636 | -0.000882 | 0.000000 | 0.000000 | 0.000000 | 0.000172 |
| | 20 | uy- | -0.000636 | -0.000882 | 0.000000 | 0.000000 | 0.000000 | 0.000172 |
| | 20 | Θz- | -0.000601 | -0.000834 | 0.000000 | 0.000000 | 0.000000 | 0.000163 |
| | 22 | uy+ | -0.000601 | -0.000834 | 0.000000 | 0.000000 | 0.000000 | 0.000163 |
| | 22 | Θz+ | -0.000893 | -0.001238 | 0.000000 | 0.000000 | 0.000000 | 0.000241 |
| | 22 | uy- | -0.000893 | -0.001238 | 0.000000 | 0.000000 | 0.000000 | 0.000241 |
| | 22 | Θz- | -0.000601 | -0.000834 | 0.000000 | 0.000000 | 0.000000 | 0.000163 |
| 105 | 1 | | -0.000211 | -0.000473 | 0.000000 | 0.000000 | 0.000000 | 0.000083 |
| | 2 | | -0.000099 | -0.000222 | 0.000000 | 0.000000 | 0.000000 | 0.000039 |
| | 3 | | -0.000018 | -0.000040 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| | 10 | uy+ | -0.000310 | -0.000695 | 0.000000 | 0.000000 | 0.000000 | 0.000122 |
| | 10 | Θz+ | -0.000310 | -0.000695 | 0.000000 | 0.000000 | 0.000000 | 0.000122 |
| | 10 | uy- | -0.000310 | -0.000695 | 0.000000 | 0.000000 | 0.000000 | 0.000122 |
| | 10 | Θz- | -0.000310 | -0.000695 | 0.000000 | 0.000000 | 0.000000 | 0.000122 |
| | 20 | uy+ | -0.000310 | -0.000695 | 0.000000 | 0.000000 | 0.000000 | 0.000122 |
| | 20 | Θz+ | -0.000328 | -0.000735 | 0.000000 | 0.000000 | 0.000000 | 0.000129 |
| | 20 | uy- | -0.000328 | -0.000735 | 0.000000 | 0.000000 | 0.000000 | 0.000129 |
| | 20 | Θz- | -0.000310 | -0.000695 | 0.000000 | 0.000000 | 0.000000 | 0.000122 |
| | 22 | uy+ | -0.000310 | -0.000695 | 0.000000 | 0.000000 | 0.000000 | 0.000122 |
| | 22 | Θz+ | -0.000460 | -0.001032 | 0.000000 | 0.000000 | 0.000000 | 0.000181 |
| | 22 | uy- | -0.000460 | -0.001032 | 0.000000 | 0.000000 | 0.000000 | 0.000181 |
| | 22 | Θz- | -0.000310 | -0.000695 | 0.000000 | 0.000000 | 0.000000 | 0.000122 |
| 106 | 1 | | -0.000075 | -0.000379 | 0.000000 | 0.000000 | 0.000000 | 0.000050 |
| | 2 | | -0.000035 | -0.000178 | 0.000000 | 0.000000 | 0.000000 | 0.000024 |
| | 3 | | -0.000006 | -0.000032 | 0.000000 | 0.000000 | 0.000000 | 0.000004 |
| | 10 | uy+ | -0.000110 | -0.000557 | 0.000000 | 0.000000 | 0.000000 | 0.000074 |
| | 10 | Θz+ | -0.000110 | -0.000557 | 0.000000 | 0.000000 | 0.000000 | 0.000074 |
| | 10 | uy- | -0.000110 | -0.000557 | 0.000000 | 0.000000 | 0.000000 | 0.000074 |
| | 10 | Θz- | -0.000110 | -0.000557 | 0.000000 | 0.000000 | 0.000000 | 0.000074 |
| | 20 | uy+ | -0.000110 | -0.000557 | 0.000000 | 0.000000 | 0.000000 | 0.000074 |
| | 20 | Θz+ | -0.000116 | -0.000589 | 0.000000 | 0.000000 | 0.000000 | 0.000078 |
| | 20 | uy- | -0.000116 | -0.000589 | 0.000000 | 0.000000 | 0.000000 | 0.000078 |
| | 20 | Θz- | -0.000110 | -0.000557 | 0.000000 | 0.000000 | 0.000000 | 0.000074 |
| | 22 | uy+ | -0.000110 | -0.000557 | 0.000000 | 0.000000 | 0.000000 | 0.000074 |
| | 22 | Θz+ | -0.000163 | -0.000827 | 0.000000 | 0.000000 | 0.000000 | 0.000110 |
| | 22 | uy- | -0.000163 | -0.000827 | 0.000000 | 0.000000 | 0.000000 | 0.000110 |
| | 22 | Θz- | -0.000110 | -0.000557 | 0.000000 | 0.000000 | 0.000000 | 0.000074 |
| 107 | 1 | | -0.000003 | -0.000284 | 0.000000 | 0.000000 | 0.000000 | 0.000022 |
| | 2 | | -0.000001 | -0.000133 | 0.000000 | 0.000000 | 0.000000 | 0.000011 |
| | 3 | | 0.000000 | -0.000024 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 10 | uy+ | -0.000004 | -0.000417 | 0.000000 | 0.000000 | 0.000000 | 0.000033 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 10 | θz+ | -0.000004 | -0.000417 | 0.000000 | 0.000000 | 0.000033 |
| | 10 | uy- | -0.000004 | -0.000417 | 0.000000 | 0.000000 | 0.000033 |
| | 10 | θz- | -0.000004 | -0.000417 | 0.000000 | 0.000000 | 0.000033 |
| | 20 | uy+ | -0.000004 | -0.000417 | 0.000000 | 0.000000 | 0.000033 |
| | 20 | θz+ | -0.000004 | -0.000441 | 0.000000 | 0.000000 | 0.000035 |
| | 20 | uy- | -0.000004 | -0.000441 | 0.000000 | 0.000000 | 0.000035 |
| | 20 | θz- | -0.000004 | -0.000417 | 0.000000 | 0.000000 | 0.000033 |
| | 22 | uy+ | -0.000004 | -0.000417 | 0.000000 | 0.000000 | 0.000033 |
| | 22 | θz+ | -0.000006 | -0.000619 | 0.000000 | 0.000000 | 0.000049 |
| | 22 | uy- | -0.000006 | -0.000619 | 0.000000 | 0.000000 | 0.000049 |
| | 22 | θz- | -0.000004 | -0.000417 | 0.000000 | 0.000000 | 0.000033 |
| 108 | 1 | | 0.000024 | -0.000189 | 0.000000 | 0.000000 | 0.000006 |
| | 2 | | 0.000011 | -0.000089 | 0.000000 | 0.000000 | 0.000003 |
| | 3 | | 0.000002 | -0.000016 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy+ | 0.000035 | -0.000278 | 0.000000 | 0.000000 | 0.000009 |
| | 10 | θz+ | 0.000035 | -0.000278 | 0.000000 | 0.000000 | 0.000009 |
| | 10 | uy- | 0.000035 | -0.000278 | 0.000000 | 0.000000 | 0.000009 |
| | 10 | θz- | 0.000035 | -0.000278 | 0.000000 | 0.000000 | 0.000009 |
| | 20 | uy+ | 0.000035 | -0.000278 | 0.000000 | 0.000000 | 0.000009 |
| | 20 | θz+ | 0.000037 | -0.000294 | 0.000000 | 0.000000 | 0.000009 |
| | 20 | uy- | 0.000037 | -0.000294 | 0.000000 | 0.000000 | 0.000009 |
| | 20 | θz- | 0.000037 | -0.000294 | 0.000000 | 0.000000 | 0.000009 |
| | 22 | uy+ | 0.000035 | -0.000278 | 0.000000 | 0.000000 | 0.000009 |
| | 22 | θz+ | 0.000052 | -0.000413 | 0.000000 | 0.000000 | 0.000013 |
| | 22 | uy- | 0.000052 | -0.000413 | 0.000000 | 0.000000 | 0.000013 |
| | 22 | θz- | 0.000038 | -0.000302 | 0.000000 | 0.000000 | 0.000009 |
| 109 | 1 | | 0.000027 | -0.000095 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 2 | | 0.000013 | -0.000044 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 3 | | 0.000002 | -0.000008 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy+ | 0.000040 | -0.000139 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 10 | θz+ | 0.000040 | -0.000139 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 10 | uy- | 0.000040 | -0.000139 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 10 | θz- | 0.000040 | -0.000139 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 20 | uy+ | 0.000040 | -0.000139 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 20 | θz+ | 0.000042 | -0.000147 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 20 | uy- | 0.000042 | -0.000147 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 20 | θz- | 0.000042 | -0.000147 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 22 | uy+ | 0.000040 | -0.000139 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 22 | θz+ | 0.000043 | -0.000151 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 22 | uy- | 0.000059 | -0.000206 | 0.000000 | 0.000000 | 0.000000 | -0.000003 |
| | 22 | θz- | 0.000059 | -0.000206 | 0.000000 | 0.000000 | 0.000000 | -0.000003 |
| 110 | 1 | | 0.000022 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000003 |
| | 2 | | 0.000010 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 3 | | 0.000002 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy+ | 0.000032 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000004 |
| | 10 | θz+ | 0.000032 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000004 |
| | 10 | uy- | 0.000032 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000004 |
| | 10 | θz- | 0.000032 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000004 |
| | 20 | uy+ | 0.000034 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000004 |
| | 20 | θz+ | 0.000034 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000004 |
| | 20 | uy- | 0.000034 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000004 |
| | 20 | θz- | 0.000034 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000004 |
| | 22 | uy+ | 0.000048 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000006 |
| | 22 | θz+ | 0.000035 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000004 |
| | 22 | uy- | 0.000048 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000006 |
| | 22 | θz- | 0.000048 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.000006 |
| 200 | 1 | | 0.000124 | -0.002240 | 0.000000 | 0.000000 | 0.000000 | 0.000024 |
| | 2 | | 0.000058 | -0.001050 | 0.000000 | 0.000000 | 0.000000 | 0.000011 |
| | 3 | | 0.000011 | -0.000191 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 10 | uy+ | 0.000182 | -0.003290 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 10 | θz+ | 0.000182 | -0.003290 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 10 | uy- | 0.000182 | -0.003290 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 10 | θz- | 0.000182 | -0.003290 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 20 | uy+ | 0.000182 | -0.003290 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 20 | θz+ | 0.000193 | -0.003481 | 0.000000 | 0.000000 | 0.000000 | 0.000037 |
| | 20 | uy- | 0.000193 | -0.003481 | 0.000000 | 0.000000 | 0.000000 | 0.000037 |
| | 20 | θz- | 0.000182 | -0.003290 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 22 | uy+ | 0.000182 | -0.003290 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| | 22 | θz+ | 0.000271 | -0.004886 | 0.000000 | 0.000000 | 0.000000 | 0.000052 |
| | 22 | uy- | 0.000271 | -0.004886 | 0.000000 | 0.000000 | 0.000000 | 0.000052 |
| | 22 | θz- | 0.000182 | -0.003290 | 0.000000 | 0.000000 | 0.000000 | 0.000035 |
| 201 | 1 | | 0.000147 | -0.002016 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 2 | | 0.000069 | -0.000945 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 3 | | 0.000012 | -0.000172 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy+ | 0.000216 | -0.002961 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | θz+ | 0.000216 | -0.002961 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy- | 0.000216 | -0.002961 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | θz- | 0.000216 | -0.002961 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 20 | uy+ | 0.000216 | -0.002961 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 20 | θz+ | 0.000228 | -0.003133 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 20 | uy- | 0.000228 | -0.003133 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 20 | θz- | 0.000228 | -0.003133 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 22 | uy+ | 0.000216 | -0.002961 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 22 | θz+ | 0.000320 | -0.004397 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 22 | uy- | 0.000320 | -0.004397 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 22 | θz- | 0.000320 | -0.004397 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 202 | 1 | | 0.000130 | -0.001792 | 0.000000 | 0.000000 | 0.000000 | -0.000014 |
| | 2 | | 0.000061 | -0.000840 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 3 | | 0.000011 | -0.000153 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 10 | uy+ | 0.000191 | -0.002632 | 0.000000 | 0.000000 | 0.000000 | -0.000021 |
| | 10 | θz+ | 0.000191 | -0.002632 | 0.000000 | 0.000000 | 0.000000 | -0.000021 |
| | 10 | uy- | 0.000191 | -0.002632 | 0.000000 | 0.000000 | 0.000000 | -0.000021 |
| | 10 | θz- | 0.000191 | -0.002632 | 0.000000 | 0.000000 | 0.000000 | -0.000021 |
| | 20 | uy+ | 0.000191 | -0.002632 | 0.000000 | 0.000000 | 0.000000 | -0.000021 |
| | 20 | θz+ | 0.000191 | -0.002632 | 0.000000 | 0.000000 | 0.000000 | -0.000021 |
| | 20 | uy- | 0.000202 | -0.002785 | 0.000000 | 0.000000 | 0.000000 | -0.000022 |
| | 20 | θz- | 0.000202 | -0.002785 | 0.000000 | 0.000000 | 0.000000 | -0.000022 |
| | 22 | uy+ | 0.000191 | -0.002632 | 0.000000 | 0.000000 | 0.000000 | -0.000021 |
| | 22 | θz+ | 0.000191 | -0.002632 | 0.000000 | 0.000000 | 0.000000 | -0.000021 |
| | 22 | uy- | 0.000284 | -0.003909 | 0.000000 | 0.000000 | 0.000000 | -0.000031 |
| | 22 | θz- | 0.000284 | -0.003909 | 0.000000 | 0.000000 | 0.000000 | -0.000031 |
| 203 | 1 | | 0.000096 | -0.001568 | 0.000000 | 0.000000 | 0.000000 | -0.000018 |
| | 2 | | 0.000045 | -0.000735 | 0.000000 | 0.000000 | 0.000000 | -0.000009 |
| | 3 | | 0.000008 | -0.000134 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 10 | uy+ | 0.000141 | -0.002303 | 0.000000 | 0.000000 | 0.000000 | -0.000027 |
| | 10 | θz+ | 0.000141 | -0.002303 | 0.000000 | 0.000000 | 0.000000 | -0.000027 |
| | 10 | uy- | 0.000141 | -0.002303 | 0.000000 | 0.000000 | 0.000000 | -0.000027 |
| | 10 | θz- | 0.000141 | -0.002303 | 0.000000 | 0.000000 | 0.000000 | -0.000027 |
| | 20 | uy+ | 0.000141 | -0.002303 | 0.000000 | 0.000000 | 0.000000 | -0.000027 |
| | 20 | θz+ | 0.000141 | -0.002303 | 0.000000 | 0.000000 | 0.000000 | -0.000027 |
| | 20 | uy- | 0.000149 | -0.002437 | 0.000000 | 0.000000 | 0.000000 | -0.000029 |
| | 20 | θz- | 0.000149 | -0.002437 | 0.000000 | 0.000000 | 0.000000 | -0.000029 |
| | 22 | uy+ | 0.000141 | -0.002303 | 0.000000 | 0.000000 | 0.000000 | -0.000027 |
| | 22 | θz+ | 0.000141 | -0.002303 | 0.000000 | 0.000000 | 0.000000 | -0.000027 |
| | 22 | uy- | 0.000209 | -0.003420 | 0.000000 | 0.000000 | 0.000000 | -0.000041 |
| | 22 | θz- | 0.000209 | -0.003420 | 0.000000 | 0.000000 | 0.000000 | -0.000041 |
| 204 | 1 | | 0.000060 | -0.001344 | 0.000000 | 0.000000 | 0.000000 | -0.000017 |
| | 2 | | 0.000028 | -0.000630 | 0.000000 | 0.000000 | 0.000000 | -0.000008 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 3 | | 0.000005 | -0.000115 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 10 | uy+ | 0.000088 | -0.001974 | 0.000000 | 0.000000 | 0.000000 | -0.000025 |
| | 10 | θz+ | 0.000088 | -0.001974 | 0.000000 | 0.000000 | 0.000000 | -0.000025 |
| | 10 | uy- | 0.000088 | -0.001974 | 0.000000 | 0.000000 | 0.000000 | -0.000025 |
| | 10 | θz- | 0.000088 | -0.001974 | 0.000000 | 0.000000 | 0.000000 | -0.000025 |
| | 20 | uy+ | 0.000088 | -0.001974 | 0.000000 | 0.000000 | 0.000000 | -0.000025 |
| | 20 | θz+ | 0.000088 | -0.001974 | 0.000000 | 0.000000 | 0.000000 | -0.000025 |
| | 20 | uy- | 0.000093 | -0.002089 | 0.000000 | 0.000000 | 0.000000 | -0.000026 |
| | 20 | θz- | 0.000093 | -0.002089 | 0.000000 | 0.000000 | 0.000000 | -0.000026 |
| | 22 | uy+ | 0.000088 | -0.001974 | 0.000000 | 0.000000 | 0.000000 | -0.000025 |
| | 22 | θz+ | 0.000088 | -0.001974 | 0.000000 | 0.000000 | 0.000000 | -0.000025 |
| | 22 | uy- | 0.000130 | -0.002932 | 0.000000 | 0.000000 | 0.000000 | -0.000036 |
| | 22 | θz- | 0.000130 | -0.002932 | 0.000000 | 0.000000 | 0.000000 | -0.000036 |
| 205 | 1 | | 0.000031 | -0.001120 | 0.000000 | 0.000000 | 0.000000 | -0.000012 |
| | 2 | | 0.000014 | -0.000525 | 0.000000 | 0.000000 | 0.000000 | -0.000006 |
| | 3 | | 0.000003 | -0.000095 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 10 | uy+ | 0.000045 | -0.001645 | 0.000000 | 0.000000 | 0.000000 | -0.000018 |
| | 10 | θz+ | 0.000045 | -0.001645 | 0.000000 | 0.000000 | 0.000000 | -0.000018 |
| | 10 | uy- | 0.000045 | -0.001645 | 0.000000 | 0.000000 | 0.000000 | -0.000018 |
| | 10 | θz- | 0.000045 | -0.001645 | 0.000000 | 0.000000 | 0.000000 | -0.000018 |
| | 20 | uy+ | 0.000045 | -0.001645 | 0.000000 | 0.000000 | 0.000000 | -0.000018 |
| | 20 | θz+ | 0.000045 | -0.001645 | 0.000000 | 0.000000 | 0.000000 | -0.000018 |
| | 20 | uy- | 0.000048 | -0.001740 | 0.000000 | 0.000000 | 0.000000 | -0.000019 |
| | 20 | θz- | 0.000048 | -0.001740 | 0.000000 | 0.000000 | 0.000000 | -0.000019 |
| | 22 | uy+ | 0.000045 | -0.001645 | 0.000000 | 0.000000 | 0.000000 | -0.000018 |
| | 22 | θz+ | 0.000045 | -0.001645 | 0.000000 | 0.000000 | 0.000000 | -0.000018 |
| | 22 | uy- | 0.000067 | -0.002442 | 0.000000 | 0.000000 | 0.000000 | -0.000027 |
| | 22 | θz- | 0.000067 | -0.002442 | 0.000000 | 0.000000 | 0.000000 | -0.000027 |
| 206 | 1 | | 0.000011 | -0.000896 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 2 | | 0.000005 | -0.000420 | 0.000000 | 0.000000 | 0.000000 | -0.000003 |
| | 3 | | 0.000001 | -0.000076 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 10 | uy+ | 0.000016 | -0.001316 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 10 | θz+ | 0.000016 | -0.001316 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 10 | uy- | 0.000016 | -0.001316 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 10 | θz- | 0.000016 | -0.001316 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 20 | uy+ | 0.000016 | -0.001316 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 20 | θz+ | 0.000016 | -0.001316 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 20 | uy- | 0.000017 | -0.001392 | 0.000000 | 0.000000 | 0.000000 | -0.000011 |
| | 20 | θz- | 0.000017 | -0.001392 | 0.000000 | 0.000000 | 0.000000 | -0.000011 |
| | 22 | uy+ | 0.000016 | -0.001316 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 22 | θz+ | 0.000016 | -0.001316 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| | 22 | uy- | 0.000024 | -0.001954 | 0.000000 | 0.000000 | 0.000000 | -0.000015 |
| | 22 | θz- | 0.000024 | -0.001954 | 0.000000 | 0.000000 | 0.000000 | -0.000015 |
| 207 | 1 | | 0.000000 | -0.000672 | 0.000000 | 0.000000 | 0.000000 | -0.000003 |
| | 2 | | 0.000000 | -0.000315 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 3 | | 0.000000 | -0.000057 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy+ | 0.000000 | -0.000987 | 0.000000 | 0.000000 | 0.000000 | -0.000005 |
| | 10 | θz+ | 0.000000 | -0.000987 | 0.000000 | 0.000000 | 0.000000 | -0.000005 |
| | 10 | uy- | 0.000000 | -0.000987 | 0.000000 | 0.000000 | 0.000000 | -0.000005 |
| | 10 | θz- | 0.000000 | -0.000987 | 0.000000 | 0.000000 | 0.000000 | -0.000005 |
| | 20 | uy+ | 0.000000 | -0.000987 | 0.000000 | 0.000000 | 0.000000 | -0.000005 |
| | 20 | θz+ | 0.000000 | -0.001044 | 0.000000 | 0.000000 | 0.000000 | -0.000005 |
| | 20 | uy- | 0.000000 | -0.001044 | 0.000000 | 0.000000 | 0.000000 | -0.000005 |
| | 20 | θz- | 0.000000 | -0.001044 | 0.000000 | 0.000000 | 0.000000 | -0.000005 |
| | 22 | uy+ | 0.000000 | -0.000987 | 0.000000 | 0.000000 | 0.000000 | -0.000005 |
| | 22 | θz+ | 0.000000 | -0.001073 | 0.000000 | 0.000000 | 0.000000 | -0.000005 |
| | 22 | uy- | 0.000000 | -0.001465 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 22 | θz- | 0.000000 | -0.001465 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| 208 | 1 | | -0.000004 | -0.000448 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2 | | -0.000002 | -0.000210 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 3 | | 0.000000 | -0.000038 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy+ | -0.000006 | -0.000658 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 10 | θz+ | -0.000006 | -0.000658 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 10 | uy- | -0.000006 | -0.000658 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 10 | θz- | -0.000006 | -0.000658 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 20 | uy+ | -0.000006 | -0.000658 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 20 | θz+ | -0.000006 | -0.000696 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 20 | uy- | -0.000006 | -0.000696 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 20 | θz- | -0.000006 | -0.000696 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 22 | uy+ | -0.000006 | -0.000658 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 22 | θz+ | -0.000007 | -0.000820 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 22 | uy- | -0.000008 | -0.000977 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| | 22 | θz- | -0.000008 | -0.000977 | 0.000000 | 0.000000 | 0.000000 | -0.000001 |
| 209 | 1 | | -0.000004 | -0.000224 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 2 | | -0.000002 | -0.000105 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 3 | | 0.000000 | -0.000019 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy+ | -0.000006 | -0.000329 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | θz+ | -0.000006 | -0.000329 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy- | -0.000006 | -0.000329 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | θz- | -0.000006 | -0.000329 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 20 | uy+ | -0.000006 | -0.000329 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 20 | θz+ | -0.000006 | -0.000348 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 20 | uy- | -0.000006 | -0.000348 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 20 | θz- | -0.000006 | -0.000348 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 22 | uy+ | -0.000006 | -0.000329 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 22 | θz+ | -0.000008 | -0.000488 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 22 | uy- | -0.000008 | -0.000488 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 22 | θz- | -0.000008 | -0.000488 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 210 | 1 | | -0.000003 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 2 | | -0.000001 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 3 | | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy+ | -0.000004 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 10 | θz+ | -0.000004 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 10 | uy- | -0.000004 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 10 | θz- | -0.000004 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 20 | uy+ | -0.000004 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 20 | θz+ | -0.000004 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 20 | uy- | -0.000004 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 20 | θz- | -0.000004 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 22 | uy+ | -0.000006 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 22 | θz+ | -0.000006 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 22 | uy- | -0.000006 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 22 | θz- | -0.000005 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| 300 | 1 | | 0.000682 | -0.000832 | 0.000000 | 0.000000 | 0.000000 | 0.000149 |
| | 2 | | 0.000320 | -0.000390 | 0.000000 | 0.000000 | 0.000000 | 0.000070 |
| | 3 | | 0.000058 | -0.000071 | 0.000000 | 0.000000 | 0.000000 | 0.000013 |
| | 10 | uy+ | 0.001002 | -0.001222 | 0.000000 | 0.000000 | 0.000000 | 0.000219 |
| | 10 | θz+ | 0.001002 | -0.001222 | 0.000000 | 0.000000 | 0.000000 | 0.000219 |
| | 10 | uy- | 0.001002 | -0.001222 | 0.000000 | 0.000000 | 0.000000 | 0.000219 |
| | 10 | θz- | 0.001002 | -0.001222 | 0.000000 | 0.000000 | 0.000000 | 0.000219 |
| | 20 | uy+ | 0.001002 | -0.001222 | 0.000000 | 0.000000 | 0.000000 | 0.000219 |
| | 20 | θz+ | 0.001060 | -0.001293 | 0.000000 | 0.000000 | 0.000000 | 0.000232 |
| | 20 | uy- | 0.001060 | -0.001293 | 0.000000 | 0.000000 | 0.000000 | 0.000232 |
| | 20 | θz- | 0.001002 | -0.001222 | 0.000000 | 0.000000 | 0.000000 | 0.000219 |
| | 22 | uy+ | 0.001002 | -0.001222 | 0.000000 | 0.000000 | 0.000000 | 0.000219 |
| | 22 | θz+ | 0.001488 | -0.001815 | 0.000000 | 0.000000 | 0.000000 | 0.000326 |
| | 22 | uy- | 0.001488 | -0.001815 | 0.000000 | 0.000000 | 0.000000 | 0.000326 |
| | 22 | θz- | 0.001002 | -0.001222 | 0.000000 | 0.000000 | 0.000000 | 0.000219 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 301 | 1 | | 0.000828 | -0.000748 | 0.000000 | 0.000000 | 0.000000 | 0.000005 |
| | 2 | | 0.000388 | -0.000351 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 3 | | 0.000071 | -0.000064 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy+ | 0.001216 | -0.001099 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| | 10 | θz+ | 0.001216 | -0.001099 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| | 10 | uy- | 0.001216 | -0.001099 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| | 10 | θz- | 0.001216 | -0.001099 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| | 20 | uy+ | 0.001216 | -0.001099 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| | 20 | θz+ | 0.001287 | -0.001163 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| | 20 | uy- | 0.001287 | -0.001163 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| | 20 | θz- | 0.001287 | -0.001163 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| | 22 | uy+ | 0.001216 | -0.001099 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| | 22 | θz+ | 0.001806 | -0.001632 | 0.000000 | 0.000000 | 0.000000 | 0.000010 |
| | 22 | uy- | 0.001806 | -0.001632 | 0.000000 | 0.000000 | 0.000000 | 0.000010 |
| | 22 | θz- | 0.001323 | -0.001195 | 0.000000 | 0.000000 | 0.000000 | 0.000007 |
| 302 | 1 | | 0.000744 | -0.000665 | 0.000000 | 0.000000 | 0.000000 | -0.000077 |
| | 2 | | 0.000349 | -0.000312 | 0.000000 | 0.000000 | 0.000000 | -0.000036 |
| | 3 | | 0.000063 | -0.000057 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 10 | uy+ | 0.001093 | -0.000977 | 0.000000 | 0.000000 | 0.000000 | -0.000113 |
| | 10 | θz+ | 0.001093 | -0.000977 | 0.000000 | 0.000000 | 0.000000 | -0.000113 |
| | 10 | uy- | 0.001093 | -0.000977 | 0.000000 | 0.000000 | 0.000000 | -0.000113 |
| | 10 | θz- | 0.001093 | -0.000977 | 0.000000 | 0.000000 | 0.000000 | -0.000113 |
| | 20 | uy+ | 0.001093 | -0.000977 | 0.000000 | 0.000000 | 0.000000 | -0.000113 |
| | 20 | θz+ | 0.001093 | -0.000977 | 0.000000 | 0.000000 | 0.000000 | -0.000113 |
| | 20 | uy- | 0.001156 | -0.001034 | 0.000000 | 0.000000 | 0.000000 | -0.000120 |
| | 20 | θz- | 0.001156 | -0.001034 | 0.000000 | 0.000000 | 0.000000 | -0.000120 |
| | 22 | uy+ | 0.001093 | -0.000977 | 0.000000 | 0.000000 | 0.000000 | -0.000113 |
| | 22 | θz+ | 0.001093 | -0.000977 | 0.000000 | 0.000000 | 0.000000 | -0.000113 |
| | 22 | uy- | 0.001622 | -0.001451 | 0.000000 | 0.000000 | 0.000000 | -0.000168 |
| | 22 | θz- | 0.001622 | -0.001451 | 0.000000 | 0.000000 | 0.000000 | -0.000168 |
| 303 | 1 | | 0.000554 | -0.000582 | 0.000000 | 0.000000 | 0.000000 | -0.000103 |
| | 2 | | 0.000260 | -0.000273 | 0.000000 | 0.000000 | 0.000000 | -0.000048 |
| | 3 | | 0.000047 | -0.000050 | 0.000000 | 0.000000 | 0.000000 | -0.000009 |
| | 10 | uy+ | 0.000814 | -0.000855 | 0.000000 | 0.000000 | 0.000000 | -0.000151 |
| | 10 | θz+ | 0.000814 | -0.000855 | 0.000000 | 0.000000 | 0.000000 | -0.000151 |
| | 10 | uy- | 0.000814 | -0.000855 | 0.000000 | 0.000000 | 0.000000 | -0.000151 |
| | 10 | θz- | 0.000814 | -0.000855 | 0.000000 | 0.000000 | 0.000000 | -0.000151 |
| | 20 | uy+ | 0.000814 | -0.000855 | 0.000000 | 0.000000 | 0.000000 | -0.000151 |
| | 20 | θz+ | 0.000814 | -0.000855 | 0.000000 | 0.000000 | 0.000000 | -0.000151 |
| | 20 | uy- | 0.000861 | -0.000905 | 0.000000 | 0.000000 | 0.000000 | -0.000160 |
| | 20 | θz- | 0.000861 | -0.000905 | 0.000000 | 0.000000 | 0.000000 | -0.000160 |
| | 22 | uy+ | 0.000814 | -0.000855 | 0.000000 | 0.000000 | 0.000000 | -0.000151 |
| | 22 | θz+ | 0.000814 | -0.000855 | 0.000000 | 0.000000 | 0.000000 | -0.000151 |
| | 22 | uy- | 0.001208 | -0.001270 | 0.000000 | 0.000000 | 0.000000 | -0.000225 |
| | 22 | θz- | 0.001208 | -0.001270 | 0.000000 | 0.000000 | 0.000000 | -0.000225 |
| 304 | 1 | | 0.000349 | -0.000499 | 0.000000 | 0.000000 | 0.000000 | -0.000095 |
| | 2 | | 0.000164 | -0.000234 | 0.000000 | 0.000000 | 0.000000 | -0.000044 |
| | 3 | | 0.000030 | -0.000043 | 0.000000 | 0.000000 | 0.000000 | -0.000008 |
| | 10 | uy+ | 0.000513 | -0.000733 | 0.000000 | 0.000000 | 0.000000 | -0.000139 |
| | 10 | θz+ | 0.000513 | -0.000733 | 0.000000 | 0.000000 | 0.000000 | -0.000139 |
| | 10 | uy- | 0.000513 | -0.000733 | 0.000000 | 0.000000 | 0.000000 | -0.000139 |
| | 10 | θz- | 0.000513 | -0.000733 | 0.000000 | 0.000000 | 0.000000 | -0.000139 |
| | 20 | uy+ | 0.000513 | -0.000733 | 0.000000 | 0.000000 | 0.000000 | -0.000139 |
| | 20 | θz+ | 0.000513 | -0.000733 | 0.000000 | 0.000000 | 0.000000 | -0.000139 |
| | 20 | uy- | 0.000543 | -0.000776 | 0.000000 | 0.000000 | 0.000000 | -0.000147 |
| | 20 | θz- | 0.000543 | -0.000776 | 0.000000 | 0.000000 | 0.000000 | -0.000147 |
| | 22 | uy+ | 0.000513 | -0.000733 | 0.000000 | 0.000000 | 0.000000 | -0.000139 |
| | 22 | θz+ | 0.000513 | -0.000733 | 0.000000 | 0.000000 | 0.000000 | -0.000139 |
| | 22 | uy- | 0.000762 | -0.001089 | 0.000000 | 0.000000 | 0.000000 | -0.000206 |
| | 22 | θz- | 0.000762 | -0.001089 | 0.000000 | 0.000000 | 0.000000 | -0.000206 |

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 305 | 1 | | 0.000179 | -0.000416 | 0.000000 | 0.000000 | 0.000000 | -0.000071 |
| | 2 | | 0.000084 | -0.000195 | 0.000000 | 0.000000 | 0.000000 | -0.000033 |
| | 3 | | 0.000015 | -0.000035 | 0.000000 | 0.000000 | 0.000000 | -0.000006 |
| | 10 | uy+ | 0.000263 | -0.000611 | 0.000000 | 0.000000 | 0.000000 | -0.000104 |
| | 10 | θz+ | 0.000263 | -0.000611 | 0.000000 | 0.000000 | 0.000000 | -0.000104 |
| | 10 | uy- | 0.000263 | -0.000611 | 0.000000 | 0.000000 | 0.000000 | -0.000104 |
| | 10 | θz- | 0.000263 | -0.000611 | 0.000000 | 0.000000 | 0.000000 | -0.000104 |
| | 20 | uy+ | 0.000263 | -0.000611 | 0.000000 | 0.000000 | 0.000000 | -0.000104 |
| | 20 | θz+ | 0.000263 | -0.000611 | 0.000000 | 0.000000 | 0.000000 | -0.000104 |
| | 20 | uy- | 0.000278 | -0.000646 | 0.000000 | 0.000000 | 0.000000 | -0.000110 |
| | 20 | θz- | 0.000278 | -0.000646 | 0.000000 | 0.000000 | 0.000000 | -0.000110 |
| | 22 | uy+ | 0.000263 | -0.000611 | 0.000000 | 0.000000 | 0.000000 | -0.000104 |
| | 22 | θz+ | 0.000263 | -0.000611 | 0.000000 | 0.000000 | 0.000000 | -0.000104 |
| | 22 | uy- | 0.000390 | -0.000907 | 0.000000 | 0.000000 | 0.000000 | -0.000154 |
| | 22 | θz- | 0.000390 | -0.000907 | 0.000000 | 0.000000 | 0.000000 | -0.000154 |
| 306 | 1 | | 0.000064 | -0.000333 | 0.000000 | 0.000000 | 0.000000 | -0.000043 |
| | 2 | | 0.000030 | -0.000156 | 0.000000 | 0.000000 | 0.000000 | -0.000020 |
| | 3 | | 0.000005 | -0.000028 | 0.000000 | 0.000000 | 0.000000 | -0.000004 |
| | 10 | uy+ | 0.000094 | -0.000489 | 0.000000 | 0.000000 | 0.000000 | -0.000063 |
| | 10 | θz+ | 0.000094 | -0.000489 | 0.000000 | 0.000000 | 0.000000 | -0.000063 |
| | 10 | uy- | 0.000094 | -0.000489 | 0.000000 | 0.000000 | 0.000000 | -0.000063 |
| | 10 | θz- | 0.000094 | -0.000489 | 0.000000 | 0.000000 | 0.000000 | -0.000063 |
| | 20 | uy+ | 0.000094 | -0.000489 | 0.000000 | 0.000000 | 0.000000 | -0.000063 |
| | 20 | θz+ | 0.000094 | -0.000489 | 0.000000 | 0.000000 | 0.000000 | -0.000063 |
| | 20 | uy- | 0.000099 | -0.000517 | 0.000000 | 0.000000 | 0.000000 | -0.000067 |
| | 20 | θz- | 0.000099 | -0.000517 | 0.000000 | 0.000000 | 0.000000 | -0.000067 |
| | 22 | uy+ | 0.000094 | -0.000489 | 0.000000 | 0.000000 | 0.000000 | -0.000063 |
| | 22 | θz+ | 0.000094 | -0.000489 | 0.000000 | 0.000000 | 0.000000 | -0.000063 |
| | 22 | uy- | 0.000139 | -0.000726 | 0.000000 | 0.000000 | 0.000000 | -0.000094 |
| | 22 | θz- | 0.000139 | -0.000726 | 0.000000 | 0.000000 | 0.000000 | -0.000094 |
| 307 | 1 | | 0.000002 | -0.000249 | 0.000000 | 0.000000 | 0.000000 | -0.000019 |
| | 2 | | 0.000001 | -0.000117 | 0.000000 | 0.000000 | 0.000000 | -0.000009 |
| | 3 | | 0.000000 | -0.000021 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 10 | uy+ | 0.000003 | -0.000366 | 0.000000 | 0.000000 | 0.000000 | -0.000028 |
| | 10 | θz+ | 0.000003 | -0.000366 | 0.000000 | 0.000000 | 0.000000 | -0.000028 |
| | 10 | uy- | 0.000003 | -0.000366 | 0.000000 | 0.000000 | 0.000000 | -0.000028 |
| | 10 | θz- | 0.000003 | -0.000366 | 0.000000 | 0.000000 | 0.000000 | -0.000028 |
| | 20 | uy+ | 0.000003 | -0.000366 | 0.000000 | 0.000000 | 0.000000 | -0.000028 |
| | 20 | θz+ | 0.000003 | -0.000366 | 0.000000 | 0.000000 | 0.000000 | -0.000028 |
| | 20 | uy- | 0.000003 | -0.000387 | 0.000000 | 0.000000 | 0.000000 | -0.000030 |
| | 20 | θz- | 0.000003 | -0.000387 | 0.000000 | 0.000000 | 0.000000 | -0.000030 |
| | 22 | uy+ | 0.000003 | -0.000366 | 0.000000 | 0.000000 | 0.000000 | -0.000028 |
| | 22 | θz+ | 0.000003 | -0.000366 | 0.000000 | 0.000000 | 0.000000 | -0.000028 |
| | 22 | uy- | 0.000004 | -0.000543 | 0.000000 | 0.000000 | 0.000000 | -0.000042 |
| | 22 | θz- | 0.000004 | -0.000543 | 0.000000 | 0.000000 | 0.000000 | -0.000042 |
| 308 | 1 | | -0.000020 | -0.000166 | 0.000000 | 0.000000 | 0.000000 | -0.000005 |
| | 2 | | -0.000010 | -0.000078 | 0.000000 | 0.000000 | 0.000000 | -0.000002 |
| | 3 | | -0.000002 | -0.000014 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy+ | -0.000030 | -0.000244 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 10 | θz+ | -0.000030 | -0.000244 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 10 | uy- | -0.000030 | -0.000244 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 10 | θz- | -0.000030 | -0.000244 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 20 | uy+ | -0.000030 | -0.000244 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 20 | θz+ | -0.000032 | -0.000258 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 20 | uy- | -0.000032 | -0.000258 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 20 | θz- | -0.000032 | -0.000258 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 22 | uy+ | -0.000030 | -0.000244 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 22 | θz+ | -0.000033 | -0.000265 | 0.000000 | 0.000000 | 0.000000 | -0.000007 |
| | 22 | uy- | -0.000045 | -0.000362 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 22 | θz- | -0.000045 | -0.000362 | 0.000000 | 0.000000 | 0.000000 | -0.000010 |
| 309 | 1 | | -0.000023 | -0.000083 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 2 | | -0.000011 | -0.000039 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 3 | | -0.000002 | -0.000007 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy+ | -0.000034 | -0.000122 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 10 | θz+ | -0.000034 | -0.000122 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 10 | uy- | -0.000034 | -0.000122 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 10 | θz- | -0.000034 | -0.000122 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 20 | uy+ | -0.000034 | -0.000122 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 20 | θz+ | -0.000036 | -0.000129 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 20 | uy- | -0.000036 | -0.000129 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 20 | θz- | -0.000036 | -0.000129 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 22 | uy+ | -0.000034 | -0.000122 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| | 22 | θz+ | -0.000051 | -0.000181 | 0.000000 | 0.000000 | 0.000000 | 0.000003 |
| | 22 | uy- | -0.000051 | -0.000181 | 0.000000 | 0.000000 | 0.000000 | 0.000003 |
| | 22 | θz- | -0.000037 | -0.000133 | 0.000000 | 0.000000 | 0.000000 | 0.000002 |
| 310 | 1 | | -0.000018 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000003 |
| | 2 | | -0.000009 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000001 |
| | 3 | | -0.000002 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | 10 | uy+ | -0.000027 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000004 |
| | 10 | θz+ | -0.000027 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000004 |
| | 10 | uy- | -0.000027 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000004 |
| | 10 | θz- | -0.000027 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000004 |
| | 20 | uy+ | -0.000029 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000004 |
| | 20 | θz+ | -0.000029 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000004 |
| | 20 | uy- | -0.000029 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000004 |
| | 20 | θz- | -0.000029 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000004 |
| | 22 | uy+ | -0.000041 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000006 |
| | 22 | θz+ | -0.000041 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000006 |
| | 22 | uy- | -0.000041 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000006 |
| | 22 | θz- | -0.000030 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000004 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Fz | Mx | My | Mz |
|---|---|---|---|---|---|---|---|---|
| 102 | 1 | | 6.97 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | 3.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | 10.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | 10.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | 10.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | 10.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | 10.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | 10.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | 10.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | 10.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | 15.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | 15.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | 15.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | 15.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 103 | 1 | | 9.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | 4.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | 0.81 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | 13.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | 13.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | 13.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | 13.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | 14.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | 14.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | 14.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | 14.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | 20.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | 20.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | 20.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | 20.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 104 | 1 | | 5.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | 2.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | 0.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | 8.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | 8.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | 8.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | 8.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | 9.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | 9.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | 9.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | 9.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | 13.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | 13.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | 13.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | 13.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 105 | 1 | | 3.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | 1.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | 4.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | 4.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | 4.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | 4.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | 4.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | 4.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | 4.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | 4.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | 6.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | 6.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | 6.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | 6.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 106 | 1 | | 4.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | 1.93 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | 6.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | 6.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | 6.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | 6.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | 6.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | 6.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | 6.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | 6.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | 8.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | 8.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | 8.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | 8.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 107 | 1 | | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 10 | Fy+ | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 108 | 1 | | -1.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -0.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -1.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -1.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -1.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -1.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -2.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -2.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -2.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -2.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -2.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -2.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -2.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -2.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 109 | 1 | | -1.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -2.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -2.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -2.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -2.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -2.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -2.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -2.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -2.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -3.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -3.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -3.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -3.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 110 | 1 | | -1.18 | 329.91 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -0.55 | 154.71 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.10 | 28.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -1.74 | 484.62 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -1.74 | 484.62 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -1.74 | 484.62 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -1.74 | 484.62 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -1.84 | 512.75 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -1.84 | 512.75 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -1.74 | 484.62 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -1.84 | 512.75 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -2.58 | 719.64 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -2.58 | 719.64 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -1.74 | 484.62 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -2.58 | 719.64 | 0.00 | 0.00 | 0.00 | 0.00 |
| 202 | 1 | | -1.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -0.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 3 | | -0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -1.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -1.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -1.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -1.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -1.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -1.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -1.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -1.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -2.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -2.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -2.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -2.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 203 | 1 | | -1.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -0.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -2.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -2.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -2.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -2.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -2.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -2.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -2.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -2.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -3.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -3.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -3.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -3.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 204 | 1 | | -0.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -1.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -1.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -1.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -1.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -1.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -1.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -1.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -1.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -1.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -1.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -1.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -1.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 205 | 1 | | -0.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -0.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -0.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -0.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -0.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -0.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -0.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -0.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -0.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 206 | 1 | | -0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2 | | -0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -0.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -0.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -0.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -0.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -0.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -0.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -0.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -0.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -1.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -1.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -1.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -1.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 207 | 1 | | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 208 | 1 | | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 209 | 1 | | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | 0.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | 0.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | 0.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | 0.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

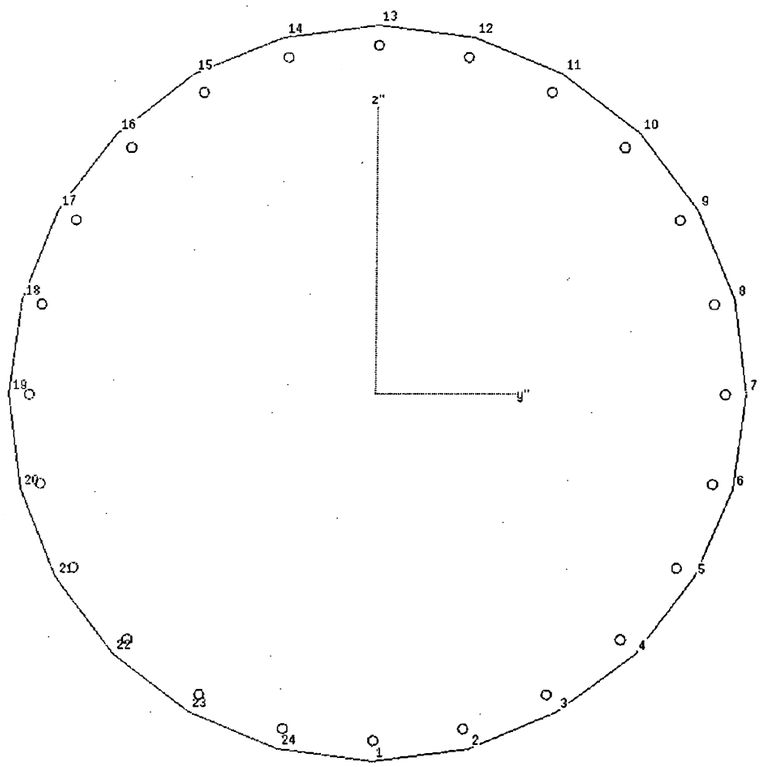
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 210 | 1 | | 0.17 | 780.60 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | 0.08 | 366.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | 0.02 | 66.56 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | 0.25 | 1146.67 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | 0.25 | 1146.67 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | 0.25 | 1146.67 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | 0.25 | 1146.67 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | 0.27 | 1213.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | 0.27 | 1213.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | 0.25 | 1146.67 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | 0.27 | 1213.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | 0.37 | 1702.75 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | 0.37 | 1702.75 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | 0.25 | 1146.67 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | 0.37 | 1702.75 | 0.00 | 0.00 | 0.00 | 0.00 |
| 302 | 1 | | -5.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -2.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -8.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -8.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -8.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -8.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -9.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -9.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -9.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -9.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -13.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -13.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -13.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -13.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 303 | 1 | | -8.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -3.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -11.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -11.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -11.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -11.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -12.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -12.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -12.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -12.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -17.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -17.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -17.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -17.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 304 | 1 | | -5.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -2.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -7.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -7.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -7.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -7.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -7.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -7.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -7.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -7.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -11.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -11.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -11.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -11.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 305 | 1 | | -2.62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -1.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -3.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -3.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -3.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -3.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -4.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -4.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -4.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -4.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -5.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -5.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -5.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -5.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 306 | 1 | | -3.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -1.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -5.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -5.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -5.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -5.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -5.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -5.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -5.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -5.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -7.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -7.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -7.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -7.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 307 | 1 | | -0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | -0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | -0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | -0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | -0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | -0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | -0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | -0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | -0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | -0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | -0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | -0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | -0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | -0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 308 | 1 | | 1.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | 0.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | 1.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | 1.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | 1.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | 1.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | 1.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | 1.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | 1.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | 1.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | 2.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | 2.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | 2.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

PILOTES.LST Sábado, 18 Mayo 2002 6:19am

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 22 | Mz- | 2.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 309 | 1 | | 1.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | 1.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | 1.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | 1.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | 1.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | 1.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | 1.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | 1.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | 1.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | 2.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | 2.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | 2.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | 2.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 310 | 1 | | 1.00 | 289.81 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | | 0.47 | 135.91 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | | 0.09 | 24.71 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy+ | 1.48 | 425.72 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz+ | 1.48 | 425.72 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Fy- | 1.48 | 425.72 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 10 | Mz- | 1.48 | 425.72 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy+ | 1.57 | 450.43 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz+ | 1.57 | 450.43 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Fy- | 1.48 | 425.72 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 20 | Mz- | 1.57 | 450.43 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy+ | 2.19 | 632.17 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz+ | 2.19 | 632.17 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Fy- | 1.48 | 425.72 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 22 | Mz- | 2.19 | 632.17 | 0.00 | 0.00 | 0.00 | 0.00 |

stb. 1 : 15.0




cción :"PILOTE" Armadura :"B1"
po : tipo viga/ Círculo/tubo Unidades :[cm]
terial :"H250"

ámetro exterior = 180.000 cm

racterísticas mecánicas de la sección:
ea : Ax= 2.516 [m2]
mentos de inercia : Iy= 0.503654 [m4] Iz= 0.503654 [m4]
ercia a torsión : Ix= 1.031 [m4]

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

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| q. | Iz | -0.900 | -0.559616 | 0.222 |
| ı. | Iz | 0.900 | 0.559616 | -0.222 |
| ajo | Iy | -0.900 | -0.559616 | 0.222 |
| -iba | Iy | 0.900 | 0.559616 | -0.222 |



Armadura: "B1"

| Nº | Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|---|
| 1 | AEH500 | (2) | 4.24 | 0.00 | 5.00 | | |
| 2 | AEH500 | (2) | 4.24 | 22.00 | 7.90 | | |
| 3 | AEH500 | (2) | 4.24 | 42.50 | 16.39 | | |
| 4 | AEH500 | (2) | 4.24 | 60.10 | 29.90 | | |
| 5 | AEH500 | (2) | 4.24 | 73.61 | 47.50 | | |
| 6 | AEH500 | (2) | 4.24 | 82.10 | 68.00 | | |
| 7 | AEH500 | (2) | 4.24 | 85.00 | 90.00 | | |
| 8 | AEH500 | (2) | 4.24 | 82.10 | 112.00 | | |
| 9 | AEH500 | (2) | 4.24 | 73.61 | 132.50 | | |
| 10 | AEH500 | (2) | 4.24 | 60.10 | 150.10 | | |
| 11 | AEH500 | (2) | 4.24 | 42.50 | 163.61 | | |
| 12 | AEH500 | (2) | 4.24 | 22.00 | 172.10 | | |
| 13 | AEH500 | (2) | 4.24 | 0.00 | 175.00 | | |
| 14 | AEH500 | (2) | 4.24 | -22.00 | 172.10 | | |
| 15 | AEH500 | (2) | 4.24 | -42.50 | 163.61 | | |
| 16 | AEH500 | (2) | 4.24 | -60.10 | 150.10 | | |
| 17 | AEH500 | (2) | 4.24 | -73.61 | 132.50 | | |
| 18 | AEH500 | (2) | 4.24 | -82.10 | 112.00 | | |
| 19 | AEH500 | (2) | 4.24 | -85.00 | 90.00 | | |
| 20 | AEH500 | (2) | 4.24 | -82.10 | 68.00 | | |
| 21 | AEH500 | (2) | 4.24 | -73.61 | 47.50 | | |
| 22 | AEH500 | (2) | 4.24 | -60.10 | 29.90 | | |
| 23 | AEH500 | (2) | 4.24 | -42.50 | 16.39 | | |
| 24 | AEH500 | (2) | 4.24 | -22.00 | 7.90 | | |

Total: 101.78 Cuantía de armadura: 0.405 [o/o]

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

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

Características del material:

| Nom.Mat. | Módulo E [ kp/cm2] | 0.85*fcd,fyd [ kp/cm2] | eps-fc [o/oo] | fct [ kp/cm2] | fcv [ kp/cm2] | fcw,mín [ kp/cm2] |
|---|---|---|---|---|---|---|
| "H250" | 278000.0 | -141.600 | -2.000 | 0.0 | 6.460 | 250.000 |
| "AEH500" | 2.10E+06 | 4434.700 | | | | |

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

mensionamiento : Viga "PILOTE"/"B1"

fuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| 1210.950 | | | | 599.790 | | 45.0 |

armadura mínima entrada es suficiente !
madura mínima definida con las áreas entradas ..
ctor actual de minoración de la resistencia de la sección ..... 1.43
ctor necesario de minoración de la resistencia de la sección .. 1.00

| madura ngitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado (As-min) | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| "AEH500" | 0.0 | 5.0 | | | 4.24 | - | 4.24 |
| "AEH500" | 22.0 | 7.9 | | | 4.24 | - | 4.24 |
| "AEH500" | 42.5 | 16.4 | | | 4.24 | - | 4.24 |
| "AEH500" | 60.1 | 29.9 | | | 4.24 | - | 4.24 |
| "AEH500" | 73.6 | 47.5 | | | 4.24 | - | 4.24 |
| "AEH500" | 82.1 | 68.0 | | | 4.24 | - | 4.24 |
| "AEH500" | 85.0 | 90.0 | | | 4.24 | - | 4.24 |
| "AEH500" | 82.1 | 112.0 | | | 4.24 | - | 4.24 |
| "AEH500" | 73.6 | 132.5 | | | 4.24 | - | 4.24 |
| "AEH500" | 60.1 | 150.1 | | | 4.24 | - | 4.24 |
| "AEH500" | 42.5 | 163.6 | | | 4.24 | - | 4.24 |
| "AEH500" | 22.0 | 172.1 | | | 4.24 | - | 4.24 |
| "AEH500" | 0.0 | 175.0 | | | 4.24 | - | 4.24 |
| "AEH500" | -22.0 | 172.1 | | | 4.24 | - | 4.24 |
| "AEH500" | -42.5 | 163.6 | | | 4.24 | - | 4.24 |
| "AEH500" | -60.1 | 150.1 | | | 4.24 | - | 4.24 |
| "AEH500" | -73.6 | 132.5 | | | 4.24 | - | 4.24 |
| "AEH500" | -82.1 | 112.0 | | | 4.24 | - | 4.24 |
| "AEH500" | -85.0 | 90.0 | | | 4.24 | - | 4.24 |
| "AEH500" | -82.1 | 68.0 | | | 4.24 | - | 4.24 |
| "AEH500" | -73.6 | 47.5 | | | 4.24 | - | 4.24 |
| "AEH500" | -60.1 | 29.9 | | | 4.24 | - | 4.24 |
| "AEH500" | -42.5 | 16.4 | | | 4.24 | - | 4.24 |
| "AEH500" | -22.0 | 7.9 | | | 4.24 | - | 4.24 |

Cuantía arm. 0.40 [o/o] Suma 101.78
=========

ormaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| migón-Min | 0.00 | 180.00 | -3.500 | -141.600 | "H250" |
| adura-Min | 0.00 | 175.00 | -3.335 | -4434.700 | "AEH500" |
| migón-Max | -0.00 | 0.00 | 2.447 | 0.000 | "H250" |
| adura-Max | -0.00 | 5.00 | 2.282 | 4434.700 | "AEH500" |

ra neutra zn 74.07 cm yn 0.00 cm Angulo 0.0
ho zona comprim. 105.93 cm Zona comprimida/Canto útil 0.66



Dimensionamiento : Viga "PILOTE"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -719.640 | | | | -573.980 | 400.000 | 45.0 |

La armadura mínima entrada es suficiente !
Armadura mínima definida con las áreas entradas ..
Factor actual de minoración de la resistencia de la sección ..... 1.01
Factor necesario de minoración de la resistencia de la sección .. 1.00

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado (As-min) | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "AEH500" | 0.0 | 5.0 | | | 4.24 | - | 4.24 |
| 2 "AEH500" | 22.0 | 7.9 | | | 4.24 | - | 4.24 |
| 3 "AEH500" | 42.5 | 16.4 | | | 4.24 | - | 4.24 |
| 4 "AEH500" | 60.1 | 29.9 | | | 4.24 | - | 4.24 |
| 5 "AEH500" | 73.6 | 47.5 | | | 4.24 | - | 4.24 |
| 6 "AEH500" | 82.1 | 68.0 | | | 4.24 | - | 4.24 |
| 7 "AEH500" | 85.0 | 90.0 | | | 4.24 | - | 4.24 |
| 8 "AEH500" | 82.1 | 112.0 | | | 4.24 | - | 4.24 |
| 9 "AEH500" | 73.6 | 132.5 | | | 4.24 | - | 4.24 |
| 10 "AEH500" | 60.1 | 150.1 | | | 4.24 | - | 4.24 |
| 11 "AEH500" | 42.5 | 163.6 | | | 4.24 | - | 4.24 |
| 12 "AEH500" | 22.0 | 172.1 | | | 4.24 | - | 4.24 |
| 13 "AEH500" | 0.0 | 175.0 | | | 4.24 | - | 4.24 |
| 14 "AEH500" | -22.0 | 172.1 | | | 4.24 | - | 4.24 |
| 15 "AEH500" | -42.5 | 163.6 | | | 4.24 | - | 4.24 |
| 16 "AEH500" | -60.1 | 150.1 | | | 4.24 | - | 4.24 |
| 17 "AEH500" | -73.6 | 132.5 | | | 4.24 | - | 4.24 |
| 18 "AEH500" | -82.1 | 112.0 | | | 4.24 | - | 4.24 |
| 19 "AEH500" | -85.0 | 90.0 | | | 4.24 | - | 4.24 |
| 20 "AEH500" | -82.1 | 68.0 | | | 4.24 | - | 4.24 |
| 21 "AEH500" | -73.6 | 47.5 | | | 4.24 | - | 4.24 |
| 22 "AEH500" | -60.1 | 29.9 | | | 4.24 | - | 4.24 |
| 23 "AEH500" | -42.5 | 16.4 | | | 4.24 | - | 4.24 |
| 24 "AEH500" | -22.0 | 7.9 | | | 4.24 | - | 4.24 |

Cuantía arm. 0.40 [o/o] Suma 101.78
=========

Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | 45.00 | 12.06 | -3.500 | -141.600 | "H250" |
| Armadura-Min | 42.50 | 16.39 | -3.220 | -4434.700 | "AEH500" |
| Hormigón-Max | -45.00 | 167.94 | 6.568 | 0.000 | "H250" |
| Armadura-Max | -42.50 | 163.61 | 6.288 | 4434.700 | "AEH500" |

Fibra neutra zn 67.56 cm yn 15.60 cm Angulo 34.82

# Listado de Datos de la Obra

Proyecto: ODT 300.20
CONSTRUCTORA HISPANICA

Fecha:03/09/03

## 1.DATOS GENERALES DE LA ESTRUCTURA

Proyecto: ODT 300.20
CONSTRUCTORA HISPANICA

Clave: JC968_A

## 2.DATOS GEOMÉTRICOS DE GRUPOS Y PLANTAS

| Grupo | NOMBRE DEL GRUPO | Planta | NOMBRE PLANTA | Altura | Cota |
|---|---|---|---|---|---|
| 1 | VIAL | 1 | VIAL | 7.00 | 7.00 |
| 0 | Cimentación | | | | 0.00 |

## 3.LOSAS Y ELEMENTOS DE CIMENTACIÓN

| Losas Cimentación | Canto (cm) | Módulo Balasto (Tn/m3) | Tensión Admisible (Tn/m2) |
|---|---|---|---|
| Todas | 80 | 1500.00 | 29.00 |

## 4.ACCIONES CONSIDERADAS

### 4.1 GRAVITATORIAS

| NOMBRE DEL GRUPO | S.C.U | CARGAS MUERTAS |
|---|---|---|
| VIAL | 0.00 | 0.00 |

### 4.2 VIENTO

Sin acción de viento

### 4.3 SISMO

Sin acción de sismo

### 4.4 CJTO.CARGAS ESPECIALES

| NºCCE | HIPOTESIS |
|---|---|
| 1 | Peso propio |
| 2 | Sobrecarga |
| 3 | Sobrecarga separada |
| 4 | Sobrecarga separada |
| 5 | Sobrecarga separada |

### 4.5 CARGAS HORIZONTALES Y EN CABEZA DE PILARES

#### 4.5.1 CARGAS HORIZONTALES EN PILARES

| Referencia Pilar | Dirección de la Carga | Tipo de Carga | CCE | VALOR | COTA (m) |
|---|---|---|---|---|---|
| P1 | X Local | Carga Uniforme | Peso propio | 1.15 Tn/m | Desde: 4.70 Hasta: 7.00 |
| | X Local | Carga Uniforme | Peso propio | 3.50 Tn/m | Desde: 2.30 Hasta: 4.70 |
| | X Local | Carga Uniforme | Peso propio | 5.85 Tn/m | Desde: 0.00 Hasta: 2.30 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 7.00 |
| P4 | X Local | Carga Uniforme | Peso propio | 1.15 Tn/m | Desde: 4.70 Hasta: 7.00 |
| | X Local | Carga Uniforme | Peso propio | 3.50 Tn/m | Desde: 2.30 Hasta: 4.70 |
| | X Local | Carga Uniforme | Peso propio | 5.85 Tn/m | Desde: 0.00 Hasta: 2.30 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 7.00 |
| P7 | X Local | Carga Uniforme | Peso propio | -1.15 Tn/m | Desde: 4.70 Hasta: 7.00 |
| | X Local | Carga Uniforme | Peso propio | 3.50 Tn/m | Desde: 2.30 Hasta: 4.70 |
| | X Local | Carga Uniforme | Peso propio | 5.85 Tn/m | Desde: 0.00 Hasta: 2.30 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 7.00 |
| P10 | X Local | Carga Uniforme | Peso propio | 1.15 Tn/m | Desde: 4.70 Hasta: 7.00 |
| | X Local | Carga Uniforme | Peso propio | 3.50 Tn/m | Desde: 2.30 Hasta: 4.70 |
| | X Local | Carga Uniforme | Peso propio | 5.85 Tn/m | Desde: 0.00 Hasta: 2.30 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 7.00 |
| P13 | X Local | Carga Uniforme | Peso propio | 1.15 Tn/m | Desde: 4.70 Hasta: 7.00 |
| | X Local | Carga Uniforme | Peso propio | 3.50 Tn/m | Desde: 2.30 Hasta: 4.70 |
| | X Local | Carga Uniforme | Peso propio | 5.85 Tn/m | Desde: 0.00 Hasta: 2.30 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 7.00 |
| P16 | X Local | Carga Uniforme | Peso propio | 1.15 Tn/m | Desde: 4.70 Hasta: 7.00 |
| | X Local | Carga Uniforme | Peso propio | 3.50 Tn/m | Desde: 2.30 Hasta: 4.70 |
| | X Local | Carga Uniforme | Peso propio | 5.85 Tn/m | Desde: 0.00 Hasta: 2.30 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 7.00 |
| P19 | X Local | Carga Uniforme | Peso propio | -1.15 Tn/m | Desde: 4.70 Hasta: 7.00 |
| | X Local | Carga Uniforme | Peso propio | -3.50 Tn/m | Desde: 2.30 Hasta: 4.70 |
| | X Local | Carga Uniforme | Peso propio | -5.85 Tn/m | Desde: 0.00 Hasta: 2.30 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 7.00 |
| P20 | X Local | Carga Uniforme | Peso propio | -1.15 Tn/m | Desde: 4.70 Hasta: 7.00 |
| | X Local | Carga Uniforme | Peso propio | -3.50 Tn/m | Desde: 2.30 Hasta: 4.70 |
| | X Local | Carga Uniforme | Peso propio | -5.85 Tn/m | Desde: 0.00 Hasta: 2.30 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 7.00 |
| P21 | X Local | Carga Uniforme | Peso propio | -1.15 Tn/m | Desde: 4.70 Hasta: 7.00 |
| | X Local | Carga Uniforme | Peso propio | -3.50 Tn/m | Desde: 2.30 Hasta: 4.70 |
| | X Local | Carga Uniforme | Peso propio | -5.85 Tn/m | Desde: 0.00 Hasta: 2.30 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 7.00 |
| P22 | X Local | Carga Uniforme | Peso propio | -1.15 Tn/m | Desde: 4.70 Hasta: 7.00 |
| | X Local | Carga Uniforme | Peso propio | -3.50 Tn/m | Desde: 2.30 Hasta: 4.70 |
| | X Local | Carga Uniforme | Peso propio | -5.85 Tn/m | Desde: 0.00 Hasta: 2.30 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 7.00 |
| P23 | X Local | Carga Uniforme | Peso propio | -1.15 Tn/m | Desde: 4.70 Hasta: 7.00 |
| | X Local | Carga Uniforme | Peso propio | -3.50 Tn/m | Desde: 2.30 Hasta: 4.70 |
| | X Local | Carga Uniforme | Peso propio | -5.85 Tn/m | Desde: 0.00 Hasta: 2.30 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 7.00 |
| P24 | X Local | Carga Uniforme | Peso propio | -1.15 Tn/m | Desde: 4.70 Hasta: 7.00 |
| | X Local | Carga Uniforme | Peso propio | -3.50 Tn/m | Desde: 2.30 Hasta: 4.70 |
| | X Local | Carga Uniforme | Peso propio | -5.85 Tn/m | Desde: 0.00 Hasta: 2.30 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 7.00 |

## 5.COMBINACIONES CONSIDERADAS

HORMIGON.....: EHE, Control normal
ACEROS CONFORMADOS.....: EA-95
ACEROS LAMINADOS.....: EA-95
DESPLAZAMIENTOS.....: Acciones Caracteristicas
TENSION DEL TERRENO.....: Acciones Caracteristicas
DIMENS. DE VIGAS CENTRADORAS...: EHE, Control normal
EQUILIBRIO DE CIMENTACIONES....: EHE, Control normal

## 6.MATERIALES UTILIZADOS

### 6.1 HORMIGONES

| ELEMENTO | HORMIGON | PLANTAS | FCK Kp/cm2 | GAMMA C |
|---|---|---|---|---|
| Forjados | HA-25 , Control Estadístico | Todas | 255 | 1.50 |
| Cimentación | HA-25 , Control Estadístico | Todas | 255 | 1.50 |
| Pilares y Pantallas | HA-25 , Control Estadístico | Todas | 255 | 1.50 |
| Muros | HA-25 , Control Estadístico | Todas | 255 | 1.50 |

### 6.2 ACEROS POR ELEMENTO Y POSICION

#### 6.2.1.ACEROS EN BARRAS

| ELEMENTO | POSICION | ACERO | FYK Kp/cm2 | GAMMA S |
|---|---|---|---|---|
| Pilares y Pantallas | Barras(Verticales) | B 500 S , Control Normal | 5097 | 1.15 |
| | Estribos(Horizontales) | B 500 S , Control Normal | 5097 | 1.15 |
| Vigas | Negativos(Superior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Positivos(Inferior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Montaje(Superior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Piel(Lateral) | B 500 S , Control Normal | 5097 | 1.15 |
| | Estribos | B 500 S , Control Normal | 5097 | 1.15 |
| Vigas de cimentación | Refuerzo Inferior | B 500 S , Control Normal | 5097 | 1.15 |
| | Superior | B 500 S , Control Normal | 5097 | 1.15 |
| | Inferior | B 500 S , Control Normal | 5097 | 1.15 |
| | Piel | B 500 S , Control Normal | 5097 | 1.15 |
| | Estribos | B 500 S , Control Normal | 5097 | 1.15 |
| Forjados | Punzonamiento | B 500 S , Control Normal | 5097 | 1.15 |
| | Negativos(Superior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Positivos(Inferior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Nervios Negativos | B 500 S , Control Normal | 5097 | 1.15 |
| | Nervios Positivos | B 500 S , Control Normal | 5097 | 1.15 |
| Losas de cimentación | Punzonamiento | B 500 S , Control Normal | 5097 | 1.15 |
| | Negativos(Superior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Positivos(Inferior) | B 500 S , Control Normal | 5097 | 1.15 |

#### 6.2.2.ACEROS EN PERFILES

| TIPO ACERO | ACERO | LIM. ELÁSTICO Kp/cm2 | MÓDULO DE ELASTICIDAD Kp/cm2 |
|---|---|---|---|
| Aceros Conformados | S275 | 2806 | 2100000 |
| Aceros Laminados | S275 | 2806 | 2100000 |

Nombre Obra: ODT 300.20
CONSTRUCTORA HISPANICA

Fecha:03/09/03

## 1. ESFUERZOS DE PILARES, PANTALLAS Y MUROS POR HIPOTESIS

Pl: nº de planta
Tramo: nivel inicial / nivel final del tramo entre plantas.
Los esfuerzos de pilares son en ejes locales.
El sistema de unidades utilizado es
N,Qx,Qy: (Tn) Mx,My,T: (Tn·m)

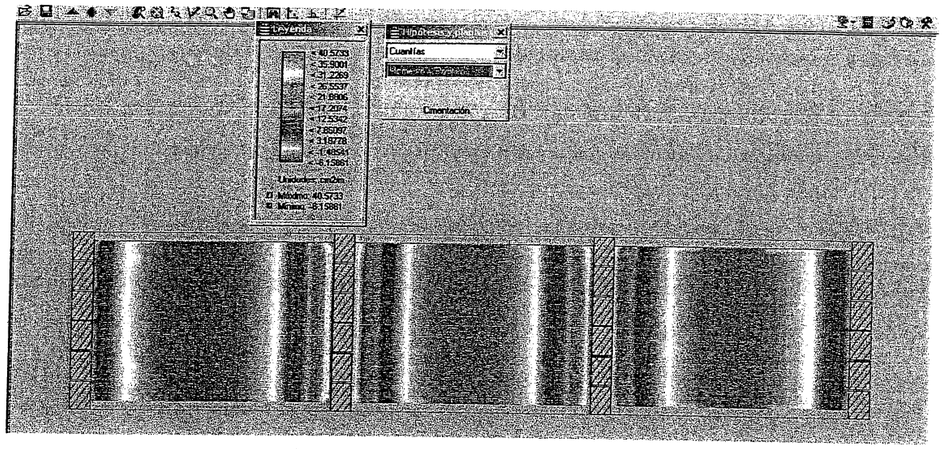
| Pilar | Pl | TRAMO | Hipótesis | Base N | Mx | My | Qx | Qy | T | Cabeza N | Mx | My | Qx | Qy | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P1 | 1 | 0.00/6.40 | Peso propio | 24.49 | -25.58 | 0.05 | -17.99 | 0.01 | -0.00 | 13.85 | -7.14 | -0.03 | 5.82 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 6.99 | -15.09 | -1.58 | -6.21 | -0.43 | -0.00 | 6.99 | -6.06 | 1.15 | 3.39 | -0.43 | -0.00 |
| | | | Sobrecarga uso 2 | 4.16 | -0.02 | -0.25 | 0.99 | -0.07 | 0.00 | 4.16 | -6.34 | 0.19 | 0.99 | -0.07 | 0.00 |
| | | | Sobrecarga uso 3 | 1.64 | 1.66 | -0.07 | 0.76 | -0.02 | -0.00 | 1.64 | -3.19 | 0.04 | 0.76 | -0.02 | -0.00 |
| | | | Sobrecarga uso 4 | -0.18 | 1.22 | 0.04 | 0.21 | 0.01 | -0.00 | -0.18 | -0.12 | -0.02 | 0.21 | 0.01 | -0.00 |
| P2 | 1 | 0.00/6.40 | Peso propio | 42.91 | -0.99 | 0.03 | -0.50 | 0.01 | -0.00 | 32.27 | 2.22 | -0.03 | -0.50 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 19.96 | -1.73 | -1.49 | -0.36 | -0.41 | -0.00 | 19.96 | 0.60 | 1.11 | -0.36 | -0.41 | -0.00 |
| | | | Sobrecarga uso 2 | 10.01 | 1.80 | -0.41 | -0.12 | -0.11 | 0.00 | 10.01 | 2.58 | 0.31 | -0.12 | -0.11 | 0.00 |
| | | | Sobrecarga uso 3 | 4.90 | -0.30 | -1.12 | -0.52 | -0.30 | -0.00 | 4.90 | 3.04 | 0.82 | -0.52 | -0.30 | -0.00 |
| | | | Sobrecarga uso 4 | 3.11 | 0.06 | -1.15 | 0.27 | -0.31 | -0.00 | 3.11 | -1.67 | 0.83 | 0.27 | -0.31 | -0.00 |
| P3 | 1 | 0.00/6.40 | Peso propio | 42.06 | 5.01 | -0.17 | 1.34 | -0.03 | -0.00 | 31.42 | -3.54 | 0.05 | 1.34 | -0.03 | -0.00 |
| | | | Sobrecarga uso 1 | 18.98 | 1.98 | -1.48 | 0.34 | -0.40 | -0.00 | 18.98 | -0.19 | 1.07 | 0.34 | -0.40 | -0.00 |
| | | | Sobrecarga uso 2 | 3.30 | -1.16 | -1.12 | -0.47 | -0.30 | 0.00 | 3.30 | 1.88 | 0.81 | -0.47 | -0.30 | 0.00 |
| | | | Sobrecarga uso 3 | 5.25 | 0.38 | -1.01 | 0.55 | -0.28 | -0.00 | 5.25 | -3.16 | 0.77 | 0.55 | -0.28 | -0.00 |
| | | | Sobrecarga uso 4 | 9.66 | -1.08 | -0.30 | 0.25 | -0.08 | -0.00 | 9.66 | -2.66 | 0.24 | 0.25 | -0.08 | -0.00 |
| P4 | 1 | 0.00/6.40 | Peso propio | 24.49 | -25.59 | 0.06 | -17.99 | 0.01 | -0.00 | 13.85 | -7.13 | -0.03 | 5.82 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 18.66 | -14.64 | -1.36 | -6.02 | -0.37 | -0.00 | 18.66 | -6.84 | 1.00 | 3.58 | -0.37 | -0.00 |
| | | | Sobrecarga uso 2 | 6.16 | 0.12 | -0.20 | 1.04 | -0.05 | 0.00 | 6.16 | -6.53 | 0.15 | 1.04 | -0.05 | 0.00 |
| | | | Sobrecarga uso 3 | 1.91 | 1.67 | -0.07 | 0.76 | -0.02 | -0.00 | 1.91 | -3.21 | 0.04 | 0.76 | -0.02 | -0.00 |
| | | | Sobrecarga uso 4 | -0.19 | 1.22 | 0.04 | 0.21 | 0.01 | -0.00 | -0.19 | -0.12 | -0.02 | 0.21 | 0.01 | -0.00 |
| P5 | 1 | 0.00/6.40 | Peso propio | 42.62 | -1.01 | 0.02 | -0.50 | 0.00 | -0.00 | 31.98 | 2.21 | -0.01 | -0.50 | 0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 31.91 | -1.63 | -1.29 | -0.32 | -0.35 | -0.00 | 31.91 | 0.41 | 0.97 | -0.32 | -0.35 | -0.00 |
| | | | Sobrecarga uso 2 | 13.22 | 1.68 | -0.34 | -0.17 | -0.09 | 0.00 | 13.22 | 2.77 | 0.26 | -0.17 | -0.09 | 0.00 |
| | | | Sobrecarga uso 3 | 13.88 | -0.57 | -0.99 | -0.63 | -0.27 | -0.00 | 13.88 | 3.43 | 0.75 | -0.63 | -0.27 | -0.00 |
| | | | Sobrecarga uso 4 | 12.07 | 0.34 | -1.02 | 0.38 | -0.28 | -0.00 | 12.07 | -2.10 | 0.76 | 0.38 | -0.28 | -0.00 |
| P6 | 1 | 0.00/6.40 | Peso propio | 41.74 | 5.01 | -0.15 | 1.33 | -0.03 | -0.00 | 31.10 | -3.51 | 0.07 | 1.33 | -0.03 | -0.00 |
| | | | Sobrecarga uso 1 | 29.87 | 1.93 | -1.27 | 0.30 | -0.34 | -0.00 | 29.87 | -0.01 | 0.93 | 0.30 | -0.34 | -0.00 |
| | | | Sobrecarga uso 2 | 12.21 | -1.39 | -0.98 | -0.57 | -0.27 | 0.00 | 12.21 | 2.25 | 0.75 | -0.57 | -0.27 | 0.00 |
| | | | Sobrecarga uso 3 | 14.15 | 0.63 | -0.87 | 0.65 | -0.24 | -0.00 | 14.15 | -3.54 | 0.69 | 0.65 | -0.24 | -0.00 |
| | | | Sobrecarga uso 4 | 12.33 | -0.99 | -0.25 | 0.28 | -0.07 | -0.00 | 12.33 | -2.80 | 0.20 | 0.28 | -0.07 | -0.00 |
| P7 | 1 | 0.00/6.40 | Peso propio | 24.53 | -24.35 | 0.07 | -17.37 | 0.01 | -0.00 | 13.89 | -6.52 | -0.03 | 2.53 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 27.55 | -14.11 | -0.60 | -5.79 | -0.17 | -0.00 | 27.55 | -7.74 | 0.49 | 3.81 | -0.17 | -0.00 |
| | | | Sobrecarga uso 2 | 7.21 | 0.24 | -0.07 | 1.08 | -0.02 | 0.00 | 7.21 | -6.68 | 0.05 | 1.08 | -0.02 | 0.00 |
| | | | Sobrecarga uso 3 | 2.06 | 1.69 | -0.05 | 0.77 | -0.01 | -0.00 | 2.06 | -3.23 | 0.02 | 0.77 | -0.01 | -0.00 |
| | | | Sobrecarga uso 4 | -0.19 | 1.22 | 0.04 | 0.21 | 0.01 | -0.00 | -0.19 | -0.12 | -0.02 | 0.21 | 0.01 | -0.00 |
| P8 | 1 | 0.00/6.40 | Peso propio | 42.77 | -1.03 | 0.02 | -0.51 | 0.00 | -0.00 | 32.13 | 2.22 | -0.00 | -0.51 | 0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 40.63 | -1.56 | -0.58 | -0.29 | -0.16 | -0.00 | 40.63 | 0.28 | 0.46 | -0.29 | -0.16 | -0.00 |
| | | | Sobrecarga uso 2 | 15.21 | 1.60 | -0.14 | -0.21 | -0.04 | 0.00 | 15.21 | 2.91 | 0.10 | -0.21 | -0.04 | 0.00 |
| | | | Sobrecarga uso 3 | 21.21 | -0.91 | -0.45 | -0.76 | -0.13 | -0.00 | 21.21 | 3.93 | 0.38 | -0.76 | -0.13 | -0.00 |
| | | | Sobrecarga uso 4 | 19.34 | 0.70 | -0.50 | 0.52 | -0.14 | -0.00 | 19.34 | -2.64 | 0.40 | 0.52 | -0.14 | -0.00 |
| P9 | 1 | 0.00/6.40 | Peso propio | 41.87 | 5.00 | -0.10 | 1.33 | -0.02 | -0.00 | 31.23 | -3.50 | 0.05 | 1.33 | -0.02 | -0.00 |
| | | | Sobrecarga uso 1 | 37.94 | 1.89 | -0.54 | 0.28 | -0.15 | -0.00 | 37.94 | 0.11 | 0.42 | 0.28 | -0.15 | -0.00 |
| | | | Sobrecarga uso 2 | 19.77 | -1.71 | -0.46 | -0.69 | -0.13 | 0.00 | 19.77 | 2.73 | 0.40 | -0.69 | -0.13 | 0.00 |
| | | | Sobrecarga uso 3 | 21.19 | 0.94 | -0.33 | 0.77 | -0.10 | -0.00 | 21.19 | -4.02 | 0.31 | 0.77 | -0.10 | -0.00 |
| | | | Sobrecarga uso 4 | 14.01 | -0.93 | -0.09 | 0.31 | -0.03 | -0.00 | 14.01 | -2.91 | 0.07 | 0.31 | -0.03 | -0.00 |
| P10 | 1 | 0.00/6.40 | Peso propio | 24.63 | -25.65 | 0.07 | -18.00 | 0.02 | -0.00 | 13.99 | -7.10 | -0.03 | 5.81 | 0.02 | -0.00 |
| | | | Sobrecarga uso 1 | 27.55 | -14.12 | 0.63 | -5.80 | 0.18 | -0.00 | 27.55 | -7.74 | -0.51 | 3.80 | 0.18 | -0.00 |

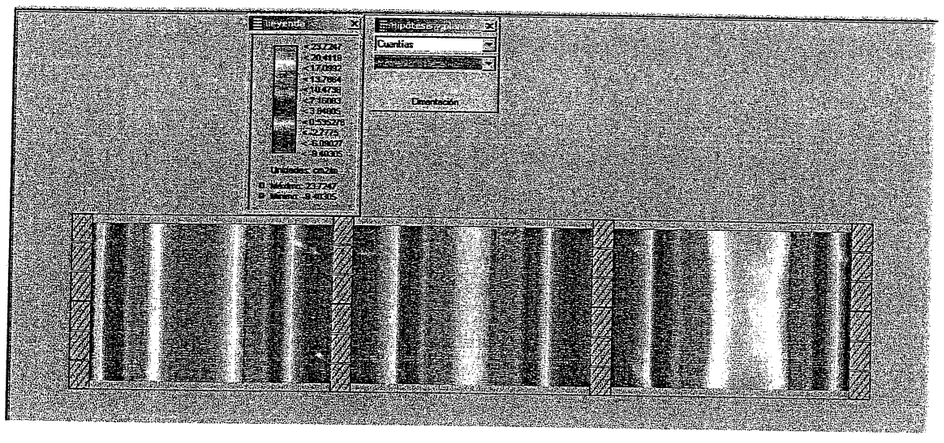
| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sobrecarga uso 2 | 7.15 | 0.24 | 0.08 | 1.08 | 0.02 | 0.00 | 7.15 | -6.67 | -0.06 | 1.08 | 0.02 | 0.00 |
| | | | Sobrecarga uso 3 | 2.04 | 1.69 | -0.03 | 0.77 | -0.01 | -0.00 | 2.04 | -3.22 | 0.01 | 0.77 | -0.01 | -0.00 |
| | | | Sobrecarga uso 4 | -0.19 | 1.21 | 0.04 | 0.21 | 0.01 | -0.00 | -0.19 | -0.12 | -0.02 | 0.21 | 0.01 | -0.00 |
| P11 | 1 | 0.00/6.40 | Peso propio | 42.80 | -1.06 | 0.02 | -0.51 | 0.00 | -0.00 | 32.16 | 2.23 | -0.01 | -0.51 | 0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 40.63 | -1.58 | 0.49 | -0.29 | 0.14 | -0.00 | 40.63 | 0.29 | -0.42 | -0.29 | 0.14 | -0.00 |
| | | | Sobrecarga uso 2 | 15.14 | 1.61 | 0.12 | -0.20 | 0.03 | 0.00 | 15.14 | 2.90 | -0.10 | -0.20 | 0.03 | 0.00 |
| | | | Sobrecarga uso 3 | 20.98 | -0.90 | 0.45 | -0.75 | 0.13 | -0.00 | 20.98 | 3.90 | -0.39 | -0.75 | 0.13 | -0.00 |
| | | | Sobrecarga uso 4 | 19.47 | 0.71 | 0.37 | 0.53 | 0.11 | -0.00 | 19.47 | -2.66 | -0.33 | 0.53 | 0.11 | -0.00 |
| P12 | 1 | 0.00/6.40 | Peso propio | 41.87 | 4.98 | -0.05 | 1.32 | -0.01 | -0.00 | 31.23 | -3.49 | 0.02 | 1.32 | -0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 37.96 | 1.86 | 0.57 | 0.27 | 0.16 | -0.00 | 37.96 | 0.12 | -0.44 | 0.27 | 0.16 | -0.00 |
| | | | Sobrecarga uso 2 | 19.66 | -1.68 | 0.49 | -0.69 | 0.14 | 0.00 | 19.66 | 2.71 | -0.42 | -0.69 | 0.14 | 0.00 |
| | | | Sobrecarga uso 3 | 20.80 | 0.89 | 0.55 | 0.76 | 0.15 | -0.00 | 20.80 | -3.96 | -0.44 | 0.76 | 0.15 | -0.00 |
| | | | Sobrecarga uso 4 | 14.03 | -0.94 | 0.11 | 0.31 | 0.03 | -0.00 | 14.03 | -2.90 | -0.08 | 0.31 | 0.03 | -0.00 |
| P13 | 1 | 0.00/6.40 | Peso propio | 24.65 | -25.68 | 0.07 | -18.01 | 0.02 | -0.00 | 14.01 | -7.06 | -0.03 | 5.80 | 0.02 | -0.00 |
| | | | Sobrecarga uso 1 | 18.65 | -14.66 | 1.39 | -6.02 | 0.37 | -0.00 | 18.65 | -6.83 | -1.01 | 3.58 | 0.37 | -0.00 |
| | | | Sobrecarga uso 2 | 5.97 | 0.15 | 0.21 | 1.04 | 0.06 | 0.00 | 5.97 | -6.49 | -0.16 | 1.04 | 0.06 | 0.00 |
| | | | Sobrecarga uso 3 | 1.85 | 1.66 | -0.01 | 0.76 | 0.00 | -0.00 | 1.85 | -3.19 | -0.01 | 0.76 | 0.00 | -0.00 |
| | | | Sobrecarga uso 4 | -0.17 | 1.21 | 0.04 | 0.21 | 0.01 | -0.00 | -0.17 | -0.11 | -0.02 | 0.21 | 0.01 | -0.00 |
| P14 | 1 | 0.00/6.40 | Peso propio | 42.72 | -1.08 | 0.01 | -0.52 | 0.00 | -0.00 | 32.08 | 2.24 | -0.01 | -0.52 | 0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 31.89 | -1.68 | 1.20 | -0.33 | 0.33 | -0.00 | 31.89 | 0.43 | -0.93 | -0.33 | 0.33 | -0.00 |
| | | | Sobrecarga uso 2 | 12.98 | 1.73 | 0.33 | -0.16 | 0.09 | 0.00 | 12.98 | 2.73 | -0.25 | -0.16 | 0.09 | 0.00 |
| | | | Sobrecarga uso 3 | 13.43 | -0.58 | 0.97 | -0.62 | 0.27 | -0.00 | 13.43 | 3.40 | -0.74 | -0.62 | 0.27 | -0.00 |
| | | | Sobrecarga uso 4 | 12.41 | 0.36 | 0.89 | 0.39 | 0.25 | -0.00 | 12.41 | -2.15 | -0.70 | 0.39 | 0.25 | -0.00 |
| P15 | 1 | 0.00/6.40 | Peso propio | 41.75 | 4.94 | -0.01 | 1.32 | -0.00 | -0.00 | 31.11 | -3.48 | -0.00 | 1.32 | -0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 29.89 | 1.85 | 1.30 | 0.29 | 0.35 | -0.00 | 29.89 | 0.01 | -0.94 | 0.29 | 0.35 | -0.00 |
| | | | Sobrecarga uso 2 | 11.93 | -1.32 | 1.01 | -0.55 | 0.28 | 0.00 | 11.93 | 2.19 | -0.76 | -0.55 | 0.28 | 0.00 |
| | | | Sobrecarga uso 3 | 13.31 | 0.53 | 1.06 | 0.62 | 0.29 | -0.00 | 13.31 | -3.42 | -0.78 | 0.62 | 0.29 | -0.00 |
| | | | Sobrecarga uso 4 | 12.42 | -1.02 | 0.26 | 0.27 | 0.07 | -0.00 | 12.42 | -2.78 | -0.20 | 0.27 | 0.07 | -0.00 |
| P16 | 1 | 0.00/6.40 | Peso propio | 24.69 | -25.73 | 0.08 | -18.02 | 0.02 | -0.00 | 14.05 | -7.06 | -0.03 | 5.79 | 0.02 | -0.00 |
| | | | Sobrecarga uso 1 | 6.98 | -15.14 | 1.61 | -6.22 | 0.43 | -0.00 | 6.98 | -6.04 | -1.16 | 3.38 | 0.43 | -0.00 |
| | | | Sobrecarga uso 2 | 3.79 | 0.03 | 0.26 | 0.99 | 0.07 | 0.00 | 3.79 | -6.28 | -0.21 | 0.99 | 0.07 | 0.00 |
| | | | Sobrecarga uso 3 | 1.50 | 1.64 | -0.00 | 0.75 | 0.00 | -0.00 | 1.50 | -3.16 | -0.01 | 0.75 | 0.00 | -0.00 |
| | | | Sobrecarga uso 4 | -0.15 | 1.20 | 0.04 | 0.20 | 0.01 | -0.00 | -0.15 | -0.11 | -0.02 | 0.20 | 0.01 | -0.00 |
| P17 | 1 | 0.00/6.40 | Peso propio | 43.13 | -1.12 | 0.01 | -0.53 | -0.00 | -0.00 | 32.49 | 2.28 | 0.02 | -0.53 | -0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 19.88 | -1.81 | 1.41 | -0.38 | 0.39 | -0.00 | 19.88 | 0.63 | -1.07 | -0.38 | 0.39 | -0.00 |
| | | | Sobrecarga uso 2 | 9.55 | 1.87 | 0.40 | -0.10 | 0.11 | 0.00 | 9.55 | 2.52 | -0.31 | -0.10 | 0.11 | 0.00 |
| | | | Sobrecarga uso 3 | 4.44 | -0.34 | 1.09 | -0.53 | 0.30 | -0.00 | 4.44 | 3.02 | -0.81 | -0.53 | 0.30 | -0.00 |
| | | | Sobrecarga uso 4 | 3.54 | 0.09 | 1.03 | 0.28 | 0.28 | -0.00 | 3.54 | -1.73 | -0.78 | 0.28 | 0.28 | -0.00 |
| P18 | 1 | 0.00/6.40 | Peso propio | 42.04 | 4.90 | 0.01 | 1.31 | -0.00 | -0.00 | 31.40 | -3.48 | 0.01 | 1.31 | -0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 19.01 | 1.85 | 1.52 | 0.31 | 0.41 | -0.00 | 19.01 | -0.14 | -1.08 | 0.31 | 0.41 | -0.00 |
| | | | Sobrecarga uso 2 | 2.93 | -1.05 | 1.14 | -0.45 | 0.31 | 0.00 | 2.93 | 1.80 | -0.83 | -0.45 | 0.31 | 0.00 |
| | | | Sobrecarga uso 3 | 4.34 | 0.25 | 1.18 | 0.51 | 0.32 | -0.00 | 4.34 | -3.01 | -0.85 | 0.51 | 0.32 | -0.00 |
| | | | Sobrecarga uso 4 | 9.83 | -1.13 | 0.31 | 0.23 | 0.09 | -0.00 | 9.83 | -2.62 | -0.24 | 0.23 | 0.09 | -0.00 |
| P19 | 1 | 0.00/6.40 | Peso propio | 23.50 | 25.10 | -0.12 | 17.99 | -0.03 | -0.00 | 12.86 | 6.64 | 0.06 | -5.82 | -0.03 | -0.00 |
| | | | Sobrecarga uso 1 | 7.14 | 14.72 | -1.94 | 6.28 | -0.51 | -0.00 | 7.14 | 5.23 | 1.34 | -3.32 | -0.51 | -0.00 |
| | | | Sobrecarga uso 2 | -0.03 | -1.55 | -0.02 | -0.31 | -0.00 | 0.00 | -0.03 | 0.43 | 0.01 | -0.31 | -0.00 | 0.00 |
| | | | Sobrecarga uso 3 | 1.72 | -1.64 | -0.09 | -0.76 | -0.02 | -0.00 | 1.72 | 3.23 | 0.05 | -0.76 | -0.02 | -0.00 |
| | | | Sobrecarga uso 4 | 4.23 | 1.05 | -0.30 | -0.82 | -0.09 | -0.00 | 4.23 | 6.27 | 0.25 | -0.82 | -0.09 | -0.00 |
| P20 | 1 | 0.00/6.40 | Peso propio | 23.64 | 25.02 | -0.09 | 17.97 | -0.02 | -0.00 | 13.00 | 6.65 | 0.05 | -5.84 | -0.02 | -0.00 |
| | | | Sobrecarga uso 1 | 19.97 | 14.12 | -1.67 | 6.06 | -0.45 | -0.00 | 19.97 | 6.07 | 1.19 | -3.54 | -0.45 | -0.00 |
| | | | Sobrecarga uso 2 | -0.05 | -1.54 | -0.02 | -0.31 | -0.00 | 0.00 | -0.05 | 0.43 | 0.01 | -0.31 | -0.00 | 0.00 |
| | | | Sobrecarga uso 3 | 1.96 | -1.67 | -0.09 | -0.77 | -0.02 | -0.00 | 1.96 | 3.25 | 0.05 | -0.77 | -0.02 | -0.00 |
| | | | Sobrecarga uso 4 | 6.87 | 0.88 | -0.24 | -0.88 | -0.07 | -0.00 | 6.87 | 6.54 | 0.19 | -0.88 | -0.07 | -0.00 |
| P21 | 1 | 0.00/6.40 | Peso propio | 23.79 | 24.96 | -0.04 | 17.96 | -0.01 | -0.00 | 13.15 | 6.67 | 0.02 | -5.85 | -0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 30.18 | 13.43 | -0.75 | 5.79 | -0.21 | -0.00 | 30.18 | 7.11 | 0.60 | -3.81 | -0.21 | -0.00 |
| | | | Sobrecarga uso 2 | -0.07 | -1.54 | -0.02 | -0.31 | -0.00 | 0.00 | -0.07 | 0.42 | 0.01 | -0.31 | -0.00 | 0.00 |
| | | | Sobrecarga uso 3 | 2.09 | -1.70 | -0.07 | -0.78 | -0.02 | -0.00 | 2.09 | 3.27 | 0.03 | -0.78 | -0.02 | -0.00 |
| | | | Sobrecarga uso 4 | 8.29 | 0.75 | -0.08 | -0.94 | -0.02 | -0.00 | 8.29 | 6.75 | 0.06 | -0.94 | -0.02 | -0.00 |
| P22 | 1 | 0.00/6.40 | Peso propio | 23.83 | 24.94 | 0.03 | 17.95 | 0.01 | -0.00 | 13.19 | 6.69 | -0.01 | -5.86 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 30.19 | 13.43 | 0.77 | 5.79 | 0.22 | -0.00 | 30.19 | 7.11 | -0.61 | -3.81 | 0.22 | -0.00 |
| | | | Sobrecarga uso 2 | -0.07 | -1.54 | -0.02 | -0.31 | -0.00 | 0.00 | -0.07 | 0.42 | 0.01 | -0.31 | -0.00 | 0.00 |
| | | | Sobrecarga uso 3 | 2.06 | -1.72 | -0.05 | -0.78 | -0.01 | -0.00 | 2.06 | 3.26 | 0.02 | -0.78 | -0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 8.30 | 0.75 | 0.12 | -0.94 | 0.03 | -0.00 | 8.30 | 6.75 | -0.08 | -0.94 | 0.03 | -0.00 |
| P23 | 1 | 0.00/6.40 | Peso propio | 23.77 | 24.95 | 0.08 | 17.96 | 0.02 | -0.00 | 13.13 | 6.68 | -0.04 | -5.85 | 0.02 | -0.00 |
| | | | Sobrecarga uso 1 | 19.99 | 14.12 | 1.70 | 6.05 | 0.45 | -0.00 | 19.99 | 6.09 | -1.20 | -3.55 | 0.45 | -0.00 |
| | | | Sobrecarga uso 2 | -0.07 | -1.52 | -0.02 | -0.30 | -0.00 | 0.00 | -0.07 | 0.42 | 0.01 | -0.30 | -0.00 | 0.00 |
| | | | Sobrecarga uso 3 | 1.84 | -1.71 | -0.03 | -0.77 | -0.00 | -0.00 | 1.84 | 3.23 | 0.00 | -0.77 | -0.00 | -0.00 |
| | | | Sobrecarga uso 4 | 6.88 | 0.88 | 0.28 | -0.88 | 0.08 | -0.00 | 6.88 | 6.54 | -0.20 | -0.88 | 0.08 | -0.00 |
| P24 | 1 | 0.00/6.40 | Peso propio | 23.76 | 24.99 | 0.11 | 17.96 | 0.03 | -0.00 | 13.12 | 6.70 | -0.05 | -5.85 | 0.03 | -0.00 |
| | | | Sobrecarga uso 1 | 7.19 | 14.71 | 1.96 | 6.28 | 0.52 | -0.00 | 7.19 | 5.25 | -1.35 | -3.32 | 0.52 | -0.00 |
| | | | Sobrecarga uso 2 | -0.06 | -1.51 | -0.02 | -0.30 | -0.00 | 0.00 | -0.06 | 0.41 | 0.01 | -0.30 | -0.00 | 0.00 |
| | | | Sobrecarga uso 3 | 1.46 | -1.70 | -0.02 | -0.77 | -0.00 | -0.00 | 1.46 | 3.20 | -0.01 | -0.77 | -0.00 | -0.00 |
| | | | Sobrecarga uso 4 | 4.25 | 1.05 | 0.34 | -0.82 | 0.09 | -0.00 | 4.25 | 6.28 | -0.26 | -0.82 | 0.09 | -0.00 |

ODT 300.2

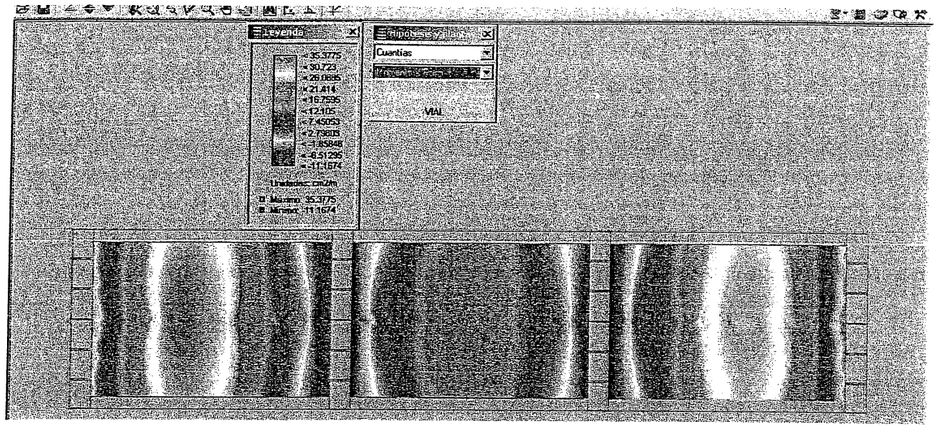
CUANTIAS

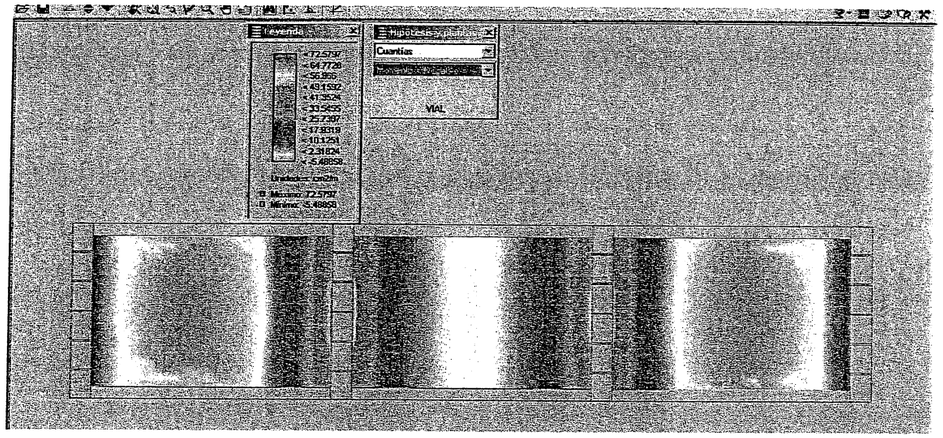
LOSA CIMENTACIÓN




LOSA SUPERIOR



VALLADARES INGENIERIA

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

Obra: AVE MARTORELL
Fecha: 04/12/2003
Hora: 13:41:12

ART 300.2

## Cálculo de secciones a cortante

### 1 Datos

- Materiales

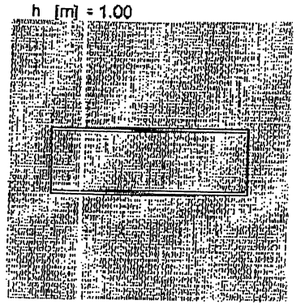
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : LOSA100
b0 [m] = 3.00
h [m] = 1.00



### 2 Dimensionamiento

Esfuerzo cortante de cálculo Vd [kN] = 1870

Inclinación de las bielas [°] = 45
Inclinación de los cercos [°] = 90.0
ρ [·1.E-3] = 4.2
Nd [kN] = 0.0
σxd [MPa] = 0.0
σyd [MPa] = 0
θe [°] = 45.0

| ϕ [mm] | Separación [mm] | nº ramas | Area [cm²/m] | Tipo | Vsu [kN] | Vu2 [kN] |
|---|---|---|---|---|---|---|
| ø 6 | ---- | — | ---- | — | ---- | — |
| ø 8 | — | ---- | — | ---- | — | ---- |
| ø 10 | 0.10 | 4 | 31.4 | 2 | 1068.1 | 1978.57 |
| ø 12 | 0.15 | 4 | 30.2 | 2 | 1025.4 | 1935.85 |

Área estricta [cm²/m] = 28.2
Vu1 [kN] = 14250.0
Vcu [kN] = 910.4

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

Obra: AVE MARTORELL
Fecha: 04/12/2003
Hora: 13:43:49

OBT 300.2

## Cálculo de secciones a cortante

### 1 Datos

- Materiales

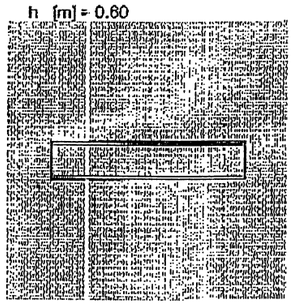
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : LOSA60
b0 [m] = 3.00
h [m] = 0.60



### 2 Dimensionamiento

Esfuerzo cortante de cálculo Vd [kN] = 1150

Inclinación de las bielas [°] = 45
Inclinación de los cercos [°] = 90.0
ρ [·1.E-3] = 7
Nd [kN] = 0.0
σxd [MPa] = 0.0
σyd [MPa] = 0
θe [°] = 45.0



| ϕ [mm] | Separación [mm] | nº ramas | Area [cm²/m] | Tipo | Vsu [kN] | Vu2 [kN] |
|---|---|---|---|---|---|---|
| ø 6 | --- | --- | --- | --- | --- | --- |
| ø 8 | --- | --- | --- | --- | --- | --- |
| ø 10 | 0.10 | 4 | 31.4 | 2 | 615.8 | --- |
| ø 12 | 0.15 | 4 | 30.2 | 2 | 591.1 | --- |

Área estricta [cm²/m] = 25.0
(Cuantía mínima)
Vu1 [kN] = 8250.0
Vcu [kN] = 686.7

VALLADARES INGENIERIA

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

Obra: AVE MARTORELL
Fecha: 04/12/2003
Hora: 14:11:30

ODT 300.2

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

## 1 Datos

- Materiales

Tipo de hormigón: HA-25
Tipo de acero: B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00

- Ambiente

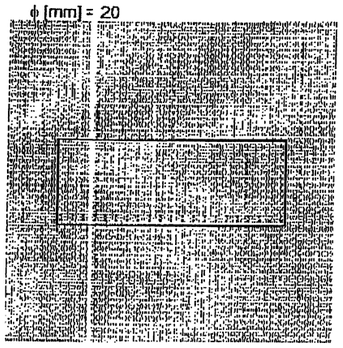
Clase general de exposición : I
Clases específicas de exposición : Qb

- Geometría de la sección

Sección : LOSA110
b [m] = 3.00
h [m] = 1.10

- Armado de la sección

ϕ [mm] = 20



| capa | nº barras | Separación [mm] |
|---|---|---|
| 1 | 21 | 55.0 |
| 2 | 21 | 55 |

As [cm²] = 131.9
Ac,ef [cm²] = 6975.0

## 2 Resultados

Mk [kN·m] = 1990

Separación media entre fisuras sm [mm] = 172.0
Deformación media de las armaduras εsm [·1.E-3] = 0.53
Tensión en las armaduras en el instante de fisuración σsr [MPa] = 140.4
Tensión en las armaduras en servicio σs [MPa] = 165.5
Abertura característica de fisura wk [mm] = 0.15

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

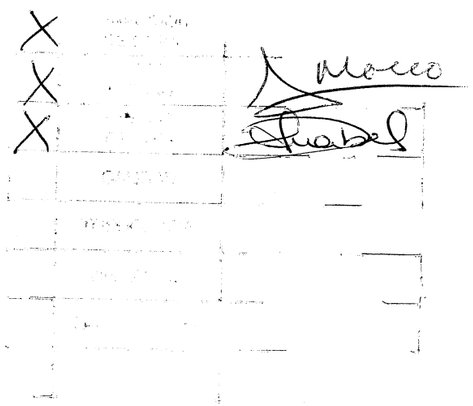
# CONSTRUCTORA HISPÁNICA

22 Jun 2005
1389 E-10

**L.A.V. MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA**
**TRAMO: MARTORELL(GÉLIDA) - BARCELONA**

**SUBTRAMO III-A PLATAFORMA**

## CARGAS CONSIDERADAS EN EL CÁLCULO DE LA ODT 300.2





Valladares Ingeniería, S.L.
C/ Josefa Valcárcel, 9 Madrid 28027
TIF 91 743 49 10 Fax: 91 320 78 74
Area Estructuras: estructuras@valladares.com
Area Instalaciones: instalaciones@valladares.com

VALLADARES

DESTINATARIO: D. David Zamorano Fecha: 22 de junio de 2005
Teléfono: 93 773 69 00 Fax: 93 775 05 18
REMITENTE: Juan J. Diaz
ASUNTO: Cargas de cálculo ODT 300.2 JC-968

Estimado David:

Te envio las cargas tenidas en cuenta en el cálculo de la O.D.T. 300.2

Un cordial saludo,

Juan J. Diaz
Ingeniero de Caminos
Responsable Departamento Edificación I

Si la recepción no fuera correcta, por favor llámenos al teléfono indicado
Ref: 03

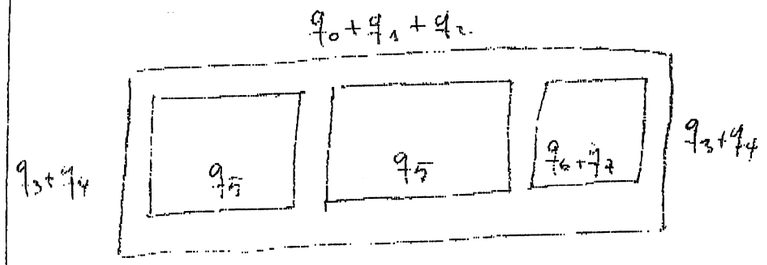
Una página: 1/3
FAX OBRA_AVE MARTORELL_Valor

JC-968 | 22/VI/05

OBRA: L.A.V. MARTORELL
CLIENTE: CONSTRUCTORA HISPANICA

VALLADARES

O.D.T. 300.2 | Hoja 1 de 3




Cargas aplicadas

Losa Superior

Sobrecarga de tierras: $q_0 = 2.0\ t/m^2$

Tierras de la misma: $q_1$: 3 cargas de 30 t separadas 1.50 m.

$q_2$: 12 t/m

Se aplica una coeficiente de impacto de 1.46

Losa inferior

$q_5$: 0.40 t/m²

Sobrecarga de tierras $q_6$: 2.0 t/m²

Vehículo $q_7$: 6 cargas de 10 t

OBSERVACIONES



JC-968 | 22/VI/05

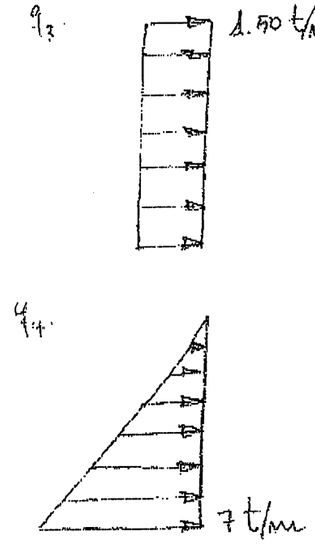
OBRA: L.A.V. MARTORELL
CLIENTE: CONSTRUCTORA HISPANICA

VALLADARES

O.D.T. 300.2. | Hoja 2 de 3

Empuje de tierras

Sobrecarga en trasdós: 3,0 t/m² $\gamma = 2\ t/m^3$ $k_0 = 0.50$




OBSERVACIONES

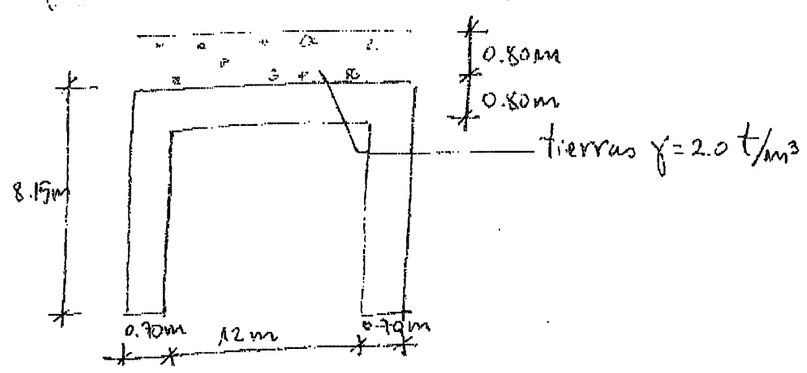
JC - 968 | 22 / VI / 05

OBRA: L.A.V. MARTORELL
CLIENTE: CONSTRUCTORA HISPANICA

VALLADARES

O.A.T. 300.2 | Hoja 3 de 3

Carga del túnel sobre la obra de paso




$$q = (2{,}50 \times 0{,}70 \times 8{,}15) + 0{,}80 \times 2{,}50 \cdot \frac{12{,}00}{2} + 2 \times 0{,}80 \times \frac{13{,}40}{2} = 36{,}98\ t/m$$

OBSERVACIONES

**O.D.T. 300.4.**

# LINEA DE ALTA VELOCIDAD. MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA

## TRAMO: SANT ESTEVE SESROVIRES-MARTORELL

**ANEJO DE CALCULO:**

**O.D.T.300.4.**

# O.D.T. 300.4

## ÍNDICE


1. INTRODUCCIÓN
2. BASES DE CÁLCULO
3. INSTRUCCIONES Y NORMAS CONSIDERADAS
4. DESCRIPCIÓN DE LOS PROGRAMAS DE ORDENADOR UTILIZADOS
5. MATERIALES Y COEFICIENTES DE MAYORACIÓN
6. ACCIONES
   - ACCIÓN PERMANENTE (G): PESO PROPIO
   - ACCIÓN PERMANENTE DE VALOR NO CONSTANTE (G*): ACCIONES DEBIDAS AL TERRENO
   - ACCIÓN VARIABLE (Q): SOBRECARGAS DE USO
   - ACCIONES ACCIDENTALES (A)
     - ACCIONES SÍSMICAS
7. HIPÓTESIS DE CARGA Y COEFICIENTES DE MAYORACIÓN
   - 7.1. VALORES REPRESENTATIVOS DE LAS ACCIONES
   - 7.2. VALORES DE CÁLCULO DE LAS ACCIONES
   - 7.3. COMBINACIÓN DE ACCIONES
8. MODELO DE CÁLCULO
9. O.D.T. 300.4
   - 9.1. GEOMETRÍA BÁSICA
   - 9.2. ANÁLISIS DE ESFUERZOS
     - ANÁLISIS DE ESFUERZOS HIPÓTESIS-1
     - ANÁLISIS DE ESFUERZOS HIPÓTESIS 2
   - 9.3. ARMADO GENERAL
   - 9.4. EMBOCADURAS

# 1.- INTRODUCCIÓN

Se trata de un marco bicelular, por el que pasa el Camino de Margen Derecha del Torrent del Llops, y el propio Torrent del Llops. El punto de intersección entre el Camino y el tronco de la L.A.V. son los:

$$P.K._{LAV}\ 300+451.280\text{-}P.K._{CAMINO}\ 0+254.554$$

Presenta un esviaje respecto a la L.A.V. de 36.9303º, tiene una longitud de 31.54m, con una distancia mínima desde carril hasta superficie del dintel de 1.10 m. La sección transversal del marco es la siguiente:

Gálibo vertical: 5.70 m
Gálibo horizontal: 2x8.00 m
Canto cimentación: 1.00 m
Espesor hastiales extremos: 0.75 m
Espesor hastial intermedio: 0.50 m
Canto dintel: 0.70 m

El marco presenta unas cartelas superiores tanto en los hastiales exteriores como en el interior de 0.70 m V; 1.10 m H. Y unas catelas inferiores en el hastial central de 0.55 m V; 1.10 m H.

El marco se realizará horizontal en toda su longitud, por lo que para el caso del Torrent del Llops se colocará sobre la solera un hormigón de forma con pendiente longitudinal del 0.50%, para adaptarse correctamente al terreno. Para el marco del camino, se colocará la sub-base necesaria sobre la losa para alcanzar su rasante. La cota de la superficie de la solera es la 65.750. Con esta cota y con el gálibo vertical de 5.70 m se consigue respetar tanto el gálibo de 4.50 m para el camino como la distancia mínima de 1.10 m entre el dintel del marco y el carril.

Como ya se ha explicado en apartados anteriores, el marco tendrá unos voladizos en la zona de cruce con el tronco de la L.A.V., para apoyar los muretes guía de la estructura tipo viga del tramo cubierto. La longitud de estos voladizos es variable desde 0.83 a 2.85 m (según la dirección de esviaje).

El condicionante para el dimensionamiento del marco es en este caso el recubrimiento de tierras (10.05 m) que viene del vertido de la estructura del tramo cubierto.

El Marco tendrá las aletas de salida en prolongación. Las aletas de entrada irán orientadas entre 23.90º y 45.00º respecto al eje del marco, según las necesidades del terreno en cada punto. La aleta de entrada de menor P.K. irá quebrada para adaptarse al trazado del Camino de Margen Derecha del Torrent del Llops.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

El Bloque Técnico esta formado por una cuña de transición compuesta por material granular y material granular tratado con cemento, que ocupa 14.00m desde el eje de la L.A.V. y que se extiende 20.00 m a cada lado del mismo, acabando con un talud 3H:2V.

Tanto a la entrada como a la salida de las obras de drenaje se colocarán unas losas de hormigón, y unos rastrillos de 1.00 m de profundidad para evitar la erosión del cauce.

Madrid, Mayo de 2002

## 2.- BASES DE CÁLCULO

El dimensionamiento de las estructuras se ha realizado según los principios de mecánica racional, con su adaptación al diseño estructural, establecida por la práctica ingenieril. Se han tenido en cuenta las normas de obligado cumplimiento en el territorio español, así como las recomendaciones y la normativa internacional de aplicación, cuando proceda. De acuerdo con ellas, el cálculo se ha realizado siguiendo el principio de los Estados Límites, que establece que la seguridad de la estructura en conjunto, o cualquiera de sus partes, se garantiza comprobando que la solicitación no supera la respuesta última de las mismas. Este formato de seguridad se expresa sintéticamente mediante la siguiente desigualdad:

$$Sd \leq Rd$$

Donde Sd representa la solicitación de cálculo aplicable en cada caso, y Rd la respuesta última de la sección o elemento.

Para la aplicación de este criterio de seguridad, se consideran tanto situaciones de servicio, como de agotamiento, esto es, Estados Límites de Servicio (ELS) y de Agotamiento (ELU), de acuerdo con las definiciones dadas para los mismos en las normativas de referencia. En principio, los Estados Límites Ultimos están asociados a la Rotura de las secciones o elementos. Para ellos, se evalúan las solicitaciones mediante la mayoración de los valores representativos de las acciones (en general característicos) utilizando los oportunos coeficientes parciales que luego se detallan. Las resistencias de las secciones o elementos se estiman mediante las características geométricas, y las resistencias minoradas de los materiales.

Por el contrario, los Estados Límites de Servicio están asociados a la pérdida de funcionalidad de la estructura. Las solicitaciones se evalúan mediante sus valores representativos, en general sin mayorar, afectados de los oportunos coeficientes de combinación, para tener en cuenta la probabilidad de ocurrencia simultanea de varias acciones. Las resistencias se estiman a partir de los valores nominales de las dimensiones y resistencias de los elementos o secciones de la estructura, sin minorar.

Los cálculos se realizará mediante programas informáticas de aplicación general al cálculo de estructuras, así como mediante programas propios de diseño de elementos particulares. Los cálculos por ordenador se justifican mediante los oportunos listados de datos y resultados incluidos en el presente anejo. Adicionalmente, cuando sea preciso para la correcta comprensión de los resultados, así como para su oportuno chequeo, se realizarán comprobaciones manuales aproximadas, que justifiquen los órdenes de magnitud.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

## 3.- INSTRUCCIONES Y NORMAS APLICADAS

El dimensionamiento general de las estructuras se ha realizado conforme a las instrucciones principales siguientes:

| | |
|---|---|
| Acciones : | IAP-98 |
| Hormigón Armado: | EHE-98 |
| Estructura Metálica y Mixta: | NBE-EA-95,RPM-95,RPX-95 |

No obstante, para realizar el dimensionamiento completo, se han considerado una lista de normas e instrucciones de referencia más amplia, que se detallan a continuación.

* EHE-98, Instrucción de Hormigón Estructural. Real Decreto 2661/1998, de 11 de Diciembre.
* Instrucción relativa a las acciones a considerar en el Proyecto de Puentes de Ferrocarril, aprobada por Orden de 25 de Junio de 1975.
* IAP-98, Instrucción sobre las acciones a considerar en el Proyecto de puentes de carretera
* Instrucción para el proyecto y ejecución de las obras de hormigón en masa o armado, EH-91, aprobada por Real Decreto 1039/1991 de 28 de Junio.
* Instrucción para el proyecto y la ejecución de obras de hormigón pretensado, EP-93, aprobada por Real Decreto 805/1993, de 28 de Mayo.
* Norma de Construcción Sismorresistente NCSE-94: Parte General y Edificación.
* Norma sismorresistente PDS-1 (1974), aprobada por Decreto 3209/1974, de 30 de Agosto.
* Recomendaciones para el proyecto y ejecución de pruebas de carga en puentes de carreteras, publicadas en 1988 por el MOPU.
* Recomendaciones para el proyecto y ejecución de pruebas de carga en puentes de ferrocarril.
* Instrucción EM-62 para Estructuras de Acero. Instituto Eduardo Torroja.
* Cálculo de Estructuras de Acero Laminado en Edificación. NB-MV-103/72.
* European Recomendations for Steel Construction. ECCS/CECM/EKS. 1.978.
* Recomendaciones para el cálculo de Estructuras Mixtas de la Comisión Conjunta IABSE-CEB-FIP-CECM(1975).
* Eurocódigos
  - ENV 1991 : EC1 - Bases de diseño y acciones
  - ENV 1992 : EC2 - Estructuras de Hormigón
  - ENV 1993 : EC3 - Estructuras Metálicas
  - ENV 1994 : EC4 - Estructuras Mixtas.
* Código Modelo CEB-FIP para Estructuras de Hormigón MC-90 .
* Recomendaciones para el Proyecto de Puentes Metálicos de Carretera. RPM-95. Ministerio de Fomento.
* Recomendaciones para el Proyecto de Puentes Mixtos de Carretera. RPX-95. Ministerio de Fomento.
* Recomendaciones CIRIA para el diseño de bloques de anclaje de pretensado.
* Recomendaciones para el cálculo de apoyos del Ministerio de Fomento.

## 4.- DESCRIPCIÓN DE LOS PROGRAMAS DE ORDENADOR UTILIZADOS

Para el desarrollo de los cálculos estructurales se han empleado fundamentalmente dos programas comerciales, suficientemente conocidos y sancionados por la práctica:

1. GT-Strudl:
   Cálculo matricial de estructuras de barras, por el método de los elementos finitos.
   Cálculo tridimensional.

2. FAGUS-2/3:
   Control de secciones de hormigón armado o pretensado, implementando los diagramas tensión-deformación y dominios de rotura que se establecen en la Instrucción EHE

Adicionalmente se emplean programas propios de preprocesamiento y postproceso de los anteriores, cuya única misión es la de agilizar la manipulación de datos y resultados.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

## 5.- MATERIALES Y COEFICIENTES DE PONDERACIÓN.

Las características de los materiales que se consideran en el presente Anejo son las detalladas en la siguiente tabla:

**Hormigones:**

Según EHE, control de ejecución Intenso para el tablero y normal para el resto:

| ELEMENTO | HORMIGON | $\gamma_c$ | *Recubrimiento [mm]* | $E_c$ *[kp/cm²]* |
|---|---|---|---|---|
| CIMENTACIONES | HA-25/P/20/IIa | 1.50 | 30 | 278 000 |
| ALZADOS | HA-25/P/20/IIa | 1.50 | 30 | 278 000 |
| DINTELES | HA-25/P/20/IIa | 1.50 | 30 | 278 000 |
| NIVELACION Y LIMPIEZA | HM-15 | | No estructural | |

**Acero Pasivo:**

Todos los elementos serán del tipo: **B 500-S**, de acuerdo con EHE

El límite elástico del acero será
$f_y = 5100$ kp/cm²
El coeficiente de minoración del acero adoptado es $\gamma_s = 1.15$

# 6.- ACCIONES

Las acciones consideradas en el dimensionamiento del Marco se expresan a continuación:

## ACCIÓN PERMANENTE (G): PESO PROPIO

Peso Propio: Según sección, con $\gamma$=2.50 Tn/m$^3$

## ACCIÓN PERMANENTE DE VALOR NO CONSTANTE (G*): ACCIONES DEBIDAS AL TERRENO

Se realizan los cálculos considerando dos posibles situaciones en cuanto al empuje de Tierras:

*a) Fases Constructivas:*

Marco "in situ": Tiene en cuenta la posibilidad de un llenado parcial del trasdós del marco (no hasta cota final), considerando un posible desequilibrio entre un hastial y otro, por haberse colocado una tongada más en un lado que en otro. El número de fases constructivas debido a este fenómeno viene determinado por la altura del Marco y el espesor de la tongada en desequilibrio, que en nuestro caso ha sido fijada en e=0.80m.

b) Marco en Servicio:

Se considera el empuje provocado por el relleno de tierras hasta cota final, así como su peso sobre el dintel.

En ambas situaciones (constructiva o servicio) el Coeficiente de empuje tomado será el pésimo entre activo y reposo, en función de la envolvente de esfuerzos estudiada.

El ángulo de rozamiento interno del terreno se fija en $\phi$=30°.
El peso de las tierras se estima con $\gamma$=2.00 Tn/m3.

Se harán dos hipótesis de carga diferentes, una considerando una altura de tierras de relleno de 10.15 m, que corresponde a la zona del marco exterior al cruce con la linea de LAV, y otra considerando únicamente un espesor de tierras de 1.10 m y una sobrecarga ferroviaria sobre el dintel. Obviamente la primera hipótesis será la condicionante.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

## ACCIÓN VARIABLE (Q): SOBRECARGAS DE USO

Se consideran dos situaciones en cuanto a las sobrecargas:

*a) Construcción:*

Se considera la actuación de una sobrecarga durante fases constructivas de 1.0 Tn/m$^2$ para el caso del Marco "in situ".

*b) Marco en Servicio:*

S.C. en rellenos laterales:

Para la hipótesis de relleno de 10.15 m se considera 1.0 Tn/m$^2$.

Para la hipótesis de relleno de 1.10m, al ser un paso inferior de ferrocarril, se toma 3.0 Tn/m$^2$. Al igual que para el empuje de Tierras, los empujes de SC se envuelven entre el Activo y el Reposo.

S.C. sobre Marco:

Para la hipótesis de relleno de 10.15 m se considera 1.0 Tn/m$^2$.

Para la hipótesis de relleno de 1.10m

Se toman la envolvente de los trenes tipo según I.P.F.:

Tren Tipo-A: tres cargas puntuales de 30.00 T separadas 1.50 m

Tren Tipo-B: carga uniforme de 12.00 T/m

La difusión de la sobrecarga se realiza según el ángulo $\phi$ del relleno.

S.C. en Losa Inferior:

Se considera una SCU de 0.40 Tn/m$^2$ sobre la Solera.

Igualmente se considera un paseo del V.P. en de 60 T.

Adicionalmente se considera una sobrecarga accidental por inundación del marco.

### ACCIONES ACCIDENTALES (A)

ACCIONES SÍSMICAS

Según las Bases de Cálculo y la norma NCSE-94, los parámetros a considerar son los siguientes:

- $a_b < 0.04 \cdot g$ (aceleración sísmica máxima en el tramo).

El coeficiente de nivel de daño, $\gamma_i = 1.0$ (Período de retorno de 50 años)

- $a_c = \gamma_i \cdot a_b = 0.04 \cdot g$ (aceleración sísmica de cálculo).

***No es necesario considerar esta acción por ser $a_c = \gamma_i \cdot a_b < 0.06g$***

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

# 7.- HIPÓTESIS DE CARGA Y COEFICIENTES DE MAYORACIÓN

## 7.1.- VALORES REPRESENTATIVOS DE LAS ACCIONES.

Según EHE: Acciones Variables; Coeficientes de Combinación.

| | $\Psi_{0,i}$ (Valor de Combinación) | $\Psi_{1,i}$ (Valor Frecuente) | $\Psi_{2,i}$ (Valor Cuasi-Permanente) |
|---|---|---|---|
| Sobrecargas. | 0.60 | 0.50 | 0.20 |

## 7.2.- VALORES DE CÁLCULO DE LAS ACCIONES.

De acuerdo con EHE, para control de ejecución Intenso

ESTADO LÍMITE ÚLTIMO:

| | $\gamma_{desfavorable}$ | | $\gamma_{favorable}$ | |
|---|---|---|---|---|
| | Construcción | Servicio | Construcción | Servicio |
| Permanentes. | 1.35 | 1.35 | 1.00 | 1.00 |
| Peso y Empuje de Tierras. | 1.35 | 1.50 | 1.00 | 1.00 |
| Sobrecargas. | 1.35 | 1.50 | 0.00 | 0.00 |

Nota: Para el empuje de tierras se toma siempre el empuje más desfavorable entre el activo y el reposo

ESTADO LÍMITE SERVICIO :

| | $\gamma_{desfavorable}$ | $\gamma_{favorable}$ |
|---|---|---|
| Permanentes. | 1.00 | 1.00 |
| Peso y Empuje de Tierras. | 1.00 | 1.00 |
| Sobrecargas. | 1.00 | 0.00 |

Nota: Para el empuje de tierras se toma siempre el empuje más desfavorable entre el activo y el reposo

## 7.3.- COMBINACIÓN DE ACCIONES.

ESTADO LÍMITE ÚLTIMO:

Según EHE:

$$\sum_{j\geq 1}\gamma_{G,j}\cdot G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\gamma_{Q,1}\cdot Q_{K,1}+\sum_{i>1}\gamma_{Q,i}\cdot\Psi_{0,i}\cdot Q_{K,i}$$

Donde:

$G_{K,j}$ = *Valor Representativo de cada Acción Permanente.*

$G^*_{K,j}$ = *Valor Representativo de cada Acción Permanente de Valor no Constante.*

$P_K$ = *Valor Representativo de la Acción del Pretensado.*

$Q_{K,1}$ = *Valor Representativo (Valor Característico) de la Acción Variable Dominante.*

$\Psi_{0,i}\cdot Q_{K,i}$ = *Valor Representativos (Valores de Combinación) de las Acciones Variables Concomitantes con la Acción Variable Dominante.*

- *Si la Acción de Sobrecarga es considerada como Dominante, se tomará ésta con su Valor Representativo y la Acción del Viento con su Valor Reducido (reducción del 50%), aplicándose además los coeficientes $\psi_i$ pertinentes.*

- *Si la Acción del Viento es considerada como Dominante, se tomará ésta con su Valor Representativo y NO se considerará la actuación simultanea de la Acción de la Sobrecarga de Uso.*

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

ESTADO LÍMITE DE SERVICIO:

Según EHE:

- *Combinación Característica. (poco probable o rara)*

$$\sum_{j\geq 1}G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\gamma_{Q,1}\cdot Q_{K,1}+\sum_{i>1}\gamma_{Q,i}\cdot\Psi_{0,i}\cdot Q_{K,i}$$

- *Combinación Frecuente.*

$$\sum_{j\geq 1}G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\gamma_{Q,1}\cdot\Psi_{1,1}\cdot Q_{K,1}+\sum_{i>1}\gamma_{Q,i}\cdot\Psi_{2,i}\cdot Q_{K,i}$$

- *Combinación Cuasi-Permanente.*

$$\sum_{j\geq 1}G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\sum_{i\geq 1}\gamma_{Q,i}\cdot\Psi_{2,i}\cdot Q_{K,i}$$

En cuanto al Viento, es de aplicación lo dicho para el Estado Límite Último.

# 8.- MODELO DE CÁLCULO

El cálculo se realiza mediante un proceso automático, de tal forma que tras la introducción de la geometría básica mediante una serie de dimensiones que la definen, se procede a formar un modelo con barras de iguales características mecánicas que las secciones que representan.

También se introducen en dicho cálculo automático las situaciones de carga descritas en el apartado anterior, de tal forma que el programa procede a formar los ficheros de cálculo necesarios para ser procesados por el programa de cálculo matricial de estructuras.

Así mismo produce una serie de ficheros de postproceso de resultados.

A continuación se ofrecen los parámetros introducidos para el cálculo de la estructura, que se particularizarán para cada una de las estructuras consideradas.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

# 9. O.D.T. 300.4

## 9.1. Geometría Básica

El marco a calcular tiene las dimensiones siguientes:

Gálibo horizontal, según la normal: 8.00 m
Gálibo esviado ($\alpha$=33.24°): 9.56 m
Gálibo vertical: 5.70
Espesor de Solera: 1.00 m
Espesor de Hastiales exteriores: 0.75 m
Espesor de Hastial interior: 0.50 m
Espesor de Dintel: 0.70 m
Cartelas superiores: 1.10 m H: 0.70 m V
Cartelas superiores: 1.10 m H: 0.55 m V

Dadas las características de la cimentación y su variación de propiedades a lo largo del conjunto de la estructura, se ha considerado conservadoramente un coeficiente de balasto vertical de 1.50 kp/cm$^3$

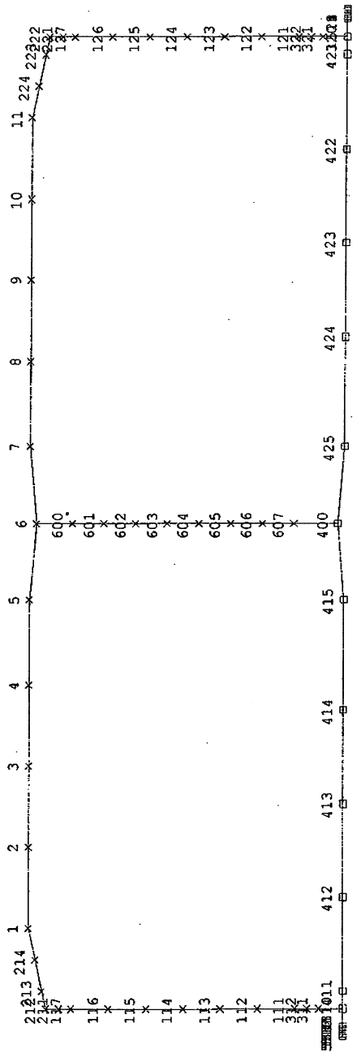
Las hojas siguientes resumen recogen los datos geométricos y de cargas considerados.

En primer lugar se realizará el cálculo con la altura de tierras de 10.15 m. posteriormente se realizará con la altura de tierras de 1.10 m. Finalmente se armara con la envolvente de las dos hipótesis.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

MODELO NUMÉRICO. HIP-1



Meters Metric Tons

**Fichero: MARCO.GEO**

```
STRUDL 'GEO' 'L.A.V.MARTORELL. : ODT 300.4.'
 UNITS  M MTON RADIANS CENTIGRADE SECONDS
TYPE SPACE FRAME
$ COORDENADAS
JOINT COORDS
$ NUDO    X     Y     Z
1 -8.505 7.050 0.000
2 -6.804 7.050 0.000
3 -5.103 7.050 0.000
4 -3.402 7.050 0.000
5 -1.610 7.050 0.000
6 0.000 6.912 0.000
7 1.610 7.050 0.000
8 3.402 7.050 0.000
9 5.103 7.050 0.000
10 6.804 7.050 0.000
11 8.505 7.050 0.000
111 -10.190 1.500 0.000
112 -10.190 2.275 0.000
113 -10.190 3.050 0.000
114 -10.190 3.825 0.000
115 -10.190 4.600 0.000
116 -10.190 5.375 0.000
117 -10.190 6.150 0.000
121 10.190 1.500 0.000
122 10.190 2.275 0.000
123 10.190 3.050 0.000
124 10.190 3.825 0.000
125 10.190 4.600 0.000
126 10.190 5.375 0.000
127 10.190 6.150 0.000
211 -10.190 6.423 0.000
212 -10.190 6.696 0.000
213 -9.815 6.775 0.000
214 -9.160 6.913 0.000
221 10.190 6.423 0.000
222 10.190 6.696 0.000
223 9.815 6.775 0.000
224 9.160 6.913 0.000
310 -10.190 0.500 0.000
311 -10.190 1.000 0.000
312 -10.190 1.250 0.000
320 10.190 0.500 0.000
321 10.190 1.000 0.000
322 10.190 1.250 0.000
400 0.000 0.638 0.000
411 -9.815 0.500 0.000
412 -7.852 0.500 0.000
413 -5.889 0.500 0.000
414 -3.926 0.500 0.000
415 -1.610 0.500 0.000
421 9.815 0.500 0.000
422 7.852 0.500 0.000
423 5.889 0.500 0.000
424 3.926 0.500 0.000
425 1.610 0.500 0.000
511 -10.565 0.500 0.000
512 -10.615 0.500 0.000
513 -10.665 0.500 0.000
514 -10.715 0.500 0.000
515 -10.765 0.500 0.000
521 10.565 0.500 0.000
522 10.615 0.500 0.000
523 10.665 0.500 0.000
524 10.715 0.500 0.000
525 10.765 0.500 0.000
600 0.000 6.150 0.000
601 0.000 5.492 0.000
602 0.000 4.836 0.000
603 0.000 4.179 0.000
604 0.000 3.521 0.000
605 0.000 2.864 0.000
606 0.000 2.207 0.000
607 0.000 1.550 0.000
```

```
$ CONECTIVIDAD DE ELEMENTOS
MEMBER INCI
$ Dintel
 1              1              2
 2              2              3
 3          3              4
 4              4              5
 5          5          6
 6              6              7
 7          7          8
 8              8              9
 9              9             10
 10             10             11
$ Hastiales
 111        111            112
 112            112            113
 113            113            114
 114            114            115
 115            115            116
 116            116            117
 121            121            122
 122            122            123
 123        123            124
 124        124              125
 125        125              126
 126        126            127
 600        600              6
 601            601            600
 602            602            601
 603        603            602
 604            604            603
 605        605            604
 606          606              605
 607        607            606
 608            400              607
$ Cartelas superiores
 210        117              211
 211        211              212
 212        212            213
 213        213            214
 214        214            1
 220        127            221
 221        221            222
 222        222              223
 223        223              224
 224        224            11
$ Cartelas Inferiores
 310        310              311
 311        311            312
 312        312              111
 320        320            321
 321        321              322
 322        322            121
$ Talones Zapata
 510        310              511
 511        511            512
 512          512              513
 513        513            514
 514          514              515
 520        320            521
 521          521              522
 522        522            523
 523            523              524
 524           524              525
$ Punteras Zapata
 410            310              411
```



```
 411            411              412
 412            412          413
 413            413          414
 414            414          415
 415            415          400
 420            320          421
 421            421          422
 422            422          423
 423            423          424
 424            424          425
 425              425              400

$ CARACTERÍSTICAS MECÁNICAS DE LOS ELEMENTOS
MEMBER PROPERTIES
1 TO 4 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.7000 YC 0.35
5 TO 6 PRIS AX 0.9750 IX 1.0000 IY 1.0000 IZ 0.0957 YD 0.9750 YC 0.49
7 TO 10 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.7000 YC 0.35
$ Hastiales
111 121 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
112 122  PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
113 123 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
114 124 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
115 125 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
116 126 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
210 220 PRIS AX 1.0753 IX 1.0000 IY 1.0000 IZ 0.1321 YD 1.08 YC 0.54
600 PRIS AX 1.8600 IX 1.0000 IY 1.0000 IZ 1.396 YD 1.86 YC 0.93
601 TO 608 PRIS AX 0.5000 IX 1.0000 IY 1.0000 IZ 0.0104 YD 0.5000 YC
0.25
$ Cartelas
211 221 PRIS AX 1.7259 IX 1.0000 IY 1.0000 IZ 0.4740 YD 1.73 YC 0.865
212 222  PRIS AX 1.2500 IX 1.0000 IY 1.0000 IZ 0.1628 YD 1.25 YC 0.625
213 223 PRIS AX 1.1125 IX 1.0000 IY 1.0000 IZ 0.1200 YD 1.11 YC 0.555
214 224 PRIS AX 0.8375 IX 1.0000 IY 1.0000 IZ 0.0529 YD 0.84 YC 0.42
310 320 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
311 321 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
312 322 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
$ Zapata
510 TO 514 PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5
520 TO 524 PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5
410 TO 414 PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5
415   425 PRIS AX 1.2750 IX 1.0000 IY 1.0000 IZ 0.1968 YD 1.28 YC 0.6
420 TO 424 PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5

$ CARACTERISTICAS DE LOS MATERIALES
 UNITS  M MTON DEGREES CENTIGRADE SECONDS
CONST
$ TODAS LAS BARRAS
E 2781000.00 ALL
G 1158750.00 ALL
CTE 1.00E-05 ALL
BETA 180.0 MEMB 222 TO 224
 UNITS  M MTON RADIANS CENTIGRADE SECONDS

$ APOYOS
STATUS SUP  511 TO 515 521 TO 525 310 320 411 TO 415 421 TO 425 400
$ LIBERACIONES DE APOYOS
 JOINT RELEASES
515 525 FORCE X MOMENT Z KFY 37.500
514 524 FORCE X MOMENT Z KFY 75.000
513 523 FORCE X MOMENT Z KFY 75.000
512 522 FORCE X MOMENT Z KFY 75.000
511 521 FORCE X MOMENT Z KFY 318.750
310 FORCE X MOMENT Z KFY 562.500
320 MOMENT Z KFY 562.500
411 421 FORCE X MOMENT Z KFY 1753.500
```

```
412 422 FORCE X MOMENT Z KFY 2944.500
413 423 FORCE X MOMENT Z KFY 2944.500
414 424 FORCE X MOMENT Z KFY 3209.250
415 425 FORCE X MOMENT Z KFY 2679.750
400 FORCE X MOMENT Z KFY 2415.000
```



## ANÁLISIS DE ESFUERZOS HIPOTESIS-1

De las acciones introducidas en el modelo, se obtienen sus esfuerzos correspondientes y las combinaciones de servicio y rotura. A continuación se listan ambas envolventes, generadas de acuerdo con los siguientes criterios:

***E.L.U.:**

Cajón hincado en Servicio:

- Rotura en Servicio, sin Sismo
- Rotura con Sismo

Estas envolventes se envuelven obteniéndose una envolvente total para el cajón hincado en servicio.

***E.L.S.:**

A partir de los estados elementales (y sus envolventes parciales), se realiza una envolvente única de Servicio, en combinación característica.

Las reacciones y esfuerzos de esta envolvente nos permitirán comprobar el estado de la cimentación del cajón hincado en servicio. Según estas reacciones es necesario una tensión mínima de 2.50 Kp/cm$^2$.

Los esfuerzos y reacciones de dicha envolvente pueden observarse a continuación.

Para la comprobación del estado de fisuración del cajón hincado, se realiza la envolvente con sobrecargas frecuentes. Dicha envolvente así como las comprobaciones pertinentes se explicitan más adelante en el presente Anejo.

Los listados que aparecen a continuación son los de definición de los estados de cargas.

# GENERACIÓN DE ENVOLVENTES. HIP-1



*Marco.gec*: Define los estados de carga elementales y envolventes totales, tanto en servicio como en rotura. Importa estados de carga calculados en el archivo: *Ma2.gec*, para realizar las envolventes totales.

*Ma2.gec:* Genera todos los posibles estados elementales de sobrecarga uniforme y sobrecaga puntual, colocándolas en distintas posiciones de la estructura y obtiene una envolvente de sobrecargas que se exporta al "*Marco.Gec*".

**Fichero: MARCO.GEC**

```
"
" Proyecto:L.A.V.MARTORELL.
" Elemento:ODT 300.4.
" Cliente:INOCSA
"
" Creado por ALEPH-MARCOS 4.2.1
" Fecha: 06.05.02 Hora: 20:47:29
"
" Generación de envolventes Totales.
"          Servicio y Rotura.



* TIT
L.A.V.MARTORELL. - ODT 300.4.
Envolventes totales

* DIRESF ESF
* SDF MARCO.SDF

* EC
" ---- ESTADOS DE CARGA MARCO EN SERVICIO -----
   1   MA1001       0   Peso Propio
   2   MA1002       0   Empuje Activo
   3   MA1003       0   Empuje Reposo
   4   MA1004       0   Sismo en Tierras
   5   SC_S_ACT     1   Envolvente S.C.U. Dintel (Empuje Activo)
   6   SC_S_REP     1   Envolvente S.C.U. Dintel (Empuje Reposo)
   8   SC_S_INF     1   Envolvente S.C.U. Zapata
   9   VP_INF       1   Envolvente Vehiculo Pesado Zapata
  10   MA2113       0   Sobre elevacion nivel de agua

" ---- ESTADOS DE CARGA MARCO EN CONSTRUCCION -----
  20    EM_C_ACT     1    Envolvente Empujes Activo (Construccion Por
Tongadas)
  21    EM_C_REP     1    Envolvente Empujes Reposo (Construccion Por
Tongadas)
  22   SC_C_ACT     1   Envolvente S.C.U. Dintel (Marco Constru., Empuje
Activo)
  23   SC_C_REP     1   Envolvente S.C.U. Dintel (Marco Constru., Empuje Reposo)
  24   SC_C_INF     1   Envolvente S.C.U. Zapata (Marco Construccion)

* ENV

  30   MA_SERV  1    Envolvente de Servicio (Marco en Servicio)

  incomp 2 3  " Empujes
```

```
 incomp 4 5  " Sobrecargas
 ec1   1.00  1.00   " Peso Propio
 ec2   1.00  1.00   " Empuje Activo
 ec3  1.00  1.00   " Empuje Reposo
 ec5  0.00  1.00   " Envolvente S.C.U. Dintel (Empuje Activo)
 ec6   0.00  1.00   " Envolvente S.C.U. Dintel (Empuje Reposo)
 ec8   0.00  1.00   " Envolvente S.C.U. Zapata
 ec9   0.00  1.00   " Envolvente Vehiculo Pesado Zapata

 31   MA_RO1  1    Envolvente de Rotura (Marco en Servicio)

 incomp 2 3  " Empujes
 incomp 4 5  " Sobrecargas
 ec1   1.00  1.35   " Peso Propio
 ec2   1.00  1.50   " Empuje Activo
 ec3   1.00  1.50   " Empuje Reposo
 ec5   0.00  1.50   " Envolvente S.C.U. Dintel (Empuje Activo)
 ec6  0.00  1.50   " Envolvente S.C.U. Dintel (Empuje Reposo)
 ec8   0.00  1.50   " Envolvente S.C.U. Zapata
 ec9   0.00  1.50   " Envolvente Vehiculo Pesado Zapata

 32   MA_SIS  1    Envolvente de Rotura en SOBRE-ELEVACION NIVEL DE
AGUA (Marco en Servicio)

 incomp 2 3  " Empujes
 incomp 5 6  " Sobrecargas
 ec1   1.00  1.35   " Peso Propio
 ec2  1.00  1.50   " Empuje Activo
 ec3   1.00  1.50   " Empuje Reposo
 ec4  -1.00  1.00   " Sismo en Tierras
 ec5   0.00  0.20   " Envolvente S.C.U. Dintel (Empuje Activo)
 ec6  0.00  0.20   " Envolvente S.C.U. Dintel (Empuje Reposo)
 ec8   0.00  0.20   " Envolvente S.C.U. Zapata
 ec9   0.00  0.20   " Envolvente Vehiculo Pesado Zapata
 ec10  0.00  1.00   "  Sobre elevacion nivel de agua

 33   MA_ROT  1    Envolvente de Rotura (Envolvente Servicio-Sismo)

 incomp todos
 ec31  1.00  1.00   " Marco en Servicio
 ec32  1.00  1.00   " Marco en Sismo

 34   MA_C1  1    Envolvente de Rotura en Construccion (Tongadas)

 incomp 2 3  " Empujes
 ec1   1.00  1.35   " Peso Propio
 ec20  1.00  1.35   " Empuje Activo (Tongadas, incluye SCU 1.0 Tn/m2)
 ec21  1.00  1.35   " Empuje Reposo (Tongadas, incluye SCU 1.0 Tn/m2)
 ec24  0.00  1.35   " Envolvente S.C.U. Zapata (construccion)

 35   MA_C2  1     Envolvente de Rotura en Construccion (Terraplen
Terminado)

 incomp 2 3  " Empujes
 incomp 4 5  " Sobrecargas
 ec1   1.00  1.35   " Peso Propio
 ec2   1.00  1.35   " Empuje Activo
 ec3   1.00  1.35   " Empuje Reposo
 ec22  0.00  1.35   " Envolvente S.C.U. Dintel (Construccion, Empuje
Activo)
 ec23  0.00  1.35   " Envolvente S.C.U. Dintel (Construccion, Empuje
Reposo)
 ec24  0.00  1.35   " Envolvente S.C.U. Zapata (Construccion)
```



```
 36   MA_CON  1    Envolvente de Rotura en Construccion (Envolvente)

 incomp todos
 ec34  1.00  1.00   " Tongadas
 ec35  1.00  1.00   " Terraplen Terminado

* SELECT

 mbdesel todos
 nddesel todos

"  Seleccionamos medio Marco.
 mbsel i 1 a 6       " Dintel
 mbsel i 111 a 116  " Hastial
 mbsel d 116         " Hastial
 mbsel i 211 a 214   " Cartela Sup
 mbsel i 311 312     " Cartela Inf
 mbsel i 511 a 514   " Talon Zapata
 mbsel d 514         " Talon Zapata
 mbsel i 411 a 415   " Puntera Zapata
 mbsel d 415         " Puntera Zapata
 mbsel i 410 520     " Empotramiento Hastial-Zapata
 ndmb

 esfsel x y zz

 ressel Esfuerzos Reacciones Desplazamientos


* PRINT

 output -r MA_ELE.LST
 grupos si

 tit Estados Elementales. Proyecto: L.A.V.MARTORELL. - ODT 300.4.
 ec(1 a 29) x+ x- y+ y- zz+ zz-

 output -a MA_ELE.LST
 grupos si

 tit Estados Envolventes secundarias. Proyecto: L.A.V.MARTORELL. -
ODT 300.4.
 ec(31 32 34 35) x+ x- y+ y- zz+ zz-


* PRINT

 output -r MA_SER.LST
 grupos si

 tit Estado Servicio. Proyecto: L.A.V.MARTORELL. - ODT 300.4.
 ec(30) x+ x- y+ y- zz+ zz-


* PRINT

 output -r MA_ROT.LST
 grupos si

 tit Estados Rotura. Proyecto: L.A.V.MARTORELL. - ODT 300.4.
 ec(33 36) x+ x- y+ y- zz+ zz-
```

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

**Fichero: MA2.GEC**

```
"
" Proyecto:L.A.V.MARTORELL.
" Elemento:ODT 300.4.
" Cliente:INOCSA
"
" Creado por ALEPH-MARCOS 4.2.1
" Creado por ALEPH-MARCOS 1.0.2.
" Fecha: 06.05.02 Hora: 20:46:32
"
" Generación de envolvente de Sobrecargas Servicio.



* TIT
L.A.V.MARTORELL. - ODT 300.4.
Paseo de Sobrecargas


* DIRESF ESF
* SDF MARCO.SDF

* EC
    1   MA2001  0  PASEO SCU Posicion 1 (Activo)
    2   MA2002  0  PASEO SCU Posicion 18 (Activo)
    3   MA2003  0  PASEO SCU Posicion 1 (Reposo)
    4   MA2004  0  PASEO SCU Posicion 18 (Reposo)
    5   MA2005  0  PASEO SCU Posicion 2
    6   MA2006  0  PASEO SCU Posicion 3
    7   MA2007  0  PASEO SCU Posicion 4
    8   MA2008  0  PASEO SCU Posicion 5
    9   MA2009  0  PASEO SCU Posicion 6
   10   MA2010  0  PASEO SCU Posicion 7
   11   MA2011  0  PASEO SCU Posicion 8
   12   MA2012  0  PASEO SCU Posicion 9
   13   MA2013  0  PASEO SCU Posicion 10
   14   MA2014  0  PASEO SCU Posicion 11
   15   MA2015  0  PASEO SCU Posicion 12
   16   MA2016  0  PASEO SCU Posicion 13
   17   MA2017  0  PASEO SCU Posicion 14
   18   MA2018  0  PASEO SCU Posicion 15
   19   MA2019  0  PASEO SCU Posicion 16
   20   MA2020  0  PASEO SCU Posicion 17
   21   MA2021  0  PASEO SCU INF. Posicion 1
   22   MA2022  0  PASEO SCU INF. Posicion 2
   23   MA2023  0  PASEO SCU INF. Posicion 3
   24   MA2024  0  PASEO SCU INF. Posicion 4
   25   MA2025  0  PASEO SCU INF. Posicion 5
   26   MA2026  0  PASEO SCU INF. Posicion 6
   27   MA2027  0  PASEO SCU INF. Posicion 7
   28   MA2028  0  PASEO SCU INF. Posicion 8
   29   MA2029  0  PASEO SCU INF. Posicion 9
   30   MA2030  0  PASEO SCU INF. Posicion 10
   95   MA2095  0  PASEO VP INFERIOR. Posicion 1
   96   MA2096  0  PASEO VP INFERIOR. Posicion 2
   97   MA2097  0  PASEO VP INFERIOR. Posicion 3
   98   MA2098  0  PASEO VP INFERIOR. Posicion 4
   99   MA2099  0  PASEO VP INFERIOR. Posicion 5
  100   MA2100  0  PASEO VP INFERIOR. Posicion 6
  101   MA2101  0  PASEO VP INFERIOR. Posicion 7
  102   MA2102  0  PASEO VP INFERIOR. Posicion 8
  103   MA2103  0  PASEO VP INFERIOR. Posicion 9
  104   MA2104  0  PASEO VP INFERIOR. Posicion 10
  105   MA2105  0  PASEO VP INFERIOR. Posicion 11
  106   MA2106  0  PASEO VP INFERIOR. Posicion 12
  107   MA2107  0  PASEO VP INFERIOR. Posicion 13
  108   MA2108  0  PASEO VP INFERIOR. Posicion 14
  109   MA2109  0  PASEO VP INFERIOR. Posicion 15
  110   MA2110  0  PASEO VP INFERIOR. Posicion 16
  111   MA2111  0  PASEO VP INFERIOR. Posicion 17
  112   MA2112  0  PASEO VP INFERIOR. Posicion 18
```

```
* ENV
113  SC_S_ACT   1   Envolvente Paseo SCU (ACTIVO)

     ec1   0.00  1.00
     ec2   0.00  1.00
     ec5   0.00  1.00
     ec6   0.00  1.00
     ec7   0.00  1.00
     ec8   0.00  1.00
     ec9   0.00  1.00
    ec10   0.00  1.00
    ec11   0.00  1.00
    ec12   0.00  1.00
    ec13   0.00  1.00
    ec14   0.00  1.00
    ec15   0.00  1.00
    ec16   0.00  1.00
    ec17   0.00  1.00
    ec18   0.00  1.00
    ec19   0.00  1.00
    ec20   0.00  1.00

114  SC_S_REP   1   Envolvente Paseo SCU (REPOSO)

     ec3   0.00  1.00
     ec4   0.00  1.00
     ec5   0.00  1.00
     ec6   0.00  1.00
     ec7   0.00  1.00
     ec8   0.00  1.00
     ec9   0.00  1.00
    ec10   0.00  1.00
    ec11   0.00  1.00
    ec12   0.00  1.00
    ec13   0.00  1.00
    ec14   0.00  1.00
    ec15   0.00  1.00
    ec16   0.00  1.00
    ec17   0.00  1.00
    ec18   0.00  1.00
    ec19   0.00  1.00
    ec20   0.00  1.00

115  SC_S_INF   1   Envolvente Paseo SCU Inferior

    ec21   0.00  1.00
    ec22   0.00  1.00
    ec23   0.00  1.00
    ec24   0.00  1.00
    ec25   0.00  1.00
    ec26   0.00  1.00
    ec27   0.00  1.00
    ec28   0.00  1.00
    ec29   0.00  1.00
    ec30   0.00  1.00


117  VP_INF   1   Envolvente Paseo VP INFERIOR
incomp todos

    ec95   0.00  1.00
    ec96   0.00  1.00
    ec97   0.00  1.00
    ec98   0.00  1.00
    ec99   0.00  1.00
   ec100   0.00  1.00
   ec101   0.00  1.00

   ec102   0.00  1.00
   ec103   0.00  1.00
   ec104   0.00  1.00
   ec105   0.00  1.00
   ec106   0.00  1.00
   ec107   0.00  1.00
   ec108   0.00  1.00
   ec109   0.00  1.00
   ec110   0.00  1.00
```

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.4.* | Fecha JUNIO-*2002* | Página de

```
   ec111   0.00  1.00
   ec112   0.00  1.00


* BORRA EC 1 a 112
```

# ENVOLVENTES DE ROTURA. HIP-1



**Fichero: MA_ROT.LST**

LISTADO DE ESTADOS DE CARGA
Fecha : 07.05.2002 10:09:42
T¡tulo: L.A.V.MARTORELL. - ODT 300.4.
Coment: Envolventes totales
Titlst: Estados Rotura. Proyecto: L.A.V.MARTORELL. - ODT 3

Tabla de estados de carga a listar

| ec | Fichero | tipo | T¡tulo |
|---|---|---|---|
| 33 | MA_ROT | 1 | [Envolvente de Rotura (Envolvente Servicio-Sismo) ] |
| 36 | MA_CON | 1 | [Envolvente de Rotura en Construccion (Envolvente) ] |

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Mz |
|---|---|---|---|---|---|---|
| 1 | 1 | 33 | Nx+ | -44.32 | -55.75 | 17.35 |
| | | 33 | Fy+ | -52.48 | -53.07 | 19.89 |
| | | 33 | Mz+ | -76.10 | -83.05 | 24.92 |
| | | 33 | Nx- | -114.41 | -93.17 | -11.18 |
| | | 33 | Fy- | -106.28 | -95.85 | -13.69 |
| | | 33 | Mz- | -106.90 | -92.76 | -17.45 |
| | | 36 | Nx+ | 2.01 | -4.03 | 8.84 |
| | | 36 | Fy+ | -5.80 | -2.84 | 0.01 |
| | | 36 | Mz+ | -65.55 | -76.91 | 16.98 |
| | | 36 | Nx- | -94.72 | -82.57 | -3.57 |
| | | 36 | Fy- | -91.96 | -84.28 | -2.73 |
| | | 36 | Mz- | -92.38 | -81.43 | -6.20 |
| 2 | 2 | 33 | Nx+ | -44.32 | -17.88 | 79.97 |
| | | 33 | Fy+ | -52.62 | -15.55 | 81.12 |
| | | 33 | Mz+ | -77.29 | -29.28 | 121.35 |
| | | 33 | Nx- | -114.41 | -36.86 | 99.42 |
| | | 33 | Fy- | -106.15 | -39.18 | 98.28 |
| | | 33 | Mz- | -71.84 | -24.60 | 60.66 |
| | | 36 | Nx+ | 2.01 | -0.01 | 12.28 |
| | | 36 | Fy+ | -5.80 | 0.14 | 2.29 |
| | | 36 | Mz+ | -66.61 | -28.11 | 107.12 |
| | | 36 | Nx- | -94.72 | -31.60 | 93.54 |
| | | 36 | Fy- | -91.84 | -32.89 | 94.35 |
| | | 36 | Mz- | -10.20 | -0.99 | -0.73 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 3 | 33 | Nx+ | -44.32 | 19.98 | 78.19 |
| | | 33 | Fy+ | -76.75 | 30.41 | 116.25 |
| | | 33 | Mz+ | -80.65 | 25.37 | 123.60 |
| | | 33 | Nx- | -114.41 | 19.44 | 114.25 |
| | | 33 | Fy- | -72.44 | 9.94 | 77.24 |
| | | 33 | Mz- | -68.19 | 15.14 | 69.95 |
| | | 36 | Nx+ | 2.01 | 4.00 | 8.89 |
| | | 36 | Fy+ | -65.88 | 25.94 | 105.49 |
| | | 36 | Mz+ | -67.00 | 23.48 | 111.13 |
| | | 36 | Nx- | -94.72 | 19.37 | 103.96 |
| | | 36 | Fy- | -6.46 | 0.81 | 4.04 |
| | | 36 | Mz- | -10.20 | 1.98 | -1.58 |
| 4 | 4 | 33 | Nx+ | -44.32 | 57.85 | 11.98 |
| | | 33 | Fy+ | -77.14 | 86.78 | 20.00 |
| | | 33 | Mz+ | -106.51 | 73.49 | 36.87 |
| | | 33 | Nx- | -114.41 | 75.74 | 33.30 |
| | | 33 | Fy- | -72.05 | 47.74 | 24.79 |
| | | 33 | Mz- | -52.25 | 60.12 | 8.38 |
| | | 36 | Nx+ | 2.01 | 8.02 | -1.34 |
| | | 36 | Fy+ | -66.23 | 77.06 | 20.96 |
| | | 36 | Mz+ | -92.23 | 69.11 | 29.66 |
| | | 36 | Nx- | -94.72 | 70.33 | 27.68 |
| | | 36 | Fy- | -6.46 | 3.79 | 0.14 |
| | | 36 | Mz- | -5.30 | 8.16 | -8.61 |
| 5 | 5 | 33 | Nx+ | -52.50 | 93.61 | -127.43 |
| | | 33 | Fy+ | -89.74 | 139.42 | -186.38 |
| | | 33 | Mz+ | -79.42 | 82.74 | -97.91 |
| | | 33 | Nx- | -125.51 | 124.78 | -155.54 |
| | | 33 | Fy- | -78.88 | 80.69 | -98.74 |
| | | 33 | Mz- | -89.22 | 137.37 | -187.19 |
| | | 36 | Nx+ | 0.97 | 12.39 | -19.51 |
| | | 36 | Fy+ | -77.52 | 125.16 | -163.34 |
| | | 36 | Mz+ | -7.02 | 6.34 | -9.45 |
| | | 36 | Nx- | -104.97 | 115.48 | -146.48 |
| | | 36 | Fy- | -7.02 | 6.34 | -9.45 |
| | | 36 | Mz- | -77.04 | 123.31 | -164.06 |
| 6 | 6 | 33 | Nx+ | -55.58 | -129.45 | -307.67 |
| | | 33 | Fy+ | -81.73 | -115.78 | -258.85 |
| | | 33 | Mz+ | -81.73 | -115.78 | -258.85 |
| | | 33 | Nx- | -130.08 | -178.07 | -400.26 |
| | | 33 | Fy- | -94.53 | -193.46 | -453.99 |
| | | 33 | Mz- | -94.53 | -193.46 | -453.99 |
| | | 36 | Nx+ | 0.63 | -16.18 | -42.58 |



| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Fy+ | -7.32 | -9.14 | -21.96 |
| | | 36 | Mz+ | -7.32 | -9.14 | -21.96 |
| | | 36 | Nx- | -109.10 | -163.73 | -372.06 |
| | | 36 | Fy- | -81.91 | -174.16 | -403.92 |
| | | 36 | Mz- | -81.91 | -174.16 | -403.92 |
| 111 | 111 | 33 | Nx+ | -110.60 | -23.99 | -56.36 |
| | | 33 | Fy+ | -122.02 | -6.31 | -36.06 |
| | | 33 | Mz+ | -118.88 | -18.33 | -32.52 |
| | | 33 | Nx- | -181.58 | -29.68 | -60.69 |
| | | 33 | Fy- | -170.16 | -47.40 | -81.30 |
| | | 33 | Mz- | -172.14 | -29.89 | -84.13 |
| | | 36 | Nx+ | -18.31 | -9.27 | -6.19 |
| | | 36 | Fy+ | -18.51 | -1.42 | -10.02 |
| | | 36 | Mz+ | -19.44 | -12.40 | -3.66 |
| | | 36 | Nx- | -163.53 | -30.39 | -62.63 |
| | | 36 | Fy- | -157.39 | -35.80 | -65.76 |
| | | 36 | Mz- | -159.14 | -20.08 | -68.31 |
| 112 | 112 | 33 | Nx+ | -109.15 | -14.26 | -41.57 |
| | | 33 | Fy+ | -120.56 | 1.68 | -34.28 |
| | | 33 | Mz+ | -116.33 | -7.15 | -22.50 |
| | | 33 | Nx- | -179.62 | -11.71 | -44.71 |
| | | 33 | Fy- | -168.20 | -27.68 | -52.26 |
| | | 33 | Mz- | -170.76 | -15.81 | -66.51 |
| | | 36 | Nx+ | -16.86 | -5.57 | -0.47 |
| | | 36 | Fy+ | -17.09 | -1.37 | -8.69 |
| | | 36 | Mz+ | -17.99 | -6.84 | 3.73 |
| | | 36 | Nx- | -161.57 | -14.21 | -45.39 |
| | | 36 | Fy- | -155.43 | -19.10 | -44.53 |
| | | 36 | Mz- | -157.72 | -8.44 | -57.33 |
| 113 | 113 | 33 | Nx+ | -107.70 | -4.93 | -34.17 |
| | | 33 | Fy+ | -166.82 | 11.19 | -53.77 |
| | | 33 | Mz+ | -113.18 | -1.73 | -17.85 |
| | | 33 | Nx- | -177.66 | 5.37 | -42.32 |
| | | 33 | Fy- | -117.63 | -9.18 | -28.54 |
| | | 33 | Mz- | -170.56 | 3.33 | -62.95 |
| | | 36 | Nx+ | -15.40 | -2.39 | 2.58 |
| | | 36 | Fy+ | -149.40 | 6.23 | -51.31 |
| | | 36 | Mz+ | -16.54 | -2.08 | 7.14 |
| | | 36 | Nx- | -159.61 | 1.16 | -40.39 |
| | | 36 | Fy- | -21.18 | -7.63 | 1.00 |
| | | 36 | Mz- | -156.49 | 4.31 | -56.13 |
| 114 | 114 | 33 | Nx+ | -106.24 | 3.99 | -33.83 |
| | | 33 | Fy+ | -168.09 | 22.53 | -48.24 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Mz+ | -109.54 | 7.13 | -20.31 |
| | | 33 | Nx- | -175.69 | 21.54 | -52.83 |
| | | 33 | Fy- | -113.85 | 2.97 | -38.63 |
| | | 33 | Mz- | -172.61 | 20.23 | -71.70 |
| | | 36 | Nx+ | -13.95 | 0.22 | 3.38 |
| | | 36 | Fy+ | -150.40 | 16.44 | -43.33 |
| | | 36 | Mz+ | -14.26 | -2.68 | 7.50 |
| | | 36 | Nx- | -157.65 | 15.71 | -46.99 |
| | | 36 | Fy- | -19.22 | -3.18 | 5.14 |
| | | 36 | Mz- | -155.16 | 15.10 | -63.60 |
| 115 | 115 | 33 | Nx+ | -104.79 | 12.54 | -40.27 |
| | | 33 | Fy+ | -166.63 | 37.81 | -71.66 |
| | | 33 | Mz+ | -106.62 | 16.38 | -29.55 |
| | | 33 | Nx- | -173.73 | 36.81 | -75.52 |
| | | 33 | Fy- | -111.89 | 11.51 | -44.26 |
| | | 33 | Mz- | -170.98 | 31.06 | -91.57 |
| | | 36 | Nx+ | -12.50 | 2.32 | 2.36 |
| | | 36 | Fy+ | -148.94 | 30.19 | -61.46 |
| | | 36 | Mz+ | -12.81 | 0.97 | 8.10 |
| | | 36 | Nx- | -155.68 | 29.46 | -64.53 |
| | | 36 | Fy- | -17.08 | -2.01 | -7.53 |
| | | 36 | Mz- | -153.24 | 24.37 | -78.94 |
| 116 | 116 | 33 | Nx+ | -103.33 | 20.66 | -53.16 |
| | | 33 | Fy+ | -165.18 | 52.18 | -106.59 |
| | | 33 | Mz+ | -105.69 | 27.61 | -46.63 |
| | | 33 | Nx- | -171.77 | 51.19 | -109.67 |
| | | 33 | Fy- | -109.93 | 19.64 | -56.35 |
| | | 33 | Mz- | -168.51 | 40.77 | -119.45 |
| | | 36 | Nx+ | -11.04 | 3.86 | -0.07 |
| | | 36 | Fy+ | -147.49 | 43.12 | -89.90 |
| | | 36 | Mz+ | -11.36 | 3.82 | 6.19 |
| | | 36 | Nx- | -153.72 | 42.39 | -92.42 |
| | | 36 | Fy- | -15.12 | -2.01 | -5.97 |
| | | 36 | Mz- | -150.80 | 33.06 | -101.22 |
| 116 | 117 | 33 | Nx+ | -101.88 | 28.39 | -72.22 |
| | | 33 | Fy+ | -162.51 | 67.12 | -142.60 |
| | | 33 | Mz+ | -102.41 | 28.32 | -72.13 |
| | | 33 | Nx- | -169.81 | 64.66 | -154.64 |
| | | 33 | Fy- | -109.18 | 25.91 | -84.29 |
| | | 33 | Mz- | -169.28 | 64.75 | -154.73 |
| | | 36 | Nx+ | -9.59 | 4.86 | -3.48 |
| | | 36 | Fy+ | -145.66 | 55.67 | -125.17 |
| | | 36 | Mz+ | -9.90 | 5.84 | 2.41 |
| | | 36 | Nx- | -151.76 | 54.52 | -130.03 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Fy- | -13.15 | -2.01 | -4.41 |
| | | 36 | Mz- | -151.29 | 54.58 | -130.11 |
| 211 | 211 | 33 | Nx+ | -101.15 | 31.02 | -80.32 |
| | | 33 | Fy+ | -161.78 | 72.26 | -161.62 |
| | | 33 | Mz+ | -101.67 | 30.95 | -80.21 |
| | | 33 | Nx- | -168.82 | 69.19 | -172.90 |
| | | 33 | Fy- | -108.19 | 27.93 | -91.67 |
| | | 33 | Mz- | -168.29 | 69.28 | -173.02 |
| | | 36 | Nx+ | -8.86 | 5.09 | -4.83 |
| | | 36 | Fy+ | -144.93 | 59.94 | -140.96 |
| | | 36 | Mz+ | -9.17 | 6.35 | 0.75 |
| | | 36 | Nx- | -150.77 | 58.59 | -145.46 |
| | | 36 | Fy- | -12.16 | -2.01 | -3.85 |
| | | 36 | Mz- | -150.30 | 58.66 | -145.57 |
| 212 | 212 | 33 | Nx+ | -49.32 | -85.59 | -97.97 |
| | | 33 | Fy+ | -64.04 | -82.91 | -95.19 |
| | | 33 | Mz+ | -52.01 | -84.13 | -89.00 |
| | | 33 | Nx- | -106.81 | -135.51 | -183.53 |
| | | 33 | Fy- | -86.12 | -138.54 | -183.33 |
| | | 33 | Mz- | -104.18 | -136.98 | -192.53 |
| | | 36 | Nx+ | -0.13 | -7.97 | -2.38 |
| | | 36 | Fy+ | -8.28 | -6.41 | -1.05 |
| | | 36 | Mz+ | -5.22 | -6.83 | -0.74 |
| | | 36 | Nx- | -90.64 | -122.58 | -159.31 |
| | | 36 | Fy- | -73.61 | -124.14 | -153.83 |
| | | 36 | Mz- | -89.87 | -122.74 | -162.12 |
| 213 | 213 | 33 | Nx+ | -49.96 | -78.25 | -66.77 |
| | | 33 | Fy+ | -66.87 | -72.85 | -65.15 |
| | | 33 | Mz+ | -53.54 | -76.96 | -58.43 |
| | | 33 | Nx- | -110.82 | -117.99 | -134.81 |
| | | 33 | Fy- | -87.27 | -123.89 | -133.31 |
| | | 33 | Mz- | -107.49 | -119.20 | -143.23 |
| | | 36 | Nx+ | 0.23 | -8.68 | 0.38 |
| | | 36 | Fy+ | -8.44 | -4.77 | 1.06 |
| | | 36 | Mz+ | -5.18 | -7.48 | 1.58 |
| | | 36 | Nx- | -93.70 | -106.48 | -115.26 |
| | | 36 | Fy- | -74.61 | -110.75 | -109.07 |
| | | 36 | Mz- | -92.63 | -106.39 | -117.99 |
| 214 | 214 | 33 | Nx+ | -51.07 | -61.75 | -19.36 |
| | | 33 | Fy+ | -71.90 | -56.22 | -21.39 |
| | | 33 | Mz+ | -56.71 | -61.90 | -12.25 |
| | | 33 | Nx- | -117.90 | -93.42 | -64.77 |
| | | 33 | Fy- | -89.28 | -99.66 | -59.18 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Mz- | -112.51 | -93.18 | -71.98 |
| | | 36 | Nx+ | 0.76 | -6.20 | 5.33 |
| | | 36 | Fy+ | -8.80 | -2.80 | 3.56 |
| | | 36 | Mz+ | -5.15 | -4.92 | 5.70 |
| | | 36 | Nx- | -99.13 | -84.37 | -52.01 |
| | | 36 | Fy- | -76.37 | -88.70 | -42.94 |
| | | 36 | Mz- | -97.12 | -82.79 | -54.51 |
| 311 | 311 | 33 | Nx+ | -111.54 | -30.48 | -69.97 |
| | | 33 | Fy+ | -122.95 | -11.67 | -40.54 |
| | | 33 | Mz+ | -118.03 | -12.66 | -37.77 |
| | | 33 | Nx- | -182.84 | -41.76 | -78.52 |
| | | 33 | Fy- | -171.43 | -60.60 | -108.26 |
| | | 33 | Mz- | -176.09 | -59.64 | -110.20 |
| | | 36 | Nx+ | -19.25 | -11.94 | -11.48 |
| | | 36 | Fy+ | -19.45 | -1.42 | -10.73 |
| | | 36 | Mz+ | -19.45 | -1.42 | -10.73 |
| | | 36 | Nx- | -164.80 | -41.25 | -80.53 |
| | | 36 | Fy- | -158.65 | -47.01 | -86.45 |
| | | 36 | Mz- | -162.85 | -46.14 | -88.19 |
| 312 | 312 | 33 | Nx+ | -111.07 | -27.22 | -62.76 |
| | | 33 | Fy+ | -122.48 | -8.97 | -37.98 |
| | | 33 | Mz+ | -117.57 | -9.96 | -34.95 |
| | | 33 | Nx- | -182.21 | -35.67 | -68.84 |
| | | 33 | Fy- | -170.80 | -53.96 | -93.95 |
| | | 33 | Mz- | -175.49 | -52.95 | -96.13 |
| | | 36 | Nx+ | -18.78 | -10.58 | -8.66 |
| | | 36 | Fy+ | -18.98 | -1.42 | -10.38 |
| | | 36 | Mz+ | -19.91 | -14.36 | -7.02 |
| | | 36 | Nx- | -164.16 | -35.78 | -70.91 |
| | | 36 | Fy- | -158.02 | -41.37 | -75.40 |
| | | 36 | Mz- | -162.22 | -40.49 | -77.36 |
| 511 | 511 | 33 | Nx+ | -11.23 | 0.11 | 0.12 |
| | | 33 | Fy+ | -11.23 | 0.52 | 0.17 |
| | | 33 | Mz+ | -11.23 | 0.50 | 0.17 |
| | | 33 | Nx- | -27.53 | -2.04 | -0.07 |
| | | 33 | Fy- | -27.53 | -3.61 | -0.24 |
| | | 33 | Mz- | -27.53 | -3.61 | -0.24 |
| | | 36 | Nx+ | 0.00 | 1.08 | 0.13 |
| | | 36 | Fy+ | 0.00 | 1.08 | 0.13 |
| | | 36 | Mz+ | -0.41 | 1.08 | 0.13 |
| | | 36 | Nx- | -23.42 | -1.66 | -0.05 |
| | | 36 | Fy- | -9.72 | -2.91 | -0.28 |
| | | 36 | Mz- | -9.72 | -2.91 | -0.28 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

| | | | | | | |
|---|---|---|---|---|---|---|
| 512 | 512 | 33 | Nx+ | -11.23 | -0.17 | 0.07 |
| | | 33 | Fy+ | -11.23 | 0.14 | 0.09 |
| | | 33 | Mz+ | -11.23 | 0.09 | 0.09 |
| | | 33 | Nx- | -27.53 | -1.84 | -0.04 |
| | | 33 | Fy- | -27.53 | -2.99 | -0.15 |
| | | 33 | Mz- | -27.53 | -2.96 | -0.15 |
| | | 36 | Nx+ | 0.00 | 0.75 | 0.08 |
| | | 36 | Fy+ | 0.00 | 0.75 | 0.08 |
| | | 36 | Mz+ | -0.41 | 0.75 | 0.08 |
| | | 36 | Nx- | -23.42 | -1.53 | -0.03 |
| | | 36 | Fy- | -9.72 | -2.23 | -0.16 |
| | | 36 | Mz- | -9.72 | -2.23 | -0.16 |
| 513 | 513 | 33 | Nx+ | -11.23 | -0.46 | 0.03 |
| | | 33 | Fy+ | -11.23 | -0.28 | 0.03 |
| | | 33 | Mz+ | -11.23 | -0.44 | 0.03 |
| | | 33 | Nx- | -27.53 | -1.66 | -0.02 |
| | | 33 | Fy- | -27.53 | -2.34 | -0.06 |
| | | 33 | Mz- | -27.53 | -2.31 | -0.06 |
| | | 36 | Nx+ | 0.00 | 0.42 | 0.03 |
| | | 36 | Fy+ | 0.00 | 0.42 | 0.03 |
| | | 36 | Mz+ | -0.41 | 0.42 | 0.03 |
| | | 36 | Nx- | -23.42 | -1.40 | -0.01 |
| | | 36 | Fy- | -23.42 | -1.68 | -0.03 |
| | | 36 | Mz- | -9.72 | -1.54 | -0.07 |
| 514 | 514 | 33 | Nx+ | -11.23 | -0.75 | 0.01 |
| | | 33 | Fy+ | -11.23 | -0.69 | 0.00 |
| | | 33 | Mz+ | -11.23 | -0.75 | 0.01 |
| | | 33 | Nx- | -27.53 | -1.50 | -0.01 |
| | | 33 | Fy- | -27.53 | -1.71 | -0.02 |
| | | 33 | Mz- | -27.53 | -1.65 | -0.02 |
| | | 36 | Nx+ | 0.00 | 0.08 | 0.01 |
| | | 36 | Fy+ | -0.41 | 0.08 | 0.01 |
| | | 36 | Mz+ | -0.41 | 0.08 | 0.01 |
| | | 36 | Nx- | -23.42 | -1.28 | 0.00 |
| | | 36 | Fy- | -23.42 | -1.37 | -0.01 |
| | | 36 | Mz- | -6.48 | -0.84 | -0.02 |
| 514 | 515 | 33 | Nx+ | -11.23 | 1.05 | 0.00 |
| | | 33 | Fy+ | -16.85 | 1.44 | 0.00 |
| | | 33 | Mz+ | -25.58 | 1.36 | 0.00 |
| | | 33 | Nx- | -27.53 | 1.34 | 0.00 |
| | | 33 | Fy- | -19.10 | 0.77 | 0.00 |
| | | 33 | Mz- | -25.58 | 1.36 | 0.00 |
| | | 36 | Nx+ | 0.00 | 0.25 | 0.00 |
| | | 36 | Fy+ | -15.16 | 1.19 | 0.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Mz+ | -23.42 | 1.17 | 0.00 |
| | | 36 | Nx- | -23.42 | 1.17 | 0.00 |
| | | 36 | Fy- | -9.72 | 0.17 | 0.00 |
| | | 36 | Mz- | -23.42 | 1.17 | 0.00 |
| 520 | 320 | 33 | Nx+ | -11.23 | 7.53 | 3.17 |
| | | 33 | Fy+ | -16.85 | 10.32 | 4.20 |
| | | 33 | Mz+ | -16.85 | 10.32 | 4.20 |
| | | 33 | Nx- | -27.53 | 6.84 | 2.65 |
| | | 33 | Fy- | -19.10 | 2.91 | 1.07 |
| | | 33 | Mz- | -19.10 | 2.91 | 1.07 |
| | | 36 | Nx+ | 0.00 | 1.93 | 1.09 |
| | | 36 | Fy+ | -15.16 | 7.56 | 3.08 |
| | | 36 | Mz+ | -15.16 | 7.56 | 3.08 |
| | | 36 | Nx- | -23.42 | 6.85 | 2.75 |
| | | 36 | Fy- | -9.72 | -2.39 | -1.00 |
| | | 36 | Mz- | -9.72 | -2.39 | -1.00 |
| 410 | 310 | 33 | Nx+ | -22.91 | 103.28 | 48.98 |
| | | 33 | Fy+ | -79.51 | 155.97 | 120.39 |
| | | 33 | Mz+ | -87.63 | 147.98 | 143.21 |
| | | 33 | Nx- | -88.12 | 145.23 | 141.45 |
| | | 33 | Fy- | -31.77 | 92.78 | 71.55 |
| | | 33 | Mz- | -23.43 | 100.01 | 46.44 |
| | | 36 | Nx+ | -1.42 | 15.32 | 12.27 |
| | | 36 | Fy+ | -67.71 | 140.51 | 109.28 |
| | | 36 | Mz+ | -69.98 | 138.70 | 114.02 |
| | | 36 | Nx- | -70.43 | 136.23 | 112.44 |
| | | 36 | Fy- | -1.75 | 15.29 | 12.40 |
| | | 36 | Mz- | -2.14 | 15.32 | 12.25 |
| 411 | 411 | 33 | Nx+ | -22.91 | 63.76 | 10.08 |
| | | 33 | Fy+ | -86.07 | 102.38 | 84.34 |
| | | 33 | Mz+ | -87.63 | 100.89 | 87.49 |
| | | 33 | Nx- | -88.12 | 99.20 | 86.77 |
| | | 33 | Fy- | -28.02 | 54.32 | 23.92 |
| | | 33 | Mz- | -23.43 | 61.12 | 8.76 |
| | | 36 | Nx+ | -1.42 | 8.02 | 6.35 |
| | | 36 | Fy+ | -68.86 | 90.51 | 59.83 |
| | | 36 | Mz+ | -69.98 | 89.74 | 61.76 |
| | | 36 | Nx- | -70.43 | 88.22 | 61.10 |
| | | 36 | Fy- | -2.50 | 8.02 | 6.33 |
| | | 36 | Mz- | -2.14 | 8.02 | 6.33 |
| 412 | 412 | 33 | Nx+ | -22.91 | 11.07 | -119.88 |
| | | 33 | Fy+ | -86.89 | 30.18 | -120.98 |
| | | 33 | Mz+ | -61.83 | 18.89 | -65.32 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Nx- | -88.12 | 24.42 | -115.63 |
| | | 33 | Fy- | -24.36 | 5.55 | -109.83 |
| | | 33 | Mz- | -37.89 | 19.84 | -168.81 |
| | | 36 | Nx+ | -1.42 | 0.80 | -14.21 |
| | | 36 | Fy+ | -69.63 | 24.38 | -121.99 |
| | | 36 | Mz+ | -32.57 | 4.61 | 0.09 |
| | | 36 | Nx- | -70.43 | 23.87 | -118.55 |
| | | 36 | Fy- | -2.50 | 0.80 | -14.22 |
| | | 36 | Mz- | -37.91 | 20.08 | -142.52 |
| 413 | 413 | 33 | Nx+ | -22.91 | -35.09 | -147.58 |
| | | 33 | Fy+ | -61.82 | -16.18 | -109.44 |
| | | 33 | Mz+ | -60.68 | -23.50 | -104.45 |
| | | 33 | Nx- | -88.12 | -32.44 | -189.33 |
| | | 33 | Fy- | -37.95 | -51.00 | -208.03 |
| | | 33 | Mz- | -41.16 | -41.45 | -219.27 |
| | | 36 | Nx+ | -1.42 | -5.24 | -20.61 |
| | | 36 | Fy+ | -32.57 | -2.03 | -13.79 |
| | | 36 | Mz+ | -32.57 | -2.03 | -13.79 |
| | | 36 | Nx- | -70.43 | -33.41 | -171.91 |
| | | 36 | Fy- | -37.99 | -38.90 | -188.31 |
| | | 36 | Mz- | -37.90 | -38.62 | -188.55 |
| 414 | 414 | 33 | Nx+ | -22.91 | -87.13 | -84.68 |
| | | 33 | Fy+ | -60.68 | -62.62 | -66.64 |
| | | 33 | Mz+ | -59.91 | -71.49 | -62.02 |
| | | 33 | Nx- | -88.12 | -104.85 | -132.18 |
| | | 33 | Fy- | -38.07 | -123.40 | -126.78 |
| | | 33 | Mz- | -41.49 | -114.56 | -145.47 |
| | | 36 | Nx+ | -1.42 | -11.94 | -15.14 |
| | | 36 | Fy+ | -32.57 | -9.13 | -14.64 |
| | | 36 | Mz+ | -32.57 | -9.13 | -14.64 |
| | | 36 | Nx- | -70.43 | -96.85 | -112.81 |
| | | 36 | Fy- | -37.99 | -104.39 | -118.44 |
| | | 36 | Mz- | -38.04 | -102.66 | -119.92 |
| 415 | 415 | 33 | Nx+ | -32.71 | -112.34 | 99.56 |
| | | 33 | Fy+ | -68.66 | -96.62 | 87.34 |
| | | 33 | Mz+ | -53.29 | -172.99 | 149.19 |
| | | 33 | Nx- | -102.19 | -161.05 | 104.85 |
| | | 33 | Fy- | -54.18 | -182.72 | 134.84 |
| | | 33 | Mz- | -72.59 | -108.40 | 61.17 |
| | | 36 | Nx+ | -2.80 | -15.98 | 5.80 |
| | | 36 | Fy+ | -33.59 | -10.62 | -0.21 |
| | | 36 | Mz+ | -51.82 | -156.87 | 116.06 |
| | | 36 | Nx- | -83.29 | -147.50 | 105.37 |
| | | 36 | Fy- | -51.72 | -158.47 | 114.26 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Mz- | -36.79 | -18.77 | -0.40 |
| 415 | 400 | 33 | Nx+ | -32.28 | -107.28 | 277.26 |
| | | 33 | Fy+ | -68.18 | -92.01 | 241.28 |
| | | 33 | Mz+ | -52.30 | -165.18 | 425.72 |
| | | 33 | Nx- | -101.73 | -155.61 | 360.72 |
| | | 33 | Fy- | -53.76 | -176.54 | 422.68 |
| | | 33 | Mz- | -70.76 | -100.35 | 229.69 |
| | | 36 | Nx+ | -2.45 | -11.95 | 28.37 |
| | | 36 | Fy+ | -33.25 | -6.59 | 13.69 |
| | | 36 | Mz+ | -51.03 | -152.59 | 366.14 |
| | | 36 | Nx- | -82.83 | -142.07 | 339.33 |
| | | 36 | Fy- | -51.25 | -153.03 | 365.95 |
| | | 36 | Mz- | -33.25 | -6.59 | 13.69 |

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | éz |
|---|---|---|---|---|---|
| 1 | 33 | ux+ | 0.004278 | -0.032678 | -0.002509 |
| | 33 | uy+ | 0.004074 | -0.023108 | -0.001778 |
| | 33 | éz+ | -0.003131 | -0.027325 | -0.001091 |
| | 33 | ux- | -0.003540 | -0.030935 | -0.001453 |
| | 33 | uy- | -0.003412 | -0.040709 | -0.002252 |
| | 33 | éz- | 0.003743 | -0.036684 | -0.002939 |
| | 36 | ux+ | 0.001644 | -0.004823 | -0.000098 |
| | 36 | uy+ | 0.001644 | -0.004823 | -0.000098 |
| | 36 | éz+ | -0.001082 | -0.004967 | 0.000183 |
| | 36 | ux- | -0.001416 | -0.007190 | 0.000073 |
| | 36 | uy- | -0.000697 | -0.034734 | -0.002353 |
| | 36 | éz- | 0.000933 | -0.034214 | -0.002476 |
| 2 | 33 | ux+ | 0.004186 | -0.036115 | -0.001187 |
| | 33 | uy+ | 0.004011 | -0.025480 | -0.000784 |
| | 33 | éz+ | -0.003303 | -0.031398 | -0.000262 |
| | 33 | ux- | -0.003582 | -0.032740 | -0.000409 |
| | 33 | uy- | -0.003447 | -0.043629 | -0.000810 |
| | 33 | éz- | 0.003037 | -0.038071 | -0.001418 |
| | 36 | ux+ | 0.001637 | -0.004873 | 0.000048 |
| | 36 | uy+ | -0.001090 | -0.004711 | 0.000133 |
| | 36 | éz+ | -0.001095 | -0.006521 | 0.000150 |
| | 36 | ux- | -0.001422 | -0.007032 | 0.000138 |
| | 36 | uy- | -0.000752 | -0.037854 | -0.000977 |
| | 36 | éz- | 0.001174 | -0.034466 | -0.001094 |
| 3 | 33 | ux+ | 0.004089 | -0.036107 | 0.001212 |
| | 33 | uy+ | 0.003916 | -0.025394 | 0.000886 |
| | 33 | éz+ | -0.001036 | -0.041564 | 0.001963 |
| | 33 | ux- | -0.003624 | -0.031841 | 0.001485 |
| | 33 | uy- | -0.000344 | -0.043087 | 0.001494 |
| | 33 | éz- | 0.000611 | -0.027368 | 0.000675 |
| | 36 | ux+ | 0.001628 | -0.004659 | 0.000198 |
| | 36 | uy+ | -0.001099 | -0.004497 | 0.000117 |
| | 36 | éz+ | 0.000059 | -0.036612 | 0.001535 |
| | 36 | ux- | -0.001427 | -0.006676 | 0.000282 |
| | 36 | uy- | -0.000809 | -0.037448 | 0.001476 |
| | 36 | éz- | -0.001099 | -0.004497 | 0.000117 |
| 4 | 33 | ux+ | 0.003997 | -0.032499 | 0.002725 |
| | 33 | uy+ | 0.003829 | -0.022843 | 0.001907 |
| | 33 | éz+ | -0.001285 | -0.037174 | 0.003712 |
| | 33 | ux- | -0.003667 | -0.028045 | 0.002751 |
| | 33 | uy- | -0.000406 | -0.038844 | 0.003181 |
| | 33 | éz- | 0.000591 | -0.024451 | 0.001768 |
| | 36 | ux+ | 0.001621 | -0.004259 | 0.000246 |
| | 36 | uy+ | 0.001621 | -0.004259 | 0.000246 |
| | 36 | éz+ | -0.000166 | -0.033032 | 0.003137 |
| | 36 | ux- | -0.001432 | -0.006107 | 0.000362 |
| | 36 | uy- | -0.000845 | -0.033306 | 0.003089 |
| | 36 | éz- | -0.001109 | -0.004355 | 0.000029 |
| 5 | 33 | ux+ | 0.003899 | -0.028334 | 0.001215 |
| | 33 | uy+ | 0.002658 | -0.019863 | 0.001007 |
| | 33 | éz+ | -0.003695 | -0.031453 | 0.002309 |
| | 33 | ux- | -0.003713 | -0.023511 | 0.001782 |
| | 33 | uy- | -0.000322 | -0.033792 | 0.001758 |
| | 33 | éz- | 0.003839 | -0.020445 | 0.000709 |
| | 36 | ux+ | 0.001611 | -0.003936 | 0.000066 |
| | 36 | uy+ | 0.001611 | -0.003936 | 0.000066 |
| | 36 | éz+ | -0.000937 | -0.028134 | 0.001877 |
| | 36 | ux- | -0.001438 | -0.005549 | 0.000211 |
| | 36 | uy- | -0.000872 | -0.028323 | 0.001743 |
| | 36 | éz- | -0.000524 | -0.004520 | -0.000266 |
| 6 | 33 | ux+ | 0.003894 | -0.028946 | -0.000522 |
| | 33 | uy+ | 0.002496 | -0.018963 | -0.000104 |
| | 33 | éz+ | -0.003429 | -0.029078 | 0.000522 |
| | 33 | ux- | -0.003578 | -0.020130 | 0.000522 |
| | 33 | uy- | -0.000102 | -0.032161 | 0.000009 |

| | | | | | |
|---|---|---|---|---|---|
| | 33 | éz- | 0.003883 | -0.029060 | -0.000522 |
| | 36 | ux+ | 0.001608 | -0.005295 | -0.000070 |
| | 36 | uy+ | 0.000005 | -0.003909 | 0.000000 |
| | 36 | éz+ | 0.000713 | -0.006442 | 0.000448 |
| | 36 | ux- | -0.001422 | -0.003940 | 0.000070 |
| | 36 | uy- | -0.000367 | -0.026729 | 0.000019 |
| | 36 | éz- | -0.000576 | -0.006452 | -0.000448 |
| 111 | 33 | ux+ | -0.000137 | -0.020065 | 0.000171 |
| | 33 | uy+ | -0.000143 | -0.019932 | 0.000178 |
| | 33 | éz+ | -0.002430 | -0.036646 | 0.002220 |
| | 33 | ux- | -0.002430 | -0.036646 | 0.002220 |
| | 33 | uy- | -0.002424 | -0.036752 | 0.002212 |
| | 33 | éz- | -0.000137 | -0.020065 | 0.000171 |
| | 36 | ux+ | 0.000375 | -0.004595 | -0.000255 |
| | 36 | uy+ | 0.000375 | -0.004595 | -0.000255 |
| | 36 | éz+ | -0.001837 | -0.030582 | 0.001648 |
| | 36 | ux- | -0.001837 | -0.030582 | 0.001648 |
| | 36 | uy- | -0.001835 | -0.030591 | 0.001644 |
| | 36 | éz- | 0.000375 | -0.004595 | -0.000255 |
| 112 | 33 | ux+ | -0.000124 | -0.020107 | -0.000171 |
| | 33 | uy+ | -0.000134 | -0.019973 | -0.000172 |
| | 33 | éz+ | -0.003950 | -0.036805 | 0.001723 |
| | 33 | ux- | -0.003955 | -0.036709 | 0.001721 |
| | 33 | uy- | -0.003944 | -0.036816 | 0.001721 |
| | 33 | éz- | -0.000126 | -0.020054 | -0.000174 |
| | 36 | ux+ | 0.000606 | -0.004602 | -0.000329 |
| | 36 | uy+ | 0.000606 | -0.004602 | -0.000329 |
| | 36 | éz+ | -0.002932 | -0.030638 | 0.001185 |
| | 36 | ux- | -0.002932 | -0.030638 | 0.001185 |
| | 36 | uy- | -0.002927 | -0.030648 | 0.001184 |
| | 36 | éz- | 0.000606 | -0.004602 | -0.000329 |
| 113 | 33 | ux+ | 0.000100 | -0.020124 | -0.000391 |
| | 33 | uy+ | 0.000091 | -0.020015 | -0.000394 |
| | 33 | éz+ | -0.005098 | -0.036879 | 0.001251 |
| | 33 | ux- | -0.005107 | -0.036773 | 0.001248 |
| | 33 | uy- | -0.005098 | -0.036879 | 0.001251 |
| | 33 | éz- | 0.000097 | -0.020029 | -0.000394 |
| | 36 | ux+ | 0.000863 | -0.004608 | -0.000326 |
| | 36 | uy+ | 0.000863 | -0.004608 | -0.000326 |
| | 36 | éz+ | -0.003679 | -0.030707 | 0.000752 |
| | 36 | ux- | -0.003684 | -0.030698 | 0.000752 |
| | 36 | uy- | -0.003679 | -0.030707 | 0.000752 |
| | 36 | éz- | 0.000863 | -0.004608 | -0.000326 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.4.* | Fecha JUNIO-*2002* | Página de

| | | | | | |
|---|---|---|---|---|---|
| 114 | 33 | ux+ | 0.000468 | -0.020069 | -0.000565 |
| | 33 | uy+ | 0.000462 | -0.020055 | -0.000565 |
| | 33 | éz+ | -0.004837 | -0.035059 | 0.000753 |
| | 33 | ux- | -0.005881 | -0.036934 | 0.000739 |
| | 33 | uy- | -0.005875 | -0.036944 | 0.000739 |
| | 33 | éz- | -0.000269 | -0.021899 | -0.000577 |
| | 36 | ux+ | 0.001101 | -0.004614 | -0.000280 |
| | 36 | uy+ | 0.001101 | -0.004614 | -0.000280 |
| | 36 | éz+ | -0.003136 | -0.028900 | 0.000298 |
| | 36 | ux- | -0.004089 | -0.030757 | 0.000285 |
| | 36 | uy- | -0.004084 | -0.030767 | 0.000285 |
| | 36 | éz- | 0.000971 | -0.006306 | -0.000290 |
| 115 | 33 | ux+ | 0.000975 | -0.020110 | -0.000760 |
| | 33 | uy+ | 0.000968 | -0.020097 | -0.000759 |
| | 33 | éz+ | -0.004183 | -0.025865 | 0.000354 |
| | 33 | ux- | -0.006220 | -0.036999 | 0.000112 |
| | 33 | uy- | -0.006215 | -0.037010 | 0.000112 |
| | 33 | éz- | -0.001003 | -0.031184 | -0.001001 |
| | 36 | ux+ | 0.001291 | -0.004619 | -0.000216 |
| | 36 | uy+ | 0.001291 | -0.004619 | -0.000216 |
| | 36 | éz+ | -0.000915 | -0.005632 | 0.000254 |
| | 36 | ux- | -0.004103 | -0.030816 | -0.000278 |
| | 36 | uy- | -0.004097 | -0.030826 | -0.000278 |
| | 36 | éz- | -0.002699 | -0.029637 | -0.000539 |
| 116 | 33 | ux+ | 0.001677 | -0.020150 | -0.001062 |
| | 33 | uy+ | 0.001668 | -0.020136 | -0.001058 |
| | 33 | éz+ | -0.004193 | -0.025689 | -0.000078 |
| | 33 | ux- | -0.006016 | -0.037055 | -0.000677 |
| | 33 | uy- | -0.006007 | -0.037069 | -0.000681 |
| | 33 | éz- | -0.000196 | -0.031679 | -0.001661 |
| | 36 | ux+ | 0.001436 | -0.004623 | -0.000157 |
| | 36 | uy+ | 0.001436 | -0.004623 | -0.000157 |
| | 36 | éz+ | -0.000669 | -0.005317 | 0.000268 |
| | 36 | ux- | -0.003626 | -0.030869 | -0.000981 |
| | 36 | uy- | -0.003619 | -0.030879 | -0.000983 |
| | 36 | éz- | -0.002229 | -0.030071 | -0.001196 |
| 117 | 33 | ux+ | 0.002669 | -0.020199 | -0.001537 |
| | 33 | uy+ | 0.002657 | -0.020176 | -0.001528 |
| | 33 | éz+ | -0.003856 | -0.025565 | -0.000696 |
| | 33 | ux- | -0.005111 | -0.037119 | -0.001697 |
| | 33 | uy- | -0.005099 | -0.037133 | -0.001704 |
| | 33 | éz- | 0.001414 | -0.031743 | -0.002535 |
| | 36 | ux+ | 0.001543 | -0.004627 | -0.000122 |
| | 36 | uy+ | 0.001543 | -0.004627 | -0.000122 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | éz+ | -0.000870 | -0.005321 | 0.000243 |
| | 36 | ux- | -0.002527 | -0.030927 | -0.001890 |
| | 36 | uy- | -0.002520 | -0.030937 | -0.001893 |
| | 36 | éz- | -0.000981 | -0.030129 | -0.002057 |
| 211 | 33 | ux+ | 0.003093 | -0.020206 | -0.001595 |
| | 33 | uy+ | 0.003079 | -0.020183 | -0.001584 |
| | 33 | éz+ | -0.003604 | -0.025526 | -0.000770 |
| | 33 | ux- | -0.004629 | -0.037131 | -0.001813 |
| | 33 | uy- | -0.004616 | -0.037145 | -0.001821 |
| | 33 | éz- | 0.002119 | -0.031754 | -0.002635 |
| | 36 | ux+ | 0.001575 | -0.004628 | -0.000121 |
| | 36 | uy+ | 0.001575 | -0.004628 | -0.000121 |
| | 36 | éz+ | -0.000936 | -0.005322 | 0.000235 |
| | 36 | ux- | -0.001994 | -0.030939 | -0.001990 |
| | 36 | uy- | -0.001986 | -0.030949 | -0.001993 |
| | 36 | éz- | -0.000404 | -0.030140 | -0.002152 |
| 212 | 33 | ux+ | 0.003532 | -0.020211 | -0.001613 |
| | 33 | uy+ | 0.003516 | -0.020188 | -0.001602 |
| | 33 | éz+ | -0.003391 | -0.025531 | -0.000792 |
| | 33 | ux- | -0.004133 | -0.037131 | -0.001848 |
| | 33 | uy- | -0.004116 | -0.037154 | -0.001858 |
| | 33 | éz- | 0.002842 | -0.031763 | -0.002668 |
| | 36 | ux+ | 0.001608 | -0.004628 | -0.000121 |
| | 36 | uy+ | 0.001608 | -0.004628 | -0.000121 |
| | 36 | éz+ | -0.001000 | -0.005322 | 0.000234 |
| | 36 | ux- | -0.001450 | -0.030947 | -0.002024 |
| | 36 | uy- | -0.001442 | -0.030957 | -0.002026 |
| | 36 | éz- | 0.000185 | -0.030148 | -0.002184 |
| 213 | 33 | ux+ | 0.003658 | -0.029479 | -0.002291 |
| | 33 | uy+ | 0.003635 | -0.020806 | -0.001673 |
| | 33 | éz+ | -0.003332 | -0.025849 | -0.000881 |
| | 33 | ux- | -0.003988 | -0.037853 | -0.001975 |
| | 33 | uy- | -0.003970 | -0.037878 | -0.001986 |
| | 33 | éz- | 0.003041 | -0.032825 | -0.002778 |
| | 36 | ux+ | 0.001618 | -0.004673 | -0.000121 |
| | 36 | uy+ | 0.001618 | -0.004673 | -0.000121 |
| | 36 | éz+ | -0.001020 | -0.005236 | 0.000225 |
| | 36 | ux- | -0.001389 | -0.007301 | 0.000101 |
| | 36 | uy- | -0.001281 | -0.031743 | -0.002137 |
| | 36 | éz- | 0.000356 | -0.030992 | -0.002290 |
| 214 | 33 | ux+ | 0.003966 | -0.031037 | -0.002436 |
| | 33 | uy+ | 0.003861 | -0.021937 | -0.001761 |
| | 33 | éz+ | -0.003214 | -0.026471 | -0.001000 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

| | | | | | |
|---|---|---|---|---|---|
| | 33 | ux- | -0.003721 | -0.039214 | -0.002142 |
| | 33 | uy- | -0.003701 | -0.039247 | -0.002153 |
| | 33 | éz- | 0.003418 | -0.034702 | -0.002913 |
| | 36 | ux+ | 0.001632 | -0.004752 | -0.000117 |
| | 36 | uy+ | 0.001632 | -0.004752 | -0.000117 |
| | 36 | éz+ | -0.001052 | -0.005095 | 0.000210 |
| | 36 | ux- | -0.001404 | -0.007240 | 0.000086 |
| | 36 | uy- | -0.000994 | -0.033199 | -0.002283 |
| | 36 | éz- | 0.000666 | -0.032549 | -0.002427 |
| 310 | 33 | ux+ | 0.000531 | -0.031023 | 0.001792 |
| | 33 | uy+ | 0.000387 | -0.019879 | 0.000954 |
| | 33 | éz+ | 0.000175 | -0.036531 | 0.003030 |
| | 33 | ux- | 0.000066 | -0.023972 | 0.001911 |
| | 33 | uy- | 0.000171 | -0.036665 | 0.003009 |
| | 33 | éz- | 0.000382 | -0.020111 | 0.000933 |
| | 36 | ux+ | 0.000405 | -0.029182 | 0.001947 |
| | 36 | uy+ | 0.000234 | -0.004586 | 0.000013 |
| | 36 | éz+ | 0.000169 | -0.030502 | 0.002399 |
| | 36 | ux- | 0.000002 | -0.004807 | 0.000280 |
| | 36 | uy- | 0.000167 | -0.030511 | 0.002392 |
| | 36 | éz- | 0.000234 | -0.004586 | 0.000013 |
| 311 | 33 | ux+ | 0.000029 | -0.020140 | 0.000498 |
| | 33 | uy+ | 0.000025 | -0.019907 | 0.000510 |
| | 33 | éz+ | -0.001225 | -0.036588 | 0.002599 |
| | 33 | ux- | -0.001225 | -0.036598 | 0.002596 |
| | 33 | uy- | -0.001221 | -0.036709 | 0.002585 |
| | 33 | éz- | 0.000029 | -0.020041 | 0.000496 |
| | 36 | ux+ | 0.000271 | -0.004591 | -0.000149 |
| | 36 | uy+ | 0.000271 | -0.004591 | -0.000149 |
| | 36 | éz+ | -0.000926 | -0.030542 | 0.001999 |
| | 36 | ux- | -0.000926 | -0.030542 | 0.001999 |
| | 36 | uy- | -0.000925 | -0.030552 | 0.001994 |
| | 36 | éz- | 0.000271 | -0.004591 | -0.000149 |
| 312 | 33 | ux+ | -0.000074 | -0.020151 | 0.000326 |
| | 33 | uy+ | -0.000080 | -0.019919 | 0.000332 |
| | 33 | éz+ | -0.001849 | -0.036625 | 0.002408 |
| | 33 | ux- | -0.001849 | -0.036620 | 0.002406 |
| | 33 | uy- | -0.001843 | -0.036731 | 0.002400 |
| | 33 | éz- | -0.000074 | -0.020053 | 0.000325 |
| | 36 | ux+ | 0.000317 | -0.004593 | -0.000208 |
| | 36 | uy+ | 0.000317 | -0.004593 | -0.000208 |
| | 36 | éz+ | -0.001401 | -0.030563 | 0.001821 |
| | 36 | ux- | -0.001401 | -0.030563 | 0.001821 |
| | 36 | uy- | -0.001399 | -0.030572 | 0.001817 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | éz- | 0.000317 | -0.004593 | -0.000208 |
| 320 | 33 | ux+ | 0.000000 | -0.034887 | -0.002074 |
| | 33 | uy+ | 0.000000 | -0.019857 | -0.000946 |
| | 33 | éz+ | 0.000000 | -0.020090 | -0.000926 |
| | 33 | ux- | 0.000000 | -0.034887 | -0.002074 |
| | 33 | uy- | 0.000000 | -0.036686 | -0.003015 |
| | 33 | éz- | 0.000000 | -0.036552 | -0.003036 |
| | 36 | ux+ | 0.000000 | -0.029908 | -0.002047 |
| | 36 | uy+ | 0.000000 | -0.004571 | -0.000009 |
| | 36 | éz+ | 0.000000 | -0.004571 | -0.000009 |
| | 36 | ux- | 0.000000 | -0.029908 | -0.002047 |
| | 36 | uy- | 0.000000 | -0.030518 | -0.002394 |
| | 36 | éz- | 0.000000 | -0.030509 | -0.002400 |
| 400 | 33 | ux+ | 0.000297 | -0.027363 | -0.000141 |
| | 33 | uy+ | 0.000199 | -0.017906 | -0.000018 |
| | 33 | éz+ | 0.000150 | -0.028077 | 0.000221 |
| | 33 | ux- | 0.000009 | -0.019941 | 0.000203 |
| | 33 | uy- | 0.000095 | -0.030567 | -0.000005 |
| | 33 | éz- | 0.000286 | -0.028064 | -0.000221 |
| | 36 | ux+ | 0.000207 | -0.024625 | -0.000003 |
| | 36 | uy+ | 0.000005 | -0.003786 | 0.000000 |
| | 36 | éz+ | 0.000089 | -0.006210 | 0.000030 |
| | 36 | ux- | 0.000001 | -0.003787 | 0.000000 |
| | 36 | uy- | 0.000080 | -0.025214 | 0.000005 |
| | 36 | éz- | 0.000047 | -0.006219 | -0.000030 |
| 411 | 33 | ux+ | 0.000520 | -0.030312 | 0.001976 |
| | 33 | uy+ | 0.000379 | -0.019494 | 0.001086 |
| | 33 | éz+ | 0.000168 | -0.035373 | 0.003139 |
| | 33 | ux- | 0.000062 | -0.023242 | 0.001964 |
| | 33 | uy- | 0.000163 | -0.035514 | 0.003115 |
| | 33 | éz- | 0.000373 | -0.019786 | 0.001062 |
| | 36 | ux+ | 0.000396 | -0.028423 | 0.002088 |
| | 36 | uy+ | 0.000230 | -0.004571 | 0.000065 |
| | 36 | éz+ | 0.000163 | -0.029581 | 0.002498 |
| | 36 | ux- | 0.000002 | -0.004699 | 0.000295 |
| | 36 | uy- | 0.000162 | -0.029593 | 0.002489 |
| | 36 | éz- | 0.000230 | -0.004571 | 0.000065 |
| 412 | 33 | ux+ | 0.000457 | -0.026331 | 0.001827 |
| | 33 | uy+ | 0.000215 | -0.017139 | 0.001114 |
| | 33 | éz+ | 0.000142 | -0.029355 | 0.002661 |
| | 33 | ux- | 0.000050 | -0.019635 | 0.001524 |
| | 33 | uy- | 0.000340 | -0.030087 | 0.001983 |
| | 33 | éz- | 0.000310 | -0.018497 | 0.000971 |



| | | | | | |
|---|---|---|---|---|---|
| | 36 | ux+ | 0.000346 | -0.024305 | 0.001851 |
| | 36 | uy+ | 0.000004 | -0.004109 | 0.000266 |
| | 36 | éz+ | 0.000138 | -0.024814 | 0.002063 |
| | 36 | ux- | 0.000001 | -0.004117 | 0.000269 |
| | 36 | uy- | 0.000297 | -0.024997 | 0.001966 |
| | 36 | éz- | 0.000208 | -0.004272 | 0.000196 |
| 413 | 33 | ux+ | 0.000398 | -0.023894 | 0.000566 |
| | 33 | uy+ | 0.000187 | -0.015703 | 0.000294 |
| | 33 | éz+ | 0.000279 | -0.025607 | 0.001119 |
| | 33 | ux- | 0.000033 | -0.019280 | 0.000410 |
| | 33 | uy- | 0.000290 | -0.027464 | 0.000599 |
| | 33 | éz- | 0.000152 | -0.017086 | 0.000110 |
| | 36 | ux+ | 0.000298 | -0.021805 | 0.000620 |
| | 36 | uy+ | 0.000001 | -0.003714 | 0.000127 |
| | 36 | éz+ | 0.000261 | -0.022078 | 0.000701 |
| | 36 | ux- | 0.000000 | -0.005019 | 0.000173 |
| | 36 | uy- | 0.000251 | -0.022384 | 0.000618 |
| | 36 | éz- | 0.000073 | -0.004351 | 0.000040 |
| 414 | 33 | ux+ | 0.000336 | -0.022960 | -0.000712 |
| | 33 | uy+ | 0.000146 | -0.016022 | -0.000497 |
| | 33 | éz+ | 0.000145 | -0.017549 | -0.000138 |
| | 33 | ux- | 0.000015 | -0.019323 | -0.000648 |
| | 33 | uy- | 0.000238 | -0.027682 | -0.000719 |
| | 33 | éz- | 0.000156 | -0.025000 | -0.000993 |
| | 36 | ux+ | 0.000249 | -0.020683 | -0.000581 |
| | 36 | uy+ | 0.000000 | -0.003615 | -0.000018 |
| | 36 | éz+ | 0.000180 | -0.004913 | 0.000111 |
| | 36 | ux- | -0.000001 | -0.004882 | -0.000023 |
| | 36 | uy- | 0.000205 | -0.022513 | -0.000653 |
| | 36 | éz- | 0.000108 | -0.022212 | -0.000752 |
| 415 | 33 | ux+ | 0.000264 | -0.025108 | -0.000778 |
| | 33 | uy+ | 0.000191 | -0.017437 | -0.000481 |
| | 33 | éz+ | 0.000164 | -0.018830 | -0.000262 |
| | 33 | ux- | -0.000004 | -0.021176 | -0.000631 |
| | 33 | uy- | 0.000058 | -0.029863 | -0.000736 |
| | 33 | éz- | 0.000120 | -0.027128 | -0.000967 |
| | 36 | ux+ | 0.000190 | -0.022485 | -0.000628 |
| | 36 | uy+ | 0.000002 | -0.003735 | -0.000052 |
| | 36 | éz+ | 0.000152 | -0.004857 | -0.000017 |
| | 36 | ux- | -0.000003 | -0.005044 | -0.000070 |
| | 36 | uy- | 0.000045 | -0.024546 | -0.000705 |
| | 36 | éz- | 0.000072 | -0.024358 | -0.000724 |
| 511 | 33 | ux+ | 0.000535 | -0.031696 | 0.001791 |

| | | | | | |
|---|---|---|---|---|---|
| | 33 | uy+ | 0.000390 | -0.020238 | 0.000953 |
| | 33 | éz+ | 0.000177 | -0.037666 | 0.003026 |
| | 33 | ux- | 0.000067 | -0.024688 | 0.001908 |
| | 33 | uy- | 0.000172 | -0.037791 | 0.003005 |
| | 33 | éz- | 0.000385 | -0.020461 | 0.000932 |
| | 36 | ux+ | 0.000409 | -0.029911 | 0.001945 |
| | 36 | uy+ | 0.000236 | -0.004591 | 0.000014 |
| | 36 | éz+ | 0.000170 | -0.031401 | 0.002396 |
| | 36 | ux- | 0.000002 | -0.004912 | 0.000279 |
| | 36 | uy- | 0.000169 | -0.031408 | 0.002389 |
| | 36 | éz- | 0.000236 | -0.004591 | 0.000014 |
| 512 | 33 | ux+ | 0.000537 | -0.031787 | 0.001791 |
| | 33 | uy+ | 0.000391 | -0.020286 | 0.000953 |
| | 33 | éz+ | 0.000178 | -0.037820 | 0.003026 |
| | 33 | ux- | 0.000068 | -0.024786 | 0.001908 |
| | 33 | uy- | 0.000174 | -0.037945 | 0.003005 |
| | 33 | éz- | 0.000387 | -0.020509 | 0.000932 |
| | 36 | ux+ | 0.000409 | -0.030008 | 0.001945 |
| | 36 | uy+ | 0.000236 | -0.004591 | 0.000014 |
| | 36 | éz+ | 0.000171 | -0.031521 | 0.002396 |
| | 36 | ux- | 0.000002 | -0.004926 | 0.000279 |
| | 36 | uy- | 0.000170 | -0.031528 | 0.002389 |
| | 36 | éz- | 0.000236 | -0.004591 | 0.000014 |
| 513 | 33 | ux+ | 0.000537 | -0.031878 | 0.001791 |
| | 33 | uy+ | 0.000391 | -0.020333 | 0.000953 |
| | 33 | éz+ | 0.000178 | -0.037974 | 0.003026 |
| | 33 | ux- | 0.000068 | -0.024884 | 0.001908 |
| | 33 | uy- | 0.000174 | -0.038099 | 0.003005 |
| | 33 | éz- | 0.000387 | -0.020556 | 0.000932 |
| | 36 | ux+ | 0.000409 | -0.030106 | 0.001945 |
| | 36 | uy+ | 0.000237 | -0.004592 | 0.000014 |
| | 36 | éz+ | 0.000171 | -0.031644 | 0.002396 |
| | 36 | ux- | 0.000002 | -0.004940 | 0.000279 |
| | 36 | uy- | 0.000170 | -0.031651 | 0.002389 |
| | 36 | éz- | 0.000237 | -0.004592 | 0.000014 |
| 514 | 33 | ux+ | 0.000537 | -0.031964 | 0.001791 |
| | 33 | uy+ | 0.000391 | -0.020381 | 0.000953 |
| | 33 | éz+ | 0.000178 | -0.038120 | 0.003026 |
| | 33 | ux- | 0.000068 | -0.024973 | 0.001908 |
| | 33 | uy- | 0.000174 | -0.038242 | 0.003005 |
| | 33 | éz- | 0.000387 | -0.020601 | 0.000932 |
| | 36 | ux+ | 0.000409 | -0.030201 | 0.001945 |
| | 36 | uy+ | 0.000237 | -0.004592 | 0.000014 |
| | 36 | éz+ | 0.000171 | -0.031760 | 0.002396 |



| | | | | | |
|---|---|---|---|---|---|
| | 36 | ux- | 0.000002 | -0.004954 | 0.000279 |
| | 36 | uy- | 0.000170 | -0.031766 | 0.002389 |
| | 36 | éz- | 0.000237 | -0.004592 | 0.000014 |
| 515 | 33 | ux+ | 0.000538 | -0.032054 | 0.001791 |
| | 33 | uy+ | 0.000392 | -0.020428 | 0.000953 |
| | 33 | éz+ | 0.000178 | -0.038273 | 0.003026 |
| | 33 | ux- | 0.000068 | -0.025070 | 0.001908 |
| | 33 | uy- | 0.000174 | -0.038394 | 0.003005 |
| | 33 | éz- | 0.000388 | -0.020649 | 0.000932 |
| | 36 | ux+ | 0.000410 | -0.030299 | 0.001945 |
| | 36 | uy+ | 0.000237 | -0.004594 | 0.000014 |
| | 36 | éz+ | 0.000171 | -0.031880 | 0.002396 |
| | 36 | ux- | 0.000002 | -0.004968 | 0.000279 |
| | 36 | uy- | 0.000170 | -0.031886 | 0.002389 |
| | 36 | éz- | 0.000237 | -0.004594 | 0.000014 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 310 | 33 | Fx+ | 0.00 | 19.77 | 0.00 |
| | 33 | Fy+ | 0.00 | 20.63 | 0.00 |
| | 33 | Mz+ | 0.00 | 19.77 | 0.00 |
| | 33 | Fx- | 0.00 | 19.77 | 0.00 |
| | 33 | Fy- | 0.00 | 11.17 | 0.00 |
| | 33 | Mz- | 0.00 | 19.77 | 0.00 |
| | 36 | Fx+ | 0.00 | 16.82 | 0.00 |
| | 36 | Fy+ | 0.00 | 17.16 | 0.00 |
| | 36 | Mz+ | 0.00 | 16.82 | 0.00 |
| | 36 | Fx- | 0.00 | 16.82 | 0.00 |
| | 36 | Fy- | 0.00 | 2.58 | 0.00 |
| | 36 | Mz- | 0.00 | 16.82 | 0.00 |
| 320 | 33 | Fx+ | 19.73 | 17.89 | 0.00 |
| | 33 | Fy+ | -19.73 | 20.63 | 0.00 |
| | 33 | Mz+ | 0.00 | 19.62 | 0.00 |
| | 33 | Fx- | -19.73 | 18.79 | 0.00 |
| | 33 | Fy- | 19.73 | 11.17 | 0.00 |
| | 33 | Mz- | 0.00 | 19.62 | 0.00 |
| | 36 | Fx+ | 15.39 | 5.08 | 0.00 |
| | 36 | Fy+ | -5.91 | 17.16 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | Mz+ | 0.00 | 16.82 | 0.00 |
| | 36 | Fx- | -15.39 | 3.92 | 0.00 |
| | 36 | Fy- | 13.92 | 2.57 | 0.00 |
| | 36 | Mz- | 0.00 | 16.82 | 0.00 |
| 400 | 33 | Fx+ | 0.00 | 73.43 | 0.00 |
| | 33 | Fy+ | 0.00 | 73.82 | 0.00 |
| | 33 | Mz+ | 0.00 | 73.43 | 0.00 |
| | 33 | Fx- | 0.00 | 73.43 | 0.00 |
| | 33 | Fy- | 0.00 | 43.25 | 0.00 |
| | 33 | Mz- | 0.00 | 73.43 | 0.00 |
| | 36 | Fx+ | 0.00 | 60.71 | 0.00 |
| | 36 | Fy+ | 0.00 | 60.89 | 0.00 |
| | 36 | Mz+ | 0.00 | 60.71 | 0.00 |
| | 36 | Fx- | 0.00 | 60.71 | 0.00 |
| | 36 | Fy- | 0.00 | 9.15 | 0.00 |
| | 36 | Mz- | 0.00 | 60.71 | 0.00 |
| 411 | 33 | Fx+ | 0.00 | 60.21 | 0.00 |
| | 33 | Fy+ | 0.00 | 62.28 | 0.00 |
| | 33 | Mz+ | 0.00 | 60.21 | 0.00 |
| | 33 | Fx- | 0.00 | 60.21 | 0.00 |
| | 33 | Fy- | 0.00 | 34.17 | 0.00 |
| | 33 | Mz- | 0.00 | 60.21 | 0.00 |
| | 36 | Fx+ | 0.00 | 51.05 | 0.00 |
| | 36 | Fy+ | 0.00 | 51.90 | 0.00 |
| | 36 | Mz+ | 0.00 | 51.05 | 0.00 |
| | 36 | Fx- | 0.00 | 51.05 | 0.00 |
| | 36 | Fy- | 0.00 | 8.01 | 0.00 |
| | 36 | Mz- | 0.00 | 51.05 | 0.00 |
| 412 | 33 | Fx+ | 0.00 | 88.33 | 0.00 |
| | 33 | Fy+ | 0.00 | 88.59 | 0.00 |
| | 33 | Mz+ | 0.00 | 88.33 | 0.00 |
| | 33 | Fx- | 0.00 | 88.33 | 0.00 |
| | 33 | Fy- | 0.00 | 50.46 | 0.00 |
| | 33 | Mz- | 0.00 | 88.33 | 0.00 |
| | 36 | Fx+ | 0.00 | 73.21 | 0.00 |
| | 36 | Fy+ | 0.00 | 73.61 | 0.00 |
| | 36 | Mz+ | 0.00 | 73.21 | 0.00 |
| | 36 | Fx- | 0.00 | 73.21 | 0.00 |
| | 36 | Fy- | 0.00 | 12.10 | 0.00 |
| | 36 | Mz- | 0.00 | 73.21 | 0.00 |
| 413 | 33 | Fx+ | 0.00 | 80.84 | 0.00 |
| | 33 | Fy+ | 0.00 | 80.87 | 0.00 |
| | 33 | Mz+ | 0.00 | 80.84 | 0.00 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

| | | | | | |
|---|---|---|---|---|---|
| | 33 | Fx- | 0.00 | 80.84 | 0.00 |
| | 33 | Fy- | 0.00 | 46.25 | 0.00 |
| | 33 | Mz- | 0.00 | 80.84 | 0.00 |
| | 36 | Fx+ | 0.00 | 65.83 | 0.00 |
| | 36 | Fy+ | 0.00 | 65.93 | 0.00 |
| | 36 | Mz+ | 0.00 | 65.83 | 0.00 |
| | 36 | Fx- | 0.00 | 65.83 | 0.00 |
| | 36 | Fy- | 0.00 | 10.94 | 0.00 |
| | 36 | Mz- | 0.00 | 65.83 | 0.00 |
| 414 | 33 | Fx+ | 0.00 | 88.76 | 0.00 |
| | 33 | Fy+ | 0.00 | 88.84 | 0.00 |
| | 33 | Mz+ | 0.00 | 88.76 | 0.00 |
| | 33 | Fx- | 0.00 | 88.76 | 0.00 |
| | 33 | Fy- | 0.00 | 51.41 | 0.00 |
| | 33 | Mz- | 0.00 | 88.76 | 0.00 |
| | 36 | Fx+ | 0.00 | 72.24 | 0.00 |
| | 36 | Fy+ | 0.00 | 72.25 | 0.00 |
| | 36 | Mz+ | 0.00 | 72.24 | 0.00 |
| | 36 | Fx- | 0.00 | 72.24 | 0.00 |
| | 36 | Fy- | 0.00 | 11.61 | 0.00 |
| | 36 | Mz- | 0.00 | 72.24 | 0.00 |
| 415 | 33 | Fx+ | 0.00 | 79.72 | 0.00 |
| | 33 | Fy+ | 0.00 | 80.03 | 0.00 |
| | 33 | Mz+ | 0.00 | 79.72 | 0.00 |
| | 33 | Fx- | 0.00 | 79.72 | 0.00 |
| | 33 | Fy- | 0.00 | 46.72 | 0.00 |
| | 33 | Mz- | 0.00 | 79.72 | 0.00 |
| | 36 | Fx+ | 0.00 | 65.63 | 0.00 |
| | 36 | Fy+ | 0.00 | 65.79 | 0.00 |
| | 36 | Mz+ | 0.00 | 65.63 | 0.00 |
| | 36 | Fx- | 0.00 | 65.63 | 0.00 |
| | 36 | Fy- | 0.00 | 10.01 | 0.00 |
| | 36 | Mz- | 0.00 | 65.63 | 0.00 |
| 511 | 33 | Fx+ | 0.00 | 11.45 | 0.00 |
| | 33 | Fy+ | 0.00 | 12.05 | 0.00 |
| | 33 | Mz+ | 0.00 | 11.45 | 0.00 |
| | 33 | Fx- | 0.00 | 11.45 | 0.00 |
| | 33 | Fy- | 0.00 | 6.45 | 0.00 |
| | 33 | Mz- | 0.00 | 11.45 | 0.00 |
| | 36 | Fx+ | 0.00 | 9.77 | 0.00 |
| | 36 | Fy+ | 0.00 | 10.01 | 0.00 |
| | 36 | Mz+ | 0.00 | 9.77 | 0.00 |
| | 36 | Fx- | 0.00 | 9.77 | 0.00 |
| | 36 | Fy- | 0.00 | 1.46 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | Mz- | 0.00 | 9.77 | 0.00 |
| 512 | 33 | Fx+ | 0.00 | 2.70 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.85 | 0.00 |
| | 33 | Mz+ | 0.00 | 2.70 | 0.00 |
| | 33 | Fx- | 0.00 | 2.70 | 0.00 |
| | 33 | Fy- | 0.00 | 1.52 | 0.00 |
| | 33 | Mz- | 0.00 | 2.70 | 0.00 |
| | 36 | Fx+ | 0.00 | 2.31 | 0.00 |
| | 36 | Fy+ | 0.00 | 2.37 | 0.00 |
| | 36 | Mz+ | 0.00 | 2.31 | 0.00 |
| | 36 | Fx- | 0.00 | 2.31 | 0.00 |
| | 36 | Fy- | 0.00 | 0.34 | 0.00 |
| | 36 | Mz- | 0.00 | 2.31 | 0.00 |
| 513 | 33 | Fx+ | 0.00 | 2.71 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.86 | 0.00 |
| | 33 | Mz+ | 0.00 | 2.71 | 0.00 |
| | 33 | Fx- | 0.00 | 2.71 | 0.00 |
| | 33 | Fy- | 0.00 | 1.52 | 0.00 |
| | 33 | Mz- | 0.00 | 2.71 | 0.00 |
| | 36 | Fx+ | 0.00 | 2.32 | 0.00 |
| | 36 | Fy+ | 0.00 | 2.38 | 0.00 |
| | 36 | Mz+ | 0.00 | 2.32 | 0.00 |
| | 36 | Fx- | 0.00 | 2.32 | 0.00 |
| | 36 | Fy- | 0.00 | 0.34 | 0.00 |
| | 36 | Mz- | 0.00 | 2.32 | 0.00 |
| 514 | 33 | Fx+ | 0.00 | 2.72 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.86 | 0.00 |
| | 33 | Mz+ | 0.00 | 2.72 | 0.00 |
| | 33 | Fx- | 0.00 | 2.72 | 0.00 |
| | 33 | Fy- | 0.00 | 1.53 | 0.00 |
| | 33 | Mz- | 0.00 | 2.72 | 0.00 |
| | 36 | Fx+ | 0.00 | 2.32 | 0.00 |
| | 36 | Fy+ | 0.00 | 2.39 | 0.00 |
| | 36 | Mz+ | 0.00 | 2.32 | 0.00 |
| | 36 | Fx- | 0.00 | 2.32 | 0.00 |
| | 36 | Fy- | 0.00 | 0.35 | 0.00 |
| | 36 | Mz- | 0.00 | 2.32 | 0.00 |
| 515 | 33 | Fx+ | 0.00 | 1.36 | 0.00 |
| | 33 | Fy+ | 0.00 | 1.44 | 0.00 |
| | 33 | Mz+ | 0.00 | 1.36 | 0.00 |
| | 33 | Fx- | 0.00 | 1.36 | 0.00 |
| | 33 | Fy- | 0.00 | 0.77 | 0.00 |
| | 33 | Mz- | 0.00 | 1.36 | 0.00 |



| | | | | |
|---|---|---|---|---|
| 36 | Fx+ | 0.00 | 1.17 | 0.00 |
| 36 | Fy+ | 0.00 | 1.19 | 0.00 |
| 36 | Mz+ | 0.00 | 1.17 | 0.00 |
| 36 | Fx- | 0.00 | 1.17 | 0.00 |
| 36 | Fy- | 0.00 | 0.17 | 0.00 |
| 36 | Mz- | 0.00 | 1.17 | 0.00 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.4.* | Fecha JUNIO-*2002* | Página de

# ENVOLVENTE DE SERVICIO.HIP-1

**Fichero: MA_SER.LST**

```
        LISTADO DE ESTADOS DE CARGA
        Fecha : 07.05.2002 10:09:41
        Título: L.A.V.MARTORELL. - ODT 300.4.
        Coment: Envolventes totales
        Titlst: Estado Servicio. Proyecto: L.A.V.MARTORELL. - ODT

Tabla de estados de carga a listar
 ec Fichero     tipo   Título
 30 MA_SERV        1   [Envolvente de Servicio (Marco en Servicio)        ]

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

 MEMB    JT    EC  ENV     Nx          Fy          Mz

    1    1    30  Nx+   -45.60     -55.37      13.10
              30  Fy+   -50.71     -54.29      16.29
              30  Mz+   -50.59     -55.67      17.25
              30  Nx-   -75.80     -63.12      -5.31
              30  Fy-   -70.71     -64.20      -8.48
              30  Mz-   -70.79     -62.85      -9.49

    2    2    30  Nx+   -45.60     -18.54      75.96
              30  Fy+   -50.80     -17.00      78.84
              30  Mz+   -51.38     -19.52      81.81
              30  Nx-   -75.80     -24.60      69.30
              30  Fy-   -70.62     -26.13      66.43
              30  Mz-   -70.00     -23.64      63.46

    3    3    30  Nx+   -45.60      18.28      76.18
              30  Fy+   -51.02      20.56      78.16
              30  Mz+   -53.62      17.20      83.06
              30  Nx-   -75.80      13.93      78.37
              30  Fy-   -70.40      11.66      76.38
              30  Mz-   -67.57      15.13      71.52

    4    4    30  Nx+   -45.60      55.11      13.75
              30  Fy+   -51.28      58.44      13.24
              30  Mz+   -70.53      50.96      24.29
              30  Nx-   -75.80      52.46      21.91
              30  Fy-   -70.14      49.14      22.41
              30  Mz-   -50.89      56.62      11.35

    5    5    30  Nx+   -53.45      89.67    -119.76
              30  Fy+   -59.76      93.86    -125.68
              30  Mz+   -77.56      83.41    -102.00
              30  Nx-   -83.46      86.23    -108.44
              30  Fy-   -77.20      82.04    -102.55
              30  Mz-   -59.41      92.49    -126.22

    6    6    30  Nx+   -56.44    -124.53    -292.83
              30  Fy+   -80.10    -117.05    -264.32
              30  Mz+   -80.10    -117.05    -264.32
              30  Nx-   -86.59    -122.69    -277.25
              30  Fy-   -62.98    -130.17    -305.78
              30  Mz-   -62.98    -130.17    -305.78

  111  111    30  Nx+  -111.71     -20.38     -53.04
              30  Fy+  -119.32      -8.59     -39.51
              30  Mz+  -117.83     -20.28     -37.05
              30  Nx-  -122.90     -19.93     -41.46
              30  Fy-  -115.29     -31.74     -55.20
              30  Mz-  -116.61     -20.07     -57.09

  112  112    30  Nx+  -110.26     -11.23     -40.82
              30  Fy+  -117.87      -0.60     -35.96
              30  Mz+  -115.65      -8.83     -25.69
              30  Nx-  -121.45      -7.95     -30.70
              30  Fy-  -113.84     -18.60     -35.73
              30  Mz-  -115.55     -10.68     -45.23

  113  113    30  Nx+  -108.81      -2.48     -35.54
              30  Fy+  -116.42       6.99     -38.46
              30  Mz+  -113.07      -1.42     -20.93
              30  Nx-  -120.00       3.44     -29.00
              30  Fy-  -112.39      -6.05     -26.23
              30  Mz-  -115.27       2.08     -42.75

  114  114    30  Nx+  -107.35       5.86     -36.87
              30  Fy+  -116.78      14.55     -34.40
              30  Mz+  -110.16       8.08     -23.76
              30  Nx-  -118.55      14.22     -35.89
              30  Fy-  -109.12       5.51     -38.50
              30  Mz-  -116.49      13.34     -48.47

  115  115    30  Nx+  -105.90      13.82     -44.53
              30  Fy+  -115.32      24.73     -49.65
              30  Mz+  -107.72      17.64     -33.83
              30  Nx-  -117.09      24.40     -50.91
              30  Fy-  -107.67      13.47     -45.88
              30  Mz-  -115.26      20.56     -61.61

  116  116    30  Nx+  -104.45      21.37     -58.20
              30  Fy+  -113.87      34.31     -72.57
              30  Mz+  -106.62      28.32     -51.68
              30  Nx-  -115.64      33.98     -73.57
              30  Fy-  -106.22      21.02     -59.27
              30  Mz-  -113.47      27.04     -80.09

  116  117    30  Nx+  -102.99      28.52     -77.57
              30  Fy+  -111.60      44.27     -96.21
              30  Mz+  -103.34      28.47     -77.51
              30  Nx-  -114.19      42.96    -103.44
              30  Fy-  -105.57      27.20     -84.82
              30  Mz-  -113.84      43.02    -103.50

  211  211    30  Nx+  -102.26      30.94     -85.68
              30  Fy+  -110.87      47.70    -108.76
              30  Mz+  -102.61      30.89     -85.61
              30  Nx-  -113.45      45.98    -115.57
              30  Fy-  -104.84      29.21     -92.54
              30  Mz-  -113.10      46.04    -115.65

  212  212    30  Nx+   -50.15     -86.07    -100.34
              30  Fy+   -63.98     -84.05    -100.50
              30  Mz+   -51.94     -85.10     -94.36
              30  Nx-   -71.23     -91.14    -122.62
              30  Fy-   -57.44     -93.16    -122.49
              30  Mz-   -69.48     -92.12    -128.62

  213  213    30  Nx+   -50.84     -76.48     -69.06
              30  Fy+   -66.56     -74.06     -70.08
              30  Mz+   -53.23     -75.62     -63.50
              30  Nx-   -73.85     -80.81     -89.84
              30  Fy-   -58.17     -83.24     -88.86
              30  Mz-   -71.63     -81.62     -95.45

  214  214    30  Nx+   -52.13     -60.66     -22.81
              30  Fy+   -71.14     -57.58     -25.67
              30  Mz+   -55.89     -60.76     -18.07
              30  Nx-   -78.44     -63.83     -41.92
              30  Fy-   -59.47     -66.91     -39.08
              30  Mz-   -74.85     -63.67     -46.73

  311  311    30  Nx+  -112.65     -26.50     -64.75
              30  Fy+  -120.26     -13.96     -45.13
              30  Mz+  -116.98     -14.62     -43.28
              30  Nx-  -123.84     -27.98     -53.42
              30  Fy-  -116.23     -40.54     -73.25
              30  Mz-  -119.34     -39.90     -74.54

  312  312    30  Nx+  -112.18     -23.42     -58.51
              30  Fy+  -119.79     -11.25     -41.99
              30  Mz+  -116.51     -11.91     -39.97
              30  Nx-  -123.37     -23.92     -46.93
              30  Fy-  -115.76     -36.11     -63.67
              30  Mz-  -118.89     -35.44     -65.12

  511  511    30  Nx+   -11.23      -0.47       0.05
              30  Fy+   -11.23      -0.24       0.08
              30  Mz+   -11.23      -0.25       0.08
              30  Nx-   -18.35      -1.28      -0.04
              30  Fy-   -18.35      -2.14      -0.13
              30  Mz-   -18.35      -2.14      -0.13

  512  512    30  Nx+   -11.23      -0.57       0.03
              30  Fy+   -11.23      -0.40       0.04
```

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Mz+ | -11.23 | -0.43 | 0.04 |
| | | 30 | Nx- | -18.35 | -1.17 | -0.02 |
| | | 30 | Fy- | -18.35 | -1.81 | -0.08 |
| | | 30 | Mz- | -18.35 | -1.79 | -0.08 |
| 513 | 513 | 30 | Nx+ | -11.23 | -0.68 | 0.01 |
| | | 30 | Fy+ | -11.23 | -0.59 | 0.01 |
| | | 30 | Mz+ | -11.23 | -0.61 | 0.01 |
| | | 30 | Nx- | -18.35 | -1.08 | -0.01 |
| | | 30 | Fy- | -18.35 | -1.46 | -0.03 |
| | | 30 | Mz- | -18.35 | -1.44 | -0.03 |
| 514 | 514 | 30 | Nx+ | -11.23 | -0.82 | 0.00 |
| | | 30 | Fy+ | -11.23 | -0.78 | 0.00 |
| | | 30 | Mz+ | -11.23 | -0.79 | 0.00 |
| | | 30 | Nx- | -18.35 | -1.00 | 0.00 |
| | | 30 | Fy- | -18.35 | -1.12 | -0.01 |
| | | 30 | Mz- | -18.35 | -1.08 | -0.01 |
| 514 | 515 | 30 | Nx+ | -11.23 | 0.94 | 0.00 |
| | | 30 | Fy+ | -11.23 | 0.98 | 0.00 |
| | | 30 | Mz+ | -18.35 | 0.91 | 0.00 |
| | | 30 | Nx- | -18.35 | 0.91 | 0.00 |
| | | 30 | Fy- | -18.35 | 0.79 | 0.00 |
| | | 30 | Mz- | -18.35 | 0.91 | 0.00 |
| 520 | 320 | 30 | Nx+ | -11.23 | 5.76 | 2.34 |
| | | 30 | Fy+ | -11.23 | 7.02 | 2.88 |
| | | 30 | Mz+ | -11.23 | 7.02 | 2.88 |
| | | 30 | Nx- | -18.35 | 4.70 | 1.85 |
| | | 30 | Fy- | -18.35 | 3.54 | 1.36 |
| | | 30 | Mz- | -18.35 | 3.54 | 1.36 |
| 410 | 310 | 30 | Nx+ | -25.19 | 101.47 | 54.51 |
| | | 30 | Fy+ | -53.15 | 105.51 | 81.49 |
| | | 30 | Mz+ | -58.56 | 100.18 | 96.70 |
| | | 30 | Nx- | -58.89 | 98.35 | 95.53 |
| | | 30 | Fy- | -31.10 | 94.47 | 69.56 |
| | | 30 | Mz- | -25.54 | 99.29 | 52.82 |
| 411 | 411 | 30 | Nx+ | -25.19 | 63.22 | 16.29 |
| | | 30 | Fy+ | -57.52 | 69.05 | 56.86 |
| | | 30 | Mz+ | -58.56 | 68.06 | 58.96 |
| | | 30 | Nx- | -58.89 | 66.94 | 58.48 |
| | | 30 | Fy- | -27.59 | 57.52 | 21.04 |
| | | 30 | Mz- | -25.54 | 61.46 | 15.41 |
| 412 | 412 | 30 | Nx+ | -25.19 | 12.34 | -112.62 |
| | | 30 | Fy+ | -58.07 | 20.20 | -82.08 |
| | | 30 | Mz+ | -57.58 | 18.21 | -73.67 |
| | | 30 | Nx- | -58.89 | 16.36 | -78.51 |
| | | 30 | Fy- | -26.16 | 8.66 | -105.92 |
| | | 30 | Mz- | -25.40 | 13.31 | -113.96 |
| 413 | 413 | 30 | Nx+ | -25.19 | -32.40 | -142.43 |
| | | 30 | Fy+ | -57.57 | -19.22 | -115.71 |
| | | 30 | Mz+ | -56.81 | -24.10 | -112.38 |
| | | 30 | Nx- | -58.89 | -22.15 | -128.28 |
| | | 30 | Fy- | -25.44 | -34.52 | -140.75 |
| | | 30 | Mz- | -27.58 | -28.15 | -148.24 |
| 414 | 414 | 30 | Nx+ | -25.19 | -82.62 | -84.41 |
| | | 30 | Fy+ | -56.81 | -65.73 | -72.22 |
| | | 30 | Mz+ | -56.30 | -71.64 | -69.14 |
| | | 30 | Nx- | -58.89 | -71.09 | -89.63 |
| | | 30 | Fy- | -25.52 | -83.46 | -86.04 |
| | | 30 | Mz- | -27.80 | -77.57 | -98.50 |
| 415 | 415 | 30 | Nx+ | -34.96 | -112.14 | 93.00 |
| | | 30 | Fy+ | -65.29 | -100.53 | 83.74 |
| | | 30 | Mz+ | -35.81 | -116.92 | 100.04 |
| | | 30 | Nx- | -68.41 | -108.96 | 70.48 |
| | | 30 | Fy- | -36.40 | -123.41 | 90.47 |
| | | 30 | Mz- | -67.91 | -108.38 | 66.29 |
| 415 | 400 | 30 | Nx+ | -34.55 | -107.43 | 270.57 |
| | | 30 | Fy+ | -64.85 | -96.12 | 243.65 |
| | | 30 | Mz+ | -35.11 | -111.32 | 286.65 |
| | | 30 | Nx- | -68.06 | -104.94 | 243.31 |
| | | 30 | Fy- | -36.08 | -118.89 | 284.62 |
| | | 30 | Mz- | -66.57 | -101.68 | 235.92 |



DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | éz |
|---|---|---|---|---|---|
| 1 | 30 | ux+ | 0.002847 | -0.023484 | -0.001715 |
| | 30 | uy+ | 0.002825 | -0.023455 | -0.001703 |
| | 30 | éz+ | -0.001978 | -0.026266 | -0.001245 |
| | 30 | ux- | -0.002298 | -0.027620 | -0.001502 |
| | 30 | uy- | -0.002276 | -0.027649 | -0.001514 |
| | 30 | éz- | 0.002494 | -0.024966 | -0.001972 |
| 2 | 30 | ux+ | 0.002786 | -0.025800 | -0.000775 |
| | 30 | uy+ | 0.002764 | -0.025742 | -0.000754 |
| | 30 | éz+ | -0.002154 | -0.028650 | -0.000414 |
| | 30 | ux- | -0.002340 | -0.029545 | -0.000512 |
| | 30 | uy- | -0.002299 | -0.029603 | -0.000535 |
| | 30 | éz- | 0.002020 | -0.027104 | -0.000929 |
| 3 | 30 | ux+ | 0.002722 | -0.025715 | 0.000883 |
| | 30 | uy+ | 0.002681 | -0.025616 | 0.000909 |
| | 30 | éz+ | -0.000692 | -0.028202 | 0.001331 |
| | 30 | ux- | -0.002382 | -0.028902 | 0.001285 |
| | 30 | uy- | -0.002341 | -0.029001 | 0.001259 |
| | 30 | éz- | 0.000478 | -0.026932 | 0.000768 |
| 4 | 30 | ux+ | 0.002661 | -0.023154 | 0.001915 |
| | 30 | uy+ | 0.002604 | -0.023005 | 0.001956 |
| | 30 | éz+ | -0.000858 | -0.025229 | 0.002504 |
| | 30 | ux- | -0.002425 | -0.025513 | 0.002483 |
| | 30 | uy- | -0.002368 | -0.025662 | 0.002442 |
| | 30 | éz- | 0.000445 | -0.024077 | 0.001863 |
| 5 | 30 | ux+ | 0.002596 | -0.020234 | 0.000855 |
| | 30 | uy+ | 0.001803 | -0.019921 | 0.001052 |
| | 30 | éz+ | -0.002464 | -0.021372 | 0.001553 |
| | 30 | ux- | -0.002470 | -0.021447 | 0.001551 |
| | 30 | uy- | -0.001660 | -0.021977 | 0.001296 |
| | 30 | éz- | 0.002590 | -0.020309 | 0.000853 |
| 6 | 30 | ux+ | 0.002596 | -0.019688 | -0.000348 |
| | 30 | uy+ | 0.001710 | -0.018968 | -0.000069 |
| | 30 | éz+ | -0.002286 | -0.019776 | 0.000348 |
| | 30 | ux- | -0.002362 | -0.019769 | 0.000348 |
| | 30 | uy- | -0.000931 | -0.020757 | 0.000044 |
| | 30 | éz- | 0.002589 | -0.019764 | -0.000348 |
| 111 | 30 | ux+ | -0.000373 | -0.020522 | 0.000394 |
| | 30 | uy+ | -0.000377 | -0.020433 | 0.000399 |
| | 30 | éz+ | -0.001642 | -0.024912 | 0.001497 |
| | 30 | ux- | -0.001642 | -0.024912 | 0.001497 |
| | 30 | uy- | -0.001638 | -0.024983 | 0.001492 |
| | 30 | éz- | -0.000373 | -0.020522 | 0.000394 |
| 112 | 30 | ux+ | -0.000540 | -0.020564 | 0.000065 |
| | 30 | uy+ | -0.000547 | -0.020475 | 0.000064 |
| | 30 | éz+ | -0.002666 | -0.025019 | 0.001158 |
| | 30 | ux- | -0.002669 | -0.024955 | 0.001157 |
| | 30 | uy- | -0.002662 | -0.025026 | 0.001157 |
| | 30 | éz- | -0.000541 | -0.020529 | 0.000063 |
| 113 | 30 | ux+ | -0.000499 | -0.020590 | -0.000158 |
| | 30 | uy+ | -0.000505 | -0.020517 | -0.000160 |
| | 30 | éz+ | -0.003436 | -0.025069 | 0.000837 |
| | 30 | ux- | -0.003442 | -0.024998 | 0.000835 |
| | 30 | uy- | -0.003436 | -0.025069 | 0.000837 |
| | 30 | éz- | -0.000501 | -0.020526 | -0.000160 |
| 114 | 30 | ux+ | -0.000305 | -0.020567 | -0.000348 |
| | 30 | uy+ | -0.000309 | -0.020558 | -0.000348 |
| | 30 | éz+ | -0.003348 | -0.024984 | 0.000492 |
| | 30 | ux- | -0.003958 | -0.025106 | 0.000490 |
| | 30 | uy- | -0.003954 | -0.025113 | 0.000490 |
| | 30 | éz- | -0.000912 | -0.020702 | -0.000350 |
| 115 | 30 | ux+ | 0.000045 | -0.020608 | -0.000573 |
| | 30 | uy+ | 0.000041 | -0.020599 | -0.000572 |
| | 30 | éz+ | -0.003393 | -0.024445 | 0.000170 |

| | | | | | |
|---|---|---|---|---|---|
| | 30 | ux- | -0.004180 | -0.025150 | 0.000067 |
| | 30 | uy- | -0.004176 | -0.025157 | 0.000067 |
| | 30 | éz- | -0.000702 | -0.021273 | -0.000675 |
| 116 | 30 | ux+ | 0.000614 | -0.020648 | -0.000910 |
| | 30 | uy+ | 0.000608 | -0.020639 | -0.000907 |
| | 30 | éz+ | -0.003299 | -0.024341 | -0.000254 |
| | 30 | ux- | -0.004036 | -0.025188 | -0.000463 |
| | 30 | uy- | -0.004030 | -0.025197 | -0.000466 |
| | 30 | éz- | -0.000156 | -0.021604 | -0.001119 |
| 117 | 30 | ux+ | 0.001504 | -0.020694 | -0.001423 |
| | 30 | uy+ | 0.001496 | -0.020679 | -0.001417 |
| | 30 | éz+ | -0.002846 | -0.024272 | -0.000863 |
| | 30 | ux- | -0.003422 | -0.025231 | -0.001146 |
| | 30 | uy- | -0.003414 | -0.025240 | -0.001151 |
| | 30 | éz- | 0.000928 | -0.021647 | -0.001705 |
| 211 | 30 | ux+ | 0.001898 | -0.020702 | -0.001485 |
| | 30 | uy+ | 0.001889 | -0.020687 | -0.001478 |
| | 30 | éz+ | -0.002566 | -0.024249 | -0.000935 |
| | 30 | ux- | -0.003097 | -0.025239 | -0.001224 |
| | 30 | uy- | -0.003088 | -0.025248 | -0.001229 |
| | 30 | éz- | 0.001402 | -0.021654 | -0.001772 |
| 212 | 30 | ux+ | 0.002307 | -0.020707 | -0.001504 |
| | 30 | uy+ | 0.002296 | -0.020692 | -0.001497 |
| | 30 | éz+ | -0.002308 | -0.024254 | -0.000957 |
| | 30 | ux- | -0.002762 | -0.025239 | -0.001247 |
| | 30 | uy- | -0.002751 | -0.025254 | -0.001254 |
| | 30 | éz- | 0.001888 | -0.021660 | -0.001794 |
| 213 | 30 | ux+ | 0.002420 | -0.021288 | -0.001578 |
| | 30 | uy+ | 0.002408 | -0.021271 | -0.001571 |
| | 30 | éz+ | -0.002236 | -0.024633 | -0.001043 |
| | 30 | ux- | -0.002664 | -0.025726 | -0.001332 |
| | 30 | uy- | -0.002652 | -0.025743 | -0.001339 |
| | 30 | éz- | 0.002022 | -0.022374 | -0.001867 |
| 214 | 30 | ux+ | 0.002633 | -0.022360 | -0.001674 |
| | 30 | uy+ | 0.002620 | -0.022338 | -0.001667 |
| | 30 | éz+ | -0.002096 | -0.025361 | -0.001160 |
| | 30 | ux- | -0.002484 | -0.026643 | -0.001443 |
| | 30 | uy- | -0.002471 | -0.026665 | -0.001450 |
| | 30 | éz- | 0.002275 | -0.023635 | -0.001957 |
| 310 | 30 | ux+ | 0.000354 | -0.021163 | 0.001223 |
| | 30 | uy+ | 0.000350 | -0.020379 | 0.001122 |
| | 30 | éz+ | 0.000117 | -0.024835 | 0.002048 |
| | 30 | ux- | 0.000090 | -0.023152 | 0.001806 |
| | 30 | uy- | 0.000114 | -0.024924 | 0.002034 |
| | 30 | éz- | 0.000347 | -0.020534 | 0.001108 |
| 311 | 30 | ux+ | -0.000101 | -0.020563 | 0.000702 |
| | 30 | uy+ | -0.000104 | -0.020408 | 0.000710 |
| | 30 | éz+ | -0.000829 | -0.024873 | 0.001755 |
| | 30 | ux- | -0.000829 | -0.024880 | 0.001753 |
| | 30 | uy- | -0.000826 | -0.024954 | 0.001746 |
| | 30 | éz- | -0.000101 | -0.020497 | 0.000701 |
| 312 | 30 | ux+ | -0.000256 | -0.020575 | 0.000540 |
| | 30 | uy+ | -0.000260 | -0.020420 | 0.000544 |
| | 30 | éz+ | -0.001250 | -0.024898 | 0.001625 |
| | 30 | ux- | -0.001250 | -0.024895 | 0.001624 |
| | 30 | uy- | -0.001246 | -0.024969 | 0.001620 |
| | 30 | éz- | -0.000256 | -0.020509 | 0.000539 |
| 320 | 30 | ux+ | 0.000000 | -0.022233 | -0.001449 |
| | 30 | uy+ | 0.000000 | -0.020365 | -0.001117 |
| | 30 | éz+ | 0.000000 | -0.020520 | -0.001103 |
| | 30 | ux- | 0.000000 | -0.022233 | -0.001449 |
| | 30 | uy- | 0.000000 | -0.024938 | -0.002038 |
| | 30 | éz- | 0.000000 | -0.024849 | -0.002052 |
| 400 | 30 | ux+ | 0.000198 | -0.018621 | -0.000094 |
| | 30 | uy+ | 0.000179 | -0.017911 | -0.000012 |
| | 30 | éz+ | 0.000100 | -0.019097 | 0.000147 |
| | 30 | ux- | 0.000029 | -0.019285 | 0.000135 |
| | 30 | uy- | 0.000053 | -0.019643 | -0.000026 |
| | 30 | éz- | 0.000191 | -0.019088 | -0.000147 |
| 411 | 30 | ux+ | 0.000347 | -0.020678 | 0.001347 |
| | 30 | uy+ | 0.000343 | -0.019934 | 0.001242 |
| | 30 | éz+ | 0.000112 | -0.024052 | 0.002122 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. | Fecha JUNIO-2002 | Página de

| | | | | | |
|---|---|---|---|---|---|
| | 30 | ux- | 0.000086 | -0.022460 | 0.001867 |
| | 30 | uy- | 0.000109 | -0.024146 | 0.002106 |
| | 30 | éz- | 0.000339 | -0.020129 | 0.001226 |
| 412 | 30 | ux+ | 0.000305 | -0.017966 | 0.001245 |
| | 30 | uy+ | 0.000181 | -0.017332 | 0.001205 |
| | 30 | éz+ | 0.000095 | -0.019982 | 0.001801 |
| | 30 | ux- | 0.000071 | -0.018996 | 0.001478 |
| | 30 | uy- | 0.000213 | -0.020228 | 0.001713 |
| | 30 | éz- | 0.000285 | -0.018258 | 0.001098 |
| 413 | 30 | ux+ | 0.000265 | -0.016301 | 0.000390 |
| | 30 | uy+ | 0.000155 | -0.015769 | 0.000335 |
| | 30 | éz+ | 0.000186 | -0.017443 | 0.000759 |
| | 30 | ux- | 0.000053 | -0.017286 | 0.000383 |
| | 30 | uy- | 0.000175 | -0.017852 | 0.000587 |
| | 30 | éz- | 0.000132 | -0.016691 | 0.000213 |
| 414 | 30 | ux+ | 0.000224 | -0.016512 | -0.000480 |
| | 30 | uy+ | 0.000121 | -0.016027 | -0.000495 |
| | 30 | éz+ | 0.000152 | -0.017054 | -0.000245 |
| | 30 | ux- | 0.000034 | -0.017384 | -0.000592 |
| | 30 | uy- | 0.000138 | -0.017790 | -0.000418 |
| | 30 | éz- | 0.000104 | -0.017028 | -0.000664 |
| 415 | 30 | ux+ | 0.000175 | -0.017984 | -0.000536 |
| | 30 | uy+ | 0.000169 | -0.017445 | -0.000481 |
| | 30 | éz+ | 0.000151 | -0.018374 | -0.000335 |
| | 30 | ux- | 0.000013 | -0.019079 | -0.000575 |
| | 30 | uy- | 0.000017 | -0.019189 | -0.000450 |
| | 30 | éz- | 0.000080 | -0.018459 | -0.000650 |
| 511 | 30 | ux+ | 0.000357 | -0.021622 | 0.001222 |
| | 30 | uy+ | 0.000353 | -0.020801 | 0.001121 |
| | 30 | éz+ | 0.000118 | -0.025602 | 0.002045 |
| | 30 | ux- | 0.000091 | -0.023829 | 0.001804 |
| | 30 | uy- | 0.000115 | -0.025685 | 0.002031 |
| | 30 | éz- | 0.000350 | -0.020950 | 0.001107 |
| 512 | 30 | ux+ | 0.000358 | -0.021684 | 0.001222 |
| | 30 | uy+ | 0.000354 | -0.020857 | 0.001121 |
| | 30 | éz+ | 0.000119 | -0.025706 | 0.002045 |
| | 30 | ux- | 0.000092 | -0.023921 | 0.001804 |
| | 30 | uy- | 0.000116 | -0.025789 | 0.002031 |
| | 30 | éz- | 0.000351 | -0.021006 | 0.001107 |
| 513 | 30 | ux+ | 0.000358 | -0.021746 | 0.001222 |
| | 30 | uy+ | 0.000354 | -0.020913 | 0.001121 |
| | 30 | éz+ | 0.000119 | -0.025810 | 0.002045 |
| | 30 | ux- | 0.000092 | -0.024013 | 0.001804 |
| | 30 | uy- | 0.000116 | -0.025893 | 0.002031 |
| | 30 | éz- | 0.000351 | -0.021062 | 0.001107 |
| 514 | 30 | ux+ | 0.000358 | -0.021805 | 0.001222 |
| | 30 | uy+ | 0.000354 | -0.020969 | 0.001121 |
| | 30 | éz+ | 0.000119 | -0.025909 | 0.002045 |
| | 30 | ux- | 0.000092 | -0.024099 | 0.001804 |
| | 30 | uy- | 0.000116 | -0.025990 | 0.002031 |
| | 30 | éz- | 0.000351 | -0.021116 | 0.001107 |
| 515 | 30 | ux+ | 0.000359 | -0.021866 | 0.001222 |
| | 30 | uy+ | 0.000355 | -0.021025 | 0.001121 |
| | 30 | éz+ | 0.000119 | -0.026012 | 0.002045 |
| | 30 | ux- | 0.000092 | -0.024190 | 0.001804 |
| | 30 | uy- | 0.000116 | -0.026093 | 0.002031 |
| | 30 | éz- | 0.000352 | -0.021172 | 0.001107 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 310 | 30 | Fx+ | 0.00 | 13.24 | 0.00 |
| | 30 | Fy+ | 0.00 | 14.02 | 0.00 |
| | 30 | Mz+ | 0.00 | 13.24 | 0.00 |
| | 30 | Fx- | 0.00 | 13.24 | 0.00 |
| | 30 | Fy- | 0.00 | 11.46 | 0.00 |
| | 30 | Mz- | 0.00 | 13.24 | 0.00 |
| 320 | 30 | Fx+ | 13.15 | 12.20 | 0.00 |

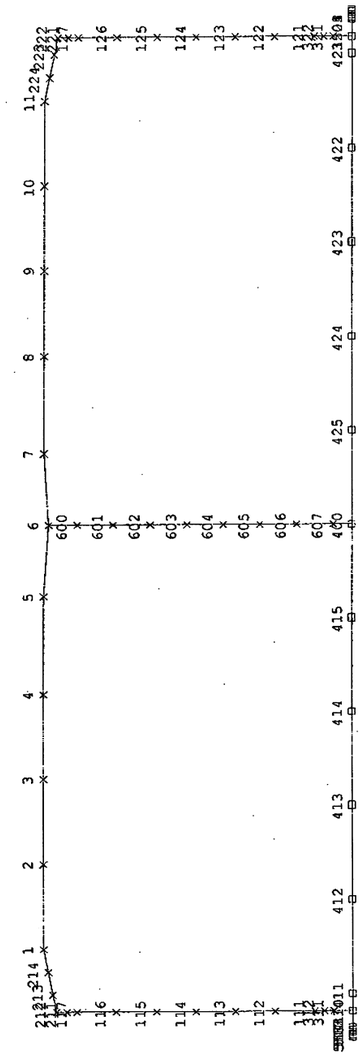
| | | | | | |
|---|---|---|---|---|---|
| | 30 | Fy+ | -13.15 | 14.02 | 0.00 |
| | 30 | Mz+ | 0.00 | 12.51 | 0.00 |
| | 30 | Fx- | -13.15 | 12.80 | 0.00 |
| | 30 | Fy- | 13.15 | 11.46 | 0.00 |
| | 30 | Mz- | 0.00 | 12.51 | 0.00 |
| 400 | 30 | Fx+ | 0.00 | 46.34 | 0.00 |
| | 30 | Fy+ | 0.00 | 47.44 | 0.00 |
| | 30 | Mz+ | 0.00 | 46.34 | 0.00 |
| | 30 | Fx- | 0.00 | 46.34 | 0.00 |
| | 30 | Fy- | 0.00 | 43.26 | 0.00 |
| | 30 | Mz- | 0.00 | 46.34 | 0.00 |
| 411 | 30 | Fx+ | 0.00 | 40.26 | 0.00 |
| | 30 | Fy+ | 0.00 | 42.34 | 0.00 |
| | 30 | Mz+ | 0.00 | 40.26 | 0.00 |
| | 30 | Fx- | 0.00 | 40.26 | 0.00 |
| | 30 | Fy- | 0.00 | 34.95 | 0.00 |
| | 30 | Mz- | 0.00 | 40.26 | 0.00 |
| 412 | 30 | Fx+ | 0.00 | 58.27 | 0.00 |
| | 30 | Fy+ | 0.00 | 59.55 | 0.00 |
| | 30 | Mz+ | 0.00 | 58.27 | 0.00 |
| | 30 | Fx- | 0.00 | 58.27 | 0.00 |
| | 30 | Fy- | 0.00 | 51.03 | 0.00 |
| | 30 | Mz- | 0.00 | 58.27 | 0.00 |
| 413 | 30 | Fx+ | 0.00 | 52.42 | 0.00 |
| | 30 | Fy+ | 0.00 | 52.57 | 0.00 |
| | 30 | Mz+ | 0.00 | 52.42 | 0.00 |
| | 30 | Fx- | 0.00 | 52.42 | 0.00 |
| | 30 | Fy- | 0.00 | 46.44 | 0.00 |
| | 30 | Mz- | 0.00 | 52.42 | 0.00 |
| 414 | 30 | Fx+ | 0.00 | 56.71 | 0.00 |
| | 30 | Fy+ | 0.00 | 57.08 | 0.00 |
| | 30 | Mz+ | 0.00 | 56.71 | 0.00 |
| | 30 | Fx- | 0.00 | 56.71 | 0.00 |
| | 30 | Fy- | 0.00 | 51.43 | 0.00 |
| | 30 | Mz- | 0.00 | 56.71 | 0.00 |
| 415 | 30 | Fx+ | 0.00 | 50.54 | 0.00 |
| | 30 | Fy+ | 0.00 | 51.44 | 0.00 |
| | 30 | Mz+ | 0.00 | 50.54 | 0.00 |
| | 30 | Fx- | 0.00 | 50.54 | 0.00 |
| | 30 | Fy- | 0.00 | 46.74 | 0.00 |
| | 30 | Mz- | 0.00 | 50.54 | 0.00 |
| 511 | 30 | Fx+ | 0.00 | 7.68 | 0.00 |
| | 30 | Fy+ | 0.00 | 8.19 | 0.00 |
| | 30 | Mz+ | 0.00 | 7.68 | 0.00 |
| | 30 | Fx- | 0.00 | 7.68 | 0.00 |
| | 30 | Fy- | 0.00 | 6.63 | 0.00 |
| | 30 | Mz- | 0.00 | 7.68 | 0.00 |
| 512 | 30 | Fx+ | 0.00 | 1.82 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.93 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.82 | 0.00 |
| | 30 | Fx- | 0.00 | 1.82 | 0.00 |
| | 30 | Fy- | 0.00 | 1.56 | 0.00 |
| | 30 | Mz- | 0.00 | 1.82 | 0.00 |
| 513 | 30 | Fx+ | 0.00 | 1.83 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.94 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.83 | 0.00 |
| | 30 | Fx- | 0.00 | 1.83 | 0.00 |
| | 30 | Fy- | 0.00 | 1.57 | 0.00 |
| | 30 | Mz- | 0.00 | 1.83 | 0.00 |
| 514 | 30 | Fx+ | 0.00 | 1.83 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.95 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.83 | 0.00 |
| | 30 | Fx- | 0.00 | 1.83 | 0.00 |
| | 30 | Fy- | 0.00 | 1.57 | 0.00 |
| | 30 | Mz- | 0.00 | 1.83 | 0.00 |
| 515 | 30 | Fx+ | 0.00 | 0.91 | 0.00 |
| | 30 | Fy+ | 0.00 | 0.98 | 0.00 |
| | 30 | Mz+ | 0.00 | 0.91 | 0.00 |
| | 30 | Fx- | 0.00 | 0.91 | 0.00 |
| | 30 | Fy- | 0.00 | 0.79 | 0.00 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.4.* | Fecha JUNIO-2002 | Página de

| | | | | | |
|---|---|---|---|---|---|
| | 30 | Mz- | 0.00 | 0.91 | 0.00 |

# MODELO NUMÉRICO. HIP-2



**Fichero: MARCO.GEO**

```
STRUDL 'GEO' 'L.A.V.MARTORELL. : ODT 300.4.'
 UNITS  M MTON RADIANS CENTIGRADE SECONDS
TYPE SPACE FRAME
$ COORDENADAS
JOINT COORDS
$ NUDO    X     Y     Z
1 -8.505 7.050 0.000
2 -6.804 7.050 0.000
3 -5.103 7.050 0.000
4 -3.402 7.050 0.000
5 -1.610 7.050 0.000
6 0.000 6.912 0.000
7 1.610 7.050 0.000
8 3.402 7.050 0.000
9 5.103 7.050 0.000
10 6.804 7.050 0.000
11 8.505 7.050 0.000
111 -10.190 1.500 0.000
112 -10.190 2.275 0.000
113 -10.190 3.050 0.000
114 -10.190 3.825 0.000
115 -10.190 4.600 0.000
116 -10.190 5.375 0.000
117 -10.190 6.150 0.000
121 10.190 1.500 0.000
122 10.190 2.275 0.000
123 10.190 3.050 0.000
124 10.190 3.825 0.000
125 10.190 4.600 0.000
126 10.190 5.375 0.000
127 10.190 6.150 0.000
211 -10.190 6.423 0.000
212 -10.190 6.696 0.000
213 -9.815 6.775 0.000
214 -9.160 6.913 0.000
221 10.190 6.423 0.000
222 10.190 6.696 0.000
223 9.815 6.775 0.000
224 9.160 6.913 0.000
310 -10.190 0.500 0.000
311 -10.190 1.000 0.000
312 -10.190 1.250 0.000
320 10.190 0.500 0.000
321 10.190 1.000 0.000
322 10.190 1.250 0.000
400 0.000 0.638 0.000
411 -9.815 0.500 0.000
412 -7.852 0.500 0.000
413 -5.889 0.500 0.000
414 -3.926 0.500 0.000
415 -1.610 0.500 0.000
421 9.815 0.500 0.000
422 7.852 0.500 0.000
423 5.889 0.500 0.000
424 3.926 0.500 0.000
425 1.610 0.500 0.000
511 -10.565 0.500 0.000
512 -10.615 0.500 0.000
513 -10.665 0.500 0.000
514 -10.715 0.500 0.000
515 -10.765 0.500 0.000
521 10.565 0.500 0.000
522 10.615 0.500 0.000
523 10.665 0.500 0.000
524 10.715 0.500 0.000
525 10.765 0.500 0.000
600 0.000 6.150 0.000
601 0.000 5.492 0.000
602 0.000 4.836 0.000
603 0.000 4.179 0.000
604 0.000 3.521 0.000
605 0.000 2.864 0.000
606 0.000 2.207 0.000
607 0.000 1.550 0.000
```



```
$ CONECTIVIDAD DE ELEMENTOS
MEMBER INCI
$ Dintel
 1              1              2
 2              2              3
 3          3                  4
 4              4              5
 5          5                  6
 6              6              7
 7          7                  8
 8              8              9
 9              9              10
 10             10             11
$ Hastiales
 111        111                112
 112            112                113
 113            113                114
 114            114                115
 115            115                116
 116            116                117
 121            121                122
 122            122                123
 123        123                124
 124        124                    125
 125        125                    126
 126        126                127
 600        600                    6
 601            601                600
 602            602                601
 603        603                602
 604            604                603
 605        605                604
 606            606                605
 607        607                606
 608            400                607
$ Cartelas superiores
 210        117                    211
 211        211                    212
 212        212                213
 213        213                214
 214        214                1
 220        127                221
 221        221                222
 222        222                    223
 223        223                    224
 224        224                11
$ Cartelas Inferiores
 310        310                    311
 311        311                312
 312        312                    111
 320        320                321
 321        321                    322
 322        322                121
$ Talones Zapata
 510        310                    511
 511        511                512
 512            512                513
 513        513                514
 514            514                515
 520        320                521
 521            521                522
 522        522                523
 523            523                524
 524            524                525
$ Punteras Zapata
 410            310                411
```

```
411          411          412
412          412          413
413          413          414
414          414          415
415          415          400
420          320          421
421          421          422
422          422          423
423          423          424
424          424          425
425          425          400

$ CARACTERÍSTICAS MECÁNICAS DE LOS ELEMENTOS
MEMBER PROPERTIES
1 TO 4 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.7000 YC 0.35
5 TO 6 PRIS AX 0.9750 IX 1.0000 IY 1.0000 IZ 0.0957 YD 0.9750 YC 0.49
7 TO 10 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.7000 YC 0.35
$ Hastiales
111 121 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
112 122  PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
113 123 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
114 124 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
115 125 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
116 126 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
210 220 PRIS AX 1.0753 IX 1.0000 IY 1.0000 IZ 0.1321 YD 1.08 YC 0.54
600 PRIS AX 1.8600 IX 1.0000 IY 1.0000 IZ 1.396 YD 1.86 YC 0.93
601 TO 608 PRIS AX 0.5000 IX 1.0000 IY 1.0000 IZ 0.0104 YD 0.5000 YC
0.25
$ Cartelas
211 221 PRIS AX 1.7259 IX 1.0000 IY 1.0000 IZ 0.4740 YD 1.73 YC 0.865
212 222  PRIS AX 1.2500 IX 1.0000 IY 1.0000 IZ 0.1628 YD 1.25 YC 0.625
213 223 PRIS AX 1.1125 IX 1.0000 IY 1.0000 IZ 0.1200 YD 1.11 YC 0.555
214 224 PRIS AX 0.8375 IX 1.0000 IY 1.0000 IZ 0.0529 YD 0.84 YC 0.42
310 320 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
311 321 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
312 322 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
$ Zapata
510 TO 514 PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5
520 TO 524 PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5
410 TO 414 PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5
415   425 PRIS AX 1.2750 IX 1.0000 IY 1.0000 IZ 0.1968 YD 1.28 YC 0.6
420 TO 424 PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5

$ CARACTERISTICAS DE LOS MATERIALES
 UNITS  M MTON DEGREES CENTIGRADE SECONDS
CONST
$ TODAS LAS BARRAS
E 2781000.00 ALL
G 1158750.00 ALL
CTE 1.00E-05 ALL
BETA 180.0 MEMB 222 TO 224
 UNITS  M MTON RADIANS CENTIGRADE SECONDS

$ APOYOS
STATUS SUP  511 TO 515 521 TO 525 310 320 411 TO 415 421 TO 425 400
$ LIBERACIONES DE APOYOS
 JOINT RELEASES
515 525 FORCE X MOMENT Z KFY 37.500
514 524 FORCE X MOMENT Z KFY 75.000
513 523 FORCE X MOMENT Z KFY 75.000
512 522 FORCE X MOMENT Z KFY 75.000
511 521 FORCE X MOMENT Z KFY 318.750
310 FORCE X MOMENT Z KFY 562.500
320 MOMENT Z KFY 562.500
411 421 FORCE X MOMENT Z KFY 1753.500
```

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

```
412 422 FORCE X MOMENT Z KFY 2944.500
413 423 FORCE X MOMENT Z KFY 2944.500
414 424 FORCE X MOMENT Z KFY 3209.250
415 425 FORCE X MOMENT Z KFY 2679.750
400 FORCE X MOMENT Z KFY 2415.000
```

## ANÁLISIS DE ESFUERZOS HIPOTESIS-2

De las acciones introducidas en el modelo, se obtienen sus esfuerzos correspondientes y las combinaciones de servicio y rotura. A continuación se listan ambas envolventes, generadas de acuerdo con los siguientes criterios:

***E.L.U.:**

Cajón hincado en Servicio:

Rotura en Servicio, sin Sismo

Rotura con Sismo

Estas envolventes se envuelven obteniéndose una envolvente total para el cajón hincado en servicio.

***E.L.S.:**

A partir de los estados elementales (y sus envolventes parciales), se realiza una envolvente única de Servicio, en combinación característica.

Las reacciones y esfuerzos de esta envolvente nos permitirán comprobar el estado de la cimentación del cajón hincado en servicio. Según estas reacciones es necesario una tensión mínima de 2.50 Kp/cm$^2$.

Los esfuerzos y reacciones de dicha envolvente pueden observarse a continuación.

Para la comprobación del estado de fisuración del cajón hincado, se realiza la envolvente con sobrecargas frecuentes. Dicha envolvente así como las comprobaciones pertinentes se explicitan más adelante en el presente Anejo.

Los listados que aparecen a continuación son los de definición de los estados de cargas.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. | Fecha JUNIO-2002 | Página de

# GENERACIÓN DE ENVOLVENTES. HIP-2

*Marco.gec*: Define los estados de carga elementales y envolventes totales, tanto en servicio como en rotura. Importa estados de carga calculados en el archivo: *Ma2.gec*, para realizar las envolventes totales.

*Ma2.gec:* Genera todos los posibles estados elementales de sobrecarga uniforme y sobrecaga puntual, colocándolas en distintas posiciones de la estructura y obtiene una envolvente de sobrecargas que se exporta al *"Marco.Gec"*.

**Fichero: MARCO.GEC**

```
"
" Proyecto:L.A.V.MARTORELL.
" Elemento:ODT 300.4.
" Cliente:INOCSA
"
" Creado por ALEPH-MARCOS 4.2.1
" Fecha: 02.05.02 Hora: 13:22:51
"
" Generación de envolventes Totales.
"          Servicio y Rotura.


* TIT
L.A.V.MARTORELL. - ODT 300.4.
Envolventes totales

* DIRESF ESF
* SDF MARCO.SDF

* EC
" ---- ESTADOS DE CARGA MARCO EN SERVICIO -----
   1   MA1001      0   Peso Propio
   2   MA1002      0   Empuje Activo
   3   MA1003      0   Empuje Reposo
   4   MA1004      0   Sismo en Tierras
   5   SC_S_ACT    1   Envolvente S.C.U. Dintel (Empuje Activo)
   6   SC_S_REP    1   Envolvente S.C.U. Dintel (Empuje Reposo)
   7   VP_SUP      1   Envolvente Vehiculo Pesado Dintel
   8   SC_S_INF    1   Envolvente S.C.U. Zapata
   9   VP_INF      1   Envolvente Vehiculo Pesado Zapata
  10   MA2113      0   Sobre elevacion nivel de agua

" ---- ESTADOS DE CARGA MARCO EN CONSTRUCCION -----
  20   EM_C_ACT    1   Envolvente Empujes Activo (Construccion Por
Tongadas)
  21   EM_C_REP    1   Envolvente Empujes Reposo (Construccion Por
Tongadas)
  22   SC_C_ACT    1   Envolvente S.C.U. Dintel (Marco Constru., Empuje
Activo)
  23   SC_C_REP    1   Envolvente S.C.U. Dintel (Marco Constru., Empuje Reposo)
  24   SC_C_INF    1   Envolvente S.C.U. Zapata (Marco Construccion)

* ENV

  30   MA_SERV  1   Envolvente de Servicio (Marco en Servicio)
   incomp 2 3  " Empujes
   incomp 4 5  " Sobrecargas
  ec1   1.00  1.00   " Peso Propio
   ec2   1.00  1.00   " Empuje Activo
  ec3  1.00  1.00   " Empuje Reposo
  ec5  0.00  1.00   " Envolvente S.C.U. Dintel (Empuje Activo)
  ec6   0.00  1.00   " Envolvente S.C.U. Dintel (Empuje Reposo)
   ec7   0.00  1.00   " Envolvente Vehiculo Pesado Dintel
   ec8   0.00  1.00   " Envolvente S.C.U. Zapata
   ec9   0.00  1.00   " Envolvente Vehiculo Pesado Zapata

  31   MA_RO1  1   Envolvente de Rotura (Marco en Servicio)

   incomp 2 3  " Empujes
   incomp 4 5  " Sobrecargas
  ec1   1.00  1.35   " Peso Propio
   ec2   1.00  1.50   " Empuje Activo
  ec3   1.00  1.50   " Empuje Reposo
   ec5   0.00  1.50   " Envolvente S.C.U. Dintel (Empuje Activo)
  ec6   0.00  1.50   " Envolvente S.C.U. Dintel (Empuje Reposo)
   ec7   0.00  1.50   " Envolvente Vehiculo Pesado Dintel
   ec8   0.00  1.50   " Envolvente S.C.U. Zapata
   ec9   0.00  1.50   " Envolvente Vehiculo Pesado Zapata

  32   MA_SIS  1   Envolvente de Rotura en SOBRE-ELEVACION NIVEL DE
AGUA (Marco en Servicio)

   incomp 2 3  " Empujes
   incomp 5 6  " Sobrecargas
  ec1   1.00  1.35   " Peso Propio
  ec2   1.00  1.50   " Empuje Activo
   ec3   1.00  1.50   " Empuje Reposo
  ec4  -1.00  1.00   " Sismo en Tierras
  ec5   0.00  0.20   " Envolvente S.C.U. Dintel (Empuje Activo)
  ec6   0.00  0.20   " Envolvente S.C.U. Dintel (Empuje Reposo)
  ec7   0.00  0.20   " Envolvente Vehiculo Pesado Dintel
   ec10  0.00  1.00   "  Sobre elevacion nivel de agua

  33  MA_ROT  1   Envolvente de Rotura (Envolvente Servicio-Sismo)

   incomp todos
   ec31  1.00  1.00   " Marco en Servicio
   ec32  1.00  1.00   " Marco en Sismo

  34   MA_C1  1   Envolvente de Rotura en Construccion (Tongadas)

   incomp 2 3  " Empujes
   ec1   1.00  1.35   " Peso Propio
  ec20  1.00  1.35   " Empuje Activo (Tongadas, incluye SCU 1.0 Tn/m2)
   ec21   1.00   1.35   " Empuje Reposo (Tongadas, incluye SCU 1.0
Tn/m2)
   ec24  0.00  1.35   " Envolvente S.C.U. Zapata (construccion)

  35   MA_C2  1   Envolvente de Rotura en Construccion (Terraplen
Terminado)

   incomp 2 3  " Empujes
   incomp 4 5  " Sobrecargas
   ec1   1.00  1.35   " Peso Propio
   ec2   1.00  1.35   " Empuje Activo
   ec3   1.00  1.35   " Empuje Reposo
```

```
   ec22  0.00  1.35   " Envolvente S.C.U. Dintel (Construccion, Empuje
Activo)
   ec23  0.00  1.35   " Envolvente S.C.U. Dintel (Construccion, Empuje Reposo)
   ec24  0.00  1.35   " Envolvente S.C.U. Zapata (Construccion)

   36   MA_CON  1    Envolvente de Rotura en Construccion (Envolvente)

   incomp todos
   ec34  1.00  1.00   " Tongadas
   ec35  1.00  1.00   " Terraplen Terminado

* SELECT

  mbdesel todos
  nddesel todos

"  Seleccionamos medio Marco.
  mbsel i 1 a 6       " Dintel
  mbsel i 111 a 116   " Hastial
  mbsel d 116         " Hastial
  mbsel i 211 a 214   " Cartela Sup
  mbsel i 311 312     " Cartela Inf
  mbsel i 511 a 514   " Talon Zapata
  mbsel d 514         " Talon Zapata
  mbsel i 411 a 415   " Puntera Zapata
  mbsel d 415         " Puntera Zapata
  mbsel i 410 520     " Empotramiento Hastial-Zapata
  ndmb

  esfsel x y zz
   ressel Esfuerzos Reacciones Desplazamientos

* PRINT

  output -r MA_ELE.LST
  grupos si

  tit Estados Elementales. Proyecto: L.A.V.MARTORELL. - ODT 300.4.
  ec(1 a 29) x+ x- y+ y- zz+ zz-

  output -a MA_ELE.LST
  grupos si

  tit Estados Envolventes secundarias. Proyecto: L.A.V.MARTORELL. - ODT
300.4.
  ec(31 32 34 35) x+ x- y+ y- zz+ zz-

* PRINT

  output -r MA_SER.LST
  grupos si

  tit Estado Servicio. Proyecto: L.A.V.MARTORELL. - ODT 300.4.
  ec(30) x+ x- y+ y- zz+ zz-

* PRINT

  output -r MA_ROT.LST
  grupos si

  tit Estados Rotura. Proyecto: L.A.V.MARTORELL. - ODT 300.4.
```

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

```
  ec(33 36) x+ x- y+ y- zz+ zz-
```

**Fichero: MA2.GEC**

```
"
" Proyecto:L.A.V.MARTORELL.
" Elemento:ODT 300.4.
" Cliente:INOCSA
"
" Creado por ALEPH-MARCOS 4.2.1
" Creado por ALEPH-MARCOS 1.0.2.
" Fecha: 02.05.02 Hora: 13:21:57
"
" Generación de envolvente de Sobrecargas Servicio.



* TIT
L.A.V.MARTORELL. - ODT 300.4.
Paseo de Sobrecargas


* DIRESF ESF
* SDF MARCO.SDF

* EC
     1   MA2001  0  PASEO SCU Posicion 1 (Activo)
     2   MA2002  0  PASEO SCU Posicion 18 (Activo)
     3   MA2003  0  PASEO SCU Posicion 1 (Reposo)
     4   MA2004  0  PASEO SCU Posicion 18 (Reposo)
     5   MA2005  0  PASEO SCU Posicion 2
     6   MA2006  0  PASEO SCU Posicion 3
     7   MA2007  0  PASEO SCU Posicion 4
     8   MA2008  0  PASEO SCU Posicion 5
     9   MA2009  0  PASEO SCU Posicion 6
    10   MA2010  0  PASEO SCU Posicion 7
    11   MA2011  0  PASEO SCU Posicion 8
    12   MA2012  0  PASEO SCU Posicion 9
    13   MA2013  0  PASEO SCU Posicion 10
    14   MA2014  0  PASEO SCU Posicion 11
    15   MA2015  0  PASEO SCU Posicion 12
    16   MA2016  0  PASEO SCU Posicion 13
    17   MA2017  0  PASEO SCU Posicion 14
    18   MA2018  0  PASEO SCU Posicion 15
    19   MA2019  0  PASEO SCU Posicion 16
    20   MA2020  0  PASEO SCU Posicion 17
    21   MA2021  0  PASEO SCU INF. Posicion 1
    22   MA2022  0  PASEO SCU INF. Posicion 2
    23   MA2023  0  PASEO SCU INF. Posicion 3
    24   MA2024  0  PASEO SCU INF. Posicion 4
    25   MA2025  0  PASEO SCU INF. Posicion 5
    26   MA2026  0  PASEO SCU INF. Posicion 6
    27   MA2027  0  PASEO SCU INF. Posicion 7
    28   MA2028  0  PASEO SCU INF. Posicion 8
    29   MA2029  0  PASEO SCU INF. Posicion 9
    30   MA2030  0  PASEO SCU INF. Posicion 10
    31   MA2031  0  PASEO TREN PUNTUAL. Posicion 1
    32   MA2032  0  PASEO TREN PUNTUAL. Posicion 2
    33   MA2033  0  PASEO TREN PUNTUAL. Posicion 3
    34   MA2034  0  PASEO TREN PUNTUAL. Posicion 4
    35   MA2035  0  PASEO TREN PUNTUAL. Posicion 5
    36   MA2036  0  PASEO TREN PUNTUAL. Posicion 6
    37   MA2037  0  PASEO TREN PUNTUAL. Posicion 7
    38   MA2038  0  PASEO TREN PUNTUAL. Posicion 8
    39   MA2039  0  PASEO TREN PUNTUAL. Posicion 9
    40   MA2040  0  PASEO TREN PUNTUAL. Posicion 10
    41   MA2041  0  PASEO TREN PUNTUAL. Posicion 11
    42   MA2042  0  PASEO TREN PUNTUAL. Posicion 12
    43   MA2043  0  PASEO TREN PUNTUAL. Posicion 13
    44   MA2044  0  PASEO TREN PUNTUAL. Posicion 14
    45   MA2045  0  PASEO TREN PUNTUAL. Posicion 15
    46   MA2046  0  PASEO TREN PUNTUAL. Posicion 16
    47   MA2047  0  PASEO TREN PUNTUAL. Posicion 17
    48   MA2048  0  PASEO TREN PUNTUAL. Posicion 18
```

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

```
    49   MA2049  0  PASEO TREN PUNTUAL. Posicion 19
    50   MA2050  0  PASEO TREN PUNTUAL. Posicion 20
    51   MA2051  0  PASEO TREN PUNTUAL. Posicion 21
    52   MA2052  0  PASEO TREN PUNTUAL. Posicion 22
    53   MA2053  0  PASEO TREN PUNTUAL. Posicion 23
    54   MA2054  0  PASEO TREN PUNTUAL. Posicion 24
    55   MA2055  0  PASEO TREN PUNTUAL. Posicion 25
    56   MA2056  0  PASEO TREN PUNTUAL. Posicion 26
    57   MA2057  0  PASEO TREN PUNTUAL. Posicion 27
    58   MA2058  0  PASEO TREN PUNTUAL. Posicion 28
    59   MA2059  0  PASEO TREN PUNTUAL. Posicion 29
    60   MA2060  0  PASEO TREN PUNTUAL. Posicion 30
    61   MA2061  0  PASEO TREN PUNTUAL. Posicion 31
    62   MA2062  0  PASEO TREN PUNTUAL. Posicion 32
    63   MA2063  0  PASEO TREN REPARTIDO. Posicion 1
    64   MA2064  0  PASEO TREN REPARTIDO. Posicion 2
    65   MA2065  0  PASEO TREN REPARTIDO. Posicion 3
    66   MA2066  0  PASEO TREN REPARTIDO. Posicion 4
    67   MA2067  0  PASEO TREN REPARTIDO. Posicion 5
    68   MA2068  0  PASEO TREN REPARTIDO. Posicion 6
    69   MA2069  0  PASEO TREN REPARTIDO. Posicion 7
    70   MA2070  0  PASEO TREN REPARTIDO. Posicion 8
    71   MA2071  0  PASEO TREN REPARTIDO. Posicion 9
    72   MA2072  0  PASEO TREN REPARTIDO. Posicion 10
    73   MA2073  0  PASEO TREN REPARTIDO. Posicion 11
    74   MA2074  0  PASEO TREN REPARTIDO. Posicion 12
    75   MA2075  0  PASEO TREN REPARTIDO. Posicion 13
    76   MA2076  0  PASEO TREN REPARTIDO. Posicion 14
    77   MA2077  0  PASEO TREN REPARTIDO. Posicion 15
    78   MA2078  0  PASEO TREN REPARTIDO. Posicion 16
    79   MA2079  0  PASEO TREN REPARTIDO. Posicion 17
    80   MA2080  0  PASEO TREN REPARTIDO. Posicion 18
    81   MA2081  0  PASEO TREN REPARTIDO. Posicion 19
    82   MA2082  0  PASEO TREN REPARTIDO. Posicion 20
    83   MA2083  0  PASEO TREN REPARTIDO. Posicion 21
    84   MA2084  0  PASEO TREN REPARTIDO. Posicion 22
    85   MA2085  0  PASEO TREN REPARTIDO. Posicion 23
    86   MA2086  0  PASEO TREN REPARTIDO. Posicion 24
    87   MA2087  0  PASEO TREN REPARTIDO. Posicion 25
    88   MA2088  0  PASEO TREN REPARTIDO. Posicion 26
    89   MA2089  0  PASEO TREN REPARTIDO. Posicion 27
    90   MA2090  0  PASEO TREN REPARTIDO. Posicion 28
    91   MA2091  0  PASEO TREN REPARTIDO. Posicion 29
    92   MA2092  0  PASEO TREN REPARTIDO. Posicion 30
    93   MA2093  0  PASEO TREN REPARTIDO. Posicion 31
    94   MA2094  0  PASEO TREN REPARTIDO. Posicion 32
    95   MA2095  0  PASEO VP INFERIOR. Posicion 1
    96   MA2096  0  PASEO VP INFERIOR. Posicion 2
    97   MA2097  0  PASEO VP INFERIOR. Posicion 3
    98   MA2098  0  PASEO VP INFERIOR. Posicion 4
    99   MA2099  0  PASEO VP INFERIOR. Posicion 5
   100   MA2100  0  PASEO VP INFERIOR. Posicion 6
   101   MA2101  0  PASEO VP INFERIOR. Posicion 7
   102   MA2102  0  PASEO VP INFERIOR. Posicion 8
   103   MA2103  0  PASEO VP INFERIOR. Posicion 9
   104   MA2104  0  PASEO VP INFERIOR. Posicion 10
   105   MA2105  0  PASEO VP INFERIOR. Posicion 11
   106   MA2106  0  PASEO VP INFERIOR. Posicion 12
   107   MA2107  0  PASEO VP INFERIOR. Posicion 13
   108   MA2108  0  PASEO VP INFERIOR. Posicion 14
   109   MA2109  0  PASEO VP INFERIOR. Posicion 15
   110   MA2110  0  PASEO VP INFERIOR. Posicion 16
   111   MA2111  0  PASEO VP INFERIOR. Posicion 17
   112   MA2112  0  PASEO VP INFERIOR. Posicion 18

* ENV
   113  SC_S_ACT   1   Envolvente Paseo SCU (ACTIVO)

        ec1   0.00  1.00
        ec2   0.00  1.00
        ec5   0.00  1.00
        ec6   0.00  1.00
        ec7   0.00  1.00
        ec8   0.00  1.00
        ec9   0.00  1.00
```

```
ec10   0.00  1.00
ec11   0.00  1.00
ec12   0.00  1.00
ec13   0.00  1.00
ec14   0.00  1.00
ec15   0.00  1.00
ec16   0.00  1.00
ec17   0.00  1.00
ec18   0.00  1.00
ec19   0.00  1.00
ec20   0.00  1.00

114  SC_S_REP   1   Envolvente Paseo SCU (REPOSO)

 ec3   0.00  1.00
 ec4   0.00  1.00
 ec5   0.00  1.00
 ec6   0.00  1.00
 ec7   0.00  1.00
 ec8   0.00  1.00
 ec9   0.00  1.00
ec10   0.00  1.00
ec11   0.00  1.00
ec12   0.00  1.00
ec13   0.00  1.00
ec14   0.00  1.00
ec15   0.00  1.00
ec16   0.00  1.00
ec17   0.00  1.00
ec18   0.00  1.00
ec19   0.00  1.00
ec20   0.00  1.00

115  SC_S_INF   1   Envolvente Paseo SCU Inferior

ec21   0.00  1.00
ec22   0.00  1.00
ec23   0.00  1.00
ec24   0.00  1.00
ec25   0.00  1.00
ec26   0.00  1.00
ec27   0.00  1.00
ec28   0.00  1.00
ec29   0.00  1.00
ec30   0.00  1.00

116  VP_SUP   1   Envolvente Paseo VP SUPERIOR
incomp todos

ec31   0.00  1.00
```

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.4.* | Fecha JUNIO-*2002* | Página de

```
ec32   0.00  1.00
ec33   0.00  1.00
ec34   0.00  1.00
ec35   0.00  1.00
ec36   0.00  1.00
ec37   0.00  1.00
ec38   0.00  1.00
ec39   0.00  1.00
ec40   0.00  1.00
ec41   0.00  1.00
ec42   0.00  1.00
ec43   0.00  1.00
ec44   0.00  1.00
ec45   0.00  1.00
ec46   0.00  1.00
ec47   0.00  1.00
ec48   0.00  1.00
ec49   0.00  1.00
ec50   0.00  1.00
ec51   0.00  1.00
ec52   0.00  1.00
ec53   0.00  1.00
ec54   0.00  1.00
ec55   0.00  1.00
ec56   0.00  1.00
ec57   0.00  1.00
ec58   0.00  1.00
ec59   0.00  1.00
ec60   0.00  1.00
ec61   0.00  1.00
ec62   0.00  1.00
ec63   0.00  1.00
ec64   0.00  1.00
ec65   0.00  1.00
ec66   0.00  1.00
ec67   0.00  1.00
ec68   0.00  1.00
ec69   0.00  1.00
ec70   0.00  1.00
ec71   0.00  1.00
ec72   0.00  1.00
ec73   0.00  1.00
ec74   0.00  1.00
ec75   0.00  1.00
ec76   0.00  1.00
ec77   0.00  1.00
ec78   0.00  1.00
```

```
      ec79    0.00  1.00
      ec80    0.00  1.00
      ec81    0.00  1.00
      ec82    0.00  1.00
      ec83    0.00  1.00
      ec84    0.00  1.00
      ec85    0.00  1.00
      ec86    0.00  1.00
      ec87    0.00  1.00
      ec88    0.00  1.00
      ec89    0.00  1.00
      ec90    0.00  1.00
      ec91    0.00  1.00
      ec92    0.00  1.00
      ec93    0.00  1.00
      ec94    0.00  1.00


117  VP_INF   1   Envolvente Paseo VP INFERIOR
incomp todos

      ec95    0.00  1.00
      ec96    0.00  1.00
      ec97    0.00  1.00
      ec98    0.00  1.00
      ec99    0.00  1.00
     ec100    0.00  1.00
     ec101    0.00  1.00
     ec102    0.00  1.00
     ec103    0.00  1.00
     ec104    0.00  1.00
     ec105    0.00  1.00
     ec106    0.00  1.00
     ec107    0.00  1.00
     ec108    0.00  1.00
     ec109    0.00  1.00
     ec110    0.00  1.00
     ec111    0.00  1.00
     ec112    0.00  1.00


* BORRA EC 1 a 112
```

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

# ENVOLVENTES DE ROTURA. HIP-2

**Fichero: MA_ROT.LST**

LISTADO DE ESTADOS DE CARGA
Fecha : 02.05.2002 13:59:01
T¡tulo: L.A.V.MARTORELL. - ODT 300.4.
Coment: Envolventes totales
Titlst: Estados Rotura. Proyecto: L.A.V.MARTORELL. - ODT 3

Tabla de estados de carga a listar
ec Fichero tipo T¡tulo
33 MA_ROT 1 [Envolvente de Rotura (Envolvente Servicio-Sismo) ]
36 MA_CON 1 [Envolvente de Rotura en Construccion (Envolvente) ]

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Mz |
|---|---|---|---|---|---|---|
| 1 | 1 | 33 | Nx+ | -6.77 | -11.61 | 5.59 |
| | | 33 | Fy+ | -14.71 | -8.81 | 8.33 |
| | | 33 | Mz+ | -14.85 | -23.45 | 14.56 |
| | | 33 | Nx- | -39.96 | -36.32 | -33.30 |
| | | 33 | Fy- | -30.79 | -48.51 | -24.73 |
| | | 33 | Mz- | -33.03 | -37.76 | -38.60 |
| | | 36 | Nx+ | 0.98 | -5.02 | 3.17 |
| | | 36 | Fy+ | 0.03 | -3.63 | 2.49 |
| | | 36 | Mz+ | 0.72 | -4.96 | 3.32 |
| | | 36 | Nx- | -24.74 | -22.97 | -12.37 |
| | | 36 | Fy- | -22.43 | -24.76 | -12.98 |
| | | 36 | Mz- | -22.55 | -21.56 | -14.43 |
| 2 | 2 | 33 | Nx+ | -6.77 | -2.71 | 18.27 |
| | | 33 | Fy+ | -15.41 | 0.75 | 32.57 |
| | | 33 | Mz+ | -23.80 | -14.32 | 51.23 |
| | | 33 | Nx- | -39.96 | -25.70 | 21.58 |
| | | 33 | Fy- | -32.23 | -29.59 | 26.96 |
| | | 33 | Mz- | -20.46 | -8.97 | 3.20 |
| | | 36 | Nx+ | 0.98 | -1.44 | 8.88 |
| | | 36 | Fy+ | 0.03 | -0.97 | 6.56 |
| | | 36 | Mz+ | -16.08 | -8.81 | 24.48 |
| | | 36 | Nx- | -24.74 | -10.75 | 17.49 |
| | | 36 | Fy- | -22.32 | -12.12 | 17.35 |
| | | 36 | Mz- | -11.51 | -1.94 | -0.61 |
| 3 | 3 | 33 | Nx+ | -6.77 | 6.19 | 15.19 |
| | | 33 | Fy+ | -22.61 | 15.45 | 46.17 |
| | | 33 | Mz+ | -28.22 | 0.76 | 59.09 |
| | | 33 | Nx- | -39.96 | -5.10 | 51.75 |
| | | 33 | Fy- | -24.42 | -11.95 | 36.92 |
| | | 33 | Mz- | -18.76 | 2.35 | 7.46 |
| | | 36 | Nx+ | 0.98 | 2.15 | 8.24 |
| | | 36 | Fy+ | -15.67 | 5.76 | 24.90 |
| | | 36 | Mz+ | -16.81 | 3.29 | 29.92 |
| | | 36 | Nx- | -24.74 | 1.47 | 25.72 |
| | | 36 | Fy- | -16.78 | -0.54 | 19.18 |
| | | 36 | Mz- | -11.51 | 1.19 | 0.06 |
| 4 | 4 | 33 | Nx+ | -6.77 | 15.09 | -3.65 |
| | | 33 | Fy+ | -25.64 | 33.96 | 21.62 |
| | | 33 | Mz+ | -32.44 | 20.40 | 41.35 |
| | | 33 | Nx- | -39.96 | 20.39 | 38.16 |
| | | 33 | Fy- | -22.71 | 1.74 | 26.02 |
| | | 33 | Mz- | -15.55 | 14.80 | -8.85 |
| | | 36 | Nx+ | 0.98 | 5.73 | 1.24 |
| | | 36 | Fy+ | -16.04 | 17.92 | 7.15 |
| | | 36 | Mz+ | -12.13 | 12.32 | 13.92 |
| | | 36 | Nx- | -24.74 | 13.69 | 12.29 |
| | | 36 | Fy- | -4.48 | 3.02 | 1.59 |
| | | 36 | Mz- | -6.95 | 5.27 | -5.47 |
| 5 | 5 | 33 | Nx+ | -8.46 | 24.87 | -45.09 |
| | | 33 | Fy+ | -30.38 | 54.78 | -51.16 |
| | | 33 | Mz+ | -24.53 | 26.56 | -4.55 |
| | | 33 | Nx- | -43.23 | 47.11 | -33.85 |
| | | 33 | Fy- | -21.60 | 13.74 | -10.85 |
| | | 33 | Mz- | -28.07 | 50.75 | -68.44 |
| | | 36 | Nx+ | 0.31 | 9.93 | -14.76 |
| | | 36 | Fy+ | -18.52 | 31.35 | -41.79 |
| | | 36 | Mz+ | -4.87 | 5.78 | -7.75 |
| | | 36 | Nx- | -26.53 | 26.11 | -30.21 |
| | | 36 | Fy- | -7.81 | 5.70 | -10.99 |
| | | 36 | Mz- | -18.03 | 29.23 | -42.31 |
| 6 | 6 | 33 | Nx+ | -8.35 | -32.24 | -86.61 |
| | | 33 | Fy+ | -20.21 | -21.43 | -39.96 |
| | | 33 | Mz+ | -20.21 | -21.43 | -39.96 |
| | | 33 | Nx- | -43.38 | -55.98 | -110.10 |
| | | 33 | Fy- | -29.54 | -69.02 | -123.60 |
| | | 33 | Mz- | -28.57 | -68.27 | -156.37 |
| | | 36 | Nx+ | 0.71 | -12.80 | -30.40 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Fy+ | -7.55 | -7.82 | -20.16 |
| | | 36 | Mz+ | -4.61 | -7.91 | -17.05 |
| | | 36 | Nx- | -26.77 | -36.32 | -76.03 |
| | | 36 | Fy- | -18.79 | -42.13 | -94.54 |
| | | 36 | Mz- | -18.79 | -42.13 | -94.54 |
| 111 | 111 | 33 | Nx+ | -26.88 | -19.88 | -25.26 |
| | | 33 | Fy+ | -49.81 | 1.48 | -10.83 |
| | | 33 | Mz+ | -31.81 | -9.42 | -1.03 |
| | | 33 | Nx- | -78.66 | -14.36 | -33.80 |
| | | 33 | Fy- | -41.34 | -31.88 | -36.17 |
| | | 33 | Mz- | -73.04 | -22.05 | -54.65 |
| | | 36 | Nx+ | -16.63 | -4.92 | -9.54 |
| | | 36 | Fy+ | -16.76 | -0.65 | -8.10 |
| | | 36 | Mz+ | -18.53 | -13.61 | -4.09 |
| | | 36 | Nx- | -50.78 | -16.01 | -23.60 |
| | | 36 | Fy- | -44.23 | -21.15 | -25.64 |
| | | 36 | Mz- | -48.29 | -14.08 | -28.82 |
| 112 | 112 | 33 | Nx+ | -25.45 | -14.24 | -11.34 |
| | | 33 | Fy+ | -48.38 | 5.29 | -13.64 |
| | | 33 | Mz+ | -30.33 | -3.75 | 4.32 |
| | | 33 | Nx- | -76.73 | -5.79 | -25.62 |
| | | 33 | Fy- | -39.41 | -21.48 | -14.44 |
| | | 33 | Mz- | -71.16 | -14.48 | -39.77 |
| | | 36 | Nx+ | -15.20 | -2.79 | -6.42 |
| | | 36 | Fy+ | -15.33 | -0.65 | -7.57 |
| | | 36 | Mz+ | -17.10 | -7.44 | 4.44 |
| | | 36 | Nx- | -48.85 | -8.30 | -13.74 |
| | | 36 | Fy- | -42.30 | -12.89 | -11.80 |
| | | 36 | Mz- | -46.97 | -8.03 | -19.94 |
| 113 | 113 | 33 | Nx+ | -24.02 | -9.04 | -1.89 |
| | | 33 | Fy+ | -46.95 | 8.65 | -19.36 |
| | | 33 | Mz+ | -35.45 | -4.89 | 10.55 |
| | | 33 | Nx- | -74.80 | 1.77 | -24.05 |
| | | 33 | Fy- | -37.48 | -12.08 | -0.83 |
| | | 33 | Mz- | -67.31 | -0.61 | -35.17 |
| | | 36 | Nx+ | -13.77 | -1.27 | -4.81 |
| | | 36 | Fy+ | -34.37 | 0.58 | -12.12 |
| | | 36 | Mz+ | -15.67 | -2.19 | 8.33 |
| | | 36 | Nx- | -46.92 | -1.50 | -9.80 |
| | | 36 | Fy- | -27.29 | -5.74 | -2.90 |
| | | 36 | Mz- | -45.61 | -1.20 | -16.73 |
| 114 | 114 | 33 | Nx+ | -22.59 | -4.29 | 3.53 |
| | | 33 | Fy+ | -53.76 | 13.23 | -21.33 |



| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Mz+ | -32.20 | 0.46 | 11.70 |
| | | 33 | Nx- | -72.87 | 8.33 | -28.23 |
| | | 33 | Fy- | -27.31 | -5.34 | -0.80 |
| | | 33 | Mz- | -66.80 | 9.63 | -38.26 |
| | | 36 | Nx+ | -12.34 | -0.34 | -4.20 |
| | | 36 | Fy+ | -38.86 | 4.81 | -7.91 |
| | | 36 | Mz+ | -14.24 | 2.18 | 8.27 |
| | | 36 | Nx- | -44.99 | 4.41 | -11.04 |
| | | 36 | Fy- | -16.76 | -1.31 | -0.70 |
| | | 36 | Mz- | -44.31 | 3.78 | -17.64 |
| 115 | 115 | 33 | Nx+ | -21.16 | 0.03 | 5.22 |
| | | 33 | Fy+ | -52.33 | 18.79 | -34.49 |
| | | 33 | Mz+ | -22.19 | 3.08 | 9.70 |
| | | 33 | Nx- | -70.94 | 13.90 | -37.36 |
| | | 33 | Fy- | -25.39 | -1.02 | 1.76 |
| | | 33 | Mz- | -62.80 | 14.59 | -48.25 |
| | | 36 | Nx+ | -10.91 | -0.03 | -4.08 |
| | | 36 | Fy+ | -37.43 | 9.81 | -13.94 |
| | | 36 | Mz+ | -11.14 | 2.29 | 5.36 |
| | | 36 | Nx- | -43.06 | 9.42 | -16.76 |
| | | 36 | Fy- | -14.86 | -0.98 | -8.02 |
| | | 36 | Mz- | -42.38 | 7.12 | -22.14 |
| 116 | 116 | 33 | Nx+ | -19.73 | 3.89 | 3.59 |
| | | 33 | Fy+ | -49.78 | 23.74 | -42.28 |
| | | 33 | Mz+ | -20.25 | 6.67 | 5.78 |
| | | 33 | Nx- | -69.01 | 18.46 | -50.64 |
| | | 33 | Fy- | -24.58 | 2.45 | -8.50 |
| | | 33 | Mz- | -60.88 | 17.65 | -61.44 |
| | | 36 | Nx+ | -9.48 | -0.03 | -4.06 |
| | | 36 | Fy+ | -35.66 | 14.04 | -20.85 |
| | | 36 | Mz+ | -9.71 | 4.52 | 2.51 |
| | | 36 | Nx- | -41.13 | 13.53 | -26.18 |
| | | 36 | Fy- | -12.93 | -0.98 | -7.22 |
| | | 36 | Mz- | -40.45 | 9.85 | -29.10 |
| 116 | 117 | 33 | Nx+ | -18.30 | 7.32 | -1.02 |
| | | 33 | Fy+ | -48.35 | 29.15 | -63.96 |
| | | 33 | Mz+ | -18.57 | 6.84 | -0.74 |
| | | 33 | Nx- | -67.08 | 22.02 | -67.24 |
| | | 33 | Fy- | -22.65 | 4.03 | -11.18 |
| | | 33 | Mz- | -59.70 | 25.35 | -77.49 |
| | | 36 | Nx+ | -8.05 | -0.03 | -4.03 |
| | | 36 | Fy+ | -34.23 | 17.79 | -33.91 |
| | | 36 | Mz+ | -8.28 | 5.85 | -1.79 |
| | | 36 | Nx- | -39.20 | 16.73 | -38.61 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Fy- | -11.00 | -0.98 | -6.44 |
| | | 36 | Mz- | -38.75 | 16.80 | -38.65 |
| 211 | 211 | 33 | Nx+ | -17.79 | 8.14 | -2.67 |
| | | 33 | Fy+ | -47.83 | 30.40 | -70.36 |
| | | 33 | Mz+ | -18.06 | 7.66 | -2.29 |
| | | 33 | Nx- | -66.39 | 22.79 | -72.01 |
| | | 33 | Fy- | -21.96 | 4.37 | -12.08 |
| | | 33 | Mz- | -58.98 | 26.40 | -83.01 |
| | | 36 | Nx+ | -7.54 | -0.03 | -4.02 |
| | | 36 | Fy+ | -33.72 | 18.63 | -37.80 |
| | | 36 | Mz+ | -7.77 | 6.06 | -3.06 |
| | | 36 | Nx- | -38.51 | 17.43 | -42.26 |
| | | 36 | Fy- | -10.31 | -0.98 | -6.23 |
| | | 36 | Mz- | -38.05 | 17.49 | -42.32 |
| 212 | 212 | 33 | Nx+ | -8.38 | -16.08 | -11.43 |
| | | 33 | Fy+ | -15.91 | -13.51 | -6.49 |
| | | 33 | Mz+ | -11.57 | -14.16 | -4.02 |
| | | 33 | Nx- | -41.66 | -51.54 | -80.58 |
| | | 33 | Fy- | -30.16 | -58.11 | -73.93 |
| | | 33 | Mz- | -38.04 | -49.65 | -88.71 |
| | | 36 | Nx+ | -0.68 | -6.86 | -4.40 |
| | | 36 | Fy+ | -7.44 | -5.60 | -4.37 |
| | | 36 | Mz+ | -4.89 | -5.97 | -3.84 |
| | | 36 | Nx- | -25.90 | -31.09 | -43.87 |
| | | 36 | Fy- | -19.81 | -32.01 | -43.38 |
| | | 36 | Mz- | -25.00 | -31.16 | -46.11 |
| 213 | 213 | 33 | Nx+ | -8.39 | -13.77 | -6.10 |
| | | 33 | Fy+ | -16.96 | -10.99 | -2.13 |
| | | 33 | Mz+ | -12.38 | -11.69 | 0.60 |
| | | 33 | Nx- | -42.47 | -46.20 | -63.14 |
| | | 33 | Fy- | -30.75 | -53.41 | -57.82 |
| | | 33 | Mz- | -38.13 | -41.28 | -72.61 |
| | | 36 | Nx+ | -0.43 | -5.70 | -2.17 |
| | | 36 | Fy+ | -7.20 | -4.44 | -2.59 |
| | | 36 | Mz+ | -1.11 | -5.48 | -1.87 |
| | | 36 | Nx- | -26.44 | -27.39 | -33.60 |
| | | 36 | Fy- | -19.80 | -28.43 | -32.75 |
| | | 36 | Mz- | -25.27 | -27.38 | -35.74 |
| 214 | 214 | 33 | Nx+ | -8.49 | -11.12 | -0.01 |
| | | 33 | Fy+ | -18.45 | -8.05 | 2.52 |
| | | 33 | Mz+ | -13.36 | -10.58 | 5.70 |
| | | 33 | Nx- | -43.87 | -40.20 | -44.21 |
| | | 33 | Fy- | -31.54 | -47.60 | -38.07 |



| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Mz- | -38.53 | -33.68 | -54.30 |
| | | 36 | Nx+ | -0.21 | -4.62 | 0.34 |
| | | 36 | Fy+ | -6.97 | -3.36 | -0.68 |
| | | 36 | Mz+ | -0.99 | -6.03 | 0.60 |
| | | 36 | Nx- | -27.25 | -23.07 | -21.55 |
| | | 36 | Fy- | -19.87 | -24.26 | -20.16 |
| | | 36 | Mz- | -25.63 | -21.51 | -23.55 |
| 311 | 311 | 33 | Nx+ | -27.58 | -22.80 | -33.80 |
| | | 33 | Fy+ | -50.51 | -0.54 | -10.62 |
| | | 33 | Mz+ | -33.16 | -6.26 | -3.63 |
| | | 33 | Nx- | -79.60 | -18.92 | -40.46 |
| | | 33 | Fy- | -42.28 | -37.34 | -50.01 |
| | | 33 | Mz- | -74.74 | -34.37 | -66.90 |
| | | 36 | Nx+ | -17.33 | -6.17 | -11.75 |
| | | 36 | Fy+ | -17.46 | -0.65 | -8.37 |
| | | 36 | Mz+ | -17.46 | -0.65 | -8.37 |
| | | 36 | Nx- | -51.73 | -20.11 | -30.84 |
| | | 36 | Fy- | -45.18 | -25.53 | -34.98 |
| | | 36 | Mz- | -49.78 | -24.69 | -37.44 |
| 312 | 312 | 33 | Nx+ | -27.23 | -21.33 | -29.39 |
| | | 33 | Fy+ | -50.16 | 0.48 | -10.62 |
| | | 33 | Mz+ | -31.65 | -5.85 | -2.37 |
| | | 33 | Nx- | -79.13 | -16.61 | -36.90 |
| | | 33 | Fy- | -41.81 | -34.58 | -42.80 |
| | | 33 | Mz- | -74.27 | -31.61 | -60.29 |
| | | 36 | Nx+ | -16.98 | -5.53 | -10.58 |
| | | 36 | Fy+ | -17.11 | -0.65 | -8.23 |
| | | 36 | Mz+ | -18.18 | -12.28 | -6.49 |
| | | 36 | Nx- | -51.25 | -18.03 | -27.02 |
| | | 36 | Fy- | -44.71 | -23.31 | -30.08 |
| | | 36 | Mz- | -49.31 | -22.48 | -32.72 |
| 511 | 511 | 33 | Nx+ | -4.37 | 0.23 | 0.08 |
| | | 33 | Fy+ | -4.37 | 1.97 | 0.29 |
| | | 33 | Mz+ | -4.37 | 1.97 | 0.29 |
| | | 33 | Nx- | -11.64 | -1.20 | -0.05 |
| | | 33 | Fy- | -11.64 | -3.99 | -0.37 |
| | | 33 | Mz- | -11.64 | -3.98 | -0.37 |
| | | 36 | Nx+ | 0.00 | 1.50 | 0.18 |
| | | 36 | Fy+ | 0.00 | 1.50 | 0.18 |
| | | 36 | Mz+ | -0.43 | 1.50 | 0.18 |
| | | 36 | Nx- | -9.40 | -1.63 | -0.11 |
| | | 36 | Fy- | -9.40 | -2.48 | -0.21 |
| | | 36 | Mz- | -9.22 | -2.46 | -0.21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 512 | 512 | 33 | Nx+ | -4.37 | 0.03 | 0.04 |
| | | 33 | Fy+ | -4.37 | 1.30 | 0.14 |
| | | 33 | Mz+ | -4.37 | 1.30 | 0.14 |
| | | 33 | Nx- | -11.64 | -1.08 | -0.03 |
| | | 33 | Fy- | -11.64 | -3.06 | -0.22 |
| | | 33 | Mz- | -11.64 | -3.06 | -0.22 |
| | | 36 | Nx+ | 0.00 | 1.06 | 0.10 |
| | | 36 | Fy+ | 0.00 | 1.06 | 0.10 |
| | | 36 | Mz+ | -0.43 | 1.06 | 0.10 |
| | | 36 | Nx- | -9.40 | -1.35 | -0.07 |
| | | 36 | Fy- | -9.40 | -1.95 | -0.12 |
| | | 36 | Mz- | -9.22 | -1.92 | -0.12 |
| 513 | 513 | 33 | Nx+ | -4.37 | -0.16 | 0.02 |
| | | 33 | Fy+ | -4.37 | 0.61 | 0.08 |
| | | 33 | Mz+ | -4.37 | 0.59 | 0.08 |
| | | 33 | Nx- | -11.64 | -0.95 | -0.02 |
| | | 33 | Fy- | -11.64 | -2.13 | -0.10 |
| | | 33 | Mz- | -11.64 | -2.10 | -0.10 |
| | | 36 | Nx+ | 0.00 | 0.61 | 0.04 |
| | | 36 | Fy+ | 0.00 | 0.61 | 0.04 |
| | | 36 | Mz+ | -0.43 | 0.61 | 0.04 |
| | | 36 | Nx- | -9.40 | -1.05 | -0.03 |
| | | 36 | Fy- | -9.40 | -1.41 | -0.06 |
| | | 36 | Mz- | -9.22 | -1.40 | -0.06 |
| 514 | 514 | 33 | Nx+ | -4.37 | -0.36 | 0.00 |
| | | 33 | Fy+ | -4.37 | -0.10 | 0.01 |
| | | 33 | Mz+ | -6.56 | -0.11 | 0.01 |
| | | 33 | Nx- | -11.64 | -0.82 | 0.00 |
| | | 33 | Fy- | -11.64 | -1.22 | -0.03 |
| | | 33 | Mz- | -8.36 | -1.18 | -0.03 |
| | | 36 | Nx+ | 0.00 | 0.16 | 0.01 |
| | | 36 | Fy+ | -0.43 | 0.16 | 0.01 |
| | | 36 | Mz+ | -0.43 | 0.16 | 0.01 |
| | | 36 | Nx- | -9.40 | -0.77 | -0.01 |
| | | 36 | Fy- | -9.40 | -0.88 | -0.01 |
| | | 36 | Mz- | -4.90 | -0.73 | -0.02 |
| 514 | 515 | 33 | Nx+ | -4.37 | 0.56 | 0.00 |
| | | 33 | Fy+ | -6.56 | 0.87 | 0.00 |
| | | 33 | Mz+ | -10.08 | 0.60 | 0.00 |
| | | 33 | Nx- | -11.64 | 0.71 | 0.00 |
| | | 33 | Fy- | -8.36 | 0.22 | 0.00 |
| | | 33 | Mz- | -10.08 | 0.60 | 0.00 |
| | | 36 | Nx+ | 0.00 | 0.29 | 0.00 |
| | | 36 | Fy+ | -5.90 | 0.52 | 0.00 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Mz+ | -9.40 | 0.48 | 0.00 |
| | | 36 | Nx- | -9.40 | 0.48 | 0.00 |
| | | 36 | Fy- | -7.02 | 0.20 | 0.00 |
| | | 36 | Mz- | -9.40 | 0.48 | 0.00 |
| 520 | 320 | 33 | Nx+ | -4.37 | 2.65 | 1.12 |
| | | 33 | Fy+ | -4.37 | 6.34 | 2.60 |
| | | 33 | Mz+ | -4.37 | 6.34 | 2.60 |
| | | 33 | Nx- | -11.64 | 1.31 | 0.46 |
| | | 33 | Fy- | -11.64 | -3.18 | -1.40 |
| | | 33 | Mz- | -11.64 | -3.18 | -1.40 |
| | | 36 | Nx+ | 0.00 | 1.83 | 0.93 |
| | | 36 | Fy+ | 0.00 | 1.83 | 0.93 |
| | | 36 | Mz+ | -0.97 | 1.83 | 0.93 |
| | | 36 | Nx- | -9.40 | 0.21 | 0.08 |
| | | 36 | Fy- | -7.02 | -2.06 | -0.84 |
| | | 36 | Mz- | -7.02 | -2.06 | -0.84 |
| 410 | 310 | 33 | Nx+ | -4.92 | 40.15 | 12.24 |
| | | 33 | Fy+ | -40.33 | 65.77 | 64.91 |
| | | 33 | Mz+ | -46.01 | 59.89 | 82.36 |
| | | 33 | Nx- | -48.98 | 34.93 | 65.03 |
| | | 33 | Fy- | -17.76 | 21.18 | 30.22 |
| | | 33 | Mz- | -7.45 | 31.24 | 6.16 |
| | | 36 | Nx+ | -0.65 | 12.39 | 9.64 |
| | | 36 | Fy+ | -32.43 | 43.31 | 43.99 |
| | | 36 | Mz+ | -34.09 | 42.28 | 47.73 |
| | | 36 | Nx- | -34.92 | 38.73 | 45.37 |
| | | 36 | Fy- | -0.99 | 12.37 | 9.78 |
| | | 36 | Mz- | -1.30 | 12.39 | 9.63 |
| 411 | 411 | 33 | Nx+ | -4.92 | 19.03 | -1.93 |
| | | 33 | Fy+ | -45.77 | 38.08 | 60.45 |
| | | 33 | Mz+ | -46.03 | 37.42 | 61.25 |
| | | 33 | Nx- | -48.98 | 23.24 | 52.65 |
| | | 33 | Fy- | -12.73 | 6.20 | 3.54 |
| | | 33 | Mz- | -7.15 | 14.62 | -5.23 |
| | | 36 | Nx+ | -0.65 | 3.60 | 5.18 |
| | | 36 | Fy+ | -33.38 | 22.93 | 31.33 |
| | | 36 | Mz+ | -32.40 | 19.06 | 33.71 |
| | | 36 | Nx- | -34.92 | 20.47 | 31.66 |
| | | 36 | Fy- | -1.63 | 3.60 | 5.17 |
| | | 36 | Mz- | -1.30 | 3.60 | 5.17 |
| 412 | 412 | 33 | Nx+ | -4.92 | -2.17 | -47.35 |
| | | 33 | Fy+ | -45.36 | 11.09 | -22.91 |
| | | 33 | Mz+ | -35.76 | 4.36 | 6.61 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Nx- | -48.98 | 1.70 | -5.04 |
| | | 33 | Fy- | -11.70 | -7.77 | -32.00 |
| | | 33 | Mz- | -13.70 | 2.85 | -63.54 |
| | | 36 | Nx+ | -0.65 | -2.08 | -9.97 |
| | | 36 | Fy+ | -33.26 | 5.02 | -20.90 |
| | | 36 | Mz+ | -25.86 | 0.57 | -1.29 |
| | | 36 | Nx- | -34.92 | 3.75 | -19.45 |
| | | 36 | Fy- | -1.85 | -2.80 | -13.47 |
| | | 36 | Mz- | -18.53 | 2.26 | -33.72 |
| 413 | 413 | 33 | Nx+ | -4.92 | -18.30 | -52.36 |
| | | 33 | Fy+ | -35.74 | 1.01 | -11.50 |
| | | 33 | Mz+ | -34.71 | -5.28 | -8.06 |
| | | 33 | Nx- | -48.98 | -6.31 | -38.59 |
| | | 33 | Fy- | -13.71 | -23.72 | -75.17 |
| | | 33 | Mz- | -16.62 | -15.72 | -83.00 |
| | | 36 | Nx+ | -0.65 | -6.19 | -13.99 |
| | | 36 | Fy+ | -25.86 | -4.36 | -10.50 |
| | | 36 | Mz+ | -25.86 | -4.36 | -10.50 |
| | | 36 | Nx- | -34.92 | -9.38 | -37.74 |
| | | 36 | Fy- | -18.53 | -12.16 | -49.07 |
| | | 36 | Mz- | -18.53 | -12.16 | -49.07 |
| 414 | 414 | 33 | Nx+ | -4.92 | -24.88 | -25.66 |
| | | 33 | Fy+ | -34.35 | -7.38 | -8.35 |
| | | 33 | Mz+ | -34.48 | -15.18 | -5.75 |
| | | 33 | Nx- | -48.98 | -22.65 | -37.09 |
| | | 33 | Fy- | -14.16 | -44.54 | -52.69 |
| | | 33 | Mz- | -16.55 | -36.97 | -63.71 |
| | | 36 | Nx+ | -0.65 | -9.83 | -9.92 |
| | | 36 | Fy+ | -25.86 | -8.40 | -10.05 |
| | | 36 | Mz+ | -0.99 | -9.79 | -9.90 |
| | | 36 | Nx- | -34.92 | -21.94 | -30.25 |
| | | 36 | Fy- | -18.60 | -26.24 | -36.04 |
| | | 36 | Mz- | -18.48 | -25.71 | -36.27 |
| 415 | 415 | 33 | Nx+ | -4.92 | -44.06 | 13.94 |
| | | 33 | Fy+ | -33.73 | -16.80 | 10.03 |
| | | 33 | Mz+ | -17.09 | -56.08 | 29.52 |
| | | 33 | Nx- | -48.98 | -40.10 | -3.57 |
| | | 33 | Fy- | -14.67 | -70.15 | 11.28 |
| | | 33 | Mz- | -34.50 | -33.33 | -17.87 |
| | | 36 | Nx+ | -0.65 | -13.69 | 1.28 |
| | | 36 | Fy+ | -25.86 | -12.26 | -1.64 |
| | | 36 | Mz+ | -17.16 | -27.02 | 7.14 |
| | | 36 | Nx- | -34.92 | -36.26 | 1.89 |
| | | 36 | Fy- | -18.64 | -42.80 | 4.55 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Mz- | -32.18 | -21.38 | -6.42 |
| 415 | 400 | 33 | Nx+ | -4.92 | -24.64 | 71.91 |
| | | 33 | Fy+ | -33.67 | -7.84 | 35.56 |
| | | 33 | Mz+ | -14.61 | -57.62 | 136.91 |
| | | 33 | Nx- | -48.98 | -28.97 | 64.21 |
| | | 33 | Fy- | -14.76 | -58.42 | 136.10 |
| | | 33 | Mz- | -34.12 | -12.35 | 30.63 |
| | | 36 | Nx+ | -0.65 | -5.45 | 20.07 |
| | | 36 | Fy+ | -25.86 | -4.02 | 14.36 |
| | | 36 | Mz+ | -18.64 | -31.67 | 77.63 |
| | | 36 | Nx- | -34.92 | -25.13 | 62.15 |
| | | 36 | Fy- | -18.64 | -31.67 | 77.63 |
| | | 36 | Mz- | -25.86 | -4.02 | 14.36 |

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | éz |
|---|---|---|---|---|---|
| 1 | 33 | ux+ | 0.005039 | -0.008944 | -0.000756 |
| | 33 | uy+ | 0.004830 | -0.007221 | -0.000593 |
| | 33 | éz+ | -0.003732 | -0.011405 | 0.000243 |
| | 33 | ux- | -0.005457 | -0.021290 | -0.000644 |
| | 33 | uy- | -0.005387 | -0.022965 | -0.000817 |
| | 33 | éz- | 0.002310 | -0.018305 | -0.001996 |
| | 36 | ux+ | 0.001494 | -0.007491 | -0.000350 |
| | 36 | uy+ | 0.001006 | -0.005640 | -0.000060 |
| | 36 | éz+ | -0.001601 | -0.005801 | 0.000259 |
| | 36 | ux- | -0.002014 | -0.007925 | 0.000176 |
| | 36 | uy- | -0.001451 | -0.014093 | -0.000771 |
| | 36 | éz- | 0.000478 | -0.013568 | -0.000919 |
| 2 | 33 | ux+ | 0.005011 | -0.009991 | -0.000319 |
| | 33 | uy+ | 0.004245 | -0.007934 | -0.000141 |
| | 33 | éz+ | -0.005247 | -0.018763 | 0.000427 |
| | 33 | ux- | -0.005469 | -0.021944 | 0.000144 |
| | 33 | uy- | -0.005283 | -0.024309 | -0.000701 |
| | 33 | éz- | 0.002308 | -0.018093 | -0.001678 |
| | 36 | ux+ | 0.001482 | -0.007982 | -0.000136 |
| | 36 | uy+ | -0.001614 | -0.005475 | 0.000146 |
| | 36 | éz+ | -0.001739 | -0.007564 | 0.000154 |
| | 36 | ux- | -0.002021 | -0.007677 | 0.000149 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | uy- | -0.001469 | -0.015352 | -0.000471 |
| | 36 | éz- | 0.000642 | -0.012302 | -0.000556 |
| 3 | 33 | ux+ | 0.004984 | -0.009924 | 0.000388 |
| | 33 | uy+ | 0.004205 | -0.007735 | 0.000343 |
| | 33 | éz+ | -0.000599 | -0.021971 | 0.001743 |
| | 33 | ux- | -0.005482 | -0.020368 | 0.001628 |
| | 33 | uy- | -0.005305 | -0.024214 | 0.000902 |
| | 33 | éz- | -0.003544 | -0.015688 | -0.000520 |
| | 36 | ux+ | 0.001469 | -0.007826 | 0.000328 |
| | 36 | uy+ | -0.001625 | -0.005216 | 0.000152 |
| | 36 | éz+ | 0.000204 | -0.014052 | 0.000633 |
| | 36 | ux- | -0.002029 | -0.007303 | 0.000282 |
| | 36 | uy- | -0.001484 | -0.015362 | 0.000501 |
| | 36 | éz- | -0.001625 | -0.005216 | 0.000152 |
| 4 | 33 | ux+ | 0.004954 | -0.008851 | 0.000700 |
| | 33 | uy+ | 0.004275 | -0.006937 | 0.000465 |
| | 33 | éz+ | -0.002024 | -0.019175 | 0.002862 |
| | 33 | ux- | -0.005499 | -0.016555 | 0.002510 |
| | 33 | uy- | -0.004258 | -0.021244 | 0.001955 |
| | 33 | éz- | 0.000938 | -0.009844 | 0.000057 |
| | 36 | ux+ | 0.001457 | -0.006878 | 0.000697 |
| | 36 | uy+ | 0.000986 | -0.004814 | 0.000358 |
| | 36 | éz+ | -0.000606 | -0.013337 | 0.001370 |
| | 36 | ux- | -0.002037 | -0.006715 | 0.000351 |
| | 36 | uy- | -0.001503 | -0.013659 | 0.001324 |
| | 36 | éz- | -0.001639 | -0.004983 | 0.000083 |
| 5 | 33 | ux+ | 0.004921 | -0.008110 | -0.000301 |
| | 33 | uy+ | 0.004835 | -0.006563 | -0.000409 |
| | 33 | éz+ | -0.004924 | -0.015053 | 0.002440 |
| | 33 | ux- | -0.005515 | -0.011675 | 0.001895 |
| | 33 | uy- | -0.003992 | -0.017092 | 0.001600 |
| | 33 | éz- | 0.004275 | -0.007853 | -0.000772 |
| | 36 | ux+ | 0.001442 | -0.005453 | 0.000552 |
| | 36 | uy+ | 0.000979 | -0.004218 | 0.000146 |
| | 36 | éz+ | 0.000255 | -0.008857 | 0.001206 |
| | 36 | ux- | -0.002045 | -0.006202 | 0.000057 |
| | 36 | uy- | -0.001447 | -0.011051 | 0.000888 |
| | 36 | éz- | -0.000925 | -0.005166 | -0.000355 |
| 6 | 33 | ux+ | 0.004837 | -0.009074 | -0.001073 |
| | 33 | uy+ | -0.000199 | -0.006655 | 0.000045 |
| | 33 | éz+ | -0.004665 | -0.012068 | 0.001564 |
| | 33 | ux- | -0.005366 | -0.009315 | 0.001178 |
| | 33 | uy- | -0.000329 | -0.015777 | 0.000073 |



| | | | | | |
|---|---|---|---|---|---|
| | 33 | éz- | 0.004195 | -0.010598 | -0.001458 |
| | 36 | ux+ | 0.001477 | -0.004804 | 0.000279 |
| | 36 | uy+ | 0.000982 | -0.004119 | -0.000036 |
| | 36 | éz+ | 0.000347 | -0.007345 | 0.000747 |
| | 36 | ux- | -0.002055 | -0.006269 | -0.000173 |
| | 36 | uy- | -0.000374 | -0.010280 | 0.000061 |
| | 36 | éz- | -0.000979 | -0.005891 | -0.000641 |
| 111 | 33 | ux+ | 0.000829 | -0.007927 | -0.000682 |
| | 33 | uy+ | 0.000754 | -0.006326 | -0.000689 |
| | 33 | éz+ | -0.001577 | -0.021693 | 0.001974 |
| | 33 | ux- | -0.001577 | -0.021693 | 0.001974 |
| | 33 | uy- | -0.001570 | -0.021861 | 0.001966 |
| | 33 | éz- | 0.000762 | -0.006504 | -0.000696 |
| | 36 | ux+ | 0.000293 | -0.005531 | -0.000146 |
| | 36 | uy+ | 0.000293 | -0.005531 | -0.000146 |
| | 36 | éz+ | -0.000620 | -0.013107 | 0.000859 |
| | 36 | ux- | -0.000620 | -0.013107 | 0.000859 |
| | 36 | uy- | -0.000620 | -0.013107 | 0.000859 |
| | 36 | éz- | 0.000293 | -0.005531 | -0.000146 |
| 112 | 33 | ux+ | 0.001470 | -0.007939 | -0.000854 |
| | 33 | uy+ | 0.001392 | -0.006335 | -0.000847 |
| | 33 | éz+ | -0.003012 | -0.021127 | 0.001630 |
| | 33 | ux- | -0.003030 | -0.021722 | 0.001599 |
| | 33 | uy- | -0.003020 | -0.021892 | 0.001597 |
| | 33 | éz- | 0.001469 | -0.007930 | -0.000856 |
| | 36 | ux+ | 0.000451 | -0.005537 | -0.000219 |
| | 36 | uy+ | 0.000451 | -0.005537 | -0.000219 |
| | 36 | éz+ | -0.001229 | -0.013126 | 0.000644 |
| | 36 | ux- | -0.001229 | -0.013126 | 0.000644 |
| | 36 | uy- | -0.001229 | -0.013126 | 0.000644 |
| | 36 | éz- | 0.000451 | -0.005537 | -0.000219 |
| 113 | 33 | ux+ | 0.002177 | -0.007946 | -0.000864 |
| | 33 | uy+ | 0.002097 | -0.006348 | -0.000868 |
| | 33 | éz+ | -0.004208 | -0.021205 | 0.001316 |
| | 33 | ux- | -0.004217 | -0.021135 | 0.001314 |
| | 33 | uy- | -0.004184 | -0.021924 | 0.001262 |
| | 33 | éz- | 0.002063 | -0.006527 | -0.000875 |
| | 36 | ux+ | 0.000627 | -0.005544 | -0.000208 |
| | 36 | uy+ | 0.000627 | -0.005544 | -0.000208 |
| | 36 | éz+ | -0.001677 | -0.013149 | 0.000467 |
| | 36 | ux- | -0.001677 | -0.013149 | 0.000467 |
| | 36 | uy- | -0.001677 | -0.013149 | 0.000467 |
| | 36 | éz- | 0.000550 | -0.007025 | -0.000236 |

| | | | | | |
|---|---|---|---|---|---|
| 114 | 33 | ux+ | 0.002854 | -0.007861 | -0.000782 |
| | 33 | uy+ | 0.002786 | -0.006357 | -0.000806 |
| | 33 | éz+ | -0.004713 | -0.021115 | 0.000989 |
| | 33 | ux- | -0.005155 | -0.021185 | 0.000971 |
| | 33 | uy- | -0.005082 | -0.021953 | 0.000923 |
| | 33 | éz- | 0.002463 | -0.006572 | -0.000836 |
| | 36 | ux+ | 0.000777 | -0.005549 | -0.000155 |
| | 36 | uy+ | 0.000777 | -0.005549 | -0.000155 |
| | 36 | éz+ | -0.000976 | -0.008189 | 0.000365 |
| | 36 | ux- | -0.001991 | -0.013169 | 0.000296 |
| | 36 | uy- | -0.001991 | -0.013169 | 0.000296 |
| | 36 | éz- | 0.000741 | -0.007034 | -0.000225 |
| 115 | 33 | ux+ | 0.003455 | -0.007851 | -0.000687 |
| | 33 | uy+ | 0.003407 | -0.006366 | -0.000717 |
| | 33 | éz+ | -0.003707 | -0.015876 | 0.000732 |
| | 33 | ux- | -0.005786 | -0.021214 | 0.000561 |
| | 33 | uy- | -0.005679 | -0.021984 | 0.000538 |
| | 33 | éz- | 0.001140 | -0.013903 | -0.000840 |
| | 36 | ux+ | 0.000916 | -0.007043 | -0.000208 |
| | 36 | uy+ | 0.000879 | -0.005554 | -0.000095 |
| | 36 | éz+ | -0.001072 | -0.006225 | 0.000385 |
| | 36 | ux- | -0.002156 | -0.013185 | 0.000095 |
| | 36 | uy- | -0.002156 | -0.013185 | 0.000095 |
| | 36 | éz- | 0.000144 | -0.011213 | -0.000232 |
| 116 | 33 | ux+ | 0.003999 | -0.007994 | -0.000658 |
| | 33 | uy+ | 0.003959 | -0.006377 | -0.000644 |
| | 33 | éz+ | -0.004019 | -0.015204 | 0.000574 |
| | 33 | ux- | -0.006045 | -0.021290 | 0.000058 |
| | 33 | uy- | -0.005941 | -0.022010 | 0.000085 |
| | 33 | éz- | 0.000950 | -0.015397 | -0.001148 |
| | 36 | ux+ | 0.001087 | -0.007050 | -0.000219 |
| | 36 | uy+ | 0.000935 | -0.005558 | -0.000051 |
| | 36 | éz+ | -0.001042 | -0.006199 | 0.000404 |
| | 36 | ux- | -0.002132 | -0.013202 | -0.000163 |
| | 36 | uy- | -0.002132 | -0.013202 | -0.000163 |
| | 36 | éz- | -0.000409 | -0.012354 | -0.000421 |
| 117 | 33 | ux+ | 0.004548 | -0.007961 | -0.000703 |
| | 33 | uy+ | 0.004475 | -0.006385 | -0.000632 |
| | 33 | éz+ | -0.003475 | -0.011809 | 0.000403 |
| | 33 | ux- | -0.005847 | -0.021312 | -0.000570 |
| | 33 | uy- | -0.005792 | -0.022037 | -0.000474 |
| | 33 | éz- | 0.002079 | -0.015422 | -0.001637 |
| | 36 | ux+ | 0.001288 | -0.007058 | -0.000285 |
| | 36 | uy+ | 0.000973 | -0.005562 | -0.000047 |



| | | | | | |
|---|---|---|---|---|---|
| | 36 | éz+ | -0.001359 | -0.006203 | 0.000359 |
| | 36 | ux- | -0.001866 | -0.013218 | -0.000506 |
| | 36 | uy- | -0.001866 | -0.013218 | -0.000506 |
| | 36 | éz- | 0.000046 | -0.012369 | -0.000709 |
| 211 | 33 | ux+ | 0.004698 | -0.007965 | -0.000712 |
| | 33 | uy+ | 0.004609 | -0.006388 | -0.000633 |
| | 33 | éz+ | -0.003557 | -0.011812 | 0.000387 |
| | 33 | ux- | -0.005718 | -0.021317 | -0.000630 |
| | 33 | uy- | -0.005682 | -0.022043 | -0.000526 |
| | 33 | éz- | 0.002433 | -0.015426 | -0.001683 |
| | 36 | ux+ | 0.001349 | -0.007060 | -0.000293 |
| | 36 | uy+ | 0.000983 | -0.005563 | -0.000050 |
| | 36 | éz+ | -0.001436 | -0.006204 | 0.000351 |
| | 36 | ux- | -0.001894 | -0.008209 | 0.000261 |
| | 36 | uy- | -0.001754 | -0.013221 | -0.000539 |
| | 36 | éz- | 0.000202 | -0.012371 | -0.000736 |
| 212 | 33 | ux+ | 0.004851 | -0.007965 | -0.000716 |
| | 33 | uy+ | 0.004747 | -0.006388 | -0.000636 |
| | 33 | éz+ | -0.003640 | -0.011812 | 0.000379 |
| | 33 | ux- | -0.005601 | -0.019836 | -0.000545 |
| | 33 | uy- | -0.005570 | -0.022046 | -0.000545 |
| | 33 | éz- | 0.002796 | -0.015429 | -0.001699 |
| | 36 | ux+ | 0.001412 | -0.007060 | -0.000297 |
| | 36 | uy+ | 0.000995 | -0.005563 | -0.000051 |
| | 36 | éz+ | -0.001509 | -0.006204 | 0.000349 |
| | 36 | ux- | -0.001949 | -0.008209 | 0.000256 |
| | 36 | uy- | -0.001639 | -0.013222 | -0.000549 |
| | 36 | éz- | 0.000359 | -0.012373 | -0.000745 |
| 213 | 33 | ux+ | 0.004901 | -0.008218 | -0.000736 |
| | 33 | uy+ | 0.004786 | -0.006609 | -0.000640 |
| | 33 | éz+ | -0.003667 | -0.011687 | 0.000345 |
| | 33 | ux- | -0.005565 | -0.020727 | -0.000505 |
| | 33 | uy- | -0.005529 | -0.022257 | -0.000633 |
| | 33 | éz- | 0.002917 | -0.016039 | -0.001782 |
| | 36 | ux+ | 0.001433 | -0.007168 | -0.000315 |
| | 36 | uy+ | 0.000997 | -0.005583 | -0.000055 |
| | 36 | éz+ | -0.001537 | -0.006088 | 0.000329 |
| | 36 | ux- | -0.001968 | -0.008123 | 0.000238 |
| | 36 | uy- | -0.001598 | -0.013430 | -0.000610 |
| | 36 | éz- | 0.000413 | -0.012647 | -0.000799 |
| 214 | 33 | ux+ | 0.004970 | -0.008579 | -0.000756 |
| | 33 | uy+ | 0.004845 | -0.006919 | -0.000645 |
| | 33 | éz+ | -0.003704 | -0.011532 | 0.000303 |

| | | | | | |
|---|---|---|---|---|---|
| | 33 | ux- | -0.005515 | -0.020989 | -0.000584 |
| | 33 | uy- | -0.005458 | -0.022586 | -0.000732 |
| | 33 | éz- | 0.003090 | -0.016942 | -0.001882 |
| | 36 | ux+ | 0.001463 | -0.007324 | -0.000334 |
| | 36 | uy+ | 0.001001 | -0.005611 | -0.000061 |
| | 36 | éz+ | -0.001570 | -0.005935 | 0.000303 |
| | 36 | ux- | -0.001993 | -0.008016 | 0.000212 |
| | 36 | uy- | -0.001536 | -0.013742 | -0.000682 |
| | 36 | éz- | 0.000440 | -0.013088 | -0.000860 |
| 310 | 33 | ux+ | 0.000459 | -0.010398 | -0.000003 |
| | 33 | uy+ | 0.000329 | -0.006314 | -0.000338 |
| | 33 | éz+ | 0.000177 | -0.021652 | 0.002427 |
| | 33 | ux- | 0.000045 | -0.012920 | 0.001292 |
| | 33 | uy- | 0.000177 | -0.021829 | 0.002411 |
| | 33 | éz- | 0.000329 | -0.006493 | -0.000355 |
| | 36 | ux+ | 0.000328 | -0.011131 | 0.000633 |
| | 36 | uy+ | 0.000246 | -0.005524 | 0.000050 |
| | 36 | éz+ | 0.000171 | -0.013088 | 0.001142 |
| | 36 | ux- | 0.000008 | -0.005601 | 0.000347 |
| | 36 | uy- | 0.000171 | -0.013088 | 0.001142 |
| | 36 | éz- | 0.000246 | -0.005524 | 0.000050 |
| 311 | 33 | ux+ | 0.000591 | -0.007920 | -0.000506 |
| | 33 | uy+ | 0.000509 | -0.006320 | -0.000540 |
| | 33 | éz+ | -0.000744 | -0.021676 | 0.002186 |
| | 33 | ux- | -0.000767 | -0.020213 | 0.002094 |
| | 33 | uy- | -0.000739 | -0.021844 | 0.002177 |
| | 33 | éz- | 0.000513 | -0.006498 | -0.000549 |
| | 36 | ux+ | 0.000251 | -0.005527 | -0.000067 |
| | 36 | uy+ | 0.000251 | -0.005527 | -0.000067 |
| | 36 | éz+ | -0.000251 | -0.013096 | 0.000987 |
| | 36 | ux- | -0.000267 | -0.012073 | 0.000922 |
| | 36 | uy- | -0.000251 | -0.013096 | 0.000987 |
| | 36 | éz- | 0.000251 | -0.005527 | -0.000067 |
| 312 | 33 | ux+ | 0.000701 | -0.007924 | -0.000605 |
| | 33 | uy+ | 0.000624 | -0.006322 | -0.000622 |
| | 33 | éz+ | -0.001171 | -0.021685 | 0.002077 |
| | 33 | ux- | -0.001177 | -0.020221 | 0.002000 |
| | 33 | uy- | -0.001165 | -0.021853 | 0.002068 |
| | 33 | éz- | 0.000630 | -0.006501 | -0.000632 |
| | 36 | ux+ | 0.000269 | -0.005529 | -0.000111 |
| | 36 | uy+ | 0.000269 | -0.005529 | -0.000111 |
| | 36 | éz+ | -0.000443 | -0.013102 | 0.000915 |
| | 36 | ux- | -0.000447 | -0.012077 | 0.000861 |
| | 36 | uy- | -0.000443 | -0.013102 | 0.000915 |



| | | | | | |
|---|---|---|---|---|---|
| | 36 | éz- | 0.000269 | -0.005529 | -0.000111 |
| 320 | 33 | ux+ | 0.000000 | -0.013831 | -0.000681 |
| | 33 | uy+ | 0.000000 | -0.004927 | 0.000370 |
| | 33 | éz+ | 0.000000 | -0.005106 | 0.000387 |
| | 33 | ux- | 0.000000 | -0.013831 | -0.000681 |
| | 33 | uy- | 0.000000 | -0.020006 | -0.002389 |
| | 33 | éz- | 0.000000 | -0.019829 | -0.002405 |
| | 36 | ux+ | 0.000000 | -0.010662 | -0.000794 |
| | 36 | uy+ | 0.000000 | -0.004146 | -0.000022 |
| | 36 | éz+ | 0.000000 | -0.004146 | -0.000022 |
| | 36 | ux- | 0.000000 | -0.010662 | -0.000794 |
| | 36 | uy- | 0.000000 | -0.011251 | -0.001114 |
| | 36 | éz- | 0.000000 | -0.011251 | -0.001114 |
| 400 | 33 | ux+ | 0.000242 | -0.010327 | 0.000066 |
| | 33 | uy+ | 0.000146 | -0.006418 | 0.000150 |
| | 33 | éz+ | 0.000098 | -0.012388 | 0.000579 |
| | 33 | ux- | 0.000007 | -0.010314 | 0.000204 |
| | 33 | uy- | 0.000083 | -0.015172 | 0.000114 |
| | 33 | éz- | 0.000224 | -0.010964 | -0.000226 |
| | 36 | ux+ | 0.000180 | -0.007071 | 0.000130 |
| | 36 | uy+ | 0.000128 | -0.004022 | 0.000132 |
| | 36 | éz+ | 0.000085 | -0.007078 | 0.000275 |
| | 36 | ux- | 0.000005 | -0.004064 | 0.000150 |
| | 36 | uy- | 0.000092 | -0.009878 | 0.000203 |
| | 36 | éz- | 0.000178 | -0.005649 | 0.000077 |
| 411 | 33 | ux+ | 0.000453 | -0.010370 | 0.000161 |
| | 33 | uy+ | 0.000324 | -0.006412 | -0.000219 |
| | 33 | éz+ | 0.000176 | -0.020777 | 0.002552 |
| | 33 | ux- | 0.000048 | -0.012463 | 0.001316 |
| | 33 | uy- | 0.000176 | -0.020962 | 0.002532 |
| | 33 | éz- | 0.000308 | -0.007854 | -0.000238 |
| | 36 | ux+ | 0.000323 | -0.010886 | 0.000752 |
| | 36 | uy+ | 0.000011 | -0.005459 | 0.000364 |
| | 36 | éz+ | 0.000169 | -0.012671 | 0.001223 |
| | 36 | ux- | 0.000008 | -0.005475 | 0.000369 |
| | 36 | uy- | 0.000169 | -0.012671 | 0.001223 |
| | 36 | éz- | 0.000242 | -0.005493 | 0.000119 |
| 412 | 33 | ux+ | 0.000410 | -0.009629 | 0.000598 |
| | 33 | uy+ | 0.000245 | -0.006319 | 0.000222 |
| | 33 | éz+ | 0.000156 | -0.015740 | 0.002467 |
| | 33 | ux- | 0.000038 | -0.010907 | 0.001174 |
| | 33 | uy- | 0.000251 | -0.015929 | 0.002403 |
| | 33 | éz- | 0.000271 | -0.007653 | -0.000079 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | ux+ | 0.000294 | -0.009095 | 0.000941 |
| | 36 | uy+ | 0.000010 | -0.004720 | 0.000349 |
| | 36 | éz+ | 0.000153 | -0.010175 | 0.001146 |
| | 36 | ux- | 0.000007 | -0.004727 | 0.000352 |
| | 36 | uy- | 0.000235 | -0.010264 | 0.001102 |
| | 36 | éz- | 0.000114 | -0.005317 | 0.000279 |
| 413 | 33 | ux+ | 0.000366 | -0.008676 | 0.000305 |
| | 33 | uy+ | 0.000127 | -0.005846 | 0.000216 |
| | 33 | éz+ | 0.000224 | -0.011841 | 0.001505 |
| | 33 | ux- | 0.000034 | -0.009119 | 0.000042 |
| | 33 | uy- | 0.000282 | -0.012894 | 0.000653 |
| | 33 | éz- | 0.000181 | -0.008209 | -0.000408 |
| | 36 | ux+ | 0.000266 | -0.007551 | 0.000583 |
| | 36 | uy+ | 0.000010 | -0.004195 | 0.000175 |
| | 36 | éz+ | 0.000181 | -0.007507 | 0.000591 |
| | 36 | ux- | 0.000007 | -0.004198 | 0.000176 |
| | 36 | uy- | 0.000234 | -0.008761 | 0.000414 |
| | 36 | éz- | 0.000100 | -0.004978 | 0.000048 |
| 414 | 33 | ux+ | 0.000326 | -0.008545 | -0.000168 |
| | 33 | uy+ | 0.000107 | -0.005785 | -0.000150 |
| | 33 | éz+ | 0.000216 | -0.009217 | 0.000503 |
| | 33 | ux- | 0.000026 | -0.009259 | -0.000820 |
| | 33 | uy- | 0.000248 | -0.012796 | -0.000368 |
| | 33 | éz- | 0.000111 | -0.010083 | -0.000967 |
| | 36 | ux+ | 0.000238 | -0.006876 | 0.000116 |
| | 36 | uy+ | 0.000009 | -0.004034 | 0.000001 |
| | 36 | éz+ | 0.000238 | -0.006876 | 0.000116 |
| | 36 | ux- | 0.000006 | -0.004035 | 0.000001 |
| | 36 | uy- | 0.000211 | -0.008601 | -0.000223 |
| | 36 | éz- | 0.000118 | -0.006983 | -0.000304 |
| 415 | 33 | ux+ | 0.000286 | -0.009856 | -0.000350 |
| | 33 | uy+ | 0.000209 | -0.006201 | -0.000231 |
| | 33 | éz+ | 0.000181 | -0.007798 | 0.000099 |
| | 33 | ux- | 0.000020 | -0.009887 | -0.000628 |
| | 33 | uy- | 0.000071 | -0.014251 | -0.000770 |
| | 33 | éz- | 0.000065 | -0.013495 | -0.001160 |
| | 36 | ux+ | 0.000209 | -0.006957 | -0.000135 |
| | 36 | uy+ | 0.000009 | -0.004113 | -0.000049 |
| | 36 | éz+ | 0.000150 | -0.004114 | 0.000006 |
| | 36 | ux- | 0.000006 | -0.004113 | -0.000048 |
| | 36 | uy- | 0.000101 | -0.009411 | -0.000490 |
| | 36 | éz- | 0.000104 | -0.009350 | -0.000502 |
| 511 | 33 | ux+ | 0.000461 | -0.010401 | -0.000001 |



| | | | | | |
|---|---|---|---|---|---|
| | 33 | uy+ | 0.000330 | -0.006198 | -0.000336 |
| | 33 | éz+ | 0.000179 | -0.022501 | 0.002422 |
| | 33 | ux- | 0.000046 | -0.013375 | 0.001291 |
| | 33 | uy- | 0.000179 | -0.022675 | 0.002405 |
| | 33 | éz- | 0.000330 | -0.006373 | -0.000353 |
| | 36 | ux+ | 0.000329 | -0.011352 | 0.000633 |
| | 36 | uy+ | 0.000247 | -0.005541 | 0.000051 |
| | 36 | éz+ | 0.000173 | -0.013489 | 0.001141 |
| | 36 | ux- | 0.000008 | -0.005722 | 0.000345 |
| | 36 | uy- | 0.000173 | -0.013489 | 0.001141 |
| | 36 | éz- | 0.000247 | -0.005541 | 0.000051 |
| 512 | 33 | ux+ | 0.000461 | -0.010401 | -0.000001 |
| | 33 | uy+ | 0.000330 | -0.006182 | -0.000336 |
| | 33 | éz+ | 0.000179 | -0.022622 | 0.002422 |
| | 33 | ux- | 0.000046 | -0.013441 | 0.001290 |
| | 33 | uy- | 0.000179 | -0.022796 | 0.002405 |
| | 33 | éz- | 0.000330 | -0.006357 | -0.000353 |
| | 36 | ux+ | 0.000329 | -0.011383 | 0.000633 |
| | 36 | uy+ | 0.000247 | -0.005543 | 0.000051 |
| | 36 | éz+ | 0.000173 | -0.013543 | 0.001141 |
| | 36 | ux- | 0.000008 | -0.005739 | 0.000345 |
| | 36 | uy- | 0.000173 | -0.013543 | 0.001141 |
| | 36 | éz- | 0.000247 | -0.005543 | 0.000051 |
| 513 | 33 | ux+ | 0.000462 | -0.010400 | -0.000001 |
| | 33 | uy+ | 0.000331 | -0.006163 | -0.000336 |
| | 33 | éz+ | 0.000179 | -0.022742 | 0.002422 |
| | 33 | ux- | 0.000046 | -0.013503 | 0.001290 |
| | 33 | uy- | 0.000179 | -0.022915 | 0.002405 |
| | 33 | éz- | 0.000331 | -0.006337 | -0.000353 |
| | 36 | ux+ | 0.000329 | -0.011414 | 0.000633 |
| | 36 | uy+ | 0.000247 | -0.005545 | 0.000051 |
| | 36 | éz+ | 0.000173 | -0.013601 | 0.001141 |
| | 36 | ux- | 0.000008 | -0.005756 | 0.000345 |
| | 36 | uy- | 0.000173 | -0.013601 | 0.001141 |
| | 36 | éz- | 0.000247 | -0.005545 | 0.000051 |
| 514 | 33 | ux+ | 0.000462 | -0.010401 | -0.000001 |
| | 33 | uy+ | 0.000331 | -0.006147 | -0.000336 |
| | 33 | éz+ | 0.000179 | -0.022863 | 0.002422 |
| | 33 | ux- | 0.000046 | -0.013567 | 0.001290 |
| | 33 | uy- | 0.000179 | -0.023034 | 0.002405 |
| | 33 | éz- | 0.000331 | -0.006320 | -0.000353 |
| | 36 | ux+ | 0.000331 | -0.011445 | 0.000633 |
| | 36 | uy+ | 0.000247 | -0.005548 | 0.000051 |
| | 36 | éz+ | 0.000173 | -0.013658 | 0.001141 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | ux- | 0.000008 | -0.005773 | 0.000345 |
| | 36 | uy- | 0.000173 | -0.013658 | 0.001141 |
| | 36 | éz- | 0.000247 | -0.005548 | 0.000051 |
| 515 | 33 | ux+ | 0.000462 | -0.010398 | -0.000001 |
| | 33 | uy+ | 0.000331 | -0.006129 | -0.000336 |
| | 33 | éz+ | 0.000179 | -0.022983 | 0.002422 |
| | 33 | ux- | 0.000046 | -0.013631 | 0.001290 |
| | 33 | uy- | 0.000179 | -0.023152 | 0.002405 |
| | 33 | éz- | 0.000331 | -0.006300 | -0.000353 |
| | 36 | ux+ | 0.000331 | -0.011478 | 0.000633 |
| | 36 | uy+ | 0.000247 | -0.005551 | 0.000051 |
| | 36 | éz+ | 0.000173 | -0.013716 | 0.001141 |
| | 36 | ux- | 0.000008 | -0.005791 | 0.000345 |
| | 36 | uy- | 0.000173 | -0.013716 | 0.001141 |
| | 36 | éz- | 0.000247 | -0.005551 | 0.000051 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 310 | 33 | Fx+ | 0.00 | 8.23 | 0.00 |
| | 33 | Fy+ | 0.00 | 11.46 | 0.00 |
| | 33 | Mz+ | 0.00 | 8.23 | 0.00 |
| | 33 | Fx- | 0.00 | 8.23 | 0.00 |
| | 33 | Fy- | 0.00 | 3.32 | 0.00 |
| | 33 | Mz- | 0.00 | 8.23 | 0.00 |
| | 36 | Fx+ | 0.00 | 6.56 | 0.00 |
| | 36 | Fy+ | 0.00 | 6.88 | 0.00 |
| | 36 | Mz+ | 0.00 | 6.56 | 0.00 |
| | 36 | Fx- | 0.00 | 6.56 | 0.00 |
| | 36 | Fy- | 0.00 | 2.90 | 0.00 |
| | 36 | Mz- | 0.00 | 6.56 | 0.00 |
| 320 | 33 | Fx+ | 18.38 | 7.13 | 0.00 |
| | 33 | Fy+ | -18.38 | 10.51 | 0.00 |
| | 33 | Mz+ | 0.00 | 7.26 | 0.00 |
| | 33 | Fx- | -18.38 | 8.03 | 0.00 |
| | 33 | Fy- | 18.38 | 2.59 | 0.00 |
| | 33 | Mz- | 0.00 | 7.26 | 0.00 |
| | 36 | Fx+ | 14.34 | 4.86 | 0.00 |
| | 36 | Fy+ | -5.51 | 5.91 | 0.00 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.4.* | Fecha JUNIO-*2002* | Página de

| | | | | | |
|---|---|---|---|---|---|
| | 36 | Mz+ | 0.00 | 5.59 | 0.00 |
| | 36 | Fx- | -14.34 | 3.30 | 0.00 |
| | 36 | Fy- | 10.72 | 2.17 | 0.00 |
| | 36 | Mz- | 0.00 | 5.59 | 0.00 |
| 400 | 33 | Fx+ | 0.00 | 39.55 | 0.00 |
| | 33 | Fy+ | 0.00 | 44.68 | 0.00 |
| | 33 | Mz+ | 0.00 | 39.55 | 0.00 |
| | 33 | Fx- | 0.00 | 39.55 | 0.00 |
| | 33 | Fy- | 0.00 | 18.89 | 0.00 |
| | 33 | Mz- | 0.00 | 39.55 | 0.00 |
| | 36 | Fx+ | 0.00 | 28.91 | 0.00 |
| | 36 | Fy+ | 0.00 | 29.09 | 0.00 |
| | 36 | Mz+ | 0.00 | 28.91 | 0.00 |
| | 36 | Fx- | 0.00 | 28.91 | 0.00 |
| | 36 | Fy- | 0.00 | 11.84 | 0.00 |
| | 36 | Mz- | 0.00 | 28.91 | 0.00 |
| 411 | 33 | Fx+ | 0.00 | 26.73 | 0.00 |
| | 33 | Fy+ | 0.00 | 36.37 | 0.00 |
| | 33 | Mz+ | 0.00 | 26.73 | 0.00 |
| | 33 | Fx- | 0.00 | 26.73 | 0.00 |
| | 33 | Fy- | 0.00 | 11.14 | 0.00 |
| | 33 | Mz- | 0.00 | 26.73 | 0.00 |
| | 36 | Fx+ | 0.00 | 21.15 | 0.00 |
| | 36 | Fy+ | 0.00 | 21.98 | 0.00 |
| | 36 | Mz+ | 0.00 | 21.15 | 0.00 |
| | 36 | Fx- | 0.00 | 21.15 | 0.00 |
| | 36 | Fy- | 0.00 | 9.47 | 0.00 |
| | 36 | Mz- | 0.00 | 21.15 | 0.00 |
| 412 | 33 | Fx+ | 0.00 | 40.05 | 0.00 |
| | 33 | Fy+ | 0.00 | 46.91 | 0.00 |
| | 33 | Mz+ | 0.00 | 40.05 | 0.00 |
| | 33 | Fx- | 0.00 | 40.05 | 0.00 |
| | 33 | Fy- | 0.00 | 18.61 | 0.00 |
| | 33 | Mz- | 0.00 | 40.05 | 0.00 |
| | 36 | Fx+ | 0.00 | 29.93 | 0.00 |
| | 36 | Fy+ | 0.00 | 30.23 | 0.00 |
| | 36 | Mz+ | 0.00 | 29.93 | 0.00 |
| | 36 | Fx- | 0.00 | 29.93 | 0.00 |
| | 36 | Fy- | 0.00 | 13.89 | 0.00 |
| | 36 | Mz- | 0.00 | 29.93 | 0.00 |
| 413 | 33 | Fx+ | 0.00 | 36.34 | 0.00 |
| | 33 | Fy+ | 0.00 | 37.97 | 0.00 |
| | 33 | Mz+ | 0.00 | 36.34 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| | 33 | Fx- | 0.00 | 36.34 | 0.00 |
| | 33 | Fy- | 0.00 | 17.22 | 0.00 |
| | 33 | Mz- | 0.00 | 36.34 | 0.00 |
| | 36 | Fx+ | 0.00 | 25.78 | 0.00 |
| | 36 | Fy+ | 0.00 | 25.79 | 0.00 |
| | 36 | Mz+ | 0.00 | 25.78 | 0.00 |
| | 36 | Fx- | 0.00 | 25.78 | 0.00 |
| | 36 | Fy- | 0.00 | 12.35 | 0.00 |
| | 36 | Mz- | 0.00 | 25.78 | 0.00 |
| 414 | 33 | Fx+ | 0.00 | 36.05 | 0.00 |
| | 33 | Fy+ | 0.00 | 37.70 | 0.00 |
| | 33 | Mz+ | 0.00 | 36.05 | 0.00 |
| | 33 | Fx- | 0.00 | 36.05 | 0.00 |
| | 33 | Fy- | 0.00 | 17.04 | 0.00 |
| | 33 | Mz- | 0.00 | 36.05 | 0.00 |
| | 36 | Fx+ | 0.00 | 25.32 | 0.00 |
| | 36 | Fy+ | 0.00 | 25.32 | 0.00 |
| | 36 | Mz+ | 0.00 | 25.32 | 0.00 |
| | 36 | Fx- | 0.00 | 25.32 | 0.00 |
| | 36 | Fy- | 0.00 | 11.88 | 0.00 |
| | 36 | Mz- | 0.00 | 25.32 | 0.00 |
| 415 | 33 | Fx+ | 0.00 | 38.31 | 0.00 |
| | 33 | Fy+ | 0.00 | 41.97 | 0.00 |
| | 33 | Mz+ | 0.00 | 38.31 | 0.00 |
| | 33 | Fx- | 0.00 | 38.31 | 0.00 |
| | 33 | Fy- | 0.00 | 18.26 | 0.00 |
| | 33 | Mz- | 0.00 | 38.31 | 0.00 |
| | 36 | Fx+ | 0.00 | 27.60 | 0.00 |
| | 36 | Fy+ | 0.00 | 27.71 | 0.00 |
| | 36 | Mz+ | 0.00 | 27.60 | 0.00 |
| | 36 | Fx- | 0.00 | 27.60 | 0.00 |
| | 36 | Fy- | 0.00 | 12.11 | 0.00 |
| | 36 | Mz- | 0.00 | 27.60 | 0.00 |
| 511 | 33 | Fx+ | 0.00 | 4.78 | 0.00 |
| | 33 | Fy+ | 0.00 | 6.81 | 0.00 |
| | 33 | Mz+ | 0.00 | 4.78 | 0.00 |
| | 33 | Fx- | 0.00 | 4.78 | 0.00 |
| | 33 | Fy- | 0.00 | 1.85 | 0.00 |
| | 33 | Mz- | 0.00 | 4.78 | 0.00 |
| | 36 | Fx+ | 0.00 | 3.83 | 0.00 |
| | 36 | Fy+ | 0.00 | 4.05 | 0.00 |
| | 36 | Mz+ | 0.00 | 3.83 | 0.00 |
| | 36 | Fx- | 0.00 | 3.83 | 0.00 |
| | 36 | Fy- | 0.00 | 1.66 | 0.00 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

| | | | | | |
|---|---|---|---|---|---|
| | 36 | Mz- | 0.00 | 3.83 | 0.00 |
| 512 | 33 | Fx+ | 0.00 | 1.20 | 0.00 |
| | 33 | Fy+ | 0.00 | 1.72 | 0.00 |
| | 33 | Mz+ | 0.00 | 1.20 | 0.00 |
| | 33 | Fx- | 0.00 | 1.20 | 0.00 |
| | 33 | Fy- | 0.00 | 0.47 | 0.00 |
| | 33 | Mz- | 0.00 | 1.20 | 0.00 |
| | 36 | Fx+ | 0.00 | 0.96 | 0.00 |
| | 36 | Fy+ | 0.00 | 1.02 | 0.00 |
| | 36 | Mz+ | 0.00 | 0.96 | 0.00 |
| | 36 | Fx- | 0.00 | 0.96 | 0.00 |
| | 36 | Fy- | 0.00 | 0.42 | 0.00 |
| | 36 | Mz- | 0.00 | 0.96 | 0.00 |
| 513 | 33 | Fx+ | 0.00 | 1.20 | 0.00 |
| | 33 | Fy+ | 0.00 | 1.74 | 0.00 |
| | 33 | Mz+ | 0.00 | 1.20 | 0.00 |
| | 33 | Fx- | 0.00 | 1.20 | 0.00 |
| | 33 | Fy- | 0.00 | 0.47 | 0.00 |
| | 33 | Mz- | 0.00 | 1.20 | 0.00 |
| | 36 | Fx+ | 0.00 | 0.97 | 0.00 |
| | 36 | Fy+ | 0.00 | 1.03 | 0.00 |
| | 36 | Mz+ | 0.00 | 0.97 | 0.00 |
| | 36 | Fx- | 0.00 | 0.97 | 0.00 |
| | 36 | Fy- | 0.00 | 0.42 | 0.00 |
| | 36 | Mz- | 0.00 | 0.97 | 0.00 |
| 514 | 33 | Fx+ | 0.00 | 1.20 | 0.00 |
| | 33 | Fy+ | 0.00 | 1.74 | 0.00 |
| | 33 | Mz+ | 0.00 | 1.20 | 0.00 |
| | 33 | Fx- | 0.00 | 1.20 | 0.00 |
| | 33 | Fy- | 0.00 | 0.47 | 0.00 |
| | 33 | Mz- | 0.00 | 1.20 | 0.00 |
| | 36 | Fx+ | 0.00 | 0.96 | 0.00 |
| | 36 | Fy+ | 0.00 | 1.03 | 0.00 |
| | 36 | Mz+ | 0.00 | 0.96 | 0.00 |
| | 36 | Fx- | 0.00 | 0.96 | 0.00 |
| | 36 | Fy- | 0.00 | 0.42 | 0.00 |
| | 36 | Mz- | 0.00 | 0.96 | 0.00 |
| 515 | 33 | Fx+ | 0.00 | 0.60 | 0.00 |
| | 33 | Fy+ | 0.00 | 0.87 | 0.00 |
| | 33 | Mz+ | 0.00 | 0.60 | 0.00 |
| | 33 | Fx- | 0.00 | 0.60 | 0.00 |
| | 33 | Fy- | 0.00 | 0.22 | 0.00 |
| | 33 | Mz- | 0.00 | 0.60 | 0.00 |

| | | | | |
|---|---|---|---|---|
| 36 | Fx+ | 0.00 | 0.48 | 0.00 |
| 36 | Fy+ | 0.00 | 0.52 | 0.00 |
| 36 | Mz+ | 0.00 | 0.48 | 0.00 |
| 36 | Fx- | 0.00 | 0.48 | 0.00 |
| 36 | Fy- | 0.00 | 0.20 | 0.00 |
| 36 | Mz- | 0.00 | 0.48 | 0.00 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.4.* Fecha JUNIO-*2002* Página de

# ENVOLVENTE DE SERVICIO.HIP-2

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. | Fecha JUNIO-2002 | Página de

**Fichero: MA_SER.LST**

```
        LISTADO DE ESTADOS DE CARGA
        Fecha : 02.05.2002 13:59:00
        Título: L.A.V.MARTORELL. - ODT 300.4.
        Coment: Envolventes totales
        Titlst: Estado Servicio. Proyecto: L.A.V.MARTORELL. - ODT

Tabla de estados de carga a listar
 ec Fichero     tipo   Título
 30 MA_SERV        1   [Envolvente de Servicio (Marco en Servicio)        ]

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

 MEMB    JT    EC  ENV     Nx         Fy         Mz

    1    1   30  Nx+     -8.02     -11.41       2.13
             30  Fy+    -13.16     -10.43       4.47
             30  Mz+    -13.41     -19.31       8.11
             30  Nx-    -26.42     -25.47     -21.47
             30  Fy-    -20.46     -32.72     -16.27
             30  Mz-    -21.80     -26.43     -25.00

    2    2   30  Nx+     -8.02      -3.45      15.28
             30  Fy+    -13.63      -1.40      26.33
             30  Mz+    -15.80      -9.66      34.80
             30  Nx-    -26.42     -17.50      16.56
             30  Fy-    -21.42     -19.84      18.62
             30  Mz-    -18.62      -8.04       6.22

    3    3   30  Nx+     -8.02       4.52      14.33
             30  Fy+    -15.01      10.45      31.40
             30  Mz+    -18.75       0.66      40.01
             30  Nx-    -26.42      -2.88      36.54
             30  Fy-    -21.26      -7.37      30.01
             30  Mz-    -17.49       2.16      10.37

    4    4   30  Nx+     -8.02      12.49      -0.75
             30  Fy+    -17.03      23.06      14.51
             30  Mz+    -21.56      14.02      27.67
             30  Nx-    -26.42      15.00      25.78
             30  Fy-    -20.12       4.41      19.34
             30  Mz-    -13.72      13.28      -3.98

    5    5   30  Nx+     -9.46      21.12     -35.77
             30  Fy+    -20.24      37.25     -35.18
             30  Mz+    -21.75      23.68     -10.85
             30  Nx-    -28.77      33.84     -26.15
             30  Fy-    -19.80      15.13     -15.05
             30  Mz-    -18.70      34.56     -46.70

    6    6   30  Nx+     -9.46     -27.75     -71.45
             30  Fy+    -18.87     -22.47     -44.75
             30  Mz+    -18.87     -22.47     -44.75
             30  Nx-    -28.77     -40.47     -80.86
             30  Fy-    -19.65     -46.96     -84.64
             30  Mz-    -19.00     -46.46    -106.49

  111  111   30  Nx+    -28.49     -16.20     -22.50
             30  Fy+    -43.78      -1.96     -12.88
             30  Mz+    -31.95     -10.75      -6.26
             30  Nx-    -54.12      -9.64     -23.35
             30  Fy-    -29.24     -21.32     -24.93
             30  Mz-    -50.37     -14.77     -37.25

  112  112   30  Nx+    -27.06     -11.17     -11.34
             30  Fy+    -42.35       1.85     -12.87
             30  Mz+    -30.49      -5.07       0.17
             30  Nx-    -52.69      -3.93     -17.84
             30  Fy-    -27.80     -14.39     -10.39
             30  Mz-    -48.97      -9.72     -27.27

  113  113   30  Nx+    -25.63      -6.58      -4.14
```

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Fy+ | -40.92 | 5.21 | -15.79 |
| | | 30 | Mz+ | -28.27 | -3.48 | 4.68 |
| | | 30 | Nx- | -51.26 | 1.11 | -16.74 |
| | | 30 | Fy- | -26.38 | -8.12 | -1.26 |
| | | 30 | Mz- | -46.26 | -0.47 | -24.15 |
| 114 | 114 | 30 | Nx+ | -24.20 | -2.44 | -0.48 |
| | | 30 | Fy+ | -40.00 | 8.60 | -16.39 |
| | | 30 | Mz+ | -25.63 | 0.09 | 5.63 |
| | | 30 | Nx- | -49.83 | 5.49 | -19.47 |
| | | 30 | Fy- | -24.44 | -2.99 | -1.85 |
| | | 30 | Mz- | -45.78 | 6.36 | -26.16 |
| 115 | 115 | 30 | Nx+ | -22.77 | 1.26 | -0.04 |
| | | 30 | Fy+ | -38.57 | 12.31 | -24.99 |
| | | 30 | Mz+ | -23.63 | 3.86 | 4.27 |
| | | 30 | Nx- | -48.40 | 9.20 | -25.51 |
| | | 30 | Fy- | -23.01 | 0.71 | -0.95 |
| | | 30 | Mz- | -42.97 | 9.66 | -32.77 |
| 116 | 116 | 30 | Nx+ | -21.35 | 4.51 | -2.42 |
| | | 30 | Fy+ | -36.39 | 15.61 | -30.00 |
| | | 30 | Mz+ | -21.86 | 7.27 | -0.24 |
| | | 30 | Nx- | -46.97 | 12.24 | -34.30 |
| | | 30 | Fy- | -22.34 | 3.70 | -9.21 |
| | | 30 | Mz- | -41.55 | 11.70 | -41.50 |
| 116 | 117 | 30 | Nx+ | -19.92 | 7.32 | -7.29 |
| | | 30 | Fy+ | -34.96 | 19.22 | -44.28 |
| | | 30 | Mz+ | -20.10 | 7.00 | -7.11 |
| | | 30 | Nx- | -45.54 | 14.62 | -45.32 |
| | | 30 | Fy- | -20.91 | 5.28 | -12.92 |
| | | 30 | Mz- | -40.62 | 16.84 | -52.15 |
| 211 | 211 | 30 | Nx+ | -19.40 | 7.98 | -8.92 |
| | | 30 | Fy+ | -34.45 | 20.05 | -48.50 |
| | | 30 | Mz+ | -19.58 | 7.66 | -8.67 |
| | | 30 | Nx- | -45.03 | 15.13 | -48.49 |
| | | 30 | Fy- | -20.39 | 5.62 | -14.08 |
| | | 30 | Mz- | -40.09 | 17.54 | -55.82 |
| 212 | 212 | 30 | Nx+ | -9.61 | -16.97 | -15.32 |
| | | 30 | Fy+ | -15.92 | -15.16 | -12.69 |
| | | 30 | Mz+ | -11.74 | -15.69 | -10.38 |
| | | 30 | Nx- | -27.85 | -35.05 | -54.19 |
| | | 30 | Fy- | -20.19 | -39.43 | -49.75 |
| | | 30 | Mz- | -25.44 | -33.79 | -59.61 |
| 213 | 213 | 30 | Nx+ | -9.62 | -14.66 | -9.68 |
| | | 30 | Fy+ | -16.70 | -12.69 | -7.73 |
| | | 30 | Mz+ | -12.28 | -13.27 | -5.21 |
| | | 30 | Nx- | -28.37 | -31.37 | -42.34 |
| | | 30 | Fy- | -20.56 | -36.18 | -38.79 |
| | | 30 | Mz- | -25.48 | -28.09 | -48.65 |
| 214 | 214 | 30 | Nx+ | -9.72 | -12.01 | -3.14 |
| | | 30 | Fy+ | -17.83 | -9.83 | -2.22 |
| | | 30 | Mz+ | -12.90 | -10.56 | 0.63 |
| | | 30 | Nx- | -29.28 | -27.27 | -29.46 |
| | | 30 | Fy- | -21.06 | -32.20 | -25.37 |
| | | 30 | Mz- | -25.79 | -24.01 | -36.16 |
| 311 | 311 | 30 | Nx+ | -29.19 | -18.82 | -29.50 |
| | | 30 | Fy+ | -44.48 | -3.98 | -14.05 |
| | | 30 | Mz+ | -32.91 | -7.79 | -9.39 |
| | | 30 | Nx- | -54.82 | -12.68 | -27.81 |
| | | 30 | Fy- | -29.94 | -24.96 | -34.18 |
| | | 30 | Mz- | -51.58 | -22.98 | -45.44 |
| 312 | 312 | 30 | Nx+ | -28.84 | -17.50 | -25.87 |
| | | 30 | Fy+ | -44.13 | -2.96 | -13.36 |
| | | 30 | Mz+ | -31.79 | -7.18 | -7.86 |
| | | 30 | Nx- | -54.47 | -11.14 | -25.43 |
| | | 30 | Fy- | -29.59 | -23.12 | -29.36 |
| | | 30 | Mz- | -51.23 | -21.14 | -41.02 |
| 511 | 511 | 30 | Nx+ | -4.37 | 0.12 | 0.06 |
| | | 30 | Fy+ | -4.37 | 0.65 | 0.13 |
| | | 30 | Mz+ | -4.37 | 0.65 | 0.13 |
| | | 30 | Nx- | -7.76 | -0.69 | -0.02 |
| | | 30 | Fy- | -7.76 | -2.29 | -0.20 |
| | | 30 | Mz- | -7.76 | -2.28 | -0.20 |
| 512 | 512 | 30 | Nx+ | -4.37 | -0.04 | 0.03 |
| | | 30 | Fy+ | -4.37 | 0.35 | 0.06 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.4. Fecha JUNIO-2002 Página de

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Mz+ | -4.37 | 0.35 | 0.06 |
| | | 30 | Nx- | -7.76 | -0.64 | -0.01 |
| | | 30 | Fy- | -7.76 | -1.78 | -0.12 |
| | | 30 | Mz- | -7.76 | -1.78 | -0.12 |
| 513 | 513 | 30 | Nx+ | -4.37 | -0.20 | 0.02 |
| | | 30 | Fy+ | -4.37 | 0.04 | 0.04 |
| | | 30 | Mz+ | -4.37 | 0.03 | 0.04 |
| | | 30 | Nx- | -7.76 | -0.59 | -0.01 |
| | | 30 | Fy- | -7.76 | -1.27 | -0.05 |
| | | 30 | Mz- | -7.76 | -1.25 | -0.05 |
| 514 | 514 | 30 | Nx+ | -4.37 | -0.35 | 0.00 |
| | | 30 | Fy+ | -4.37 | -0.28 | 0.00 |
| | | 30 | Mz+ | -6.56 | -0.28 | 0.00 |
| | | 30 | Nx- | -7.76 | -0.53 | 0.00 |
| | | 30 | Fy- | -7.76 | -0.77 | -0.02 |
| | | 30 | Mz- | -7.76 | -0.75 | -0.02 |
| 514 | 515 | 30 | Nx+ | -4.37 | 0.53 | 0.00 |
| | | 30 | Fy+ | -4.37 | 0.60 | 0.00 |
| | | 30 | Mz+ | -7.76 | 0.50 | 0.00 |
| | | 30 | Nx- | -7.76 | 0.50 | 0.00 |
| | | 30 | Fy- | -7.76 | 0.26 | 0.00 |
| | | 30 | Mz- | -7.76 | 0.50 | 0.00 |
| 520 | 320 | 30 | Nx+ | -4.37 | 2.06 | 0.82 |
| | | 30 | Fy+ | -4.37 | 3.89 | 1.56 |
| | | 30 | Mz+ | -4.37 | 3.89 | 1.56 |
| | | 30 | Nx- | -7.76 | 1.01 | 0.38 |
| | | 30 | Fy- | -7.76 | -1.67 | -0.70 |
| | | 30 | Mz- | -7.76 | -1.67 | -0.70 |
| 410 | 310 | 30 | Nx+ | -8.36 | 35.85 | 16.67 |
| | | 30 | Fy+ | -26.95 | 45.09 | 44.24 |
| | | 30 | Mz+ | -30.74 | 41.17 | 55.87 |
| | | 30 | Nx- | -32.72 | 24.53 | 44.32 |
| | | 30 | Fy- | -16.92 | 23.20 | 28.66 |
| | | 30 | Mz- | -10.05 | 29.91 | 12.62 |
| 411 | 411 | 30 | Nx+ | -8.36 | 17.20 | 4.01 |
| | | 30 | Fy+ | -30.58 | 25.75 | 40.82 |
| | | 30 | Mz+ | -30.75 | 25.31 | 41.35 |
| | | 30 | Nx- | -32.72 | 15.86 | 35.62 |
| | | 30 | Fy- | -13.57 | 8.65 | 7.66 |
| | | 30 | Mz- | -9.85 | 14.26 | 1.81 |
| 412 | 412 | 30 | Nx+ | -8.36 | -0.96 | -37.83 |
| | | 30 | Fy+ | -30.46 | 6.70 | -18.60 |
| | | 30 | Mz+ | -31.51 | 3.60 | -1.07 |
| | | 30 | Nx- | -32.72 | 0.93 | -4.36 |
| | | 30 | Fy- | -12.73 | -4.21 | -25.27 |
| | | 30 | Mz- | -9.20 | 1.69 | -43.36 |
| 413 | 413 | 30 | Nx+ | -8.36 | -14.79 | -44.82 |
| | | 30 | Fy+ | -31.50 | -1.77 | -17.19 |
| | | 30 | Mz+ | -30.81 | -5.96 | -14.90 |
| | | 30 | Nx- | -32.72 | -4.83 | -27.13 |
| | | 30 | Fy- | -9.21 | -16.43 | -51.51 |
| | | 30 | Mz- | -11.15 | -11.10 | -56.73 |
| 414 | 414 | 30 | Nx+ | -8.36 | -22.13 | -24.63 |
| | | 30 | Fy+ | -30.57 | -10.32 | -13.00 |
| | | 30 | Mz+ | -30.66 | -15.52 | -11.27 |
| | | 30 | Nx- | -32.72 | -16.08 | -25.72 |
| | | 30 | Fy- | -9.51 | -30.68 | -36.12 |
| | | 30 | Mz- | -11.10 | -25.63 | -43.47 |
| 415 | 415 | 30 | Nx+ | -8.36 | -38.30 | 9.95 |
| | | 30 | Fy+ | -30.16 | -19.98 | 7.16 |
| | | 30 | Mz+ | -11.46 | -38.75 | 19.81 |
| | | 30 | Nx- | -32.72 | -28.10 | -2.25 |
| | | 30 | Fy- | -9.85 | -48.13 | 7.65 |
| | | 30 | Mz- | -30.67 | -31.00 | -11.44 |
| 415 | 400 | 30 | Nx+ | -8.36 | -22.61 | 63.43 |
| | | 30 | Fy+ | -30.12 | -11.26 | 38.72 |
| | | 30 | Mz+ | -9.81 | -38.96 | 93.28 |
| | | 30 | Nx- | -32.72 | -19.86 | 44.81 |
| | | 30 | Fy- | -9.91 | -39.49 | 92.74 |
| | | 30 | Mz- | -30.42 | -14.27 | 35.43 |

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | éz |
|---|---|---|---|---|---|
| 1 | 30 | ux+ | 0.003240 | -0.007908 | -0.000553 |
| | 30 | uy+ | 0.003157 | -0.007799 | -0.000525 |
| | 30 | éz+ | -0.002551 | -0.010589 | 0.000032 |
| | 30 | ux- | -0.003638 | -0.015882 | -0.000549 |
| | 30 | uy- | -0.003627 | -0.015894 | -0.000559 |
| | 30 | éz- | 0.001504 | -0.012787 | -0.001345 |
| 2 | 30 | ux+ | 0.003222 | -0.008650 | -0.000205 |
| | 30 | uy+ | 0.002762 | -0.008489 | -0.000171 |
| | 30 | éz+ | -0.003483 | -0.014316 | 0.000202 |
| | 30 | ux- | -0.003650 | -0.016521 | 0.000013 |
| | 30 | uy- | -0.003558 | -0.016803 | -0.000465 |
| | 30 | éz- | 0.001420 | -0.014051 | -0.001111 |
| 3 | 30 | ux+ | 0.003204 | -0.008521 | 0.000345 |
| | 30 | uy+ | 0.002730 | -0.008339 | 0.000333 |
| | 30 | éz+ | -0.000435 | -0.015219 | 0.001188 |
| | 30 | ux- | -0.003662 | -0.015499 | 0.001142 |
| | 30 | uy- | -0.003572 | -0.016714 | 0.000627 |
| | 30 | éz- | -0.002436 | -0.013641 | -0.000242 |
| 4 | 30 | ux+ | 0.003184 | -0.007602 | 0.000600 |
| | 30 | uy+ | 0.002771 | -0.007476 | 0.000559 |
| | 30 | éz+ | -0.001385 | -0.013294 | 0.001948 |
| | 30 | ux- | -0.003677 | -0.012741 | 0.001845 |
| | 30 | uy- | -0.002874 | -0.014673 | 0.001343 |
| | 30 | éz- | 0.000546 | -0.009414 | 0.000287 |
| 5 | 30 | ux+ | 0.003162 | -0.006868 | -0.000126 |
| | 30 | uy+ | 0.003138 | -0.006748 | -0.000121 |
| | 30 | éz+ | -0.003318 | -0.010474 | 0.001649 |
| | 30 | ux- | -0.003692 | -0.009152 | 0.001369 |
| | 30 | uy- | -0.002697 | -0.011833 | 0.001089 |
| | 30 | éz- | 0.002765 | -0.007608 | -0.000363 |
| 6 | 30 | ux+ | 0.003111 | -0.007439 | -0.000700 |
| | 30 | uy+ | -0.000212 | -0.006671 | 0.000045 |
| | 30 | éz+ | -0.003144 | -0.008462 | 0.001047 |
| | 30 | ux- | -0.003589 | -0.007485 | 0.000790 |
| | 30 | uy- | -0.000253 | -0.010935 | 0.000053 |
| | 30 | éz- | 0.002683 | -0.008455 | -0.000957 |
| 111 | 30 | ux+ | 0.000474 | -0.007154 | -0.000367 |
| | 30 | uy+ | 0.000468 | -0.007035 | -0.000362 |
| | 30 | éz+ | -0.001075 | -0.015023 | 0.001342 |
| | 30 | ux- | -0.001075 | -0.015023 | 0.001342 |
| | 30 | uy- | -0.001070 | -0.015135 | 0.001337 |
| | 30 | éz- | 0.000473 | -0.007154 | -0.000367 |
| 112 | 30 | ux+ | 0.000841 | -0.007164 | -0.000509 |
| | 30 | uy+ | 0.000833 | -0.007046 | -0.000509 |
| | 30 | éz+ | -0.002050 | -0.014646 | 0.001105 |
| | 30 | ux- | -0.002062 | -0.015043 | 0.001084 |
| | 30 | uy- | -0.002055 | -0.015156 | 0.001083 |
| | 30 | éz- | 0.000840 | -0.007158 | -0.000510 |
| 113 | 30 | ux+ | 0.001273 | -0.007171 | -0.000540 |
| | 30 | uy+ | 0.001266 | -0.007059 | -0.000542 |
| | 30 | éz+ | -0.002859 | -0.014699 | 0.000888 |
| | 30 | ux- | -0.002865 | -0.014652 | 0.000887 |
| | 30 | uy- | -0.002843 | -0.015178 | 0.000852 |
| | 30 | éz- | 0.001243 | -0.007178 | -0.000547 |
| 114 | 30 | ux+ | 0.001705 | -0.007116 | -0.000509 |
| | 30 | uy+ | 0.001701 | -0.007069 | -0.000513 |
| | 30 | éz+ | -0.003201 | -0.014639 | 0.000663 |
| | 30 | ux- | -0.003496 | -0.014686 | 0.000651 |
| | 30 | uy- | -0.003447 | -0.015198 | 0.000619 |
| | 30 | éz- | 0.001388 | -0.007239 | -0.000536 |
| 115 | 30 | ux+ | 0.002104 | -0.007111 | -0.000467 |
| | 30 | uy+ | 0.002101 | -0.007078 | -0.000470 |
| | 30 | éz+ | -0.002670 | -0.012461 | 0.000479 |



| | | | | | |
|---|---|---|---|---|---|
| | 30 | ux- | -0.003917 | -0.014706 | 0.000371 |
| | 30 | uy- | -0.003846 | -0.015219 | 0.000356 |
| | 30 | éz- | 0.000700 | -0.009832 | -0.000563 |
| 116 | 30 | ux+ | 0.002482 | -0.007208 | -0.000467 |
| | 30 | uy+ | 0.002474 | -0.007089 | -0.000453 |
| | 30 | éz+ | -0.002863 | -0.012014 | 0.000354 |
| | 30 | ux- | -0.004085 | -0.014757 | 0.000030 |
| | 30 | uy- | -0.004016 | -0.015237 | 0.000048 |
| | 30 | éz- | 0.000578 | -0.010828 | -0.000774 |
| 117 | 30 | ux+ | 0.002879 | -0.007187 | -0.000515 |
| | 30 | uy+ | 0.002858 | -0.007098 | -0.000500 |
| | 30 | éz+ | -0.002442 | -0.010714 | 0.000190 |
| | 30 | ux- | -0.003944 | -0.014772 | -0.000394 |
| | 30 | uy- | -0.003907 | -0.015255 | -0.000330 |
| | 30 | éz- | 0.001340 | -0.010845 | -0.001105 |
| 211 | 30 | ux+ | 0.002989 | -0.007190 | -0.000522 |
| | 30 | uy+ | 0.002965 | -0.007101 | -0.000507 |
| | 30 | éz+ | -0.002479 | -0.010717 | 0.000173 |
| | 30 | ux- | -0.003855 | -0.014775 | -0.000434 |
| | 30 | uy- | -0.003831 | -0.015259 | -0.000365 |
| | 30 | éz- | 0.001579 | -0.010848 | -0.001136 |
| 212 | 30 | ux+ | 0.003101 | -0.007190 | -0.000525 |
| | 30 | uy+ | 0.003075 | -0.007101 | -0.000511 |
| | 30 | éz+ | -0.002516 | -0.010717 | 0.000165 |
| | 30 | ux- | -0.003760 | -0.014777 | -0.000449 |
| | 30 | uy- | -0.003753 | -0.015261 | -0.000378 |
| | 30 | éz- | 0.001824 | -0.010850 | -0.001147 |
| 213 | 30 | ux+ | 0.003138 | -0.007376 | -0.000541 |
| | 30 | uy+ | 0.003107 | -0.007281 | -0.000525 |
| | 30 | éz+ | -0.002528 | -0.010667 | 0.000131 |
| | 30 | ux- | -0.003730 | -0.015403 | -0.000431 |
| | 30 | uy- | -0.003725 | -0.015407 | -0.000437 |
| | 30 | éz- | 0.001906 | -0.011262 | -0.001203 |
| 214 | 30 | ux+ | 0.003189 | -0.007641 | -0.000555 |
| | 30 | uy+ | 0.003156 | -0.007539 | -0.000543 |
| | 30 | éz+ | -0.002543 | -0.010615 | 0.000089 |
| | 30 | ux- | -0.003687 | -0.015626 | -0.000495 |
| | 30 | uy- | -0.003676 | -0.015634 | -0.000503 |
| | 30 | éz- | 0.002023 | -0.011871 | -0.001270 |
| 310 | 30 | ux+ | 0.000307 | -0.007492 | 0.000033 |
| | 30 | uy+ | 0.000290 | -0.007023 | -0.000052 |
| | 30 | éz+ | 0.000119 | -0.014995 | 0.001653 |
| | 30 | ux- | 0.000077 | -0.011454 | 0.001063 |
| | 30 | uy- | 0.000119 | -0.015113 | 0.001642 |
| | 30 | éz- | 0.000290 | -0.007142 | -0.000063 |
| 311 | 30 | ux+ | 0.000353 | -0.007148 | -0.000236 |
| | 30 | uy+ | 0.000350 | -0.007029 | -0.000230 |
| | 30 | éz+ | -0.000508 | -0.015011 | 0.001488 |
| | 30 | ux- | -0.000508 | -0.015011 | 0.001488 |
| | 30 | uy- | -0.000505 | -0.015123 | 0.001482 |
| | 30 | éz- | 0.000353 | -0.007148 | -0.000236 |
| 312 | 30 | ux+ | 0.000407 | -0.007151 | -0.000309 |
| | 30 | uy+ | 0.000402 | -0.007032 | -0.000303 |
| | 30 | éz+ | -0.000799 | -0.015017 | 0.001413 |
| | 30 | ux- | -0.000799 | -0.015017 | 0.001413 |
| | 30 | uy- | -0.000795 | -0.015129 | 0.001407 |
| | 30 | éz- | 0.000406 | -0.007151 | -0.000309 |
| 320 | 30 | ux+ | 0.000000 | -0.010058 | -0.000798 |
| | 30 | uy+ | 0.000000 | -0.005643 | 0.000081 |
| | 30 | éz+ | 0.000000 | -0.005762 | 0.000092 |
| | 30 | ux- | 0.000000 | -0.010058 | -0.000798 |
| | 30 | uy- | 0.000000 | -0.013761 | -0.001625 |
| | 30 | éz- | 0.000000 | -0.013643 | -0.001636 |
| 400 | 30 | ux+ | 0.000162 | -0.007291 | 0.000059 |
| | 30 | uy+ | 0.000133 | -0.006433 | 0.000150 |
| | 30 | éz+ | 0.000066 | -0.008665 | 0.000401 |
| | 30 | ux- | 0.000029 | -0.009042 | 0.000186 |
| | 30 | uy- | 0.000056 | -0.010521 | 0.000091 |
| | 30 | éz- | 0.000151 | -0.008664 | -0.000101 |
| 411 | 30 | ux+ | 0.000303 | -0.007461 | 0.000144 |
| | 30 | uy+ | 0.000286 | -0.007023 | 0.000052 |
| | 30 | éz+ | 0.000118 | -0.014399 | 0.001738 |

| | | | | | |
|---|---|---|---|---|---|
| | 30 | ux- | 0.000078 | -0.011075 | 0.001099 |
| | 30 | uy- | 0.000118 | -0.014522 | 0.001725 |
| | 30 | éz- | 0.000275 | -0.007984 | 0.000039 |
| 412 | 30 | ux+ | 0.000274 | -0.006892 | 0.000434 |
| | 30 | uy+ | 0.000205 | -0.006513 | 0.000369 |
| | 30 | éz+ | 0.000105 | -0.010966 | 0.001680 |
| | 30 | ux- | 0.000067 | -0.009572 | 0.001004 |
| | 30 | uy- | 0.000168 | -0.011092 | 0.001637 |
| | 30 | éz- | 0.000243 | -0.007414 | 0.000161 |
| 413 | 30 | ux+ | 0.000245 | -0.006204 | 0.000221 |
| | 30 | uy+ | 0.000122 | -0.005877 | 0.000239 |
| | 30 | éz+ | 0.000150 | -0.008314 | 0.001021 |
| | 30 | ux- | 0.000060 | -0.008059 | 0.000123 |
| | 30 | uy- | 0.000189 | -0.009016 | 0.000453 |
| | 30 | éz- | 0.000158 | -0.007452 | -0.000177 |
| 414 | 30 | ux+ | 0.000218 | -0.006100 | -0.000112 |
| | 30 | uy+ | 0.000104 | -0.005790 | -0.000141 |
| | 30 | éz+ | 0.000192 | -0.007143 | 0.000300 |
| | 30 | ux- | 0.000050 | -0.008106 | -0.000588 |
| | 30 | uy- | 0.000166 | -0.008934 | -0.000245 |
| | 30 | éz- | 0.000076 | -0.008067 | -0.000644 |
| 415 | 30 | ux+ | 0.000191 | -0.006982 | -0.000238 |
| | 30 | uy+ | 0.000182 | -0.006214 | -0.000239 |
| | 30 | éz+ | 0.000163 | -0.007279 | -0.000019 |
| | 30 | ux- | 0.000042 | -0.008677 | -0.000509 |
| | 30 | uy- | 0.000048 | -0.009912 | -0.000518 |
| | 30 | éz- | 0.000044 | -0.009408 | -0.000778 |
| 511 | 30 | ux+ | 0.000308 | -0.007506 | 0.000034 |
| | 30 | uy+ | 0.000291 | -0.007006 | -0.000051 |
| | 30 | éz+ | 0.000120 | -0.015573 | 0.001649 |
| | 30 | ux- | 0.000078 | -0.011828 | 0.001062 |
| | 30 | uy- | 0.000120 | -0.015689 | 0.001638 |
| | 30 | éz- | 0.000291 | -0.007123 | -0.000062 |
| 512 | 30 | ux+ | 0.000308 | -0.007508 | 0.000034 |
| | 30 | uy+ | 0.000291 | -0.007004 | -0.000051 |
| | 30 | éz+ | 0.000120 | -0.015655 | 0.001649 |
| | 30 | ux- | 0.000078 | -0.011882 | 0.001061 |
| | 30 | uy- | 0.000120 | -0.015771 | 0.001638 |
| | 30 | éz- | 0.000291 | -0.007121 | -0.000062 |
| 513 | 30 | ux+ | 0.000309 | -0.007509 | 0.000034 |
| | 30 | uy+ | 0.000292 | -0.007000 | -0.000051 |
| | 30 | éz+ | 0.000120 | -0.015737 | 0.001649 |
| | 30 | ux- | 0.000078 | -0.011934 | 0.001061 |
| | 30 | uy- | 0.000120 | -0.015852 | 0.001638 |
| | 30 | éz- | 0.000292 | -0.007116 | -0.000062 |
| 514 | 30 | ux+ | 0.000309 | -0.007511 | 0.000034 |
| | 30 | uy+ | 0.000292 | -0.006998 | -0.000051 |
| | 30 | éz+ | 0.000120 | -0.015819 | 0.001649 |
| | 30 | ux- | 0.000078 | -0.011986 | 0.001061 |
| | 30 | uy- | 0.000120 | -0.015933 | 0.001638 |
| | 30 | éz- | 0.000292 | -0.007113 | -0.000062 |
| 515 | 30 | ux+ | 0.000309 | -0.007511 | 0.000034 |
| | 30 | uy+ | 0.000292 | -0.006995 | -0.000051 |
| | 30 | éz+ | 0.000120 | -0.015901 | 0.001649 |
| | 30 | ux- | 0.000078 | -0.012039 | 0.001061 |
| | 30 | uy- | 0.000120 | -0.016014 | 0.001638 |
| | 30 | éz- | 0.000292 | -0.007109 | -0.000062 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 310 | 30 | Fx+ | 0.00 | 6.65 | 0.00 |
| | 30 | Fy+ | 0.00 | 7.93 | 0.00 |
| | 30 | Mz+ | 0.00 | 6.65 | 0.00 |
| | 30 | Fx- | 0.00 | 6.65 | 0.00 |
| | 30 | Fy- | 0.00 | 3.69 | 0.00 |
| | 30 | Mz- | 0.00 | 6.65 | 0.00 |
| 320 | 30 | Fx+ | 12.25 | 4.97 | 0.00 |



| | | | | | |
|---|---|---|---|---|---|
| | 30 | Fy+ | -12.25 | 7.23 | 0.00 |
| | 30 | Mz+ | 0.00 | 5.28 | 0.00 |
| | 30 | Fx- | -12.25 | 5.57 | 0.00 |
| | 30 | Fy- | 12.25 | 2.96 | 0.00 |
| | 30 | Mz- | 0.00 | 5.28 | 0.00 |
| 400 | 30 | Fx+ | 0.00 | 28.85 | 0.00 |
| | 30 | Fy+ | 0.00 | 30.98 | 0.00 |
| | 30 | Mz+ | 0.00 | 28.85 | 0.00 |
| | 30 | Fx- | 0.00 | 28.85 | 0.00 |
| | 30 | Fy- | 0.00 | 18.94 | 0.00 |
| | 30 | Mz- | 0.00 | 28.85 | 0.00 |
| 411 | 30 | Fx+ | 0.00 | 21.43 | 0.00 |
| | 30 | Fy+ | 0.00 | 25.20 | 0.00 |
| | 30 | Mz+ | 0.00 | 21.43 | 0.00 |
| | 30 | Fx- | 0.00 | 21.43 | 0.00 |
| | 30 | Fy- | 0.00 | 12.19 | 0.00 |
| | 30 | Mz- | 0.00 | 21.43 | 0.00 |
| 412 | 30 | Fx+ | 0.00 | 30.63 | 0.00 |
| | 30 | Fy+ | 0.00 | 32.66 | 0.00 |
| | 30 | Mz+ | 0.00 | 30.63 | 0.00 |
| | 30 | Fx- | 0.00 | 30.63 | 0.00 |
| | 30 | Fy- | 0.00 | 19.18 | 0.00 |
| | 30 | Mz- | 0.00 | 30.63 | 0.00 |
| 413 | 30 | Fx+ | 0.00 | 26.50 | 0.00 |
| | 30 | Fy+ | 0.00 | 26.55 | 0.00 |
| | 30 | Mz+ | 0.00 | 26.50 | 0.00 |
| | 30 | Fx- | 0.00 | 26.50 | 0.00 |
| | 30 | Fy- | 0.00 | 17.31 | 0.00 |
| | 30 | Mz- | 0.00 | 26.50 | 0.00 |
| 414 | 30 | Fx+ | 0.00 | 25.73 | 0.00 |
| | 30 | Fy+ | 0.00 | 26.32 | 0.00 |
| | 30 | Mz+ | 0.00 | 25.73 | 0.00 |
| | 30 | Fx- | 0.00 | 25.73 | 0.00 |
| | 30 | Fy- | 0.00 | 17.05 | 0.00 |
| | 30 | Mz- | 0.00 | 25.73 | 0.00 |
| 415 | 30 | Fx+ | 0.00 | 27.72 | 0.00 |
| | 30 | Fy+ | 0.00 | 29.19 | 0.00 |
| | 30 | Mz+ | 0.00 | 27.72 | 0.00 |
| | 30 | Fx- | 0.00 | 27.72 | 0.00 |
| | 30 | Fy- | 0.00 | 18.30 | 0.00 |
| | 30 | Mz- | 0.00 | 27.72 | 0.00 |
| 511 | 30 | Fx+ | 0.00 | 3.89 | 0.00 |
| | 30 | Fy+ | 0.00 | 4.71 | 0.00 |
| | 30 | Mz+ | 0.00 | 3.89 | 0.00 |
| | 30 | Fx- | 0.00 | 3.89 | 0.00 |
| | 30 | Fy- | 0.00 | 2.10 | 0.00 |
| | 30 | Mz- | 0.00 | 3.89 | 0.00 |
| 512 | 30 | Fx+ | 0.00 | 0.99 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.19 | 0.00 |
| | 30 | Mz+ | 0.00 | 0.99 | 0.00 |
| | 30 | Fx- | 0.00 | 0.99 | 0.00 |
| | 30 | Fy- | 0.00 | 0.53 | 0.00 |
| | 30 | Mz- | 0.00 | 0.99 | 0.00 |
| 513 | 30 | Fx+ | 0.00 | 0.99 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.20 | 0.00 |
| | 30 | Mz+ | 0.00 | 0.99 | 0.00 |
| | 30 | Fx- | 0.00 | 0.99 | 0.00 |
| | 30 | Fy- | 0.00 | 0.53 | 0.00 |
| | 30 | Mz- | 0.00 | 0.99 | 0.00 |
| 514 | 30 | Fx+ | 0.00 | 0.99 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.20 | 0.00 |
| | 30 | Mz+ | 0.00 | 0.99 | 0.00 |
| | 30 | Fx- | 0.00 | 0.99 | 0.00 |
| | 30 | Fy- | 0.00 | 0.53 | 0.00 |
| | 30 | Mz- | 0.00 | 0.99 | 0.00 |
| 515 | 30 | Fx+ | 0.00 | 0.50 | 0.00 |
| | 30 | Fy+ | 0.00 | 0.60 | 0.00 |
| | 30 | Mz+ | 0.00 | 0.50 | 0.00 |
| | 30 | Fx- | 0.00 | 0.50 | 0.00 |
| | 30 | Fy- | 0.00 | 0.26 | 0.00 |

30 Mz- 0.00 0.50 0.00



## 9.3.- ARMADO GENERAL.

*Control en rotura*

*** Armado a Flexión.**

De las envolventes de rotura antes comentadas, se extraen las envolvente de Axil, Cortante y Flector para cada sección con objeto de dimensionar la armadura en Estado Límite Último.

A continuación se exponen los resultados de dicho dimensionamiento para cada uno de los extremos de barra del modelo (se muestra medio cajón sólo, puesto que éste es simétrico).

Las secciones geométricas consideradas para el armado son las correspondientes a la definición geométrica establecida en el apartado precedente de este anejo.

En las páginas siguientes se muestra el dimensionamiento de armadura realizado, considerando los mínimos mecánicos y geométricos de las secciones, así como las posibles necesidades de armadura requeridas por el dimensionamiento a cortante.

*** Armado a Cortante.**

Una vez realizado el armado a flexión de las secciones y de forma paralela a éste, se procede al control a cortante de la estructura. Dicho control se realiza según la norma EHE-98.

En las páginas siguientes se muestran las hipótesis determinantes para cada elemento, resultando claramente más desfavorable el caso de mayor relleno de tierras sin carga de ferrocarril.

ESFUERZOS Y DEFORMACIONES CONDICIONANTES

Hip-1 Cargas CMD y SCu Ferrocarril

| Dir. Tel | | Nd | Md | As |
|---|---|---|---|---|
| | Emp. hastial int. | -107,49 | -143,73 | 50,29 cm² |
| | CV | -20,65 | 123,60 | 42,16 cm² |
| | Emp. hastial ext. | -94,53 | 454,00 | 76,10 cm² |

| Hastial ext | | | | |
|---|---|---|---|---|
| | Superior | -169,28 | 154,73 | 45,73 cm² |
| | Inferior | +174,89 | 140,42 | 37,96 cm² |

| Zapata | | | | |
|---|---|---|---|---|
| | Inf. ext | -88,12 | 141,45 | 27,07 cm² |
| | CV | -41,16 | 219,27 | 53,98 cm² |
| | Inf. int | -52,30 | 478,72 | 69,30 cm². |

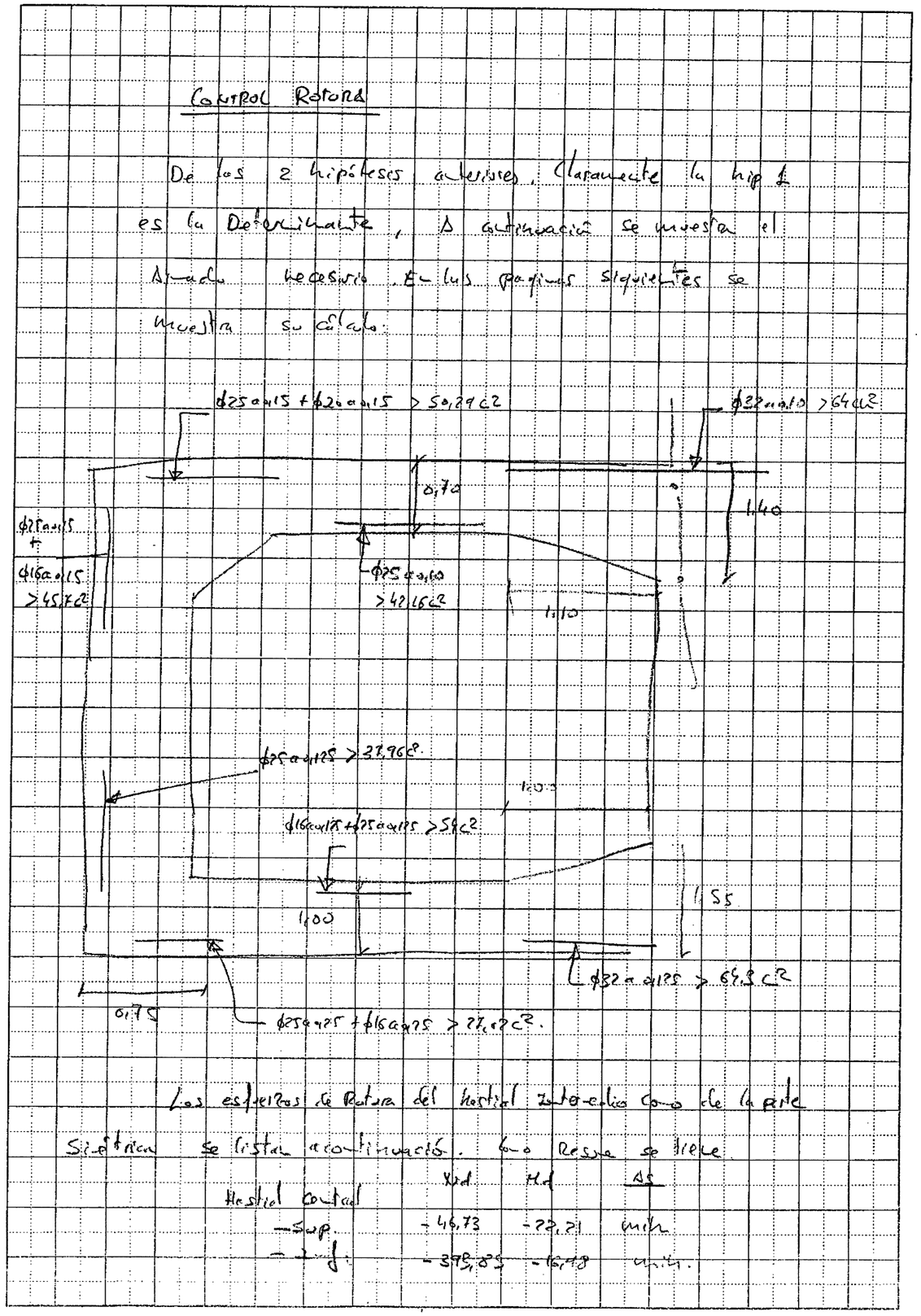


HIP-2 Cargas viento = 1,10 + Peso

| Dir. Tel (se tratan individualmente e=0,60) | | Nd | Md | As |
|---|---|---|---|---|
| | Emp. hastial ext | -38,18 | -72,61 | 13,82 cm² |
| | CV | -28,22 | 57,04 | 23,46 cm² |
| | Emp. hastial int | -29,25 | -157,64 | 64,11 cm² |

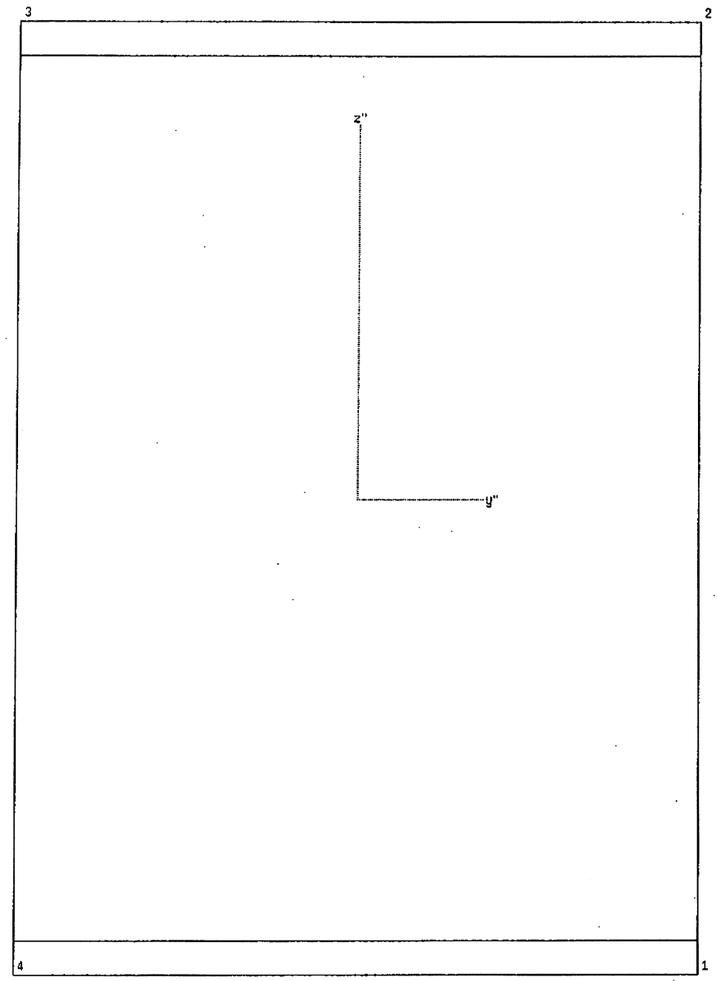
| Hastiales ext (se tratan individualmente e=0,80 m) | | | | |
|---|---|---|---|---|
| | Sup. | -87,70 | -77,49 | 23,02 cm² |
| | Inf. | -74,74 | -80,62 | 22,87 cm² |

| Zapata (se tratan individualmente con e=0,80 m) | | | | |
|---|---|---|---|---|
| | Inf ext | -46,01 | 82,36 | 21,58 cm² |
| | CV | -16,62 | 83,00 | 24,90 |
| | Inf. centro | -14,61 | 136,91 | 44,38 |






Mstb. 1 : 9.0




Sección :"DINTELC" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"HA_25"

Ancho = 100.00 cm Canto = 140.00 cm

Características mecánicas de la sección:
Area : Ax= 1.400 [m2]
Momentos de inercia : Iy= 0.228666 [m4] Iz= 0.116667 [m4]
Inercia a torsión : Ix= 0.261179 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.700000 [m]

| I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|
| izq. Iz | -0.500 | -0.233333 | 0.167 |
| dch. Iz | 0.500 | 0.233333 | -0.167 |

bajo Iy -0.700 -0.326666 0.233
rriba Iy 0.700 0.326666 -0.233

rmadura: "B1"

| º | Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|---|
| 1 | B500S | (2) | 0.01 | -50.00 | 5.00 | 50.00 | 5.00 |
| 2 | B500S | (2) | 0.01 | -50.00 | 135.00 | 50.00 | 135.00 |

Total: 0.02 Cuantía de armadura: 0.000 [o/o]

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

imens. a cortante (valores por defecto): (Acero"B500S"/Hormigón"HA_25")

| ›rtante | Area mín.cercos | Ancho alma ideal | Canto útil | Incl.bielas |
|---|---|---|---|---|
| /z | 0.00 [cm2/m] | 100.00 [cm] | 136.00 [cm] | 0.00 |
| /y | 0.00 [cm2/m] | 140.00 [cm] | 96.00 [cm] | 0.00 |

ıracterísticas del material:

| ım.Mat. | Módulo E [ kp/cm2] | 0.85*fcd,fyd [ kp/cm2] | eps-fc [o/oo] | fct [ kp/cm2] | fcv [ kp/cm2] | fcw,mín [ kp/cm2] |
|---|---|---|---|---|---|---|
| A_25" | 278100.0 | -141.667 | -2.000 | 0.0 | 6.460 | 250.000 |
| 500S" | 2.10E+06 | 4434.780 | | | | |

yenda:
d,fyd resistencia de cálculo del hormigón,acero
s-fc deformación al final de la parábola (fig.2.3, cap.2.2)
t resistencia de cálculo a tracción del hormigón
v resistencia virtual de cálculo del hormigón a esfuerzo cortante



Dimensionamiento : Viga "DINTELC"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -94.530 | | | | -454.000 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. As [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.01 | - | 0.01 |
| 2 "B500S" | -50.0 | 135.0 | 50.0 | 135.0 | 0.01 | 76.10 | 76.10 |

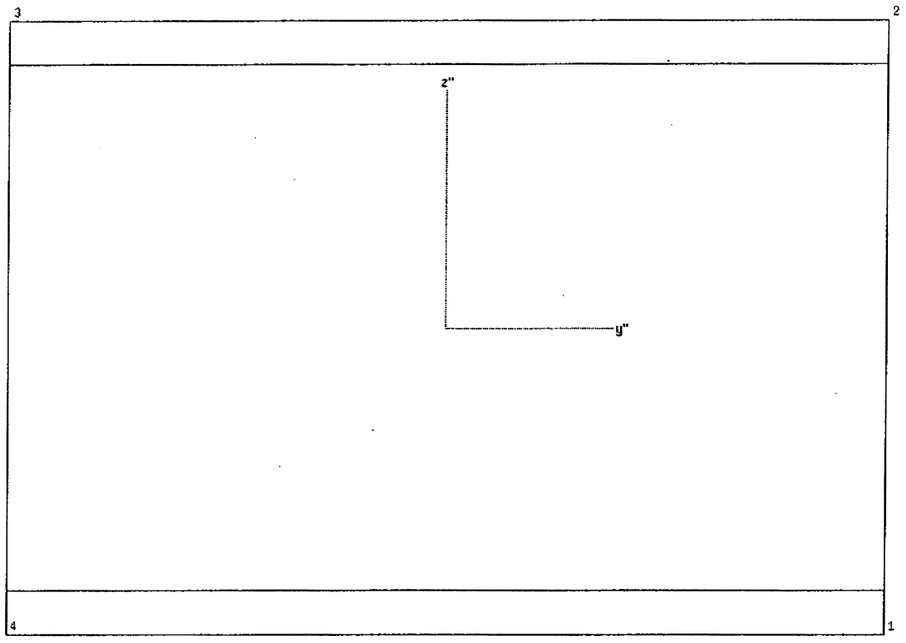
Cuantía arm. 0.54 [o/o] Suma 76.11

Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | 50.00 | 0.00 | -3.500 | -141.667 | "HA_25" |
| Armadura-Min | 50.00 | 5.00 | -3.037 | -4434.780 | "B500S" |
| Hormigón-Max | -50.00 | 140.00 | 9.477 | 0.000 | "HA_25" |
| Armadura-Max | -50.00 | 135.00 | 9.014 | 4434.780 | "B500S" |

Fibra neutra zn 37.76 cm yn 0.00 cm Angulo 0.0
Ancho zona comprim. 37.76 cm Zona comprimida/Canto útil 0.28

stb. 1 : 7.0




:cción :"DINTEL" Armadura :"B1"
po : tipo viga/ Rectángulo Unidades :[cm]
iterial :"HA_25"

ıcho = 100.00 cm Canto = 70.00 cm

racterísticas mecánicas de la sección:
ea : Ax= 0.700000 [m2]
mentos de inercia : Iy= 0.028583 [m4] Iz= 0.058333 [m4]
ercia a torsión : Ix= 0.064912 [m4]

sición del centro de gravedad: ys= 0.000 [m] zs= 0.350000 [m]

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| q. | Iz | -0.500 | -0.116667 | 0.167 |
| h. | Iz | 0.500 | 0.116667 | -0.167 |
| ajo | Iy | -0.350 | -0.081667 | 0.117 |
| riba | Iy | 0.350 | 0.081667 | -0.117 |

madura: "B1"

| | Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|---|
| 1 | B500S | (2) | 0.05 | -50.00 | 65.00 | 50.00 | 65.00 |
| 2 | B500S | (2) | 0.05 | -50.00 | 5.00 | 50.00 | 5.00 |

Total: 0.10 Cuantía de armadura: 0.001 [o/o]



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

Dimens. a cortante (valores por defecto): (Acero"B500S"/Hormigón"HA_25")

| Cortante | Area mín.cercos | Ancho alma ideal | Canto útil | Incl.bielas |
|---|---|---|---|---|
| Vz | 0.00 [cm2/m] | 100.00 [cm] | 66.00 [cm] | 0.00 |
| Vy | 0.00 [cm2/m] | 70.00 [cm] | 96.00 [cm] | 0.00 |

Características del material:

| Nom.Mat. | Módulo E [kp/cm2] | 0.85*fcd,fyd [kp/cm2] | eps-fc [o/oo] | fct [kp/cm2] | fcv [kp/cm2] | fcw,mín [kp/cm2] |
|---|---|---|---|---|---|---|
| "HA_25" | 278100.0 | -141.667 | -2.000 | 0.0 | 6.460 | 250.000 |
| "B500S" | 2.10E+06 | 4434.780 | | | | |

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

imensionamiento : Viga "DINTEL"/"B1"

sfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -80.650 | | | | 123.600 | | 45.0 |

| madura ngitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| "B500S" | -50.0 | 65.0 | 50.0 | 65.0 | 0.05 | - | 0.05 |
| "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.05 | 42.11 | 42.11 |

Cuantía arm. 0.60 [o/o] Suma 42.16

formaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| rmigón-Min | -50.00 | 70.00 | -3.500 | -141.667 | "HA_25" |
| madura-Min | -50.00 | 65.00 | -2.752 | -4434.780 | "B500S" |
| rmigón-Max | 50.00 | 0.00 | 6.973 | 0.000 | "HA_25" |
| madura-Max | 50.00 | 5.00 | 6.225 | 4434.780 | "B500S" |

bra neutra zn 46.61 cm yn -0.00 cm Angulo 0.0
cho zona comprim. 23.39 cm Zona comprimida/Canto útil 0.36



Dimensionamiento : Viga "H-7"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -169.280 | | | | 154.730 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 70.0 | 50.0 | 70.0 | 0.05 | - | 0.05 |
| 2 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.05 | 45.68 | 45.68 |

Cuantía arm. 0.61 [o/o] Suma 45.73

Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | -50.00 | 75.00 | -3.500 | -141.667 | "HA_25" |
| Armadura-Min | -50.00 | 70.00 | -2.965 | -4434.780 | "B500S" |
| Hormigón-Max | 50.00 | 0.00 | 4.527 | 0.000 | "HA_25" |
| Armadura-Max | 50.00 | 5.00 | 3.992 | 4434.780 | "B500S" |

Fibra neutra zn 42.30 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 32.70 cm Zona comprimida/Canto útil 0.47

Dimensionamiento : Viga "H-7"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -174.890 | | | | 140.420 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 70.0 | 50.0 | 70.0 | 0.05 | - | 0.05 |
| 2 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.05 | 37.91 | 37.91 |

Cuantía arm. 0.51 [o/o] Suma 37.96

eformaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| ›rmigón-Min | -50.00 | 75.00 | -3.500 | -141.667 | "HA_25" |
| ·madura-Min | -50.00 | 70.00 | -2.918 | -4434.780 | "B500S" |
| ›rmigón-Max | 50.00 | 0.00 | 5.235 | 0.000 | "HA_25" |
| ·madura-Max | 50.00 | 5.00 | 4.653 | 4434.780 | "B500S" |

bra neutra zn 44.95 cm yn -0.00 cm Angulo 0.0
ıcho zona comprim. 30.05 cm Zona comprimida/Canto útil 0.43



Dimensionamiento : Viga "H-7"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -169.280 | | | | 154.730 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 70.0 | 50.0 | 70.0 | 0.05 | - | 0.05 |
| 2 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.05 | 45.68 | 45.68 |
| | | | | Cuantía arm. 0.61 [o/o] | | Suma | 45.73 |

Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | -50.00 | 75.00 | -3.500 | -141.667 | "HA_25" |
| Armadura-Min | -50.00 | 70.00 | -2.965 | -4434.780 | "B500S" |
| Hormigón-Max | 50.00 | 0.00 | 4.527 | 0.000 | "HA_25" |
| Armadura-Max | 50.00 | 5.00 | 3.992 | 4434.780 | "B500S" |

Fibra neutra zn 42.30 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 32.70 cm Zona comprimida/Canto útil 0.47

Dimensionamiento : Viga "H-7"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -174.890 | | | | 140.420 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 70.0 | 50.0 | 70.0 | 0.05 | - | 0.05 |
| 2 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.05 | 37.91 | 37.91 |
| | | | | Cuantía arm. 0.51 [o/o] | | Suma | 37.96 |

eformaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| ɔrmigón-Min | -50.00 | 75.00 | -3.500 | -141.667 | "HA_25" |
| madura-Min | -50.00 | 70.00 | -2.918 | -4434.780 | "B500S" |
| ɔrmigón-Max | 50.00 | 0.00 | 5.235 | 0.000 | "HA_25" |
| madura-Max | 50.00 | 5.00 | 4.653 | 4434.780 | "B500S" |

bra neutra zn 44.95 cm yn -0.00 cm Angulo 0.0
ıcho zona comprim. 30.05 cm Zona comprimida/Canto útil 0.43



Dimensionamiento : Viga "ZAPCEN"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -52.300 | | | | 425.720 | | 45.0 |

| Armadura Longitudinal: | | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|---|
| 1 | "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.01 | 64.29 | 64.29 |
| 2 | "B500S" | -50.0 | 150.0 | 50.0 | 150.0 | 0.01 | - | 0.01 |

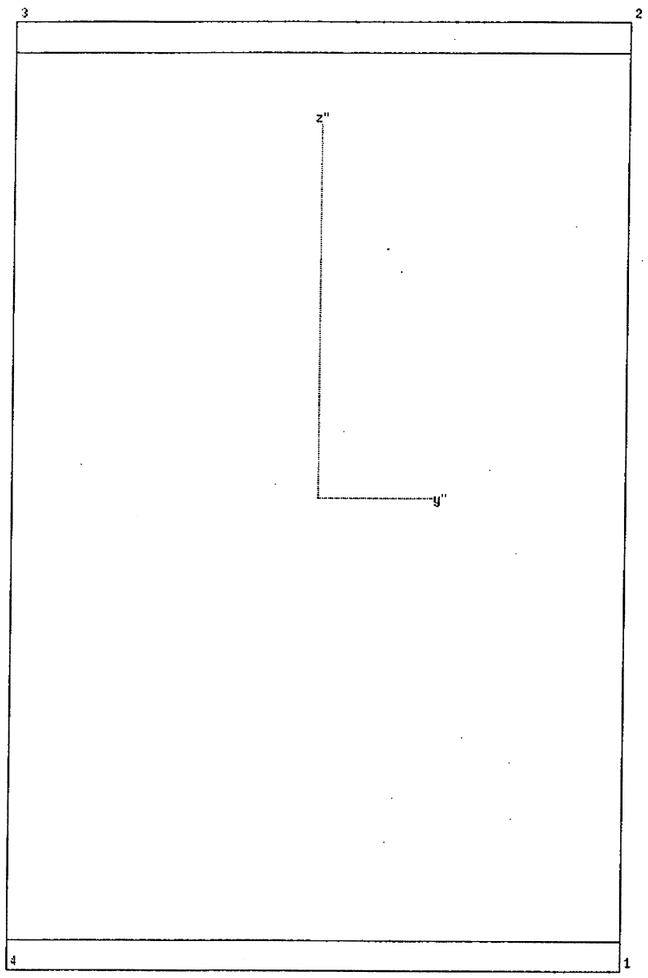
Cuantía arm. 0.41 [o/o] Suma 64.30

Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | -50.00 | 155.00 | -2.686 | -141.667 | "HA_25" |
| Armadura-Min | -50.00 | 150.00 | -2.263 | -4434.780 | "B500S" |
| Hormigón-Max | 50.00 | 0.00 | 10.423 | 0.000 | "HA_25" |
| Armadura-Max | 50.00 | 5.00 | 10.000 | 4434.780 | "B500S" |

Fibra neutra zn 123.24 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 31.76 cm Zona comprimida/Canto útil 0.21

stb. 1 : 10.0




cción :"ZAPCEN" Armadura :"B1"
po : tipo viga/ Rectángulo Unidades :[cm]
terial :"HA_25"

cho = 100.00 cm Canto = 155.00 cm

racterísticas mecánicas de la sección:
ea : Ax= 1.550 [m2]
mentos de inercia : Iy= 0.310323 [m4] Iz= 0.129167 [m4]
ercia a torsión : Ix= 0.309670 [m4]

sición del centro de gravedad: ys= 0.000 [m] zs= 0.775000 [m]

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| 1. | Iz | -0.500 | -0.258333 | 0.167 |
| 2. | Iz | 0.500 | 0.258333 | -0.167 |



| | | | |
|---|---|---|---|
| abajo | Iy | -0.775 | -0.400416 | 0.258 |
| arriba | Iy | 0.775 | 0.400416 | -0.258 |

Armadura: "B1"

| Nº | Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|---|
| 1 | B500S | (2) | 0.01 | -50.00 | 5.00 | 50.00 | 5.00 |
| 2 | B500S | (2) | 0.01 | -50.00 | 150.00 | 50.00 | 150.00 |

Total: 0.02 Cuantía de armadura: 0.000 [o/o]

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

Dimens. a cortante (valores por defecto): (Acero"B500S"/Hormigón"HA_25")

| Cortante | Area mín.cercos | Ancho alma ideal | Canto útil | Incl.bielas |
|---|---|---|---|---|
| Vz | 0.00 [cm2/m] | 100.00 [cm] | 151.00 [cm] | 0.00 |
| Vy | 0.00 [cm2/m] | 155.00 [cm] | 96.00 [cm] | 0.00 |

Características del material:

| Nom.Mat. | Módulo E [ kp/cm2] | 0.85*fcd,fyd [ kp/cm2] | eps-fc [o/oo] | fct [ kp/cm2] | fcv [ kp/cm2] | fcw,mín [ kp/cm2] |
|---|---|---|---|---|---|---|
| "HA_25" | 278100.0 | -141.667 | -2.000 | 0.0 | 6.460 | 250.000 |
| "B500S" | 2.10E+06 | 4434.780 | | | | |

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

imensionamiento : Viga "ZAPCEN"/"B1"

sfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -52.300 | | | | 425.720 | | 45.0 |

| rmadura ongitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.01 | 64.29 | 64.29 |
| 2 "B500S" | -50.0 | 150.0 | 50.0 | 150.0 | 0.01 | - | 0.01 |
| | | | | | Cuantía arm. 0.41 [o/o] | Suma | 64.30 |

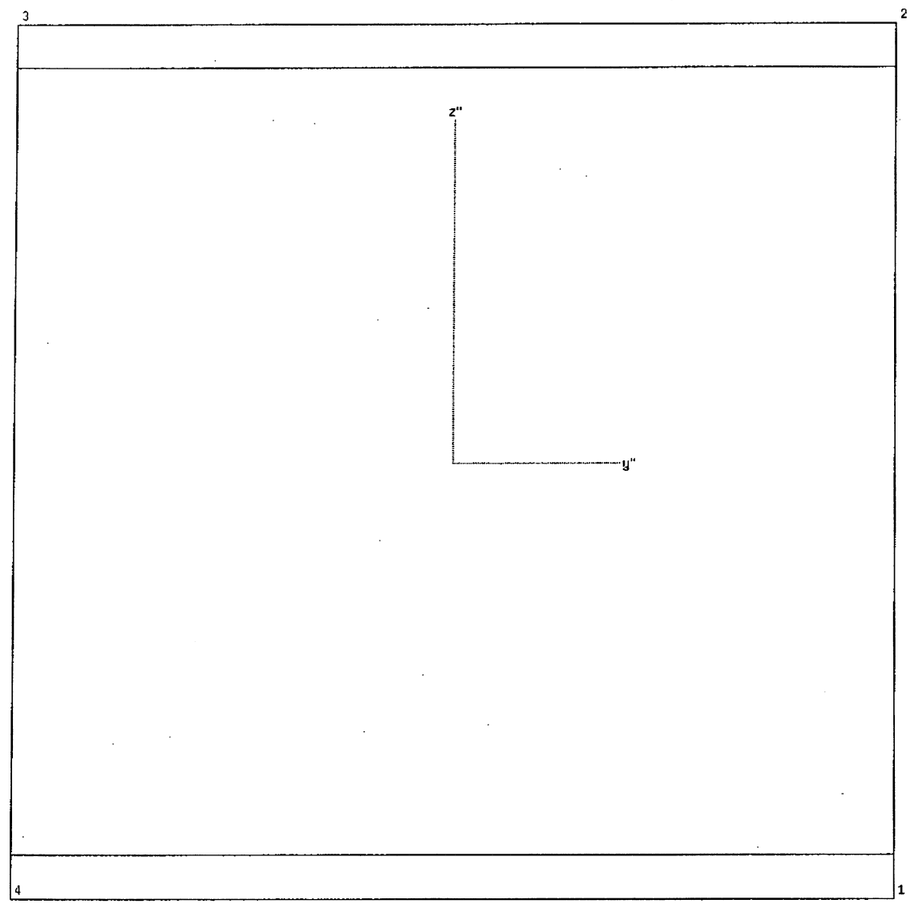
eformaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| ormigón-Min | -50.00 | 155.00 | -2.686 | -141.667 | "HA_25" |
| madura-Min | -50.00 | 150.00 | -2.263 | -4434.780 | "B500S" |
| ormigón-Max | 50.00 | 0.00 | 10.423 | 0.000 | "HA_25" |
| madura-Max | 50.00 | 5.00 | 10.000 | 4434.780 | "B500S" |

bra neutra zn 123.24 cm yn -0.00 cm Angulo 0.0
ncho zona comprim. 31.76 cm Zona comprimida/Canto útil 0.21



Mstb. 1 : 7.0




Sección :"ZAP" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"HA_25"

Ancho = 100.00 cm Canto = 100.00 cm

Características mecánicas de la sección:
Area : Ax= 1.000 [m2]
Momentos de inercia : Iy= 0.083333 [m4] Iz= 0.083333 [m4]
Inercia a torsión : Ix= 0.140667 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.500000 [m]

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| izq. | Iz | -0.500 | -0.166667 | 0.167 |
| dch. | Iz | 0.500 | 0.166667 | -0.167 |
| abajo | Iy | -0.500 | -0.166667 | 0.167 |
| arriba | Iy | 0.500 | 0.166667 | -0.167 |

rmadura: "B1"

| | Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|---|
| 1 | B500S | (2) | 0.05 | -50.00 | 95.00 | 50.00 | 95.00 |
| 2 | B500S | (2) | 0.05 | -50.00 | 5.00 | 50.00 | 5.00 |

Total: 0.10 Cuantía de armadura: 0.001 [o/o]

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

mens. a cortante (valores por defecto): (Acero"B500S"/Hormigón"HA_25")

| rtante | Area mín.cercos | Ancho alma ideal | Canto útil | Incl.bielas |
|---|---|---|---|---|
| z | 0.00 [cm2/m] | 100.00 [cm] | 96.00 [cm] | 0.00 |
| y | 0.00 [cm2/m] | 100.00 [cm] | 96.00 [cm] | 0.00 |

racterísticas del material:

| m.Mat. | Módulo E [ kp/cm2] | 0.85*fcd,fyd [ kp/cm2] | eps-fc [o/oo] | fct [ kp/cm2] | fcv [ kp/cm2] | fcw,mín [ kp/cm2] |
|---|---|---|---|---|---|---|
| A_25" | 278100.0 | -141.667 | -2.000 | 0.0 | 6.460 | 250.000 |
| 500S" | 2.10E+06 | 4434.780 | | | | |

yenda:
d,fyd resistencia de cálculo del hormigón,acero
s-fc deformación al final de la parábola (fig.2.3, cap.2.2)
t resistencia virtual de cálculo del hormigón a esfuerzo cortante



Dimensionamiento : Viga "ZAP"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -41.160 | | | | 219.270 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. As [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 95.0 | 50.0 | 95.0 | 0.05 | - | 0.05 |
| 2 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.05 | 53.93 | 53.93 |

Cuantía arm. 0.54 [o/o] Suma 53.98

Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | -50.00 | 100.00 | -3.475 | -141.667 | "HA_25" |
| Armadura-Min | -50.00 | 95.00 | -2.766 | -4434.780 | "B500S" |
| Hormigón-Max | 50.00 | 0.00 | 10.709 | 0.000 | "HA_25" |
| Armadura-Max | 50.00 | 5.00 | 10.000 | 4434.780 | "B500S" |

Fibra neutra zn 75.50 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 24.50 cm Zona comprimida/Canto útil 0.26

Dimensionamiento : Viga "ZAP"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -88.120 | | | | 141.450 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. As [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 95.0 | 50.0 | 95.0 | 0.05 | - | 0.05 |
| 2 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.05 | 26.97 | 26.97 |

Cuantía arm. 0.27 [o/o] Suma 27.02

eformaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| ɔrmigón-Min | -50.00 | 100.00 | -2.631 | -141.667 | "HA_25" |
| ʻmadura-Min | -50.00 | 95.00 | -1.966 | -4128.598 | "B500S" |
| ɔrmigón-Max | 50.00 | 0.00 | 10.665 | 0.000 | "HA_25" |
| ʻmadura-Max | 50.00 | 5.00 | 10.000 | 4434.780 | "B500S" |

bra neutra zn 80.21 cm yn -0.00 cm Angulo 0.0
ıcho zona comprim. 19.79 cm Zona comprimida/Canto útil 0.21

LISTADO DE ESTADOS DE CARGA
Fecha : 07.05.2002 10:10:25
Título: L.A.V.MARTORELL. - ODT 300.4.
Coment: Envolventes totales
Titlst: Estados Rotura. Proyecto: L.A.V.MARTORELL. - ODT 3

Tabla de estados de carga a listar

| ec | Fichero | tipo | Título |
|---|---|---|---|
| 33 | MA_ROT | 1 | [Envolvente de Rotura (Envolvente Servicio-Sobreele] |
| 36 | MA_CON | 1 | [Envolvente de Rotura en Construccion (Envolvente) ] |

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Mz |
|---|---|---|---|---|---|---|
| 6 | 6 | 33 | Nx+ | -55.58 | -129.45 | -307.67 |
| | | 33 | Fy+ | -81.73 | -115.78 | -258.85 |
| | | 33 | Mz+ | -81.73 | -115.78 | -258.85 |
| | | 33 | Nx- | -130.08 | -178.07 | -400.26 |
| | | 33 | Fy- | -94.53 | -193.46 | -453.99 |
| | | 33 | Mz- | -94.53 | -193.46 | -453.99 |
| | | 36 | Nx+ | 0.63 | -16.18 | -42.58 |
| | | 36 | Fy+ | -7.32 | -9.14 | -21.96 |
| | | 36 | Mz+ | -7.32 | -9.14 | -21.96 |
| | | 36 | Nx- | -109.10 | -163.73 | -372.06 |
| | | 36 | Fy- | -81.91 | -174.16 | -403.92 |
| | | 36 | Mz- | -81.91 | -174.16 | -403.92 |
| 7 | 7 | 33 | Nx+ | -44.32 | -97.75 | -127.43 |
| | | 33 | Fy+ | -71.76 | -87.10 | -98.75 |
| | | 33 | Mz+ | -72.12 | -89.20 | -97.94 |
| | | 33 | Nx- | -114.41 | -135.07 | -155.54 |
| | | 33 | Fy- | -77.42 | -146.62 | -186.37 |
| | | 33 | Mz- | -77.06 | -144.52 | -187.18 |
| | | 36 | Nx+ | 2.00 | -12.26 | -19.51 |
| | | 36 | Fy+ | -6.52 | -6.89 | -9.46 |
| | | 36 | Mz+ | -6.52 | -6.89 | -9.46 |
| | | 36 | Nx- | -94.72 | -124.03 | -146.46 |
| | | 36 | Fy- | -66.53 | -131.32 | -163.32 |
| | | 36 | Mz- | -66.21 | -129.45 | -164.06 |
| 8 | 8 | 33 | Nx+ | -44.32 | -57.85 | 11.98 |
| | | 33 | Fy+ | -72.12 | -47.71 | 24.73 |
| | | 33 | Mz+ | -106.58 | -73.46 | 36.81 |
| | | 33 | Nx- | -114.41 | -75.74 | 33.32 |
| | | 33 | Fy- | -77.06 | -86.79 | 20.06 |
| | | 33 | Mz- | -52.18 | -60.13 | 8.44 |
| | | 36 | Nx+ | 2.00 | -8.02 | -1.34 |
| | | 36 | Fy+ | -6.52 | -3.76 | 0.10 |
| | | 36 | Mz+ | -92.26 | -69.11 | 29.64 |
| | | 36 | Nx- | -94.72 | -70.33 | 27.68 |
| | | 36 | Fy- | -66.21 | -77.07 | 20.97 |
| | | 36 | Mz- | -5.33 | -8.14 | -8.65 |
| 9 | 9 | 33 | Nx+ | -44.32 | -19.98 | 78.19 |
| | | 33 | Fy+ | -72.51 | -9.91 | 77.13 |
| | | 33 | Mz+ | -80.57 | -25.40 | 123.70 |
| | | 33 | Nx- | -114.41 | -19.44 | 114.25 |
| | | 33 | Fy- | -76.67 | -30.44 | 116.35 |
| | | 33 | Mz- | -68.27 | -15.13 | 69.84 |

MA_ROT2.LST Sábado, 18 Mayo 2002 3:27am

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Nx+ | 2.00 | -4.00 | 8.88 |
| | | 36 | Fy+ | -6.52 | -0.78 | 3.97 |
| | | 36 | Mz+ | -66.98 | -23.50 | 111.17 |
| | | 36 | Nx- | -94.72 | -19.37 | 103.96 |
| | | 36 | Fy- | -65.86 | -25.94 | 105.52 |
| | | 36 | Mz- | -10.26 | -1.97 | -1.66 |
| 10 | 10 | 33 | Nx+ | -44.32 | 17.88 | 79.97 |
| | | 33 | Fy+ | -106.22 | 39.21 | 98.13 |
| | | 33 | Mz+ | -77.21 | 29.26 | 121.49 |
| | | 33 | Nx- | -114.41 | 36.86 | 99.42 |
| | | 33 | Fy- | -52.54 | 15.54 | 81.27 |
| | | 33 | Mz- | -71.91 | 24.63 | 60.52 |
| | | 36 | Nx+ | 2.00 | 0.01 | 12.26 |
| | | 36 | Fy+ | -91.87 | 32.89 | 94.31 |
| | | 36 | Mz+ | -66.58 | 28.11 | 107.16 |
| | | 36 | Nx- | -94.72 | 31.60 | 93.54 |
| | | 36 | Fy- | -5.83 | -0.13 | 2.23 |
| | | 36 | Mz- | -10.26 | 1.01 | -0.84 |
| 121 | 121 | 33 | Nx+ | -110.57 | 24.07 | 56.55 |
| | | 33 | Fy+ | -170.13 | 47.47 | 81.49 |
| | | 33 | Mz+ | -172.11 | 29.97 | 84.32 |
| | | 33 | Nx- | -181.59 | 29.61 | 60.49 |
| | | 33 | Fy- | -122.05 | 6.23 | 35.87 |
| | | 33 | Mz- | -118.91 | 18.26 | 32.31 |
| | | 36 | Nx+ | -18.32 | 9.23 | 6.08 |
| | | 36 | Fy+ | -157.37 | 35.83 | 65.82 |
| | | 36 | Mz+ | -159.13 | 20.09 | 68.38 |
| | | 36 | Nx- | -163.54 | 30.36 | 62.58 |
| | | 36 | Fy- | -18.51 | 1.42 | 10.02 |
| | | 36 | Mz- | -19.46 | 12.34 | 3.51 |
| 122 | 122 | 33 | Nx+ | -109.12 | 14.34 | 41.70 |
| | | 33 | Fy+ | -168.17 | 27.76 | 52.39 |
| | | 33 | Mz+ | -170.75 | 15.88 | 66.64 |
| | | 33 | Nx- | -179.63 | 11.63 | 44.58 |
| | | 33 | Fy- | -120.59 | -1.76 | 34.14 |
| | | 33 | Mz- | -116.36 | 7.07 | 22.37 |
| | | 36 | Nx+ | -16.87 | 5.53 | 0.40 |
| | | 36 | Fy+ | -155.41 | 19.12 | 44.58 |
| | | 36 | Mz+ | -157.70 | 8.47 | 57.38 |
| | | 36 | Nx- | -161.58 | 14.18 | 45.35 |
| | | 36 | Fy- | -17.10 | 1.35 | 8.65 |
| | | 36 | Mz- | -18.00 | 6.78 | -3.84 |
| 123 | 123 | 33 | Nx+ | -107.67 | 5.01 | 34.26 |
| | | 33 | Fy+ | -117.60 | 9.25 | 28.62 |
| | | 33 | Mz+ | -170.56 | -3.33 | 62.95 |
| | | 33 | Nx- | -177.67 | -5.44 | 42.23 |
| | | 33 | Fy- | -166.85 | -11.27 | 53.70 |
| | | 33 | Mz- | -113.20 | 1.72 | 17.85 |
| | | 36 | Nx+ | -15.42 | 2.35 | -2.62 |
| | | 36 | Fy+ | -21.16 | 7.68 | -0.94 |
| | | 36 | Mz+ | -156.49 | -4.31 | 56.13 |
| | | 36 | Nx- | -159.62 | -1.18 | 40.36 |
| | | 36 | Fy- | -149.40 | -6.26 | 51.28 |
| | | 36 | Mz- | -16.55 | 2.03 | -7.19 |
| 124 | 124 | 33 | Nx+ | -106.21 | -3.92 | 33.86 |
| | | 33 | Fy+ | -113.82 | -2.90 | 38.64 |
| | | 33 | Mz+ | -172.64 | -20.30 | 71.67 |
| | | 33 | Nx- | -175.71 | -21.62 | 52.80 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Fy- | -168.12 | -22.61 | 48.21 |
| | | 33 | Mz- | -109.51 | -7.05 | 20.34 |
| | | 36 | Nx+ | -13.97 | -0.27 | -3.40 |
| | | 36 | Fy+ | -19.20 | 3.23 | -5.12 |
| | | 36 | Mz+ | -155.17 | -15.11 | 63.59 |
| | | 36 | Nx- | -157.66 | -15.74 | 46.97 |
| | | 36 | Fy- | -150.40 | -16.47 | 43.33 |
| | | 36 | Mz- | -14.25 | 2.73 | -7.47 |
| 125 | 125 | 33 | Nx+ | -104.76 | -12.46 | 40.24 |
| | | 33 | Fy+ | -111.86 | -11.44 | 44.23 |
| | | 33 | Mz+ | -171.00 | -31.13 | 91.60 |
| | | 33 | Nx- | -173.75 | -36.89 | 75.54 |
| | | 33 | Fy- | -166.66 | -37.88 | 71.69 |
| | | 33 | Mz- | -106.59 | -16.31 | 29.52 |
| | | 36 | Nx+ | -12.51 | -2.34 | -2.34 |
| | | 36 | Fy+ | -17.08 | 2.00 | 7.53 |
| | | 36 | Mz+ | -153.25 | -24.40 | 78.95 |
| | | 36 | Nx- | -155.70 | -29.49 | 64.55 |
| | | 36 | Fy- | -148.94 | -30.21 | 61.47 |
| | | 36 | Mz- | -12.79 | -0.91 | -8.13 |
| 126 | 126 | 33 | Nx+ | -103.31 | -20.59 | 53.07 |
| | | 33 | Fy+ | -109.90 | -19.57 | 56.26 |
| | | 33 | Mz+ | -168.53 | -40.85 | 119.56 |
| | | 33 | Nx- | -171.78 | -51.26 | 109.76 |
| | | 33 | Fy- | -165.21 | -52.25 | 106.68 |
| | | 33 | Mz- | -105.67 | -27.54 | 46.53 |
| | | 36 | Nx+ | -11.06 | -3.90 | 0.11 |
| | | 36 | Fy+ | -15.12 | 2.00 | 5.97 |
| | | 36 | Mz+ | -150.80 | -33.09 | 101.24 |
| | | 36 | Nx- | -153.74 | -42.42 | 92.46 |
| | | 36 | Fy- | -147.49 | -43.15 | 89.94 |
| | | 36 | Mz- | -11.34 | -3.76 | -6.26 |
| 126 | 127 | 33 | Nx+ | -101.85 | -28.32 | 72.05 |
| | | 33 | Fy+ | -109.18 | -25.91 | 84.29 |
| | | 33 | Mz+ | -169.30 | -64.82 | 154.88 |
| | | 33 | Nx- | -169.82 | -64.73 | 154.79 |
| | | 33 | Fy- | -162.51 | -67.12 | 142.60 |
| | | 33 | Mz- | -102.39 | -28.24 | 71.98 |
| | | 36 | Nx+ | -9.61 | -4.90 | 3.56 |
| | | 36 | Fy+ | -13.15 | 2.00 | 4.43 |
| | | 36 | Mz+ | -151.29 | -54.61 | 130.15 |
| | | 36 | Nx- | -151.77 | -54.54 | 130.07 |
| | | 36 | Fy- | -145.66 | -55.67 | 125.17 |
| | | 36 | Mz- | -9.89 | -5.79 | -2.52 |
| 600 | 600 | 33 | Nx+ | -250.06 | 0.21 | -0.30 |
| | | 33 | Fy+ | -384.60 | 6.10 | -16.68 |
| | | 33 | Mz+ | -384.55 | -6.09 | 16.74 |
| | | 33 | Nx- | -402.77 | -0.27 | 0.43 |
| | | 33 | Fy- | -384.55 | -6.10 | 16.68 |
| | | 33 | Mz- | -384.60 | 6.09 | -16.74 |
| | | 36 | Nx+ | -24.27 | -2.50 | 6.56 |
| | | 36 | Fy+ | -50.48 | 5.72 | -17.83 |
| | | 36 | Mz+ | -50.45 | -5.72 | 17.83 |
| | | 36 | Nx- | -363.95 | 0.00 | 0.00 |
| | | 36 | Fy- | -50.45 | -5.72 | 17.83 |
| | | 36 | Mz- | -50.48 | 5.72 | -17.83 |
| 600 | 6 | 33 | Nx+ | -247.28 | 0.21 | -0.46 |
| | | 33 | Fy+ | -380.84 | 6.10 | -21.32 |

MA_ROT2.LST Sábado, 18 Mayo 2002 3:27am

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Mz+ | -380.80 | -6.09 | 21.38 |
| | | 33 | Nx- | -399.02 | -0.27 | 0.63 |
| | | 33 | Fy- | -380.80 | -6.10 | 21.32 |
| | | 33 | Mz- | -380.84 | 6.09 | -21.38 |
| | | 36 | Nx+ | -21.48 | -2.50 | 8.46 |
| | | 36 | Fy+ | -46.73 | 5.72 | -22.21 |
| | | 36 | Mz+ | -46.70 | -5.72 | 22.21 |
| | | 36 | Nx- | -360.20 | 0.00 | 0.00 |
| | | 36 | Fy- | -46.70 | -5.72 | 22.21 |
| | | 36 | Mz- | -46.73 | 5.72 | -22.21 |
| 601 | 601 | 33 | Nx+ | -250.89 | 0.21 | -0.17 |
| | | 33 | Fy+ | -385.71 | 6.10 | -12.66 |
| | | 33 | Mz+ | -385.68 | -6.09 | 12.74 |
| | | 33 | Nx- | -403.88 | -0.27 | 0.25 |
| | | 33 | Fy- | -385.66 | -6.10 | 12.66 |
| | | 33 | Mz- | -385.71 | 6.09 | -12.74 |
| | | 36 | Nx+ | -25.09 | -2.50 | 4.93 |
| | | 36 | Fy+ | -51.59 | 5.72 | -14.07 |
| | | 36 | Mz+ | -51.56 | -5.72 | 14.07 |
| | | 36 | Nx- | -365.06 | 0.00 | 0.00 |
| | | 36 | Fy- | -51.56 | -5.72 | 14.07 |
| | | 36 | Mz- | -51.59 | 5.72 | -14.07 |
| 602 | 602 | 33 | Nx+ | -251.71 | 0.21 | -0.03 |
| | | 33 | Fy+ | -386.81 | 6.10 | -8.66 |
| | | 33 | Mz+ | -386.78 | -6.09 | 8.73 |
| | | 33 | Nx- | -404.99 | -0.27 | 0.08 |
| | | 33 | Fy- | -386.77 | -6.10 | 8.66 |
| | | 33 | Mz- | -386.83 | 6.09 | -8.73 |
| | | 36 | Nx+ | -25.91 | -2.50 | 3.28 |
| | | 36 | Fy+ | -52.70 | 5.72 | -10.31 |
| | | 36 | Mz+ | -52.67 | -5.72 | 10.31 |
| | | 36 | Nx- | -366.17 | 0.00 | 0.00 |
| | | 36 | Fy- | -52.67 | -5.72 | 10.31 |
| | | 36 | Mz- | -52.70 | 5.72 | -10.31 |
| 603 | 603 | 33 | Nx+ | -252.53 | 0.21 | 0.11 |
| | | 33 | Fy+ | -387.92 | 6.10 | -4.65 |
| | | 33 | Mz+ | -386.93 | -4.64 | 5.13 |
| | | 33 | Nx- | -406.10 | -0.27 | -0.09 |
| | | 33 | Fy- | -387.88 | -6.10 | 4.65 |
| | | 33 | Mz- | -386.99 | 4.64 | -5.13 |
| | | 36 | Nx+ | -26.73 | -2.50 | 1.65 |
| | | 36 | Fy+ | -53.81 | 5.72 | -6.55 |
| | | 36 | Mz+ | -53.78 | -5.72 | 6.55 |
| | | 36 | Nx- | -367.28 | 0.00 | 0.00 |
| | | 36 | Fy- | -53.78 | -5.72 | 6.55 |
| | | 36 | Mz- | -53.81 | 5.72 | -6.55 |
| 604 | 604 | 33 | Nx+ | -253.35 | 0.21 | 0.24 |
| | | 33 | Fy+ | -389.03 | 6.10 | -0.61 |
| | | 33 | Mz+ | -388.37 | -3.27 | 2.10 |
| | | 33 | Nx- | -407.21 | -0.27 | -0.27 |
| | | 33 | Fy- | -388.99 | -6.10 | 0.61 |
| | | 33 | Mz- | -388.40 | 3.27 | -2.10 |
| | | 36 | Nx+ | -27.55 | -2.50 | 0.00 |
| | | 36 | Fy+ | -54.92 | 5.72 | -2.78 |
| | | 36 | Mz+ | -54.89 | -5.72 | 2.78 |
| | | 36 | Nx- | -368.39 | 0.00 | 0.00 |
| | | 36 | Fy- | -54.89 | -5.72 | 2.78 |
| | | 36 | Mz- | -54.92 | 5.72 | -2.78 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 605 | 605 | 33 | Nx+ | -254.17 | 0.21 | 0.38 |
| | | 33 | Fy+ | -390.14 | 6.10 | 3.37 |
| | | 33 | Mz+ | -390.14 | 3.28 | 4.13 |
| | | 33 | Nx- | -408.32 | -0.27 | -0.45 |
| | | 33 | Fy- | -390.10 | -6.10 | -3.37 |
| | | 33 | Mz- | -390.10 | -3.28 | -4.13 |
| | | 36 | Nx+ | -28.37 | -2.50 | -1.65 |
| | | 36 | Fy+ | -56.03 | 5.72 | 0.99 |
| | | 36 | Mz+ | -39.11 | 2.50 | 1.65 |
| | | 36 | Nx- | -369.50 | 0.00 | 0.00 |
| | | 36 | Fy- | -56.00 | -5.72 | -0.99 |
| | | 36 | Mz- | -39.08 | -2.50 | -1.65 |
| 606 | 606 | 33 | Nx+ | -254.99 | 0.21 | 0.51 |
| | | 33 | Fy+ | -391.25 | 6.10 | 7.40 |
| | | 33 | Mz+ | -391.25 | 6.04 | 7.43 |
| | | 33 | Nx- | -409.42 | -0.27 | -0.62 |
| | | 33 | Fy- | -391.21 | -6.10 | -7.40 |
| | | 33 | Mz- | -391.21 | -6.04 | -7.43 |
| | | 36 | Nx+ | -29.19 | -2.50 | -3.28 |
| | | 36 | Fy+ | -57.13 | 5.72 | 4.75 |
| | | 36 | Mz+ | -57.13 | 5.72 | 4.75 |
| | | 36 | Nx- | -370.60 | 0.00 | 0.00 |
| | | 36 | Fy- | -57.11 | -5.72 | -4.75 |
| | | 36 | Mz- | -57.11 | -5.72 | -4.75 |
| 607 | 607 | 33 | Nx+ | -255.81 | 0.21 | 0.65 |
| | | 33 | Fy+ | -392.36 | 6.10 | 11.40 |
| | | 33 | Mz+ | -392.36 | 6.10 | 11.40 |
| | | 33 | Nx- | -410.53 | -0.27 | -0.80 |
| | | 33 | Fy- | -392.31 | -6.10 | -11.40 |
| | | 33 | Mz- | -392.31 | -6.10 | -11.40 |
| | | 36 | Nx+ | -30.02 | -2.50 | -4.93 |
| | | 36 | Fy+ | -58.24 | 5.72 | 8.51 |
| | | 36 | Mz+ | -58.24 | 5.72 | 8.51 |
| | | 36 | Nx- | -371.71 | 0.00 | 0.00 |
| | | 36 | Fy- | -58.22 | -5.72 | -8.51 |
| | | 36 | Mz- | -58.22 | -5.72 | -8.51 |
| 608 | 400 | 33 | Nx+ | -256.95 | 0.21 | 0.84 |
| | | 33 | Fy+ | -393.90 | 6.10 | 16.98 |
| | | 33 | Mz+ | -393.90 | 6.10 | 16.98 |
| | | 33 | Nx- | -412.07 | -0.27 | -1.04 |
| | | 33 | Fy- | -393.85 | -6.10 | -16.98 |
| | | 33 | Mz- | -393.85 | -6.10 | -16.98 |
| | | 36 | Nx+ | -31.16 | -2.50 | -7.21 |
| | | 36 | Fy+ | -59.78 | 5.72 | 13.73 |
| | | 36 | Mz+ | -59.78 | 5.72 | 13.73 |
| | | 36 | Nx- | -373.25 | 0.00 | 0.00 |
| | | 36 | Fy- | -59.76 | -5.72 | -13.73 |
| | | 36 | Mz- | -59.76 | -5.72 | -13.73 |
| 221 | 221 | 33 | Nx+ | -101.12 | -30.95 | 80.14 |
| | | 33 | Fy+ | -108.19 | -27.93 | 91.67 |
| | | 33 | Mz+ | -168.31 | -69.35 | 173.19 |
| | | 33 | Nx- | -168.83 | -69.26 | 173.08 |
| | | 33 | Fy- | -161.78 | -72.25 | 161.62 |
| | | 33 | Mz- | -101.66 | -30.87 | 80.03 |
| | | 36 | Nx+ | -8.87 | -5.13 | 4.93 |
| | | 36 | Fy+ | -12.16 | 2.00 | 3.88 |
| | | 36 | Mz+ | -150.30 | -58.69 | 145.61 |
| | | 36 | Nx- | -150.78 | -58.62 | 145.52 |
| | | 36 | Fy- | -144.93 | -59.94 | 140.96 |

MA_ROT2.LST Sábado, 18 Mayo 2002 3:27am

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Mz- | -9.15 | -6.30 | -0.87 |
| 222 | 222 | 33 | Nx+ | -49.31 | 85.59 | 97.97 |
| | | 33 | Fy+ | -86.20 | 138.55 | 183.53 |
| | | 33 | Mz+ | -104.26 | 136.98 | 192.73 |
| | | 33 | Nx- | -106.81 | 135.51 | 183.53 |
| | | 33 | Fy- | -63.95 | 82.91 | 95.00 |
| | | 33 | Mz- | -51.92 | 84.12 | 88.81 |
| | | 36 | Nx+ | -0.14 | 7.97 | 2.40 |
| | | 36 | Fy+ | -73.64 | 124.16 | 153.90 |
| | | 36 | Mz+ | -89.90 | 122.74 | 162.19 |
| | | 36 | Nx- | -90.64 | 122.58 | 159.31 |
| | | 36 | Fy- | -8.23 | 6.41 | 0.92 |
| | | 36 | Mz- | -5.18 | 6.83 | 0.65 |
| 223 | 223 | 33 | Nx+ | -49.96 | 78.25 | 66.77 |
| | | 33 | Fy+ | -87.35 | 123.89 | 133.50 |
| | | 33 | Mz+ | -107.57 | 119.20 | 143.43 |
| | | 33 | Nx- | -110.82 | 117.99 | 134.81 |
| | | 33 | Fy- | -66.80 | 72.85 | 64.96 |
| | | 33 | Mz- | -53.47 | 76.96 | 58.24 |
| | | 36 | Nx+ | 0.22 | 8.68 | -0.35 |
| | | 36 | Fy+ | -74.63 | 110.75 | 109.12 |
| | | 36 | Mz+ | -92.66 | 106.39 | 118.04 |
| | | 36 | Nx- | -93.70 | 106.48 | 115.26 |
| | | 36 | Fy- | -8.39 | 4.76 | -1.21 |
| | | 36 | Mz- | -5.14 | 7.48 | -1.68 |
| 224 | 224 | 33 | Nx+ | -51.07 | 61.75 | 19.36 |
| | | 33 | Fy+ | -89.35 | 99.68 | 59.38 |
| | | 33 | Mz+ | -112.59 | 93.20 | 72.16 |
| | | 33 | Nx- | -117.90 | 93.42 | 64.77 |
| | | 33 | Fy- | -71.83 | 56.22 | 21.21 |
| | | 33 | Mz- | -56.63 | 61.90 | 12.07 |
| | | 36 | Nx+ | 0.75 | 6.22 | -5.30 |
| | | 36 | Fy+ | -76.38 | 88.72 | 42.99 |
| | | 36 | Mz+ | -97.15 | 82.80 | 54.58 |
| | | 36 | Nx- | -99.15 | 84.37 | 52.01 |
| | | 36 | Fy- | -8.75 | 2.79 | -3.69 |
| | | 36 | Mz- | -5.11 | 4.91 | -5.78 |
| 320 | 320 | 33 | Nx+ | -111.51 | 30.56 | 85.48 |
| | | 33 | Fy+ | -171.40 | 60.67 | 138.84 |
| | | 33 | Mz+ | -174.89 | 60.18 | 140.42 |
| | | 33 | Nx- | -182.86 | 41.68 | 99.11 |
| | | 33 | Fy- | -122.98 | 11.60 | 46.12 |
| | | 33 | Mz- | -119.23 | 12.12 | 43.72 |
| | | 36 | Nx+ | -19.26 | 11.91 | 17.30 |
| | | 36 | Fy+ | -158.64 | 47.03 | 110.04 |
| | | 36 | Mz+ | -161.80 | 46.59 | 111.47 |
| | | 36 | Nx- | -164.81 | 41.23 | 101.07 |
| | | 36 | Fy- | -19.45 | 1.42 | 11.44 |
| | | 36 | Mz- | -19.45 | 1.42 | 11.44 |
| 321 | 321 | 33 | Nx+ | -111.51 | 30.56 | 70.20 |
| | | 33 | Fy+ | -171.40 | 60.67 | 108.50 |
| | | 33 | Mz+ | -176.06 | 59.71 | 110.44 |
| | | 33 | Nx- | -182.86 | 41.68 | 78.29 |
| | | 33 | Fy- | -122.98 | 11.60 | 40.30 |
| | | 33 | Mz- | -118.06 | 12.59 | 37.53 |
| | | 36 | Nx+ | -19.26 | 11.91 | 11.35 |
| | | 36 | Fy+ | -158.64 | 47.03 | 86.52 |
| | | 36 | Mz+ | -162.84 | 46.16 | 88.26 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Nx- | -164.81 | 41.23 | 80.46 |
| | | 36 | Fy- | -19.45 | 1.42 | 10.73 |
| | | 36 | Mz- | -20.40 | 16.35 | 10.68 |
| 322 | 322 | 33 | Nx+ | -111.04 | 27.30 | 62.98 |
| | | 33 | Fy+ | -170.77 | 54.03 | 94.18 |
| | | 33 | Mz+ | -175.46 | 53.03 | 96.35 |
| | | 33 | Nx- | -182.23 | 35.60 | 68.62 |
| | | 33 | Fy- | -122.51 | 8.89 | 37.77 |
| | | 33 | Mz- | -117.60 | 9.88 | 34.74 |
| | | 36 | Nx+ | -18.79 | 10.53 | 8.55 |
| | | 36 | Fy+ | -158.01 | 41.38 | 75.47 |
| | | 36 | Mz+ | -162.21 | 40.52 | 77.43 |
| | | 36 | Nx- | -164.18 | 35.75 | 70.84 |
| | | 36 | Fy- | -18.98 | 1.42 | 10.38 |
| | | 36 | Mz- | -19.93 | 14.30 | 6.84 |
| 520 | 320 | 33 | Nx+ | -11.23 | 7.53 | 3.17 |
| | | 33 | Fy+ | -16.85 | 10.32 | 4.20 |
| | | 33 | Mz+ | -16.85 | 10.32 | 4.20 |
| | | 33 | Nx- | -27.53 | 6.84 | 2.65 |
| | | 33 | Fy- | -19.10 | 2.91 | 1.07 |
| | | 33 | Mz- | -19.10 | 2.91 | 1.07 |
| | | 36 | Nx+ | 0.00 | 1.93 | 1.09 |
| | | 36 | Fy+ | -15.16 | 7.56 | 3.08 |
| | | 36 | Mz+ | -15.16 | 7.56 | 3.08 |
| | | 36 | Nx- | -23.42 | 6.85 | 2.75 |
| | | 36 | Fy- | -9.72 | -2.39 | -1.00 |
| | | 36 | Mz- | -9.72 | -2.39 | -1.00 |
| 521 | 521 | 33 | Nx+ | -11.23 | 0.04 | 0.11 |
| | | 33 | Fy+ | -11.23 | 0.52 | 0.17 |
| | | 33 | Mz+ | -11.23 | 0.52 | 0.17 |
| | | 33 | Nx- | -27.53 | -2.55 | -0.13 |
| | | 33 | Fy- | -27.53 | -3.62 | -0.26 |
| | | 33 | Mz- | -27.53 | -3.62 | -0.26 |
| | | 36 | Nx+ | 0.00 | 1.08 | 0.13 |
| | | 36 | Fy+ | -1.08 | 1.08 | 0.13 |
| | | 36 | Mz+ | -1.08 | 1.08 | 0.13 |
| | | 36 | Nx- | -23.42 | -1.66 | -0.05 |
| | | 36 | Fy- | -9.72 | -2.91 | -0.28 |
| | | 36 | Mz- | -9.72 | -2.91 | -0.28 |
| 522 | 522 | 33 | Nx+ | -11.23 | -0.22 | 0.06 |
| | | 33 | Fy+ | -11.23 | 0.14 | 0.09 |
| | | 33 | Mz+ | -11.23 | 0.11 | 0.09 |
| | | 33 | Nx- | -27.53 | -2.21 | -0.07 |
| | | 33 | Fy- | -27.53 | -2.99 | -0.15 |
| | | 33 | Mz- | -27.53 | -2.98 | -0.15 |
| | | 36 | Nx+ | 0.00 | 0.75 | 0.08 |
| | | 36 | Fy+ | -1.08 | 0.75 | 0.08 |
| | | 36 | Mz+ | -1.08 | 0.75 | 0.08 |
| | | 36 | Nx- | -23.42 | -1.53 | -0.03 |
| | | 36 | Fy- | -9.72 | -2.23 | -0.16 |
| | | 36 | Mz- | -9.72 | -2.23 | -0.16 |
| 523 | 523 | 33 | Nx+ | -11.23 | -0.49 | 0.03 |
| | | 33 | Fy+ | -11.23 | -0.28 | 0.03 |
| | | 33 | Mz+ | -11.23 | -0.44 | 0.03 |
| | | 33 | Nx- | -27.53 | -1.89 | -0.03 |
| | | 33 | Fy- | -27.53 | -2.34 | -0.06 |
| | | 33 | Mz- | -27.53 | -2.31 | -0.06 |
| | | 36 | Nx+ | 0.00 | 0.42 | 0.03 |

MA_ROT2.LST Sábado, 18 Mayo 2002 3:27am

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Fy+ | -1.08 | 0.42 | 0.03 |
| | | 36 | Mz+ | -1.08 | 0.42 | 0.03 |
| | | 36 | Nx- | -23.42 | -1.40 | -0.01 |
| | | 36 | Fy- | -23.42 | -1.68 | -0.03 |
| | | 36 | Mz- | -9.72 | -1.54 | -0.07 |
| 524 | 524 | 33 | Nx+ | -11.23 | -0.76 | 0.01 |
| | | 33 | Fy+ | -11.23 | -0.69 | 0.00 |
| | | 33 | Mz+ | -11.23 | -0.75 | 0.01 |
| | | 33 | Nx- | -27.53 | -1.58 | -0.01 |
| | | 33 | Fy- | -27.53 | -1.71 | -0.02 |
| | | 33 | Mz- | -27.53 | -1.65 | -0.02 |
| | | 36 | Nx+ | 0.00 | 0.08 | 0.01 |
| | | 36 | Fy+ | -1.08 | 0.08 | 0.01 |
| | | 36 | Mz+ | -1.08 | 0.08 | 0.01 |
| | | 36 | Nx- | -23.42 | -1.28 | 0.00 |
| | | 36 | Fy- | -23.42 | -1.37 | -0.01 |
| | | 36 | Mz- | -6.48 | -0.84 | -0.02 |
| 524 | 525 | 33 | Nx+ | -11.23 | 1.04 | 0.00 |
| | | 33 | Fy+ | -16.85 | 1.44 | 0.00 |
| | | 33 | Mz+ | -25.58 | 1.35 | 0.00 |
| | | 33 | Nx- | -27.53 | 1.27 | 0.00 |
| | | 33 | Fy- | -19.10 | 0.77 | 0.00 |
| | | 33 | Mz- | -25.58 | 1.35 | 0.00 |
| | | 36 | Nx+ | 0.00 | 0.25 | 0.00 |
| | | 36 | Fy+ | -15.16 | 1.19 | 0.00 |
| | | 36 | Mz+ | -23.42 | 1.17 | 0.00 |
| | | 36 | Nx- | -23.42 | 1.17 | 0.00 |
| | | 36 | Fy- | -9.72 | 0.17 | 0.00 |
| | | 36 | Mz- | -23.42 | 1.17 | 0.00 |
| 420 | 320 | 33 | Nx+ | -19.02 | 102.92 | 76.37 |
| | | 33 | Fy+ | -79.51 | 155.97 | 120.39 |
| | | 33 | Mz+ | -67.98 | 147.99 | 143.48 |
| | | 33 | Nx- | -92.02 | 145.59 | 114.06 |
| | | 33 | Fy- | -31.77 | 92.78 | 71.57 |
| | | 33 | Mz- | -43.08 | 100.01 | 46.17 |
| | | 36 | Nx+ | -1.42 | 15.32 | 12.27 |
| | | 36 | Fy+ | -67.71 | 140.51 | 109.28 |
| | | 36 | Mz+ | -64.10 | 138.70 | 114.09 |
| | | 36 | Nx- | -71.60 | 136.34 | 104.22 |
| | | 36 | Fy- | -3.50 | 15.29 | 12.39 |
| | | 36 | Mz- | -2.14 | 15.32 | 12.25 |
| 421 | 421 | 33 | Nx+ | -19.02 | 65.85 | 37.61 |
| | | 33 | Fy+ | -66.42 | 102.42 | 84.61 |
| | | 33 | Mz+ | -67.98 | 100.92 | 87.76 |
| | | 33 | Nx- | -92.02 | 97.11 | 59.24 |
| | | 33 | Fy- | -30.64 | 54.31 | 23.89 |
| | | 33 | Mz- | -43.08 | 61.09 | 8.51 |
| | | 36 | Nx+ | -1.42 | 8.02 | 6.35 |
| | | 36 | Fy+ | -62.98 | 90.52 | 59.91 |
| | | 36 | Mz+ | -64.10 | 89.74 | 61.84 |
| | | 36 | Nx- | -71.60 | 87.59 | 52.85 |
| | | 36 | Fy- | -2.50 | 8.02 | 6.33 |
| | | 36 | Mz- | -2.14 | 8.02 | 6.33 |
| 422 | 422 | 33 | Nx+ | -19.02 | 14.94 | -96.45 |
| | | 33 | Fy+ | -67.24 | 30.24 | -120.79 |
| | | 33 | Mz+ | -42.18 | 18.94 | -65.11 |
| | | 33 | Nx- | -92.02 | 20.53 | -139.07 |
| | | 33 | Fy- | -44.01 | 5.49 | -110.02 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Mz- | -57.54 | 19.79 | -169.00 |
| | | 36 | Nx+ | -1.42 | 0.80 | -14.21 |
| | | 36 | Fy+ | -63.75 | 24.41 | -121.93 |
| | | 36 | Mz+ | -18.70 | 4.65 | 0.22 |
| | | 36 | Nx- | -71.60 | 22.71 | -125.59 |
| | | 36 | Fy- | -2.50 | 0.80 | -14.22 |
| | | 36 | Mz- | -43.81 | 20.07 | -142.57 |
| 423 | 423 | 33 | Nx+ | -19.02 | -30.59 | -131.76 |
| | | 33 | Fy+ | -42.17 | -16.13 | -109.35 |
| | | 33 | Mz+ | -41.03 | -23.44 | -104.37 |
| | | 33 | Nx- | -92.02 | -36.94 | -205.15 |
| | | 33 | Fy- | -57.60 | -51.06 | -208.12 |
| | | 33 | Mz- | -60.82 | -41.51 | -219.36 |
| | | 36 | Nx+ | -1.42 | -5.24 | -20.61 |
| | | 36 | Fy+ | -18.70 | -1.98 | -13.73 |
| | | 36 | Mz+ | -18.70 | -1.98 | -13.73 |
| | | 36 | Nx- | -71.60 | -34.76 | -176.64 |
| | | 36 | Fy- | -43.89 | -38.91 | -188.34 |
| | | 36 | Mz- | -43.80 | -38.63 | -188.58 |
| 424 | 424 | 33 | Nx+ | -19.02 | -82.40 | -77.69 |
| | | 33 | Fy+ | -41.03 | -62.59 | -66.67 |
| | | 33 | Mz+ | -40.26 | -71.44 | -62.03 |
| | | 33 | Nx- | -92.02 | -109.56 | -139.17 |
| | | 33 | Fy- | -57.72 | -123.44 | -126.75 |
| | | 33 | Mz- | -61.14 | -114.59 | -145.46 |
| | | 36 | Nx+ | -1.42 | -11.94 | -15.14 |
| | | 36 | Fy+ | -18.70 | -9.10 | -14.65 |
| | | 36 | Mz+ | -18.70 | -9.10 | -14.65 |
| | | 36 | Nx- | -71.60 | -98.27 | -114.90 |
| | | 36 | Fy- | -43.89 | -104.40 | -118.44 |
| | | 36 | Mz- | -43.94 | -102.68 | -119.90 |
| 425 | 425 | 33 | Nx+ | -28.42 | -107.87 | 95.62 |
| | | 33 | Fy+ | -49.09 | -98.30 | 87.24 |
| | | 33 | Mz+ | -72.87 | -171.31 | 149.30 |
| | | 33 | Nx- | -106.48 | -165.53 | 108.78 |
| | | 33 | Fy- | -73.75 | -181.04 | 134.93 |
| | | 33 | Mz- | -53.00 | -110.08 | 61.06 |
| | | 36 | Nx+ | -2.80 | -15.98 | 5.80 |
| | | 36 | Fy+ | -19.78 | -11.81 | -0.29 |
| | | 36 | Mz+ | -57.70 | -156.37 | 116.10 |
| | | 36 | Nx- | -84.57 | -148.84 | 106.56 |
| | | 36 | Fy- | -57.59 | -157.97 | 114.30 |
| | | 36 | Mz- | -21.52 | -20.08 | -0.48 |
| 425 | 400 | 33 | Nx+ | -27.99 | -102.81 | 266.09 |
| | | 33 | Fy+ | -48.61 | -93.69 | 243.89 |
| | | 33 | Mz+ | -71.88 | -163.50 | 423.11 |
| | | 33 | Nx- | -106.02 | -160.10 | 371.89 |
| | | 33 | Fy- | -73.33 | -174.86 | 420.07 |
| | | 33 | Mz- | -51.17 | -102.03 | 232.30 |
| | | 36 | Nx+ | -2.45 | -11.95 | 28.37 |
| | | 36 | Fy+ | -19.44 | -7.78 | 15.54 |
| | | 36 | Mz+ | -56.91 | -152.07 | 365.35 |
| | | 36 | Nx- | -84.11 | -143.41 | 342.68 |
| | | 36 | Fy- | -57.12 | -152.53 | 365.17 |
| | | 36 | Mz- | -19.44 | -7.78 | 15.54 |

MA_ROT2.LST Sábado, 18 Mayo 2002 3:27am

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | θz |
|---|---|---|---|---|---|
| 6 | 33 | ux+ | 0.003894 | -0.028946 | -0.000522 |
| | 33 | uy+ | 0.002496 | -0.018963 | -0.000104 |
| | 33 | θz+ | -0.003429 | -0.029078 | 0.000522 |
| | 33 | ux- | -0.003578 | -0.020130 | 0.000522 |
| | 33 | uy- | -0.000102 | -0.032161 | 0.000009 |
| | 33 | θz- | 0.003883 | -0.029060 | -0.000522 |
| | 36 | ux+ | 0.001608 | -0.005295 | -0.000070 |
| | 36 | uy+ | 0.000005 | -0.003909 | 0.000000 |
| | 36 | θz+ | 0.000713 | -0.006442 | 0.000448 |
| | 36 | ux- | -0.001422 | -0.003940 | 0.000070 |
| | 36 | uy- | -0.000367 | -0.026729 | 0.000019 |
| | 36 | θz- | -0.000576 | -0.006452 | -0.000448 |
| 7 | 33 | ux+ | 0.004035 | -0.031387 | -0.002243 |
| | 33 | uy+ | -0.002347 | -0.019880 | -0.001007 |
| | 33 | θz+ | -0.003524 | -0.020462 | -0.000709 |
| | 33 | ux- | -0.003588 | -0.020456 | -0.000754 |
| | 33 | uy- | 0.000519 | -0.033790 | -0.001758 |
| | 33 | θz- | 0.003943 | -0.031435 | -0.002309 |
| | 36 | ux+ | 0.001624 | -0.005536 | -0.000211 |
| | 36 | uy+ | -0.001427 | -0.003949 | -0.000066 |
| | 36 | θz+ | 0.000660 | -0.004512 | 0.000266 |
| | 36 | ux- | -0.001427 | -0.003949 | -0.000066 |
| | 36 | uy- | 0.001056 | -0.028318 | -0.001743 |
| | 36 | θz- | 0.001129 | -0.028129 | -0.001877 |
| 8 | 33 | ux+ | 0.003942 | -0.037214 | -0.003530 |
| | 33 | uy+ | -0.003509 | -0.022861 | -0.001907 |
| | 33 | θz+ | -0.000281 | -0.024439 | -0.001769 |
| | 33 | ux- | -0.003640 | -0.023330 | -0.001947 |
| | 33 | uy- | 0.000606 | -0.038842 | -0.003181 |
| | 33 | θz- | 0.001503 | -0.037174 | -0.003712 |
| | 36 | ux+ | 0.001619 | -0.006097 | -0.000362 |
| | 36 | uy+ | -0.001436 | -0.004271 | -0.000245 |
| | 36 | θz+ | 0.001313 | -0.004343 | -0.000030 |
| | 36 | ux- | -0.001436 | -0.004271 | -0.000245 |
| | 36 | uy- | 0.001033 | -0.033300 | -0.003089 |
| | 36 | θz- | 0.000350 | -0.033032 | -0.003137 |
| 9 | 33 | ux+ | 0.003848 | -0.041976 | -0.001765 |
| | 33 | uy+ | -0.003597 | -0.025407 | -0.000883 |
| | 33 | θz+ | -0.000300 | -0.027366 | -0.000675 |
| | 33 | ux- | -0.003684 | -0.025971 | -0.000932 |
| | 33 | uy- | 0.000547 | -0.043086 | -0.001494 |
| | 33 | θz- | 0.001258 | -0.041564 | -0.001963 |
| | 36 | ux+ | 0.001613 | -0.006666 | -0.000285 |
| | 36 | uy+ | 0.001304 | -0.004486 | -0.000118 |
| | 36 | θz+ | 0.001304 | -0.004486 | -0.000118 |
| | 36 | ux- | -0.001442 | -0.004668 | -0.000195 |
| | 36 | uy- | 0.000996 | -0.037444 | -0.001476 |
| | 36 | θz- | 0.000130 | -0.036612 | -0.001535 |
| 10 | 33 | ux+ | 0.003762 | -0.032225 | 0.000413 |
| | 33 | uy+ | -0.003687 | -0.025487 | 0.000790 |
| | 33 | θz+ | -0.002623 | -0.038067 | 0.001424 |
| | 33 | ux- | -0.003736 | -0.036883 | 0.001178 |
| | 33 | uy- | 0.003686 | -0.043622 | 0.000804 |

| | | | | | |
|---|---|---|---|---|---|
| | 33 | θz- | 0.003487 | -0.031391 | 0.000256 |
| | 36 | ux+ | 0.001608 | -0.007027 | -0.000142 |
| | 36 | uy+ | 0.001296 | -0.004706 | -0.000137 |
| | 36 | θz+ | -0.000799 | -0.034469 | 0.001096 |
| | 36 | ux- | -0.001450 | -0.004878 | -0.000044 |
| | 36 | uy- | 0.000940 | -0.037853 | 0.000975 |
| | 36 | θz- | 0.001301 | -0.006515 | -0.000154 |
| 121 | 33 | ux+ | 0.002612 | -0.036652 | -0.002231 |
| | 33 | uy+ | 0.000520 | -0.019911 | -0.000170 |
| | 33 | θz+ | 0.000507 | -0.020044 | -0.000162 |
| | 33 | ux- | 0.000507 | -0.020044 | -0.000162 |
| | 33 | uy- | 0.002599 | -0.036773 | -0.002223 |
| | 33 | θz- | 0.002611 | -0.036667 | -0.002231 |
| | 36 | ux+ | 0.002006 | -0.030588 | -0.001652 |
| | 36 | uy+ | -0.000146 | -0.004580 | 0.000262 |
| | 36 | θz+ | -0.000146 | -0.004580 | 0.000262 |
| | 36 | ux- | -0.000146 | -0.004580 | 0.000262 |
| | 36 | uy- | 0.002001 | -0.030598 | -0.001648 |
| | 36 | θz- | 0.002006 | -0.030588 | -0.001652 |
| 122 | 33 | ux+ | 0.004145 | -0.036715 | -0.001730 |
| | 33 | uy+ | 0.000507 | -0.019952 | 0.000182 |
| | 33 | θz+ | 0.000497 | -0.020033 | 0.000184 |
| | 33 | ux- | 0.000492 | -0.020086 | 0.000181 |
| | 33 | uy- | 0.004130 | -0.036837 | -0.001732 |
| | 33 | θz- | 0.004137 | -0.036826 | -0.001733 |
| | 36 | ux+ | 0.003106 | -0.030645 | -0.001189 |
| | 36 | uy+ | -0.000382 | -0.004587 | 0.000337 |
| | 36 | θz+ | -0.000382 | -0.004587 | 0.000337 |
| | 36 | ux- | -0.000382 | -0.004587 | 0.000337 |
| | 36 | uy- | 0.003100 | -0.030654 | -0.001188 |
| | 36 | θz- | 0.003106 | -0.030645 | -0.001189 |
| 123 | 33 | ux+ | 0.005305 | -0.036794 | -0.001259 |
| | 33 | uy+ | 0.000273 | -0.019994 | 0.000405 |
| | 33 | θz+ | 0.000264 | -0.020008 | 0.000405 |
| | 33 | ux- | 0.000261 | -0.020128 | 0.000399 |
| | 33 | uy- | 0.005293 | -0.036900 | -0.001262 |
| | 33 | θz- | 0.005293 | -0.036900 | -0.001262 |
| | 36 | ux+ | 0.003860 | -0.030704 | -0.000755 |
| | 36 | uy+ | -0.000647 | -0.004593 | 0.000334 |
| | 36 | θz+ | -0.000647 | -0.004593 | 0.000334 |
| | 36 | ux- | -0.000647 | -0.004593 | 0.000334 |
| | 36 | uy- | 0.003852 | -0.030714 | -0.000755 |
| | 36 | θz- | 0.003852 | -0.030714 | -0.000755 |
| 124 | 33 | ux+ | 0.006088 | -0.036955 | -0.000751 |
| | 33 | uy+ | -0.000103 | -0.020036 | 0.000575 |
| | 33 | θz+ | 0.000486 | -0.021880 | 0.000587 |
| | 33 | ux- | -0.000112 | -0.020145 | 0.000569 |
| | 33 | uy- | 0.006079 | -0.036965 | -0.000751 |
| | 33 | θz- | 0.005249 | -0.035080 | -0.000764 |
| | 36 | ux+ | 0.004269 | -0.030762 | -0.000289 |
| | 36 | uy+ | -0.000888 | -0.004599 | 0.000288 |
| | 36 | θz+ | -0.000757 | -0.006291 | 0.000298 |
| | 36 | ux- | -0.000888 | -0.004599 | 0.000288 |
| | 36 | uy- | 0.004261 | -0.030772 | -0.000289 |
| | 36 | θz- | 0.003501 | -0.028906 | -0.000302 |
| 125 | 33 | ux+ | 0.006436 | -0.037020 | -0.000124 |
| | 33 | uy+ | -0.000621 | -0.020076 | 0.000771 |
| | 33 | θz+ | 0.001275 | -0.031163 | 0.001013 |

MA_ROT2.LST Sábado, 18 Mayo 2002 3:27am

| | | | | | |
|---|---|---|---|---|---|
| | 33 | ux- | -0.000630 | -0.020089 | 0.000772 |
| | 33 | uy- | 0.006427 | -0.037031 | -0.000124 |
| | 33 | θz- | 0.004466 | -0.025886 | -0.000367 |
| | 36 | ux+ | 0.004284 | -0.030822 | 0.000274 |
| | 36 | uy+ | -0.001088 | -0.004604 | 0.000224 |
| | 36 | θz+ | 0.002896 | -0.029631 | 0.000541 |
| | 36 | ux- | -0.001088 | -0.004604 | 0.000224 |
| | 36 | uy- | 0.004275 | -0.030831 | 0.000274 |
| | 36 | θz- | 0.001080 | -0.005646 | -0.000262 |
| 126 | 33 | ux+ | 0.006239 | -0.037076 | 0.000666 |
| | 33 | uy+ | -0.001328 | -0.020115 | 0.001070 |
| | 33 | θz+ | 0.000458 | -0.031658 | 0.001673 |
| | 33 | ux- | -0.001339 | -0.020138 | 0.001076 |
| | 33 | uy- | 0.006229 | -0.037090 | 0.000671 |
| | 33 | θz- | 0.004492 | -0.025710 | 0.000068 |
| | 36 | ux+ | 0.003810 | -0.030876 | 0.000979 |
| | 36 | uy+ | -0.001237 | -0.004608 | 0.000165 |
| | 36 | θz+ | 0.002422 | -0.030066 | 0.001200 |
| | 36 | ux- | -0.001237 | -0.004608 | 0.000165 |
| | 36 | uy- | 0.003802 | -0.030885 | 0.000980 |
| | 36 | θz- | 0.000861 | -0.005333 | -0.000278 |
| 127 | 33 | ux+ | 0.005347 | -0.037140 | 0.001686 |
| | 33 | uy+ | -0.002327 | -0.020155 | 0.001538 |
| | 33 | θz+ | -0.001160 | -0.031722 | 0.002546 |
| | 33 | ux- | -0.002341 | -0.020178 | 0.001547 |
| | 33 | uy- | 0.005332 | -0.037154 | 0.001694 |
| | 33 | θz- | 0.004166 | -0.025586 | 0.000686 |
| | 36 | ux+ | 0.002715 | -0.030934 | 0.001886 |
| | 36 | uy+ | -0.001349 | -0.004612 | 0.000130 |
| | 36 | θz+ | 0.001173 | -0.030124 | 0.002060 |
| | 36 | ux- | -0.001349 | -0.004612 | 0.000130 |
| | 36 | uy- | 0.002705 | -0.030943 | 0.001889 |
| | 36 | θz- | 0.001069 | -0.005337 | -0.000251 |
| 221 | 33 | ux+ | 0.004867 | -0.037143 | 0.001801 |
| | 33 | uy+ | -0.002752 | -0.020163 | 0.001593 |
| | 33 | θz+ | -0.001871 | -0.031734 | 0.002644 |
| | 33 | ux- | -0.002770 | -0.020186 | 0.001604 |
| | 33 | uy- | 0.004849 | -0.037166 | 0.001812 |
| | 33 | θz- | 0.003916 | -0.025547 | 0.000761 |
| | 36 | ux+ | 0.002184 | -0.030946 | 0.001987 |
| | 36 | uy+ | -0.001385 | -0.004613 | 0.000129 |
| | 36 | θz+ | 0.000597 | -0.030135 | 0.002155 |
| | 36 | ux- | -0.001385 | -0.004613 | 0.000129 |
| | 36 | uy- | 0.002175 | -0.030956 | 0.001990 |
| | 36 | θz- | 0.001136 | -0.005338 | -0.000244 |
| 222 | 33 | ux+ | 0.004373 | -0.037152 | 0.001837 |
| | 33 | uy+ | -0.003192 | -0.020168 | 0.001613 |
| | 33 | θz+ | -0.002598 | -0.031743 | 0.002679 |
| | 33 | ux- | -0.003213 | -0.020191 | 0.001623 |
| | 33 | uy- | 0.004352 | -0.037175 | 0.001848 |
| | 33 | θz- | 0.003705 | -0.025552 | 0.000782 |
| | 36 | ux+ | 0.001638 | -0.030954 | 0.002020 |
| | 36 | uy+ | -0.001420 | -0.004613 | 0.000128 |
| | 36 | θz+ | 0.000001 | -0.030143 | 0.002187 |
| | 36 | ux- | -0.001420 | -0.004613 | 0.000128 |
| | 36 | uy- | 0.001627 | -0.030964 | 0.002022 |
| | 36 | θz- | 0.001202 | -0.005338 | -0.000242 |
| 223 | 33 | ux+ | 0.004232 | -0.037871 | 0.001965 |

| | | | | | |
|---|---|---|---|---|---|
| | 33 | uy+ | -0.003317 | -0.020790 | 0.001682 |
| | 33 | θz+ | -0.002797 | -0.032808 | 0.002787 |
| | 33 | ux- | -0.003338 | -0.020815 | 0.001692 |
| | 33 | uy- | 0.004211 | -0.037896 | 0.001975 |
| | 33 | θz- | 0.003646 | -0.025867 | 0.000870 |
| | 36 | ux+ | 0.001573 | -0.007313 | -0.000108 |
| | 36 | uy+ | -0.001429 | -0.004663 | 0.000129 |
| | 36 | θz+ | -0.000166 | -0.030987 | 0.002292 |
| | 36 | ux- | -0.001429 | -0.004663 | 0.000129 |
| | 36 | uy- | 0.001472 | -0.031748 | 0.002133 |
| | 36 | θz- | 0.001222 | -0.005250 | -0.000233 |
| 224 | 33 | ux+ | 0.003962 | -0.039224 | 0.002132 |
| | 33 | uy+ | -0.003536 | -0.021926 | 0.001771 |
| | 33 | θz+ | -0.003173 | -0.034691 | 0.002924 |
| | 33 | ux- | -0.003559 | -0.021959 | 0.001782 |
| | 33 | uy- | 0.003940 | -0.039257 | 0.002142 |
| | 33 | θz- | 0.003532 | -0.026482 | 0.000989 |
| | 36 | ux+ | 0.001589 | -0.007248 | -0.000093 |
| | 36 | uy+ | -0.001445 | -0.004744 | 0.000123 |
| | 36 | θz+ | -0.000477 | -0.032544 | 0.002430 |
| | 36 | ux- | -0.001445 | -0.004744 | 0.000123 |
| | 36 | uy- | 0.001179 | -0.033202 | 0.002280 |
| | 36 | θz- | 0.001255 | -0.005103 | -0.000217 |
| 320 | 33 | ux+ | 0.000000 | -0.034887 | -0.002074 |
| | 33 | uy+ | 0.000000 | -0.019857 | -0.000946 |
| | 33 | θz+ | 0.000000 | -0.020090 | -0.000926 |
| | 33 | ux- | 0.000000 | -0.034887 | -0.002074 |
| | 33 | uy- | 0.000000 | -0.036686 | -0.003015 |
| | 33 | θz- | 0.000000 | -0.036552 | -0.003036 |
| | 36 | ux+ | 0.000000 | -0.029908 | -0.002047 |
| | 36 | uy+ | 0.000000 | -0.004571 | -0.000009 |
| | 36 | θz+ | 0.000000 | -0.004571 | -0.000009 |
| | 36 | ux- | 0.000000 | -0.029908 | -0.002047 |
| | 36 | uy- | 0.000000 | -0.030518 | -0.002394 |
| | 36 | θz- | 0.000000 | -0.030509 | -0.002400 |
| 321 | 33 | ux+ | 0.001411 | -0.036604 | -0.002605 |
| | 33 | uy+ | 0.000360 | -0.019886 | -0.000501 |
| | 33 | θz+ | 0.000353 | -0.020020 | -0.000488 |
| | 33 | ux- | 0.000353 | -0.020119 | -0.000489 |
| | 33 | uy- | 0.001403 | -0.036730 | -0.002593 |
| | 33 | θz- | 0.001411 | -0.036609 | -0.002606 |
| | 36 | ux+ | 0.001100 | -0.030549 | -0.002001 |
| | 36 | uy+ | -0.000039 | -0.004576 | 0.000154 |
| | 36 | θz+ | -0.000039 | -0.004576 | 0.000154 |
| | 36 | ux- | -0.000039 | -0.004576 | 0.000154 |
| | 36 | uy- | 0.001098 | -0.030559 | -0.001995 |
| | 36 | θz- | 0.001100 | -0.030549 | -0.002001 |
| 322 | 33 | ux+ | 0.002036 | -0.036626 | -0.002415 |
| | 33 | uy+ | 0.000462 | -0.019900 | -0.000325 |
| | 33 | θz+ | 0.000451 | -0.020033 | -0.000317 |
| | 33 | ux- | 0.000451 | -0.020033 | -0.000317 |
| | 33 | uy- | 0.002025 | -0.036752 | -0.002409 |
| | 33 | θz- | 0.002034 | -0.036646 | -0.002417 |
| | 36 | ux+ | 0.001575 | -0.030569 | -0.001824 |
| | 36 | uy+ | -0.000085 | -0.004578 | 0.000213 |
| | 36 | θz+ | -0.000085 | -0.004578 | 0.000213 |
| | 36 | ux- | -0.000085 | -0.004578 | 0.000213 |
| | 36 | uy- | 0.001571 | -0.030579 | -0.001820 |
| | 36 | θz- | 0.001575 | -0.030569 | -0.001824 |

MA_ROT2.LST Sábado, 18 Mayo 2002 3:27am

| | | | | | |
|---|---|---|---|---|---|
| 400 | 33 | ux+ | 0.000297 | -0.027363 | -0.000141 |
| | 33 | uy+ | 0.000199 | -0.017906 | -0.000018 |
| | 33 | θz+ | 0.000150 | -0.028077 | 0.000221 |
| | 33 | ux- | 0.000009 | -0.019941 | 0.000203 |
| | 33 | uy- | 0.000095 | -0.030567 | -0.000005 |
| | 33 | θz- | 0.000286 | -0.028064 | -0.000221 |
| | 36 | ux+ | 0.000207 | -0.024625 | -0.000003 |
| | 36 | uy+ | 0.000005 | -0.003786 | 0.000000 |
| | 36 | θz+ | 0.000089 | -0.006210 | 0.000030 |
| | 36 | ux- | 0.000001 | -0.003787 | 0.000000 |
| | 36 | uy- | 0.000080 | -0.025214 | 0.000005 |
| | 36 | θz- | 0.000047 | -0.006219 | -0.000030 |
| 421 | 33 | ux+ | 0.000011 | -0.032463 | -0.002566 |
| | 33 | uy+ | 0.000005 | -0.019476 | -0.001078 |
| | 33 | θz+ | 0.000005 | -0.019768 | -0.001054 |
| | 33 | ux- | 0.000003 | -0.023079 | -0.001538 |
| | 33 | uy- | 0.000008 | -0.035532 | -0.003121 |
| | 33 | θz- | 0.000008 | -0.035391 | -0.003145 |
| | 36 | ux+ | 0.000008 | -0.029114 | -0.002180 |
| | 36 | uy+ | 0.000003 | -0.004557 | -0.000061 |
| | 36 | θz+ | 0.000003 | -0.004557 | -0.000061 |
| | 36 | ux- | 0.000000 | -0.006465 | -0.000387 |
| | 36 | uy- | 0.000005 | -0.029599 | -0.002492 |
| | 36 | θz- | 0.000005 | -0.029587 | -0.002500 |
| 422 | 33 | ux+ | 0.000076 | -0.029646 | -0.002486 |
| | 33 | uy+ | 0.000021 | -0.017132 | -0.001110 |
| | 33 | θz+ | 0.000033 | -0.018483 | -0.000967 |
| | 33 | ux- | 0.000018 | -0.019005 | -0.001234 |
| | 33 | uy- | 0.000062 | -0.030088 | -0.001983 |
| | 33 | θz- | 0.000052 | -0.029363 | -0.002666 |
| | 36 | ux+ | 0.000059 | -0.024944 | -0.001932 |
| | 36 | uy+ | 0.000002 | -0.004109 | -0.000266 |
| | 36 | θz+ | 0.000016 | -0.004267 | -0.000193 |
| | 36 | ux- | 0.000001 | -0.004178 | -0.000281 |
| | 36 | uy- | 0.000059 | -0.024999 | -0.001967 |
| | 36 | θz- | 0.000038 | -0.024817 | -0.002064 |
| 423 | 33 | ux+ | 0.000142 | -0.026144 | -0.000989 |
| | 33 | uy+ | 0.000037 | -0.015703 | -0.000291 |
| | 33 | θz+ | 0.000033 | -0.017086 | -0.000107 |
| | 33 | ux- | 0.000033 | -0.017736 | -0.000241 |
| | 33 | uy- | 0.000115 | -0.027464 | -0.000599 |
| | 33 | θz- | 0.000142 | -0.025607 | -0.001122 |
| | 36 | ux+ | 0.000111 | -0.022372 | -0.000613 |
| | 36 | uy+ | 0.000005 | -0.003714 | -0.000127 |
| | 36 | θz+ | 0.000044 | -0.004351 | -0.000043 |
| | 36 | ux- | 0.000002 | -0.003718 | -0.000128 |
| | 36 | uy- | 0.000111 | -0.022384 | -0.000620 |
| | 36 | θz- | 0.000111 | -0.022078 | -0.000702 |
| 424 | 33 | ux+ | 0.000204 | -0.025567 | 0.000488 |
| | 33 | uy+ | 0.000051 | -0.016027 | 0.000500 |
| | 33 | θz+ | 0.000078 | -0.025006 | 0.000996 |
| | 33 | ux- | 0.000045 | -0.017960 | 0.000671 |
| | 33 | uy- | 0.000166 | -0.027681 | 0.000718 |
| | 33 | θz- | 0.000148 | -0.017543 | 0.000135 |
| | 36 | ux+ | 0.000159 | -0.022330 | 0.000645 |
| | 36 | uy+ | 0.000007 | -0.003615 | 0.000018 |
| | 36 | θz+ | 0.000082 | -0.022214 | 0.000753 |
| | 36 | ux- | 0.000003 | -0.003616 | 0.000017 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | uy- | 0.000157 | -0.022511 | 0.000653 |
| | 36 | θz- | 0.000045 | -0.004919 | -0.000109 |
| 425 | 33 | ux+ | 0.000280 | -0.027238 | 0.000610 |
| | 33 | uy+ | 0.000129 | -0.017450 | 0.000486 |
| | 33 | θz+ | 0.000109 | -0.027142 | 0.000972 |
| | 33 | ux- | 0.000060 | -0.019983 | 0.000544 |
| | 33 | uy- | 0.000137 | -0.029861 | 0.000736 |
| | 33 | θz- | 0.000196 | -0.018845 | 0.000259 |
| | 36 | ux+ | 0.000219 | -0.024215 | 0.000672 |
| | 36 | uy+ | 0.000007 | -0.003735 | 0.000052 |
| | 36 | θz+ | 0.000113 | -0.024362 | 0.000725 |
| | 36 | ux- | 0.000004 | -0.003736 | 0.000052 |
| | 36 | uy- | 0.000134 | -0.024542 | 0.000703 |
| | 36 | θz- | 0.000061 | -0.004867 | 0.000020 |
| 521 | 33 | ux+ | -0.000002 | -0.027157 | -0.001483 |
| | 33 | uy+ | -0.000002 | -0.020214 | -0.000945 |
| | 33 | θz+ | -0.000002 | -0.020437 | -0.000925 |
| | 33 | ux- | -0.000003 | -0.035664 | -0.002072 |
| | 33 | uy- | -0.000003 | -0.037815 | -0.003011 |
| | 33 | θz- | -0.000003 | -0.037690 | -0.003032 |
| | 36 | ux+ | 0.000000 | -0.006741 | -0.000360 |
| | 36 | uy+ | -0.000001 | -0.004575 | -0.000009 |
| | 36 | θz+ | -0.000001 | -0.004575 | -0.000009 |
| | 36 | ux- | -0.000003 | -0.030926 | -0.002232 |
| | 36 | uy- | -0.000003 | -0.031416 | -0.002391 |
| | 36 | θz- | -0.000003 | -0.031409 | -0.002398 |
| 522 | 33 | ux+ | -0.000002 | -0.027423 | -0.001621 |
| | 33 | uy+ | -0.000003 | -0.020262 | -0.000945 |
| | 33 | θz+ | -0.000003 | -0.020485 | -0.000925 |
| | 33 | ux- | -0.000005 | -0.035769 | -0.002072 |
| | 33 | uy- | -0.000003 | -0.037969 | -0.003011 |
| | 33 | θz- | -0.000003 | -0.037844 | -0.003032 |
| | 36 | ux+ | 0.000000 | -0.006758 | -0.000360 |
| | 36 | uy+ | -0.000001 | -0.004575 | -0.000009 |
| | 36 | θz+ | -0.000001 | -0.004575 | -0.000009 |
| | 36 | ux- | -0.000004 | -0.030779 | -0.002045 |
| | 36 | uy- | -0.000003 | -0.031536 | -0.002391 |
| | 36 | θz- | -0.000003 | -0.031529 | -0.002398 |
| 523 | 33 | ux+ | -0.000002 | -0.027504 | -0.001621 |
| | 33 | uy+ | -0.000003 | -0.020309 | -0.000945 |
| | 33 | θz+ | -0.000003 | -0.020533 | -0.000925 |
| | 33 | ux- | -0.000005 | -0.035873 | -0.002072 |
| | 33 | uy- | -0.000003 | -0.038123 | -0.003011 |
| | 33 | θz- | -0.000003 | -0.037998 | -0.003032 |
| | 36 | ux+ | 0.000000 | -0.006784 | -0.000379 |
| | 36 | uy+ | -0.000001 | -0.004576 | -0.000009 |
| | 36 | θz+ | -0.000001 | -0.004576 | -0.000009 |
| | 36 | ux- | -0.000004 | -0.030884 | -0.002045 |
| | 36 | uy- | -0.000003 | -0.031658 | -0.002391 |
| | 36 | θz- | -0.000003 | -0.031651 | -0.002398 |
| 524 | 33 | ux+ | -0.000002 | -0.027584 | -0.001621 |
| | 33 | uy+ | -0.000003 | -0.020357 | -0.000945 |
| | 33 | θz+ | -0.000003 | -0.020577 | -0.000925 |
| | 33 | ux- | -0.000005 | -0.035976 | -0.002072 |
| | 33 | uy- | -0.000003 | -0.038266 | -0.003011 |
| | 33 | θz- | -0.000003 | -0.038144 | -0.003032 |
| | 36 | ux+ | 0.000000 | -0.006803 | -0.000379 |
| | 36 | uy+ | -0.000001 | -0.004576 | -0.000009 |

MA_ROT2.LST Sábado, 18 Mayo 2002 3:27am

| | | | | | |
|---|---|---|---|---|---|
| | 36 | θz+ | -0.000001 | -0.004576 | -0.000009 |
| | 36 | ux- | -0.000004 | -0.030983 | -0.002045 |
| | 36 | uy- | -0.000003 | -0.031772 | -0.002391 |
| | 36 | θz- | -0.000003 | -0.031767 | -0.002398 |
| 525 | 33 | ux+ | -0.000002 | -0.027665 | -0.001621 |
| | 33 | uy+ | -0.000003 | -0.020404 | -0.000945 |
| | 33 | θz+ | -0.000003 | -0.020625 | -0.000925 |
| | 33 | ux- | -0.000005 | -0.036080 | -0.002072 |
| | 33 | uy- | -0.000003 | -0.038420 | -0.003011 |
| | 33 | θz- | -0.000003 | -0.038298 | -0.003032 |
| | 36 | ux+ | 0.000000 | -0.006823 | -0.000379 |
| | 36 | uy+ | -0.000001 | -0.004577 | -0.000009 |
| | 36 | θz+ | -0.000001 | -0.004577 | -0.000009 |
| | 36 | ux- | -0.000004 | -0.031086 | -0.002045 |
| | 36 | uy- | -0.000003 | -0.031894 | -0.002391 |
| | 36 | θz- | -0.000003 | -0.031888 | -0.002398 |
| 600 | 33 | ux+ | 0.003648 | -0.028891 | -0.000180 |
| | 33 | uy+ | 0.002416 | -0.018926 | -0.000105 |
| | 33 | θz+ | -0.003033 | -0.029023 | 0.000522 |
| | 33 | ux- | -0.003335 | -0.020091 | 0.000180 |
| | 33 | uy- | -0.000095 | -0.032105 | 0.000009 |
| | 33 | θz- | 0.003484 | -0.029005 | -0.000522 |
| | 36 | ux+ | 0.001693 | -0.006408 | 0.000414 |
| | 36 | uy+ | 0.000005 | -0.003905 | 0.000000 |
| | 36 | θz+ | 0.001053 | -0.006434 | 0.000444 |
| | 36 | ux- | -0.001488 | -0.005055 | -0.000414 |
| | 36 | uy- | -0.000356 | -0.026677 | 0.000020 |
| | 36 | θz- | -0.000915 | -0.006444 | -0.000444 |
| 601 | 33 | ux+ | 0.003442 | -0.028707 | -0.000405 |
| | 33 | uy+ | 0.002277 | -0.018806 | -0.000309 |
| | 33 | θz+ | -0.002631 | -0.028813 | 0.000633 |
| | 33 | ux- | -0.003131 | -0.019962 | 0.000405 |
| | 33 | uy- | -0.000083 | -0.031922 | 0.000028 |
| | 33 | θz- | 0.003081 | -0.028797 | -0.000633 |
| | 36 | ux+ | 0.001841 | -0.006384 | 0.000051 |
| | 36 | uy+ | 0.000005 | -0.003892 | 0.000000 |
| | 36 | θz+ | -0.000381 | -0.025911 | 0.000221 |
| | 36 | ux- | -0.001637 | -0.005035 | -0.000051 |
| | 36 | uy- | -0.000329 | -0.026503 | 0.000061 |
| | 36 | θz- | 0.000757 | -0.025907 | -0.000221 |
| 602 | 33 | ux+ | 0.003099 | -0.028522 | -0.000632 |
| | 33 | uy+ | 0.002023 | -0.018685 | -0.000456 |
| | 33 | θz+ | -0.002192 | -0.028629 | 0.000701 |
| | 33 | ux- | -0.002783 | -0.019836 | 0.000632 |
| | 33 | uy- | -0.000060 | -0.031740 | 0.000041 |
| | 33 | θz- | 0.002646 | -0.028613 | -0.000701 |
| | 36 | ux+ | 0.001779 | -0.006360 | -0.000225 |
| | 36 | uy+ | 0.000005 | -0.003879 | 0.000000 |
| | 36 | θz+ | -0.001110 | -0.005269 | 0.000296 |
| | 36 | ux- | -0.001574 | -0.005015 | 0.000225 |
| | 36 | uy- | -0.000278 | -0.026333 | 0.000089 |
| | 36 | θz- | 0.001296 | -0.005257 | -0.000296 |
| 603 | 33 | ux+ | 0.002632 | -0.028340 | -0.000776 |
| | 33 | uy+ | 0.001692 | -0.018565 | -0.000543 |
| | 33 | θz+ | -0.002126 | -0.028502 | 0.000779 |
| | 33 | ux- | -0.002316 | -0.019711 | 0.000776 |
| | 33 | uy- | -0.000030 | -0.031559 | 0.000049 |
| | 33 | θz- | 0.002581 | -0.028484 | -0.000779 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | ux+ | 0.001565 | -0.006334 | -0.000417 |
| | 36 | uy+ | 0.000005 | -0.003866 | 0.000000 |
| | 36 | θz+ | -0.001359 | -0.006349 | 0.000417 |
| | 36 | ux- | -0.001360 | -0.004996 | 0.000417 |
| | 36 | uy- | -0.000369 | -0.026160 | 0.000163 |
| | 36 | θz- | 0.001565 | -0.006334 | -0.000417 |
| 604 | 33 | ux+ | 0.002100 | -0.028150 | -0.000837 |
| | 33 | uy+ | 0.001321 | -0.018443 | -0.000573 |
| | 33 | θz+ | -0.001610 | -0.028258 | 0.000840 |
| | 33 | ux- | -0.001784 | -0.019578 | 0.000837 |
| | 33 | uy- | 0.000003 | -0.031375 | 0.000051 |
| | 33 | θz- | 0.002064 | -0.028240 | -0.000840 |
| | 36 | ux+ | 0.001250 | -0.006309 | -0.000522 |
| | 36 | uy+ | 0.000005 | -0.003852 | 0.000000 |
| | 36 | θz+ | -0.001045 | -0.006322 | 0.000522 |
| | 36 | ux- | -0.001045 | -0.004974 | 0.000522 |
| | 36 | uy- | -0.000139 | -0.025979 | 0.000113 |
| | 36 | θz- | 0.001250 | -0.006309 | -0.000522 |
| 605 | 33 | ux+ | 0.001545 | -0.027966 | -0.000816 |
| | 33 | uy+ | 0.000951 | -0.018322 | -0.000544 |
| | 33 | θz+ | -0.001082 | -0.028098 | 0.000816 |
| | 33 | ux- | -0.001235 | -0.019451 | 0.000816 |
| | 33 | uy- | 0.000035 | -0.031191 | 0.000047 |
| | 33 | θz- | 0.001530 | -0.028082 | -0.000816 |
| | 36 | ux+ | 0.000896 | -0.006282 | -0.000543 |
| | 36 | uy+ | 0.000005 | -0.003837 | 0.000000 |
| | 36 | θz+ | -0.000690 | -0.006295 | 0.000543 |
| | 36 | ux- | -0.000690 | -0.004952 | 0.000543 |
| | 36 | uy- | -0.000070 | -0.025804 | 0.000108 |
| | 36 | θz- | 0.000896 | -0.006282 | -0.000543 |
| 606 | 33 | ux+ | 0.001036 | -0.027784 | -0.000721 |
| | 33 | uy+ | 0.000616 | -0.018201 | -0.000459 |
| | 33 | θz+ | -0.000582 | -0.027851 | 0.000721 |
| | 33 | ux- | -0.000724 | -0.019325 | 0.000721 |
| | 33 | uy- | 0.000064 | -0.031009 | 0.000038 |
| | 33 | θz- | 0.001033 | -0.027835 | -0.000721 |
| | 36 | ux+ | 0.000556 | -0.006256 | -0.000478 |
| | 36 | uy+ | 0.000005 | -0.003823 | 0.000000 |
| | 36 | θz+ | -0.000351 | -0.006269 | 0.000478 |
| | 36 | ux- | -0.000351 | -0.004931 | 0.000478 |
| | 36 | uy- | -0.000046 | -0.025635 | 0.000138 |
| | 36 | θz- | 0.000556 | -0.006256 | -0.000478 |
| 607 | 33 | ux+ | 0.000624 | -0.027645 | -0.000536 |
| | 33 | uy+ | 0.000360 | -0.018078 | -0.000315 |
| | 33 | θz+ | -0.000167 | -0.027612 | 0.000540 |
| | 33 | ux- | -0.000318 | -0.019605 | 0.000488 |
| | 33 | uy- | 0.000085 | -0.030823 | 0.000024 |
| | 33 | θz- | 0.000624 | -0.027594 | -0.000540 |
| | 36 | ux+ | 0.000286 | -0.024943 | -0.000154 |
| | 36 | uy+ | 0.000005 | -0.003808 | 0.000000 |
| | 36 | θz+ | -0.000081 | -0.006242 | 0.000327 |
| | 36 | ux- | -0.000081 | -0.004909 | 0.000327 |
| | 36 | uy- | 0.000051 | -0.025456 | 0.000062 |
| | 36 | θz- | 0.000286 | -0.006229 | -0.000327 |

MA_ROT2.LST Sábado, 18 Mayo 2002 3:27am

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 320 | 33 | Fx+ | 19.73 | 17.89 | 0.00 |
| | 33 | Fy+ | -19.73 | 20.63 | 0.00 |
| | 33 | Mz+ | 0.00 | 19.62 | 0.00 |
| | 33 | Fx- | -19.73 | 18.79 | 0.00 |
| | 33 | Fy- | 19.73 | 11.17 | 0.00 |
| | 33 | Mz- | 0.00 | 19.62 | 0.00 |
| | 36 | Fx+ | 15.39 | 5.08 | 0.00 |
| | 36 | Fy+ | -5.91 | 17.16 | 0.00 |
| | 36 | Mz+ | 0.00 | 16.82 | 0.00 |
| | 36 | Fx- | -15.39 | 3.92 | 0.00 |
| | 36 | Fy- | 13.92 | 2.57 | 0.00 |
| | 36 | Mz- | 0.00 | 16.82 | 0.00 |
| 400 | 33 | Fx+ | 0.00 | 73.43 | 0.00 |
| | 33 | Fy+ | 0.00 | 73.82 | 0.00 |
| | 33 | Mz+ | 0.00 | 73.43 | 0.00 |
| | 33 | Fx- | 0.00 | 73.43 | 0.00 |
| | 33 | Fy- | 0.00 | 43.25 | 0.00 |
| | 33 | Mz- | 0.00 | 73.43 | 0.00 |
| | 36 | Fx+ | 0.00 | 60.71 | 0.00 |
| | 36 | Fy+ | 0.00 | 60.89 | 0.00 |
| | 36 | Mz+ | 0.00 | 60.71 | 0.00 |
| | 36 | Fx- | 0.00 | 60.71 | 0.00 |
| | 36 | Fy- | 0.00 | 9.15 | 0.00 |
| | 36 | Mz- | 0.00 | 60.71 | 0.00 |
| 421 | 33 | Fx+ | 0.00 | 59.76 | 0.00 |
| | 33 | Fy+ | 0.00 | 62.31 | 0.00 |
| | 33 | Mz+ | 0.00 | 59.76 | 0.00 |
| | 33 | Fx- | 0.00 | 59.76 | 0.00 |
| | 33 | Fy- | 0.00 | 34.14 | 0.00 |
| | 33 | Mz- | 0.00 | 59.76 | 0.00 |
| | 36 | Fx+ | 0.00 | 51.05 | 0.00 |
| | 36 | Fy+ | 0.00 | 51.90 | 0.00 |
| | 36 | Mz+ | 0.00 | 51.05 | 0.00 |
| | 36 | Fx- | 0.00 | 51.05 | 0.00 |
| | 36 | Fy- | 0.00 | 8.00 | 0.00 |
| | 36 | Mz- | 0.00 | 51.05 | 0.00 |
| 422 | 33 | Fx+ | 0.00 | 87.64 | 0.00 |
| | 33 | Fy+ | 0.00 | 88.59 | 0.00 |
| | 33 | Mz+ | 0.00 | 87.64 | 0.00 |
| | 33 | Fx- | 0.00 | 87.64 | 0.00 |
| | 33 | Fy- | 0.00 | 50.43 | 0.00 |
| | 33 | Mz- | 0.00 | 87.64 | 0.00 |
| | 36 | Fx+ | 0.00 | 73.21 | 0.00 |
| | 36 | Fy+ | 0.00 | 73.61 | 0.00 |
| | 36 | Mz+ | 0.00 | 73.21 | 0.00 |
| | 36 | Fx- | 0.00 | 73.21 | 0.00 |
| | 36 | Fy- | 0.00 | 12.10 | 0.00 |
| | 36 | Mz- | 0.00 | 73.21 | 0.00 |
| 423 | 33 | Fx+ | 0.00 | 80.26 | 0.00 |
| | 33 | Fy+ | 0.00 | 80.87 | 0.00 |
| | 33 | Mz+ | 0.00 | 80.26 | 0.00 |
| | 33 | Fx- | 0.00 | 80.26 | 0.00 |
| | 33 | Fy- | 0.00 | 46.25 | 0.00 |
| | 33 | Mz- | 0.00 | 80.26 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | Fx+ | 0.00 | 65.83 | 0.00 |
| | 36 | Fy+ | 0.00 | 65.92 | 0.00 |
| | 36 | Mz+ | 0.00 | 65.83 | 0.00 |
| | 36 | Fx- | 0.00 | 65.83 | 0.00 |
| | 36 | Fy- | 0.00 | 10.94 | 0.00 |
| | 36 | Mz- | 0.00 | 65.83 | 0.00 |
| 424 | 33 | Fx+ | 0.00 | 88.33 | 0.00 |
| | 33 | Fy+ | 0.00 | 88.84 | 0.00 |
| | 33 | Mz+ | 0.00 | 88.33 | 0.00 |
| | 33 | Fx- | 0.00 | 88.33 | 0.00 |
| | 33 | Fy- | 0.00 | 51.44 | 0.00 |
| | 33 | Mz- | 0.00 | 88.33 | 0.00 |
| | 36 | Fx+ | 0.00 | 72.24 | 0.00 |
| | 36 | Fy+ | 0.00 | 72.24 | 0.00 |
| | 36 | Mz+ | 0.00 | 72.24 | 0.00 |
| | 36 | Fx- | 0.00 | 72.24 | 0.00 |
| | 36 | Fy- | 0.00 | 11.61 | 0.00 |
| | 36 | Mz- | 0.00 | 72.24 | 0.00 |
| 425 | 33 | Fx+ | 0.00 | 79.57 | 0.00 |
| | 33 | Fy+ | 0.00 | 80.02 | 0.00 |
| | 33 | Mz+ | 0.00 | 79.57 | 0.00 |
| | 33 | Fx- | 0.00 | 79.57 | 0.00 |
| | 33 | Fy- | 0.00 | 46.76 | 0.00 |
| | 33 | Mz- | 0.00 | 79.57 | 0.00 |
| | 36 | Fx+ | 0.00 | 65.63 | 0.00 |
| | 36 | Fy+ | 0.00 | 65.78 | 0.00 |
| | 36 | Mz+ | 0.00 | 65.63 | 0.00 |
| | 36 | Fx- | 0.00 | 65.63 | 0.00 |
| | 36 | Fy- | 0.00 | 10.01 | 0.00 |
| | 36 | Mz- | 0.00 | 65.63 | 0.00 |
| 521 | 33 | Fx+ | 0.00 | 11.37 | 0.00 |
| | 33 | Fy+ | 0.00 | 12.05 | 0.00 |
| | 33 | Mz+ | 0.00 | 11.37 | 0.00 |
| | 33 | Fx- | 0.00 | 11.37 | 0.00 |
| | 33 | Fy- | 0.00 | 6.45 | 0.00 |
| | 33 | Mz- | 0.00 | 11.37 | 0.00 |
| | 36 | Fx+ | 0.00 | 9.77 | 0.00 |
| | 36 | Fy+ | 0.00 | 10.01 | 0.00 |
| | 36 | Mz+ | 0.00 | 9.77 | 0.00 |
| | 36 | Fx- | 0.00 | 9.77 | 0.00 |
| | 36 | Fy- | 0.00 | 1.46 | 0.00 |
| | 36 | Mz- | 0.00 | 9.77 | 0.00 |
| 522 | 33 | Fx+ | 0.00 | 2.68 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.85 | 0.00 |
| | 33 | Mz+ | 0.00 | 2.68 | 0.00 |
| | 33 | Fx- | 0.00 | 2.68 | 0.00 |
| | 33 | Fy- | 0.00 | 1.52 | 0.00 |
| | 33 | Mz- | 0.00 | 2.68 | 0.00 |
| | 36 | Fx+ | 0.00 | 2.31 | 0.00 |
| | 36 | Fy+ | 0.00 | 2.37 | 0.00 |
| | 36 | Mz+ | 0.00 | 2.31 | 0.00 |
| | 36 | Fx- | 0.00 | 2.31 | 0.00 |
| | 36 | Fy- | 0.00 | 0.34 | 0.00 |
| | 36 | Mz- | 0.00 | 2.31 | 0.00 |
| 523 | 33 | Fx+ | 0.00 | 2.69 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.86 | 0.00 |
| | 33 | Mz+ | 0.00 | 2.69 | 0.00 |
| | 33 | Fx- | 0.00 | 2.69 | 0.00 |

MA_ROT2.LST Sábado, 18 Mayo 2002 3:27am

| | | | | | |
|---|---|---|---|---|---|
| | 33 | Fy- | 0.00 | 1.52 | 0.00 |
| | 33 | Mz- | 0.00 | 2.69 | 0.00 |
| | 36 | Fx+ | 0.00 | 2.32 | 0.00 |
| | 36 | Fy+ | 0.00 | 2.38 | 0.00 |
| | 36 | Mz+ | 0.00 | 2.32 | 0.00 |
| | 36 | Fx- | 0.00 | 2.32 | 0.00 |
| | 36 | Fy- | 0.00 | 0.34 | 0.00 |
| | 36 | Mz- | 0.00 | 2.32 | 0.00 |
| 524 | 33 | Fx+ | 0.00 | 2.70 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.86 | 0.00 |
| | 33 | Mz+ | 0.00 | 2.70 | 0.00 |
| | 33 | Fx- | 0.00 | 2.70 | 0.00 |
| | 33 | Fy- | 0.00 | 1.53 | 0.00 |
| | 33 | Mz- | 0.00 | 2.70 | 0.00 |
| | 36 | Fx+ | 0.00 | 2.32 | 0.00 |
| | 36 | Fy+ | 0.00 | 2.39 | 0.00 |
| | 36 | Mz+ | 0.00 | 2.32 | 0.00 |
| | 36 | Fx- | 0.00 | 2.32 | 0.00 |
| | 36 | Fy- | 0.00 | 0.35 | 0.00 |
| | 36 | Mz- | 0.00 | 2.32 | 0.00 |
| 525 | 33 | Fx+ | 0.00 | 1.35 | 0.00 |
| | 33 | Fy+ | 0.00 | 1.44 | 0.00 |
| | 33 | Mz+ | 0.00 | 1.35 | 0.00 |
| | 33 | Fx- | 0.00 | 1.35 | 0.00 |
| | 33 | Fy- | 0.00 | 0.77 | 0.00 |
| | 33 | Mz- | 0.00 | 1.35 | 0.00 |
| | 36 | Fx+ | 0.00 | 1.17 | 0.00 |
| | 36 | Fy+ | 0.00 | 1.19 | 0.00 |
| | 36 | Mz+ | 0.00 | 1.17 | 0.00 |
| | 36 | Fx- | 0.00 | 1.17 | 0.00 |
| | 36 | Fy- | 0.00 | 0.17 | 0.00 |
| | 36 | Mz- | 0.00 | 1.17 | 0.00 |

CONTROL SERVICIO

Habiendo comprobado que la hipótesis-1 es la condicionante se listan los esfuerzos tanto en el hastial interior como en el resto de Barras de la estructura.

Como Resumen se tiene:

| | Nserv. | Mser. | σs (Cps Pésimas) | σsr |
|---|---|---|---|---|
| Dintel | | | | |
| Cara hastial ext | -71,63 | -93,45 | 2546,91 (ok) | |
| cu | -53,62 | 83,06 | 2376,11 (ok) | |
| Cara inst. int. | -62,98 | -305,78 | 2748,54 | 688 |
| Hastial ext | | | | |
| Sup | -113,84 | -103,50 | 7527 (ok) | |
| Inf | -169,34 | -74,53 | 1686 (ok) | |
| Zapata | | | | |
| Inf ext | -58,56 | 99,70 | 2900 kp/cm2 | |
| cu | -79,58 | -148,79 | 2832 kp/cm2 | 771,5 |
| Inf int | -36,08 | 284,62 | 2941,71 kp/cm2 | 1012 |

| | Wk |
|---|---|
| Dintel cu | 0,27 |
| Zapata cu | 0,296 |
| Zapata cpint | 0,34 |

→ Limitamos al resto controlando deformaciones y luego en Kunsi como muestra EHE

**FISURACIÓN EN SECCIONES RECTANGULARES DE HORMIGÓN. (EHE-98)**

VER 1.0.0

**Características Generales:**

| | |
|---|---|
| Es [Kp/cm2]: | 2.10E+06 |
| Canto [m]: | 1.550 |
| Tipo de Hormigón: | HA-25 |
| Tipo de Barras : | Corrugada |
| Tipo de Sección: | Losa |
| o de Diagra. Tens. : | Flexo-Tracc |

**SECCION: Zapata**

**Características de Armadura:**

| CAPAS | f [mm] | c [cm] | s [cm] | σs [Kp/cm2] | σsr [Kp/cm2] |
|---|---|---|---|---|---|
| Capa 1 | 32 | 3 | 12.5 | 2941 | 1012 |
| Capa 2 | | | | | |
| Capa 3 | | | | | |

**RESULTADOS:**

| | |
|---|---|
| **Ac,eficaz =** | **0.2700 m2** |
| **Sm =** | **152.1435 mm** |
| **esm =** | **1.3176E-03** |
| **Wk =** | **0.3408 mm** |

## FISURACIÓN EN SECCIONES RECTANGULARES DE HORMIGÓN. (EHE-98)

VER 1.0.0

**Características Generales:**

| | |
|---|---|
| Es [Kp/cm2]: | 2.10E+06 |
| Canto [m]: | 0.900 |
| Tipo de Hormigón: | HA-25 |
| Tipo de Barras : | Corrugada |
| Tipo de Sección: | Losa |
| o de Diagra. Tens. : | Flexo-Tracc |

**SECCION:** **Hastial**

**Características de Armadura:**

| | f | c | s | σs | σsr |
|---|---|---|---|---|---|
| CAPAS | [mm] | [cm] | [cm] | [Kp/cm2] | [Kp/cm2] |
| Capa 1 | 16 | 3 | 15 | 2380.54 | 1097.7 |
| Capa 2 | 20 | 3 | 20 | | |
| Capa 3 | | | | | |

**RESULTADOS:**

| | |
|---|---|
| **Ac,eficaz =** | **0.1800 m2** |
| **Sm =** | **151.8300 mm** |
| **esm =** | **1.0131E-03** |
| **Wk =** | **0.2615 mm** |

## FISURACIÓN EN SECCIONES RECTANGULARES DE HORMIGÓN. (EHE-98)

VER 1.0.0

**Características Generales:**

| | |
|---|---|
| Es [Kp/cm2]: | 2.10E+06 |
| Canto [m]: | 0.700 |
| Tipo de Hormigón: | HA-25 |
| Tipo de Barras : | Corrugada |
| Tipo de Sección: | Losa |
| o de Diagra. Tens. : | Flexo-Tracc |

**SECCION:** **Dintel.Centro de vano**

**Características de Armadura:**

| | f | c | s | σs | σsr |
|---|---|---|---|---|---|
| CAPAS | [mm] | [cm] | [cm] | [Kp/cm2] | [Kp/cm2] |
| Capa 1 | 25 | 3 | 10 | 2748 | 688 |
| Capa 2 | | | | | |
| Capa 3 | | | | | |

**RESULTADOS:**

| | |
|---|---|
| **Ac,eficaz =** | **0.1750 m2** |
| **Sm =** | **124.5634 mm** |
| **esm =** | **1.2676E-03** |
| **Wk =** | **0.2684 mm** |

LISTADO DE ESTADOS DE CARGA
Fecha : 07.05.2002 10:10:24
Título: L.A.V.MARTORELL. - ODT 300.4.
Coment: Envolventes totales
Titlst: Estado Servicio. Proyecto: L.A.V.MARTORELL. - ODT

Tabla de estados de carga a listar

| ec | Fichero | tipo | Título |
|---|---|---|---|
| 30 | MA_SERV | 1 | [Envolvente de Servicio (Marco en Servicio) ] |

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Mz |
|---|---|---|---|---|---|---|
| 6 | 6 | 30 | Nx+ | -56.44 | -124.53 | -292.83 |
| | | 30 | Fy+ | -80.10 | -117.05 | -264.32 |
| | | 30 | Mz+ | -80.10 | -117.05 | -264.32 |
| | | 30 | Nx- | -86.59 | -122.69 | -277.25 |
| | | 30 | Fy- | -62.98 | -130.17 | -305.78 |
| | | 30 | Mz- | -62.98 | -130.17 | -305.78 |
| 7 | 7 | 30 | Nx+ | -45.60 | -93.91 | -119.76 |
| | | 30 | Fy+ | -69.95 | -88.31 | -102.56 |
| | | 30 | Mz+ | -70.19 | -89.71 | -102.02 |
| | | 30 | Nx- | -75.80 | -93.05 | -108.44 |
| | | 30 | Fy- | -51.47 | -98.65 | -125.67 |
| | | 30 | Mz- | -51.23 | -97.25 | -126.21 |
| 8 | 8 | 30 | Nx+ | -45.60 | -55.11 | 13.75 |
| | | 30 | Fy+ | -70.19 | -49.12 | 22.37 |
| | | 30 | Mz+ | -70.58 | -50.94 | 24.25 |
| | | 30 | Nx- | -75.80 | -52.46 | 21.92 |
| | | 30 | Fy- | -51.23 | -58.45 | 13.28 |
| | | 30 | Mz- | -50.84 | -56.63 | 11.39 |
| 9 | 9 | 30 | Nx+ | -45.60 | -18.28 | 76.18 |
| | | 30 | Fy+ | -70.45 | -11.64 | 76.31 |
| | | 30 | Mz+ | -53.57 | -17.22 | 83.13 |
| | | 30 | Nx- | -75.80 | -13.93 | 78.37 |
| | | 30 | Fy- | -50.97 | -20.58 | 78.23 |
| | | 30 | Mz- | -67.62 | -15.12 | 71.45 |
| 10 | 10 | 30 | Nx+ | -45.60 | 18.54 | 75.96 |
| | | 30 | Fy+ | -70.67 | 26.15 | 66.33 |
| | | 30 | Mz+ | -51.33 | 19.51 | 81.90 |
| | | 30 | Nx- | -75.80 | 24.60 | 69.30 |
| | | 30 | Fy- | -50.75 | 16.99 | 78.94 |
| | | 30 | Mz- | -70.05 | 23.66 | 63.37 |
| 121 | 121 | 30 | Nx+ | -111.69 | 20.43 | 53.17 |
| | | 30 | Fy+ | -115.27 | 31.79 | 55.33 |
| | | 30 | Mz+ | -116.59 | 20.12 | 57.22 |
| | | 30 | Nx- | -122.91 | 19.88 | 41.33 |
| | | 30 | Fy- | -119.34 | 8.54 | 39.38 |
| | | 30 | Mz- | -117.85 | 20.23 | 36.91 |
| 122 | 122 | 30 | Nx+ | -110.24 | 11.28 | 40.91 |
| | | 30 | Fy+ | -113.82 | 18.65 | 35.82 |
| | | 30 | Mz+ | -115.54 | 10.73 | 45.32 |
| | | 30 | Nx- | -121.46 | 7.90 | 30.61 |
| | | 30 | Fy- | -117.89 | 0.55 | 35.87 |
| | | 30 | Mz- | -115.67 | 8.78 | 25.60 |
| 123 | 123 | 30 | Nx+ | -108.79 | 2.53 | 35.60 |
| | | 30 | Fy+ | -112.37 | 6.10 | 26.28 |
| | | 30 | Mz+ | -115.27 | -2.08 | 42.75 |
| | | 30 | Nx- | -120.01 | -3.49 | 28.94 |
| | | 30 | Fy- | -116.43 | -7.04 | 38.41 |
| | | 30 | Mz- | -113.08 | 1.41 | 20.93 |
| 124 | 124 | 30 | Nx+ | -107.33 | -5.81 | 36.89 |
| | | 30 | Fy+ | -109.10 | -5.46 | 38.51 |
| | | 30 | Mz+ | -116.51 | -13.39 | 48.45 |
| | | 30 | Nx- | -118.56 | -14.27 | 35.87 |
| | | 30 | Fy- | -116.80 | -14.60 | 34.38 |
| | | 30 | Mz- | -110.13 | -8.03 | 23.78 |
| 125 | 125 | 30 | Nx+ | -105.88 | -13.77 | 44.51 |
| | | 30 | Fy+ | -107.65 | -13.42 | 45.86 |
| | | 30 | Mz+ | -115.27 | -20.61 | 61.63 |
| | | 30 | Nx- | -117.10 | -24.45 | 50.92 |
| | | 30 | Fy- | -115.34 | -24.78 | 49.67 |
| | | 30 | Mz- | -107.70 | -17.59 | 33.81 |
| 126 | 126 | 30 | Nx+ | -104.43 | -21.32 | 58.14 |
| | | 30 | Fy+ | -106.20 | -20.97 | 59.21 |
| | | 30 | Mz+ | -113.48 | -27.09 | 80.16 |
| | | 30 | Nx- | -115.65 | -34.03 | 73.63 |
| | | 30 | Fy- | -113.89 | -34.36 | 72.63 |
| | | 30 | Mz- | -106.61 | -28.27 | 51.61 |
| 126 | 127 | 30 | Nx+ | -102.97 | -28.47 | 77.46 |
| | | 30 | Fy+ | -105.57 | -27.20 | 84.82 |
| | | 30 | Mz+ | -113.84 | -43.07 | 103.60 |
| | | 30 | Nx- | -114.20 | -43.01 | 103.54 |
| | | 30 | Fy- | -111.60 | -44.27 | 96.21 |
| | | 30 | Mz- | -103.33 | -28.42 | 77.41 |
| 600 | 600 | 30 | Nx+ | -251.45 | 0.14 | -0.20 |
| | | 30 | Fy+ | -259.05 | 4.07 | -11.12 |
| | | 30 | Mz+ | -259.02 | -4.06 | 11.16 |
| | | 30 | Nx- | -271.16 | -0.18 | 0.29 |
| | | 30 | Fy- | -259.02 | -4.07 | 11.12 |
| | | 30 | Mz- | -259.05 | 4.06 | -11.16 |
| 600 | 6 | 30 | Nx+ | -248.67 | 0.14 | -0.31 |
| | | 30 | Fy+ | -256.27 | 4.07 | -14.21 |
| | | 30 | Mz+ | -256.24 | -4.06 | 14.25 |
| | | 30 | Nx- | -268.38 | -0.18 | 0.42 |
| | | 30 | Fy- | -256.24 | -4.07 | 14.21 |
| | | 30 | Mz- | -256.27 | 4.06 | -14.25 |
| 601 | 601 | 30 | Nx+ | -252.27 | 0.14 | -0.11 |
| | | 30 | Fy+ | -259.87 | 4.07 | -8.44 |
| | | 30 | Mz+ | -259.85 | -4.06 | 8.49 |
| | | 30 | Nx- | -271.99 | -0.18 | 0.17 |
| | | 30 | Fy- | -259.84 | -4.07 | 8.44 |
| | | 30 | Mz- | -259.87 | 4.06 | -8.49 |
| 602 | 602 | 30 | Nx+ | -253.09 | 0.14 | -0.02 |
| | | 30 | Fy+ | -260.69 | 4.07 | -5.77 |
| | | 30 | Mz+ | -260.67 | -4.06 | 5.82 |
| | | 30 | Nx- | -272.81 | -0.18 | 0.05 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Fy- | -260.66 | -4.07 | 5.77 |
| | | 30 | Mz- | -260.70 | 4.06 | -5.82 |
| 603 | 603 | 30 | Nx+ | -253.91 | 0.14 | 0.07 |
| | | 30 | Fy+ | -261.51 | 4.07 | -3.10 |
| | | 30 | Mz+ | -260.85 | -3.09 | 3.42 |
| | | 30 | Nx- | -273.63 | -0.18 | -0.06 |
| | | 30 | Fy- | -261.48 | -4.07 | 3.10 |
| | | 30 | Mz- | -260.89 | 3.09 | -3.42 |
| 604 | 604 | 30 | Nx+ | -254.73 | 0.14 | 0.16 |
| | | 30 | Fy+ | -262.33 | 4.07 | -0.41 |
| | | 30 | Mz+ | -261.68 | -3.06 | 1.40 |
| | | 30 | Nx- | -274.45 | -0.18 | -0.18 |
| | | 30 | Fy- | -262.30 | -4.07 | 0.41 |
| | | 30 | Mz- | -261.71 | 3.06 | -1.40 |
| 605 | 605 | 30 | Nx+ | -255.56 | 0.14 | 0.25 |
| | | 30 | Fy+ | -263.16 | 4.07 | 2.25 |
| | | 30 | Mz+ | -263.16 | 2.19 | 2.75 |
| | | 30 | Nx- | -275.27 | -0.18 | -0.30 |
| | | 30 | Fy- | -263.13 | -4.07 | -2.25 |
| | | 30 | Mz- | -263.13 | -2.19 | -2.75 |
| 606 | 606 | 30 | Nx+ | -256.38 | 0.14 | 0.34 |
| | | 30 | Fy+ | -263.98 | 4.07 | 4.93 |
| | | 30 | Mz+ | -263.98 | 4.03 | 4.95 |
| | | 30 | Nx- | -276.09 | -0.18 | -0.41 |
| | | 30 | Fy- | -263.95 | -4.07 | -4.93 |
| | | 30 | Mz- | -263.95 | -4.03 | -4.95 |
| 607 | 607 | 30 | Nx+ | -257.20 | 0.14 | 0.43 |
| | | 30 | Fy+ | -264.80 | 4.07 | 7.60 |
| | | 30 | Mz+ | -264.80 | 4.07 | 7.60 |
| | | 30 | Nx- | -276.91 | -0.18 | -0.53 |
| | | 30 | Fy- | -264.77 | -4.07 | -7.60 |
| | | 30 | Mz- | -264.77 | -4.07 | -7.60 |
| 608 | 400 | 30 | Nx+ | -258.34 | 0.14 | 0.56 |
| | | 30 | Fy+ | -265.94 | 4.07 | 11.32 |
| | | 30 | Mz+ | -265.94 | 4.07 | 11.32 |
| | | 30 | Nx- | -278.05 | -0.18 | -0.69 |
| | | 30 | Fy- | -265.91 | -4.07 | -11.32 |
| | | 30 | Mz- | -265.91 | -4.07 | -11.32 |
| 221 | 221 | 30 | Nx+ | -102.24 | -30.89 | 85.56 |
| | | 30 | Fy+ | -104.84 | -29.21 | 92.54 |
| | | 30 | Mz+ | -113.11 | -46.09 | 115.76 |
| | | 30 | Nx- | -113.46 | -46.03 | 115.69 |
| | | 30 | Fy- | -110.87 | -47.69 | 108.76 |
| | | 30 | Mz- | -102.60 | -30.84 | 85.49 |
| 222 | 222 | 30 | Nx+ | -50.14 | 86.07 | 100.34 |
| | | 30 | Fy+ | -57.49 | 93.17 | 122.62 |
| | | 30 | Mz+ | -69.53 | 92.12 | 128.75 |
| | | 30 | Nx- | -71.23 | 91.14 | 122.62 |
| | | 30 | Fy- | -63.92 | 84.05 | 100.37 |
| | | 30 | Mz- | -51.88 | 85.09 | 94.23 |
| 223 | 223 | 30 | Nx+ | -50.84 | 76.48 | 69.06 |
| | | 30 | Fy+ | -58.22 | 83.24 | 88.99 |
| | | 30 | Mz+ | -71.68 | 81.62 | 95.58 |
| | | 30 | Nx- | -73.85 | 80.81 | 89.84 |

MA_SER2.LST Sábado, 18 Mayo 2002 4:03am

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Fy- | -66.51 | 74.06 | 69.95 |
| | | 30 | Mz- | -53.18 | 75.62 | 63.37 |
| 224 | 224 | 30 | Nx+ | -52.13 | 60.66 | 22.81 |
| | | 30 | Fy+ | -59.52 | 66.92 | 39.21 |
| | | 30 | Mz+ | -74.90 | 63.68 | 46.85 |
| | | 30 | Nx- | -78.44 | 63.83 | 41.92 |
| | | 30 | Fy- | -71.09 | 57.58 | 25.55 |
| | | 30 | Mz- | -55.84 | 60.76 | 17.95 |
| 320 | 320 | 30 | Nx+ | -112.63 | 26.55 | 78.18 |
| | | 30 | Fy+ | -116.21 | 40.59 | 93.71 |
| | | 30 | Mz+ | -118.54 | 40.26 | 94.76 |
| | | 30 | Nx- | -123.85 | 27.93 | 67.22 |
| | | 30 | Fy- | -120.28 | 13.91 | 51.94 |
| | | 30 | Mz- | -117.78 | 14.26 | 50.34 |
| 321 | 321 | 30 | Nx+ | -112.63 | 26.55 | 64.90 |
| | | 30 | Fy+ | -116.21 | 40.59 | 73.41 |
| | | 30 | Mz+ | -119.32 | 39.95 | 74.70 |
| | | 30 | Nx- | -123.85 | 27.93 | 53.27 |
| | | 30 | Fy- | -120.28 | 13.91 | 44.97 |
| | | 30 | Mz- | -117.00 | 14.57 | 43.12 |
| 322 | 322 | 30 | Nx+ | -112.16 | 23.47 | 58.66 |
| | | 30 | Fy+ | -115.74 | 36.16 | 63.82 |
| | | 30 | Mz+ | -118.87 | 35.49 | 65.27 |
| | | 30 | Nx- | -123.38 | 23.87 | 46.78 |
| | | 30 | Fy- | -119.81 | 11.20 | 41.85 |
| | | 30 | Mz- | -116.53 | 11.86 | 39.83 |
| 520 | 320 | 30 | Nx+ | -11.23 | 5.76 | 2.34 |
| | | 30 | Fy+ | -11.23 | 7.02 | 2.88 |
| | | 30 | Mz+ | -11.23 | 7.02 | 2.88 |
| | | 30 | Nx- | -18.35 | 4.70 | 1.85 |
| | | 30 | Fy- | -18.35 | 3.54 | 1.36 |
| | | 30 | Mz- | -18.35 | 3.54 | 1.36 |
| 521 | 521 | 30 | Nx+ | -11.23 | -0.80 | 0.01 |
| | | 30 | Fy+ | -11.23 | -0.24 | 0.08 |
| | | 30 | Mz+ | -11.23 | -0.24 | 0.08 |
| | | 30 | Nx- | -18.35 | -1.62 | -0.08 |
| | | 30 | Fy- | -18.35 | -2.15 | -0.14 |
| | | 30 | Mz- | -18.35 | -2.15 | -0.14 |
| 522 | 522 | 30 | Nx+ | -11.23 | -0.81 | 0.01 |
| | | 30 | Fy+ | -11.23 | -0.40 | 0.04 |
| | | 30 | Mz+ | -11.23 | -0.42 | 0.04 |
| | | 30 | Nx- | -18.35 | -1.42 | -0.04 |
| | | 30 | Fy- | -18.35 | -1.81 | -0.08 |
| | | 30 | Mz- | -18.35 | -1.80 | -0.08 |
| 523 | 523 | 30 | Nx+ | -11.23 | -0.83 | 0.00 |
| | | 30 | Fy+ | -11.23 | -0.59 | 0.01 |
| | | 30 | Mz+ | -11.23 | -0.61 | 0.01 |
| | | 30 | Nx- | -18.35 | -1.23 | -0.02 |
| | | 30 | Fy- | -18.35 | -1.46 | -0.03 |
| | | 30 | Mz- | -18.35 | -1.44 | -0.03 |
| 524 | 524 | 30 | Nx+ | -11.23 | -0.87 | 0.00 |
| | | 30 | Fy+ | -11.23 | -0.78 | 0.00 |
| | | 30 | Mz+ | -11.23 | -0.79 | 0.00 |
| | | 30 | Nx- | -18.35 | -1.05 | 0.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Fy- | -18.35 | -1.12 | -0.01 |
| | | 30 | Mz- | -18.35 | -1.08 | -0.01 |
| 524 | 525 | 30 | Nx+ | -11.23 | 0.89 | 0.00 |
| | | 30 | Fy+ | -11.23 | 0.98 | 0.00 |
| | | 30 | Mz+ | -18.35 | 0.86 | 0.00 |
| | | 30 | Nx- | -18.35 | 0.86 | 0.00 |
| | | 30 | Fy- | -18.35 | 0.79 | 0.00 |
| | | 30 | Mz- | -18.35 | 0.86 | 0.00 |
| 420 | 320 | 30 | Nx+ | -22.60 | 101.23 | 72.77 |
| | | 30 | Fy+ | -53.15 | 105.51 | 81.49 |
| | | 30 | Mz+ | -45.46 | 100.19 | 96.88 |
| | | 30 | Nx- | -61.49 | 98.59 | 77.27 |
| | | 30 | Fy- | -31.10 | 94.47 | 69.57 |
| | | 30 | Mz- | -38.64 | 99.29 | 52.64 |
| 421 | 421 | 30 | Nx+ | -22.60 | 64.61 | 34.64 |
| | | 30 | Fy+ | -44.42 | 69.09 | 57.04 |
| | | 30 | Mz+ | -45.46 | 68.09 | 59.14 |
| | | 30 | Nx- | -61.49 | 65.55 | 40.13 |
| | | 30 | Fy- | -40.70 | 57.50 | 20.86 |
| | | 30 | Mz- | -38.64 | 61.44 | 15.24 |
| 422 | 422 | 30 | Nx+ | -22.60 | 14.92 | -97.00 |
| | | 30 | Fy+ | -44.97 | 20.24 | -81.95 |
| | | 30 | Mz+ | -44.48 | 18.24 | -73.53 |
| | | 30 | Nx- | -61.49 | 13.77 | -94.14 |
| | | 30 | Fy- | -39.26 | 8.62 | -106.05 |
| | | 30 | Mz- | -38.50 | 13.28 | -114.09 |
| 423 | 423 | 30 | Nx+ | -22.60 | -29.40 | -131.88 |
| | | 30 | Fy+ | -44.47 | -19.19 | -115.65 |
| | | 30 | Mz+ | -43.71 | -24.06 | -112.33 |
| | | 30 | Nx- | -61.49 | -25.15 | -138.83 |
| | | 30 | Fy- | -38.54 | -34.56 | -140.81 |
| | | 30 | Mz- | -40.69 | -28.19 | -148.30 |
| 424 | 424 | 30 | Nx+ | -22.60 | -79.47 | -79.75 |
| | | 30 | Fy+ | -43.71 | -65.71 | -72.24 |
| | | 30 | Mz+ | -43.20 | -71.61 | -69.15 |
| | | 30 | Nx- | -61.49 | -74.23 | -94.29 |
| | | 30 | Fy- | -38.62 | -83.49 | -86.02 |
| | | 30 | Mz- | -40.90 | -77.59 | -98.49 |
| 425 | 425 | 30 | Nx+ | -32.10 | -109.16 | 90.37 |
| | | 30 | Fy+ | -52.24 | -101.65 | 83.67 |
| | | 30 | Mz+ | -48.86 | -115.80 | 100.11 |
| | | 30 | Nx- | -71.27 | -111.95 | 73.10 |
| | | 30 | Fy- | -49.45 | -122.29 | 90.53 |
| | | 30 | Mz- | -54.85 | -109.50 | 66.22 |
| 425 | 400 | 30 | Nx+ | -31.69 | -104.45 | 263.12 |
| | | 30 | Fy+ | -51.80 | -97.24 | 245.38 |
| | | 30 | Mz+ | -48.16 | -110.20 | 284.91 |
| | | 30 | Nx- | -70.92 | -107.93 | 250.77 |
| | | 30 | Fy- | -49.13 | -117.77 | 282.88 |
| | | 30 | Mz- | -53.51 | -102.80 | 237.65 |

MA_SER2.LST Sábado, 18 Mayo 2002 4:03am

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | θz |
|---|---|---|---|---|---|
| 6 | 30 | ux+ | 0.002596 | -0.019688 | -0.000348 |
| | 30 | uy+ | 0.001710 | -0.018968 | -0.000069 |
| | 30 | θz+ | -0.002286 | -0.019776 | 0.000348 |
| | 30 | ux- | -0.002362 | -0.019769 | 0.000348 |
| | 30 | uy- | -0.000931 | -0.020757 | 0.000044 |
| | 30 | θz- | 0.002589 | -0.019764 | -0.000348 |
| 7 | 30 | ux+ | 0.002691 | -0.021328 | -0.001509 |
| | 30 | uy+ | -0.001503 | -0.019932 | -0.001052 |
| | 30 | θz+ | -0.002288 | -0.020320 | -0.000853 |
| | 30 | ux- | -0.002349 | -0.020352 | -0.000897 |
| | 30 | uy- | 0.001800 | -0.021965 | -0.001296 |
| | 30 | θz- | 0.002630 | -0.021360 | -0.001553 |
| 8 | 30 | ux+ | 0.002629 | -0.025256 | -0.002383 |
| | 30 | uy+ | -0.002298 | -0.023017 | -0.001956 |
| | 30 | θz+ | -0.000146 | -0.024069 | -0.001864 |
| | 30 | ux- | -0.002398 | -0.023411 | -0.002016 |
| | 30 | uy- | 0.002529 | -0.025650 | -0.002443 |
| | 30 | θz- | 0.001003 | -0.025229 | -0.002504 |
| 9 | 30 | ux+ | 0.002567 | -0.028477 | -0.001199 |
| | 30 | uy+ | -0.002376 | -0.025625 | -0.000907 |
| | 30 | θz+ | -0.000178 | -0.026931 | -0.000768 |
| | 30 | ux- | -0.002441 | -0.026139 | -0.000969 |
| | 30 | uy- | 0.002502 | -0.028991 | -0.001261 |
| | 30 | θz- | 0.000840 | -0.028202 | -0.001331 |
| 10 | 30 | ux+ | 0.002507 | -0.029032 | 0.000518 |
| | 30 | uy+ | -0.002455 | -0.025746 | 0.000758 |
| | 30 | θz+ | -0.001743 | -0.027101 | 0.000933 |
| | 30 | ux- | -0.002485 | -0.026312 | 0.000769 |
| | 30 | uy- | 0.002459 | -0.029598 | 0.000531 |
| | 30 | θz- | 0.002322 | -0.028645 | 0.000410 |
| 121 | 30 | ux+ | 0.001764 | -0.024916 | -0.001504 |
| | 30 | uy+ | 0.000721 | -0.020419 | -0.000393 |
| | 30 | θz+ | 0.000712 | -0.020508 | -0.000388 |
| | 30 | ux- | 0.000712 | -0.020508 | -0.000388 |
| | 30 | uy- | 0.001755 | -0.024997 | -0.001499 |
| | 30 | θz- | 0.001763 | -0.024926 | -0.001504 |
| 122 | 30 | ux+ | 0.002796 | -0.024959 | -0.001163 |
| | 30 | uy+ | 0.000888 | -0.020461 | -0.000057 |
| | 30 | θz+ | 0.000881 | -0.020515 | -0.000056 |
| | 30 | ux- | 0.000878 | -0.020550 | -0.000058 |
| | 30 | uy- | 0.002786 | -0.025040 | -0.001164 |
| | 30 | θz- | 0.002791 | -0.025033 | -0.001165 |
| 123 | 30 | ux+ | 0.003574 | -0.025012 | -0.000842 |
| | 30 | uy+ | 0.000840 | -0.020503 | 0.000167 |
| | 30 | θz+ | 0.000834 | -0.020512 | 0.000167 |
| | 30 | ux- | 0.000832 | -0.020592 | 0.000163 |
| | 30 | uy- | 0.003566 | -0.025083 | -0.000844 |
| | 30 | θz- | 0.003566 | -0.025083 | -0.000844 |
| 124 | 30 | ux+ | 0.004096 | -0.025120 | -0.000498 |
| | 30 | uy+ | 0.000641 | -0.020545 | 0.000355 |

| | | | | | |
|---|---|---|---|---|---|
| | 30 | θz+ | 0.001102 | -0.020689 | 0.000357 |
| | 30 | ux- | 0.000635 | -0.020618 | 0.000351 |
| | 30 | uy- | 0.004090 | -0.025127 | -0.000498 |
| | 30 | θz- | 0.003624 | -0.024998 | -0.000500 |
| 125 | 30 | ux+ | 0.004324 | -0.025164 | -0.000075 |
| | 30 | uy+ | 0.000283 | -0.020585 | 0.000580 |
| | 30 | θz+ | 0.000883 | -0.021259 | 0.000683 |
| | 30 | ux- | 0.000277 | -0.020594 | 0.000581 |
| | 30 | uy- | 0.004318 | -0.025171 | -0.000075 |
| | 30 | θz- | 0.003674 | -0.024459 | -0.000178 |
| 126 | 30 | ux+ | 0.004185 | -0.025202 | 0.000456 |
| | 30 | uy+ | -0.000289 | -0.020625 | 0.000915 |
| | 30 | θz+ | 0.000331 | -0.021590 | 0.001127 |
| | 30 | ux- | -0.000296 | -0.020640 | 0.000919 |
| | 30 | uy- | 0.004178 | -0.025211 | 0.000459 |
| | 30 | θz- | 0.003591 | -0.024355 | 0.000247 |
| 127 | 30 | ux+ | 0.003580 | -0.025245 | 0.001139 |
| | 30 | uy+ | -0.001183 | -0.020665 | 0.001424 |
| | 30 | θz+ | -0.000758 | -0.021633 | 0.001712 |
| | 30 | ux- | -0.001193 | -0.020680 | 0.001430 |
| | 30 | uy- | 0.003570 | -0.025254 | 0.001144 |
| | 30 | θz- | 0.003145 | -0.024286 | 0.000856 |
| 221 | 30 | ux+ | 0.003256 | -0.025247 | 0.001216 |
| | 30 | uy+ | -0.001578 | -0.020674 | 0.001484 |
| | 30 | θz+ | -0.001236 | -0.021641 | 0.001778 |
| | 30 | ux- | -0.001590 | -0.020689 | 0.001491 |
| | 30 | uy- | 0.003244 | -0.025262 | 0.001223 |
| | 30 | θz- | 0.002867 | -0.024263 | 0.000929 |
| 222 | 30 | ux+ | 0.002922 | -0.025253 | 0.001240 |
| | 30 | uy+ | -0.001988 | -0.020679 | 0.001504 |
| | 30 | θz+ | -0.001725 | -0.021647 | 0.001801 |
| | 30 | ux- | -0.002002 | -0.020694 | 0.001511 |
| | 30 | uy- | 0.002908 | -0.025268 | 0.001247 |
| | 30 | θz- | 0.002610 | -0.024268 | 0.000950 |
| 223 | 30 | ux+ | 0.002827 | -0.025738 | 0.001325 |
| | 30 | uy+ | -0.002104 | -0.021260 | 0.001577 |
| | 30 | θz+ | -0.001859 | -0.022363 | 0.001873 |
| | 30 | ux- | -0.002118 | -0.021277 | 0.001584 |
| | 30 | uy- | 0.002813 | -0.025755 | 0.001332 |
| | 30 | θz- | 0.002538 | -0.024645 | 0.001036 |
| 224 | 30 | ux+ | 0.002645 | -0.026650 | 0.001436 |
| | 30 | uy+ | -0.002311 | -0.022331 | 0.001674 |
| | 30 | θz+ | -0.002112 | -0.023628 | 0.001964 |
| | 30 | ux- | -0.002326 | -0.022353 | 0.001681 |
| | 30 | uy- | 0.002630 | -0.026672 | 0.001443 |
| | 30 | θz- | 0.002401 | -0.025368 | 0.001153 |
| 320 | 30 | ux+ | 0.000000 | -0.022233 | -0.001449 |
| | 30 | uy+ | 0.000000 | -0.020365 | -0.001117 |
| | 30 | θz+ | 0.000000 | -0.020520 | -0.001103 |
| | 30 | ux- | 0.000000 | -0.022233 | -0.001449 |
| | 30 | uy- | 0.000000 | -0.024938 | -0.002038 |
| | 30 | θz- | 0.000000 | -0.024849 | -0.002052 |
| 321 | 30 | ux+ | 0.000953 | -0.024884 | -0.001759 |
| | 30 | uy+ | 0.000453 | -0.020394 | -0.000704 |

MA_SER2.LST Sábado, 18 Mayo 2002 4:03am

| | | | | | |
|---|---|---|---|---|---|
| | 30 | θz+ | 0.000448 | -0.020483 | -0.000695 |
| | 30 | ux- | 0.000448 | -0.020549 | -0.000696 |
| | 30 | uy- | 0.000948 | -0.024968 | -0.001751 |
| | 30 | θz- | 0.000953 | -0.024887 | -0.001760 |
| 322 | 30 | ux+ | 0.001375 | -0.024899 | -0.001630 |
| | 30 | uy+ | 0.000607 | -0.020407 | -0.000539 |
| | 30 | θz+ | 0.000600 | -0.020496 | -0.000534 |
| | 30 | ux- | 0.000600 | -0.020496 | -0.000534 |
| | 30 | uy- | 0.001368 | -0.024983 | -0.001626 |
| | 30 | θz- | 0.001374 | -0.024912 | -0.001631 |
| 400 | 30 | ux+ | 0.000198 | -0.018621 | -0.000094 |
| | 30 | uy+ | 0.000179 | -0.017911 | -0.000012 |
| | 30 | θz+ | 0.000100 | -0.019097 | 0.000147 |
| | 30 | ux- | 0.000029 | -0.019285 | 0.000135 |
| | 30 | uy- | 0.000053 | -0.019643 | -0.000026 |
| | 30 | θz- | 0.000191 | -0.019088 | -0.000147 |
| 421 | 30 | ux+ | 0.000007 | -0.022112 | -0.001740 |
| | 30 | uy+ | 0.000005 | -0.019922 | -0.001237 |
| | 30 | θz+ | 0.000005 | -0.020117 | -0.001221 |
| | 30 | ux- | 0.000003 | -0.021255 | -0.001514 |
| | 30 | uy- | 0.000005 | -0.024158 | -0.002110 |
| | 30 | θz- | 0.000005 | -0.024064 | -0.002126 |
| 422 | 30 | ux+ | 0.000051 | -0.020176 | -0.001684 |
| | 30 | uy+ | 0.000022 | -0.017327 | -0.001202 |
| | 30 | θz+ | 0.000036 | -0.018249 | -0.001095 |
| | 30 | ux- | 0.000020 | -0.018576 | -0.001285 |
| | 30 | uy- | 0.000051 | -0.020233 | -0.001716 |
| | 30 | θz- | 0.000035 | -0.019987 | -0.001804 |
| 423 | 30 | ux+ | 0.000095 | -0.017801 | -0.000672 |
| | 30 | uy+ | 0.000040 | -0.015769 | -0.000333 |
| | 30 | θz+ | 0.000037 | -0.016691 | -0.000211 |
| | 30 | ux- | 0.000037 | -0.017124 | -0.000300 |
| | 30 | uy- | 0.000093 | -0.017852 | -0.000586 |
| | 30 | θz- | 0.000095 | -0.017443 | -0.000761 |
| 424 | 30 | ux+ | 0.000136 | -0.017406 | 0.000327 |
| | 30 | uy+ | 0.000056 | -0.016031 | 0.000497 |
| | 30 | θz+ | 0.000052 | -0.017032 | 0.000666 |
| | 30 | ux- | 0.000052 | -0.017319 | 0.000611 |
| | 30 | uy- | 0.000130 | -0.017786 | 0.000416 |
| | 30 | θz- | 0.000135 | -0.017050 | 0.000243 |
| 425 | 30 | ux+ | 0.000187 | -0.018532 | 0.000412 |
| | 30 | uy+ | 0.000136 | -0.017454 | 0.000484 |
| | 30 | θz+ | 0.000073 | -0.018468 | 0.000653 |
| | 30 | ux- | 0.000070 | -0.019155 | 0.000529 |
| | 30 | uy- | 0.000118 | -0.019179 | 0.000448 |
| | 30 | θz- | 0.000181 | -0.018384 | 0.000333 |
| 521 | 30 | ux+ | -0.000002 | -0.022775 | -0.001448 |
| | 30 | uy+ | -0.000002 | -0.020785 | -0.001116 |
| | 30 | θz+ | -0.000002 | -0.020934 | -0.001102 |
| | 30 | ux- | -0.000002 | -0.022775 | -0.001448 |
| | 30 | uy- | -0.000002 | -0.025701 | -0.002035 |
| | 30 | θz- | -0.000002 | -0.025618 | -0.002049 |
| 522 | 30 | ux+ | -0.000002 | -0.023041 | -0.001586 |
| | 30 | uy+ | -0.000003 | -0.020841 | -0.001116 |

| | | | | | |
|---|---|---|---|---|---|
| | 30 | θz+ | -0.000003 | -0.020990 | -0.001102 |
| | 30 | ux- | -0.000003 | -0.022850 | -0.001448 |
| | 30 | uy- | -0.000002 | -0.025805 | -0.002035 |
| | 30 | θz- | -0.000002 | -0.025722 | -0.002049 |
| 523 | 30 | ux+ | -0.000002 | -0.023122 | -0.001586 |
| | 30 | uy+ | -0.000003 | -0.020897 | -0.001116 |
| | 30 | θz+ | -0.000003 | -0.021046 | -0.001102 |
| | 30 | ux- | -0.000003 | -0.022924 | -0.001448 |
| | 30 | uy- | -0.000002 | -0.025909 | -0.002035 |
| | 30 | θz- | -0.000002 | -0.025826 | -0.002049 |
| 524 | 30 | ux+ | -0.000002 | -0.023197 | -0.001586 |
| | 30 | uy+ | -0.000003 | -0.020953 | -0.001116 |
| | 30 | θz+ | -0.000003 | -0.021100 | -0.001102 |
| | 30 | ux- | -0.000003 | -0.022993 | -0.001448 |
| | 30 | uy- | -0.000002 | -0.026006 | -0.002035 |
| | 30 | θz- | -0.000002 | -0.025925 | -0.002049 |
| 525 | 30 | ux+ | -0.000002 | -0.023278 | -0.001586 |
| | 30 | uy+ | -0.000003 | -0.021009 | -0.001116 |
| | 30 | θz+ | -0.000003 | -0.021156 | -0.001102 |
| | 30 | ux- | -0.000003 | -0.023067 | -0.001448 |
| | 30 | uy- | -0.000002 | -0.026110 | -0.002035 |
| | 30 | θz- | -0.000002 | -0.026029 | -0.002049 |
| 600 | 30 | ux+ | 0.002432 | -0.019651 | -0.000120 |
| | 30 | uy+ | 0.001657 | -0.018931 | -0.000070 |
| | 30 | θz+ | -0.002022 | -0.019739 | 0.000348 |
| | 30 | ux- | -0.002200 | -0.019731 | 0.000120 |
| | 30 | uy- | -0.000899 | -0.020719 | 0.000045 |
| | 30 | θz- | 0.002323 | -0.019727 | -0.000348 |
| 601 | 30 | ux+ | 0.002295 | -0.019527 | -0.000270 |
| | 30 | uy+ | 0.001564 | -0.018811 | -0.000206 |
| | 30 | θz+ | -0.001754 | -0.019598 | 0.000422 |
| | 30 | ux- | -0.002064 | -0.019604 | 0.000270 |
| | 30 | uy- | -0.000839 | -0.020591 | 0.000140 |
| | 30 | θz- | 0.002054 | -0.019587 | -0.000422 |
| 602 | 30 | ux+ | 0.002066 | -0.019403 | -0.000421 |
| | 30 | uy+ | 0.001395 | -0.018690 | -0.000304 |
| | 30 | θz+ | -0.001461 | -0.019474 | 0.000467 |
| | 30 | ux- | -0.001832 | -0.019479 | 0.000421 |
| | 30 | uy- | -0.000721 | -0.020465 | 0.000205 |
| | 30 | θz- | 0.001764 | -0.019463 | -0.000467 |
| 603 | 30 | ux+ | 0.001755 | -0.019280 | -0.000517 |
| | 30 | uy+ | 0.001174 | -0.018570 | -0.000362 |
| | 30 | θz+ | -0.001417 | -0.019388 | 0.000519 |
| | 30 | ux- | -0.001521 | -0.019355 | 0.000517 |
| | 30 | uy- | -0.000572 | -0.020338 | 0.000243 |
| | 30 | θz- | 0.001721 | -0.019376 | -0.000519 |
| 604 | 30 | ux+ | 0.001400 | -0.019152 | -0.000558 |
| | 30 | uy+ | 0.000927 | -0.018448 | -0.000382 |
| | 30 | θz+ | -0.001073 | -0.019224 | 0.000560 |
| | 30 | ux- | -0.001166 | -0.019225 | 0.000558 |
| | 30 | uy- | -0.000407 | -0.020206 | 0.000255 |
| | 30 | θz- | 0.001376 | -0.019212 | -0.000560 |
| 605 | 30 | ux+ | 0.001030 | -0.019028 | -0.000544 |
| | 30 | uy+ | 0.000680 | -0.018326 | -0.000363 |

MA_SER2.LST Sábado, 18 Mayo 2002 4:03am

| | | | | | |
|---|---|---|---|---|---|
| | 30 | θz+ | -0.000721 | -0.019116 | 0.000544 |
| | 30 | ux- | -0.000800 | -0.019099 | 0.000544 |
| | 30 | uy- | -0.000247 | -0.020078 | 0.000237 |
| | 30 | θz- | 0.001020 | -0.019105 | -0.000544 |
| 606 | 30 | ux+ | 0.000691 | -0.018905 | -0.000481 |
| | 30 | uy+ | 0.000457 | -0.018205 | -0.000306 |
| | 30 | θz+ | -0.000388 | -0.018950 | 0.000481 |
| | 30 | ux- | -0.000460 | -0.018974 | 0.000481 |
| | 30 | uy- | -0.000102 | -0.019954 | 0.000192 |
| | 30 | θz- | 0.000689 | -0.018939 | -0.000481 |
| 607 | 30 | ux+ | 0.000416 | -0.018811 | -0.000357 |
| | 30 | uy+ | 0.000286 | -0.018082 | -0.000210 |
| | 30 | θz+ | -0.000111 | -0.018789 | 0.000360 |
| | 30 | ux- | -0.000189 | -0.019119 | 0.000325 |
| | 30 | uy- | 0.000004 | -0.019822 | 0.000121 |
| | 30 | θz- | 0.000416 | -0.018777 | -0.000360 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 320 | 30 | Fx+ | 13.15 | 12.20 | 0.00 |
| | 30 | Fy+ | -13.15 | 14.02 | 0.00 |
| | 30 | Mz+ | 0.00 | 12.51 | 0.00 |
| | 30 | Fx- | -13.15 | 12.80 | 0.00 |
| | 30 | Fy- | 13.15 | 11.46 | 0.00 |
| | 30 | Mz- | 0.00 | 12.51 | 0.00 |
| 400 | 30 | Fx+ | 0.00 | 46.34 | 0.00 |
| | 30 | Fy+ | 0.00 | 47.44 | 0.00 |
| | 30 | Mz+ | 0.00 | 46.34 | 0.00 |
| | 30 | Fx- | 0.00 | 46.34 | 0.00 |
| | 30 | Fy- | 0.00 | 43.26 | 0.00 |
| | 30 | Mz- | 0.00 | 46.34 | 0.00 |
| 421 | 30 | Fx+ | 0.00 | 38.00 | 0.00 |
| | 30 | Fy+ | 0.00 | 42.36 | 0.00 |
| | 30 | Mz+ | 0.00 | 38.00 | 0.00 |
| | 30 | Fx- | 0.00 | 38.00 | 0.00 |
| | 30 | Fy- | 0.00 | 34.93 | 0.00 |
| | 30 | Mz- | 0.00 | 38.00 | 0.00 |
| 422 | 30 | Fx+ | 0.00 | 54.80 | 0.00 |
| | 30 | Fy+ | 0.00 | 59.57 | 0.00 |
| | 30 | Mz+ | 0.00 | 54.80 | 0.00 |
| | 30 | Fx- | 0.00 | 54.80 | 0.00 |
| | 30 | Fy- | 0.00 | 51.01 | 0.00 |
| | 30 | Mz- | 0.00 | 54.80 | 0.00 |
| 423 | 30 | Fx+ | 0.00 | 49.53 | 0.00 |
| | 30 | Fy+ | 0.00 | 52.57 | 0.00 |
| | 30 | Mz+ | 0.00 | 49.53 | 0.00 |
| | 30 | Fx- | 0.00 | 49.53 | 0.00 |
| | 30 | Fy- | 0.00 | 46.44 | 0.00 |
| | 30 | Mz- | 0.00 | 49.53 | 0.00 |

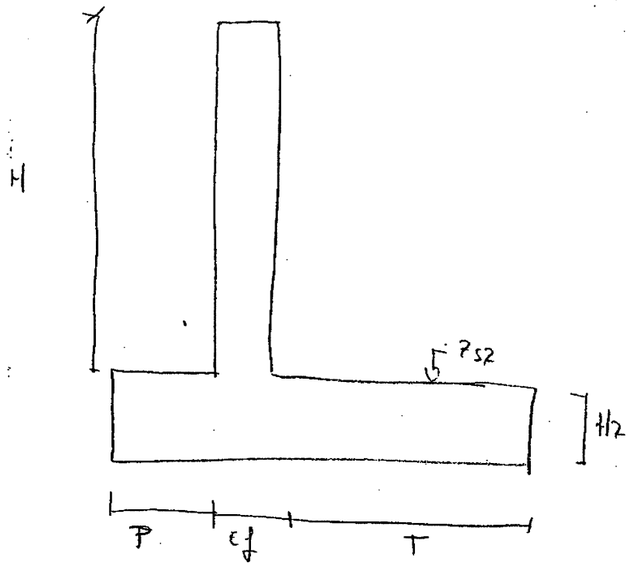
| | | | | | |
|---|---|---|---|---|---|
| 424 | 30 | Fx+ | 0.00 | 54.53 | 0.00 |
| | 30 | Fy+ | 0.00 | 57.07 | 0.00 |
| | 30 | Mz+ | 0.00 | 54.53 | 0.00 |
| | 30 | Fx- | 0.00 | 54.53 | 0.00 |
| | 30 | Fy- | 0.00 | 51.45 | 0.00 |
| | 30 | Mz- | 0.00 | 54.53 | 0.00 |
| 425 | 30 | Fx+ | 0.00 | 49.80 | 0.00 |
| | 30 | Fy+ | 0.00 | 51.41 | 0.00 |
| | 30 | Mz+ | 0.00 | 49.80 | 0.00 |
| | 30 | Fx- | 0.00 | 49.80 | 0.00 |
| | 30 | Fy- | 0.00 | 46.77 | 0.00 |
| | 30 | Mz- | 0.00 | 49.80 | 0.00 |
| 521 | 30 | Fx+ | 0.00 | 7.26 | 0.00 |
| | 30 | Fy+ | 0.00 | 8.19 | 0.00 |
| | 30 | Mz+ | 0.00 | 7.26 | 0.00 |
| | 30 | Fx- | 0.00 | 7.26 | 0.00 |
| | 30 | Fy- | 0.00 | 6.63 | 0.00 |
| | 30 | Mz- | 0.00 | 7.26 | 0.00 |
| 522 | 30 | Fx+ | 0.00 | 1.72 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.93 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.72 | 0.00 |
| | 30 | Fx- | 0.00 | 1.72 | 0.00 |
| | 30 | Fy- | 0.00 | 1.56 | 0.00 |
| | 30 | Mz- | 0.00 | 1.72 | 0.00 |
| 523 | 30 | Fx+ | 0.00 | 1.73 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.94 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.73 | 0.00 |
| | 30 | Fx- | 0.00 | 1.73 | 0.00 |
| | 30 | Fy- | 0.00 | 1.57 | 0.00 |
| | 30 | Mz- | 0.00 | 1.73 | 0.00 |
| 524 | 30 | Fx+ | 0.00 | 1.73 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.95 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.73 | 0.00 |
| | 30 | Fx- | 0.00 | 1.73 | 0.00 |
| | 30 | Fy- | 0.00 | 1.57 | 0.00 |
| | 30 | Mz- | 0.00 | 1.73 | 0.00 |
| 525 | 30 | Fx+ | 0.00 | 0.86 | 0.00 |
| | 30 | Fy+ | 0.00 | 0.98 | 0.00 |
| | 30 | Mz+ | 0.00 | 0.86 | 0.00 |
| | 30 | Fx- | 0.00 | 0.86 | 0.00 |
| | 30 | Fy- | 0.00 | 0.79 | 0.00 |
| | 30 | Mz- | 0.00 | 0.86 | 0.00 |

### 9.4. EMBOCADURAS

Tras el encaje geométrico previo se obtiene las siguientes dimensiones básicas:

| Elemento | H (m) | Hz (m) | Zsz | T (m) | Ef (m) | P (m) |
|---|---|---|---|---|---|---|
| E-1 | 6.90-3.65 | 1.00 | 65.75 | 4.60 | 0.85 | 1.60 |
| E-2.1 | 6.90-4.25 | 1.00 | 65.75 | 4.20 | 0.80 | 1.60 |
| E-2.2 | 4.25-4.25 | 1.00 | 65.75 | 4.20 | 0.80 | 1.60 |
| S-1 | 6.90-5.65 | 1.00 | 65.75 | 3.50 | 0.80 | 1.60 |
| S-2 | 6.90-7.75 | 1.00 | 65.75 | 3.50 | 0.80 | 1.60 |

Se ha considerado como Tensión admisible del terreno 2.0 Kp/cm². Y su ángulo de rozamiento es de 30°






ACCIONES:

- Terreno: $\gamma$=2.00 T/m²; $\phi$= 30°; Sobre carga terraplen= 3.0 T/m²

CONTROL DE ESTABILIDAD Y ESFUERZOS DE ARMADO

Según la combinación de acciones que se muestra en las hojas siguientes se obtienen los resultados pésimos siguientes:

**Control de Estabilidad**

| Aleta | $\gamma$ deslizamiento | $\gamma$ vuelco | $\sigma$ máxima (T/m²) | $\sigma$ media (T/m²) |
|---|---|---|---|---|
| E1 | 1.50 | 3.49 | 21.88 | 15.28 |
| E2 | 1.51 | 3.66 | 23.22 | 16.07 |
| S1 y S2 | 1.58 | 3.05 | 24.68 | 16.105 |

**Esfuerzos de Armado**

| | Arranque Fuste | | | Talón | | Puntera |
|---|---|---|---|---|---|---|
| | Vd(T) | Nd(T) | Md(mT) | Vd(T) | Md(mT) | $\sigma$(T/m²) |
| E-1 | 45.53 | 20.70 | 120.59 | 40.43 | 103.42 | 27.35 |
| E-2 | 50.79 | 26.44 | 132.63 | 39.42 | 115.33 | 29.33 |
| S1- S-2 | 41.66 | 23.25 | 122.63 | 44.03 | 92.62 | 34.24 |

## Calculo de Esfuerzos en Muros:

Proyecto: **LAV. MARTORELL.**
Elemento: **ODT300.4. E1**

### Geometría

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | 6.90 | 0.80 | Zapata | 4.20 | 1.60 | 1.00 |
| eso especif. | 2.50 | | | 2.50 | | |

### Terreno

| | Densidad [tm/m³] | ϕ [°] | δ [°] | β [°] | α [°] |
|---|---|---|---|---|---|
| Relleno | 2.00 | 30.00 | 0.00 | 20.34 | 0.00 |

| | σ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | 2.00 | 1.30 | 0.57 |

### Hipótesis de cálculo

| | | | Cargas Tablero | | | | Sismo | |
|---|---|---|---|---|---|---|---|---|
| Hip | γf | SC terraplén [tm/m²] | Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | ac horiz. [1/g] | ac vert. [1/g] |
| 1 | 1.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 1.50 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

### Control Estabilidad

| Hip | γdes | γvuelco | σmin | σmax | σmed | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 1.81 | 4.69 | 10.42 | 16.32 | 13.37 | 6.60 |
| 2 | 1.50 | 3.49 | 8.68 | 21.88 | 15.28 | 6.60 |

### Esfuerzos de Armado

| | Arranque Fuste | | | Talón | | Puntera | | |
|---|---|---|---|---|---|---|---|---|
| Hip | Vd | Nd | Md | Vd | Md | Vd | Md | |
| 1 | 31.74 | 20.70 | 72.99 | -25.20 | -61.20 | 22.61 | 29.53 | Tipo I |
| 2 | 45.53 | 20.70 | 120.59 | -40.43 | -103.42 | 30.67 | 40.46 | Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. E1: FUSTE**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | 250 | 1.500 | 166.67 kp/cm2 |
| Acero | 5100 | 1.150 | 4434.78 kp/cm2 |

### SECCION

| | | |
|---|---|---|
| Título | | |
| Ancho | 1.000 | m |
| Canto | 0.800 | m |
| C, util | 0.750 | m |

### ESFUERZOS

| | | |
|---|---|---|
| Título | | |
| Mserv | 80.40 | mtm |
| Md | 120.59 | mtm |
| Vd | 45.53 | tm |
| min geo | 0.90 | /mil |

### ARMADO

| | | |
|---|---|---|
| diam | 25.00 | mm |
| sep | 10.00 | cm |
| recub, c | 3.00 | cm |
| wk | 0.27 | mm |

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 7.2 | |
| As, calc | 39.52 cm2 | **49.09** cm2 |
| num. | 8.05 | |
| sep. | 12.42 cm | |

### CONTROL CORTANTE

| | | |
|---|---|---|
| Vcu | 48.41 | tm |
| Vu2a | 32.13 | tm |
| coef. | 0.71 | |

Cuantía de cercos necesaria 8.13 cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | | |
|---|---|---|
| Uc | 1062.50 | tm |
| 0.35*Uc*d | 278.91 | mtm |
| Us | 175.24 | tm |
| Usmin,0 | 53.33 | tm |
| alpha | -0.14 | |
| Us | 175.24 | tm |
| As | 39.52 | cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | | |
|---|---|---|
| bef | 10.00 | cm |
| hef,0 | 23.00 | cm |
| hef | 20.00 | cm |
| sm | 130.93 | mm |
| fctm | 26.15 | kp/cm2 |
| sig, sr | 946.93 | kp/cm2 |
| sig, s | 2729.70 | kp/cm2 |
| k red | 0.94 | |
| eps sm | 1221.65 | *10^6 |
| wk | 0.27 | mm |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. E1: TALON**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

### SECCION

| | |
|---|---|
| Título | |
| Ancho | **1.000** m |
| Canto | **1.000** m |
| C, util | **0.900** m |

### ESFUERZOS

| | |
|---|---|
| Título | |
| Mserv | **68.95** mtm |
| Md | **103.42** mtm |
| Vd | **40.43** tm |
| min geo | **0.90** /mil |

### ARMADO

| | |
|---|---|
| diam | **20.00** mm |
| sep | **10.00** cm |
| recub, c | **3.50** cm |
| wk | 0.30 mm |

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 9 | |
| As, calc | 27.20 cm2 | **31.42** cm2 |
| num. | 8.66 | |
| sep. | 11.55 cm | |

### CONTROL CORTANTE

| | |
|---|---|
| Vcu | 58.09 tm |
| Vu2a | 34.12 tm |
| coef. | **0.84** |

Cuantia de cercos necesaria 8.13 cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1275.00 tm |
| 0.35*Uc*d | 401.63 mtm |
| Us | 120.61 tm |
| Usmin,0 | 66.67 tm |
| alpha | 0.60 |
| Us | 120.61 tm |
| As | 27.20 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 10.00 cm |
| hef,0 | 19.50 cm |
| hef | 19.50 cm |
| sm | 152.07 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 1926.54 kp/cm2 |
| sig, s | 3048.07 kp/cm2 |
| k red | 0.80 |
| eps sm | 1161.54 *10^6 |
| wk | 0.30 mm |

PROYECTO **LAV. MARTORELL.**
ZAPATA **ODT300.4. E1: PUNTERA**

**CALCULO DE ZAPATAS RIGIDAS SEGÚN EHE-98**

**DIMENSIONES**

| | LONG | TRANS | CANTO | UTIL | |
|---|---|---|---|---|---|
| Pilar | **0.80** | **1.00** | | | [m] |
| Zapata | **4.00** | **1.00** | **1.00** | **0.90** | [m] |

**HORMIGON**

| | | |
|---|---|---|
| fkc | **250** | [kp/cm2] |
| gamma,c | **1.5** | |

**ACERO**

| | | |
|---|---|---|
| fyk | **4080** | [kp/cm2] |
| gamma,s | **1** | |

**TENSIONES TERRENO**

(Descontado el peso de la Zapata)

| | LONG | TRANS | |
|---|---|---|---|
| Tensión | **27.35** | **27.35** | [tm/m2] |
| gamma,f | **1.00** | | |

**COMPROBACION A FLEXION**

| | LONG | TRANS | |
|---|---|---|---|
| vd | 1.80 | 0.25 | [m] |
| z max | 0.88 | 0.90 | [m] |
| z | **0.77** | **0.77** | [m] |
| Armadura | 14.02 | 0.00 | [cm2] |
| | 14.20 | 1.10 | |

| ontrol zapata alargada | LONG Zona Pilar | LONG Resto | TRANS Zona Pilar | TRANS Resto | |
|---|---|---|---|---|---|
| dimensión | 1.00 | 0.00 | 2.80 | 1.20 | [m] |
| Armadura | 14.02 | 0.00 | 0.00 | 0.00 | [cm2] |
| Mínima mecánica | 15.02 | 0.00 | 0.00 | 0.00 | [cm2] |
| Mínima geométrica | 18.00 | 0.00 | 50.40 | 21.60 | [cm2] |
| Armadura inferior | **15.02** | **0.00** | **9.00** | **9.00** | [cm2/m] |
| Armadura superior | **6.00** | **0.00** | **9.00** | **9.00** | [cm2/m] |

**COMPROBACION A CORTANTE**

| | LONG | | | TRANS | | | |
|---|---|---|---|---|---|---|---|
| Zona comprimida | | 0.27 | | | 0.27 | | [m] |
| Reacción total | 43.761174 | 43.761174 | | 0.00 | 0.00 | | [tm] |
| | α | β | θ | α | β | θ | |
| Ángulos | 34.02 | 18.56 | 37.42 | 28.37 | -10.27 | 71.90 | [°] |
| | Ancho | Canto | | Ancho | Canto | | |
| Biela, horizontal | 1.00 | 0.27 | | 1.07 | 0.27 | | [m] |
| Biela, superior | 1.00 | 0.46 | | 1.07 | 0.56 | | [m] |
| Bilea, Inferior | 1.00 | 0.97 | | 2.80 | 0.00 | | [m] |

| Control validez | Tensión | Admisible | | Tensión | Admisible | |
|---|---|---|---|---|---|---|
| Horizontal | 211.87 | 1666.67 | **CUMPLE** | 0.00 | 1666.67 | **CUMPLE** |
| Superior | 157.43 | 1666.67 | **CUMPLE** | 0.00 | 1666.67 | **CUMPLE** |
| Inferior | 74.09 | 1166.67 | **CUMPLE** | 0.00 | 1166.67 | **CUMPLE** |

## Calculo de Esfuerzos en Muros:

Proyecto: **LAV. MARTORELL.**
Elemento: **ODT300.4. E1**
Corte de armado

### Geometría

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | 5.10 | 0.80 | Zapata | 4.20 | 1.60 | 1.00 |
| eso especif. | 2.50 | | | 2.50 | | |

### Terreno

| | Densidad [tm/m³] | ϕ [º] | δ [º] | β [º] | α [º] |
|---|---|---|---|---|---|
| Relleno | 2.00 | 30.00 | 0.00 | 20.34 | 0.00 |

| | σ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | 2.00 | 1.30 | 0.57 |

### Hipótesis de cálculo

| | | | Cargas Tablero | | | | Sismo | |
|---|---|---|---|---|---|---|---|---|
| Hip | γf | SC terraplén [tm/m²] | Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | ac horiz. [1/g] | ac vert. [1/g] |
| 1 | 1.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 1.50 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

### Control Estabilidad

| Hip | γdes | γvuelco | σmin | σmax | σmed | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 2.40 | 7.96 | 11.16 | 9.91 | 10.54 | 6.60 |
| 2 | 1.90 | 5.55 | 11.74 | 13.16 | 12.45 | 6.60 |

### Esfuerzos de Armado

| | Arranque Fuste | | | Talón | | Puntera | | |
|---|---|---|---|---|---|---|---|---|
| Hip | Vd | Nd | Md | Vd | Md | Vd | Md | |
| 1 | 17.34 | 15.30 | 29.47 | -12.20 | -23.88 | 13.05 | 16.69 | Tipo I |
| 2 | 27.54 | 15.30 | 55.48 | -22.13 | -48.47 | 18.08 | 23.37 | Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. E1: FUSTE**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | 250 | 1.500 | 166.67 kp/cm2 |
| Acero | 5100 | 1.150 | 4434.78 kp/cm2 |

### SECCION

Título
Ancho **1.000** m
Canto **0.800** m
C, util **0.750** m

### ESFUERZOS

Título
Mserv **36.99** mtm
Md **55.48** mtm
Vd **27.54** tm
min geo **0.90** /mil

### ARMADO

diam **25.00** mm
sep **20.00** cm
recub, c **3.00** cm
wk 0.29 mm

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 7.2 | |
| As, calc | 17.31 cm2 | **24.54** cm2 |
| num. | 3.53 | |
| sep. | 28.37 cm | |

### CONTROL CORTANTE

Vcu 48.41 tm
Vu2a 28.17 tm
coef. **1.02**
Cuantía de cercos necesaria cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1062.50 tm |
| 0.35*Uc*d | 278.91 mtm |
| Us | 76.74 tm |
| Usmin,0 | 53.33 tm |
| alpha | 0.78 |
| Us | 76.74 tm |
| As | 17.31 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 20.00 cm |
| hef,0 | 23.00 cm |
| hef | 20.00 cm |
| sm | 201.86 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 1893.87 kp/cm2 |
| sig, s | 2511.62 kp/cm2 |
| k red | 0.72 |
| eps sm | 856.00 *10^6 |
| wk | 0.29 mm |

## Calculo de Esfuerzos en Muros:

Proyecto: **LAV. MARTORELL.**
Elemento: **ODT300.4. E1**
Corte de cercos

### Geometría

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | **5.50** | **0.80** | Zapata | **4.20** | **1.60** | **1.00** |
| eso específ. | **2.50** | | | **2.50** | | |

### Terreno

| | Densidad [tm/m³] | ϕ [°] | δ [°] | β [°] | α [°] |
|---|---|---|---|---|---|
| Relleno | **2.00** | **30.00** | **0.00** | **20.34** | **0.00** |

| | σ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | **2.00** | **1.30** | **0.57** |

### Hipótesis de cálculo

| | | | Cargas Tablero | | | | Sismo | |
|---|---|---|---|---|---|---|---|---|
| Hip | γf | SC terraplén [tm/m²] | Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | ac horiz. [1/g] | ac vert. [1/g] |
| 1 | **1.50** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |
| 2 | **1.50** | **3.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

### Control Estabilidad

| Hip | γdes | γvuelco | σmin | σmax | σmed | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 2.24 | 6.99 | 11.23 | 11.10 | 11.17 | 6.60 |
| 2 | 1.79 | 4.95 | 11.34 | 14.81 | 13.08 | 6.60 |

### Esfuerzos de Armado

| | Arranque Fuste | | | Talón | | Puntera | | |
|---|---|---|---|---|---|---|---|---|
| Hip | Vd | Nd | Md | Vd | Md | Vd | Md | |
| 1 | 20.16 | 16.50 | 36.97 | -14.55 | -30.39 | 14.87 | 19.11 | Tipo I |
| 2 | 31.16 | 16.50 | 67.21 | -25.54 | -58.50 | 20.51 | 26.64 | Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. E1: FUSTE**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

### SECCION

| | |
|---|---|
| Título | |
| Ancho | **1.000** m |
| Canto | **0.800** m |
| C, util | **0.750** m |

### ESFUERZOS

| | |
|---|---|
| Título | |
| Mserv | **44.81** mtm |
| Md | **67.21** mtm |
| Vd | **31.16** tm |
| min geo | **0.90** /mil |

### ARMADO

| | |
|---|---|
| diam | **25.00** mm |
| sep | **10.00** cm |
| recub, c | **3.00** cm |
| wk | 0.13 mm |

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 7.2 | |
| As, calc | 21.14 cm2 | **49.09** cm2 |
| num. | 4.31 | |
| sep. | 23.22 cm | |

### CONTROL CORTANTE

| | |
|---|---|
| Vcu | 48.41 tm |
| Vu2a | 32.13 tm |
| coef. | **1.03** |

Cuantía de cercos necesaria cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1062.50 tm |
| 0.35*Uc*d | 278.91 mtm |
| Us | 93.75 tm |
| Usmin,0 | 53.33 tm |
| alpha | 0.62 |
| Us | 93.75 tm |
| As | 21.14 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 10.00 cm |
| hef,0 | 23.00 cm |
| hef | 20.00 cm |
| sm | 130.93 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 946.93 kp/cm2 |
| sig, s | 1521.38 kp/cm2 |
| k red | 0.81 |
| eps sm | 584.14 *10^6 |
| wk | 0.13 mm |

## Calculo de Esfuerzos en Muros:

Proyecto: **LAV. MARTORELL.**
Elemento: **ODT300.4. E2**

### Geometría

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | 6.90 | 0.85 | Zapata | 4.60 | 1.60 | 1.00 |
| eso especif. | 2.50 | | | 2.50 | | |

### Terreno

| | Densidad [tm/m³] | ϕ [°] | δ [°] | β [°] | α [°] |
|---|---|---|---|---|---|
| Relleno | 2.00 | 30.00 | 5.00 | 25.23 | 0.00 |

| | σ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | 2.00 | 1.30 | 0.57 |

### Hipótesis de cálculo

| | | | Cargas Tablero | | | | Sismo | |
|---|---|---|---|---|---|---|---|---|
| Hip | γf | SC terraplén [tm/m²] | Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | ac horiz. [1/g] | ac vert. [1/g] |
| 1 | 1.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 1.50 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

### Control Estabilidad

| Hip | γdes | γvuelco | σmin | σmax | σmed | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 1.81 | 4.91 | 10.51 | 17.42 | 13.97 | 7.05 |
| 2 | 1.51 | 3.66 | 8.92 | 23.22 | 16.07 | 7.05 |

### Esfuerzos de Armado

| | Arranque Fuste | | | Talón | | Puntera | |
|---|---|---|---|---|---|---|---|
| Hip | Vd | Nd | Md | Vd | Md | Vd | Md |
| 1 | 35.40 | 25.09 | 80.10 | -24.37 | -67.97 | 24.39 | 32.13 Tipo I |
| 2 | 50.79 | 26.44 | 132.63 | -39.42 | -115.33 | 32.94 | 43.76 Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. E2: FUSTE**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | 250 | 1.500 | 166.67 kp/cm2 |
| Acero | 5100 | 1.150 | 4434.78 kp/cm2 |

### SECCION

Título
Ancho **1.000** m
Canto **0.850** m
C, util **0.800** m

### ESFUERZOS

Título
Mserv **88.42** mtm
Md **132.63** mtm
Vd **50.79** tm
min geo **0.90** /mil

### ARMADO

diam **25.00** mm
sep **10.00** cm
recub, c **3.00** cm
wk 0.29 mm

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 7.65 | |
| As, calc | 40.61 cm2 | **49.09** cm2 |
| num. | 8.27 | |
| sep. | 12.09 cm | |

### CONTROL CORTANTE

Vcu 51.64 tm
Vu2a 33.74 tm
coef. **0.66**
Cuantia de cercos necesaria 8.13 cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1133.33 tm |
| 0.35*Uc*d | 317.33 mtm |
| Us | 180.10 tm |
| Usmin,0 | 56.67 tm |
| alpha | -0.09 |
| Us | 180.10 tm |
| As | 40.61 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 10.00 cm |
| hef,0 | 23.00 cm |
| hef | 21.25 cm |
| sm | 134.11 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 1002.19 kp/cm2 |
| sig, s | 2814.49 kp/cm2 |
| k red | 0.94 |
| eps sm | 1255.27 *10^6 |
| wk | 0.29 mm |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. E2: TALON**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

### SECCION

| | |
|---|---|
| Título | |
| Ancho | **1.000** m |
| Canto | **1.000** m |
| C, util | **0.900** m |

| ESFUERZOS | | ARMADO | |
|---|---|---|---|
| Título | | | |
| Mserv | **76.89** mtm | diam | **25.00** mm |
| Md | **115.33** mtm | sep | **10.00** cm |
| Vd | **39.42** tm | recub, c | **3.50** cm |
| min geo | **0.90** /mil | wk | 0.22 mm |

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 9 | |
| As, calc | 30.52 cm2 | **49.09** cm2 |
| num. | 6.22 | |
| sep. | 16.09 cm | |

### CONTROL CORTANTE

| | |
|---|---|
| Vcu | 58.09 tm |
| Vu2a | 36.97 tm |
| coef. | **0.94** |

Cuantía de cercos necesaria 8.13 cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1275.00 tm |
| 0.35*Uc*d | 401.63 mtm |
| Us | 135.33 tm |
| Usmin,0 | 66.67 tm |
| alpha | 0.49 |
| Us | 135.33 tm |
| As | 30.52 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 10.00 cm |
| hef,0 | 23.50 cm |
| hef | 23.50 cm |
| sm | 149.84 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 1232.99 kp/cm2 |
| sig, s | 2175.48 kp/cm2 |
| k red | 0.84 |
| eps sm | 869.56 *10^6 |
| wk | 0.22 mm |

PROYECTO **LAV. MARTORELL.**
ZAPATA **ODT300.4. E2: PUNTERA**

**CALCULO DE ZAPATAS RIGIDAS SEGÚN EHE-98**

**DIMENSIONES**

| | LONG | TRANS | CANTO | UTIL | | HORMIGON | | ACERO | |
|---|---|---|---|---|---|---|---|---|---|
| Pilar | **0.85** | **1.00** | | | [m] | fkc | **250** [kp/cm2] | fyk | **4080** [kp/cm2] |
| Zapata | **4.05** | **1.00** | **1.00** | **0.90** | [m] | gamma,c | **1.5** | gamma,s | **1** |

**TENSIONES TERRENO**

(Descontado el peso de la Zapata)

| | LONG | TRANS |
|---|---|---|
| Tensión | **29.33** | **29.33** [tm/m2] |
| gamma,f | **1.00** | |

**COMPROBACION A FLEXION**

| | LONG | TRANS | |
|---|---|---|---|
| vd | 1.81 | 0.25 [m] | |
| z max | 0.88 | 0.90 [m] | |
| z | **0.77** | **0.77** [m] | |
| Armadura | 15.22 | 0.00 [cm2] | |
| | 15.43 | 1.19 | |

| ontrol zapata alargada | LONG Zona Pilar | LONG Resto | TRANS Zona Pilar | TRANS Resto | |
|---|---|---|---|---|---|
| dimensión | 1.00 | 0.00 | 2.85 | 1.20 | [m] |
| Armadura | 15.22 | 0.00 | 0.00 | 0.00 | [cm2] |
| Mínima mecánica | 15.74 | 0.00 | 0.00 | 0.00 | [cm2] |
| Mínima geométrica | 18.00 | 0.00 | 51.30 | 21.60 | [cm2] |
| Armadura inferior | **15.74** | **0.00** | **9.00** | **9.00** | [cm2/m] |
| Armadura superior | **6.00** | **0.00** | **9.00** | **9.00** | [cm2/m] |

**COMPROBACION A CORTANTE**

| | LONG | | | TRANS | | | |
|---|---|---|---|---|---|---|---|
| Zona comprimida | | 0.27 | | | 0.27 | | [m] |
| Reacción total | 46.923853 | 46.923853 | | 0.00 | 0.00 | | [tm] |
| | α | β | θ | α | β | θ | |
| Ángulos | 32.43 | 20.50 | 37.07 | 28.37 | -10.27 | 71.90 | (°) |
| | Ancho | Canto | | Ancho | Canto | | |
| Biela, horizontal | 1.00 | 0.27 | | 1.12 | 0.27 | | [m] |
| Biela, superior | 1.00 | 0.47 | | 1.12 | 0.56 | | [m] |
| Bilea, inferior | 1.00 | 0.96 | | 2.85 | 0.00 | | [m] |

| Control validez | Tensión | Admisible | | Tensión | Admisible | |
|---|---|---|---|---|---|---|
| Horizontal | 230.02 | 1666.67 | **CUMPLE** | 0.00 | 1666.67 | **CUMPLE** |
| Superior | 165.04 | 1666.67 | **CUMPLE** | 0.00 | 1666.67 | **CUMPLE** |
| Inferior | 80.70 | 1166.67 | **CUMPLE** | 0.00 | 1166.67 | **CUMPLE** |

## Calculo de Esfuerzos en Muros:

Proyecto: **LAV. MARTORELL.**
Elemento: **ODT300.4. E2**
corte de armado

**Geometría**

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | **5.10** | **0.85** | Zapata | **4.60** | **1.60** | **1.00** |
| eso especif. | **2.50** | | | **2.50** | | |

**Terreno**

| | Densidad [tm/m³] | ϕ [º] | δ [º] | β [º] | α [º] |
|---|---|---|---|---|---|
| Relleno | **2.00** | **30.00** | **5.00** | **25.23** | **0.00** |

| | σ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | **2.00** | **1.30** | **0.57** |

**Hipótesis de cálculo**

| | | | Cargas Tablero | | | | Sismo | |
|---|---|---|---|---|---|---|---|---|
| Hip | γf | SC terraplén [tm/m²] | Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | ac horiz. [1/g] | ac vert. [1/g] |
| 1 | **1.50** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |
| 2 | **1.50** | **3.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Control Estabilidad**

| Hip | γdes | γvuelco | σmin | σmax | σmed | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 2.38 | 8.29 | 11.16 | 10.68 | 10.92 | 7.05 |
| 2 | 1.90 | 5.81 | 11.83 | 14.15 | 12.99 | 7.05 |

**Esfuerzos de Armado**

| | Arranque Fuste | | | Talón | | Puntera | |
|---|---|---|---|---|---|---|---|
| Hip | Vd | Nd | Md | Vd | Md | Vd | Md |
| 1 | 19.34 | 17.95 | 32.16 | -11.70 | -26.08 | 14.21 | 18.40 Tipo I |
| 2 | 30.72 | 18.94 | 60.74 | -21.48 | -53.41 | 19.65 | 25.66 Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. E2: FUSTE**

**MATERIALES**

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

**SECCION**

| | | |
|---|---|---|
| Título | | |
| Ancho | **1.000** | m |
| Canto | **0.850** | m |
| C, util | **0.800** | m |

| **ESFUERZOS** | | **ARMADO** | |
|---|---|---|---|
| Título | | | |
| Mserv | **40.50** mtm | diam | **25.00** mm |
| Md | **60.74** mtm | sep | **20.00** cm |
| Vd | **30.72** tm | recub, c | **3.00** cm |
| min geo | **0.90** /mil | wk | 0.30 mm |

| | **CONTROL FLEXION** | | | **CONTROL CORTANTE** | |
|---|---|---|---|---|---|
| | Cálculo | Dispuesto | | | |
| min geom | 7.65 | | Vcu | 51.64 | tm |
| As, calc | 17.74 cm2 | **24.54** cm2 | Vu2a | 29.78 | tm |
| num. | 3.61 | | coef. | **0.97** | |
| sep. | 27.68 cm | | Cuantía de cercos necesaria | | 8.13 cm2/m |

CALCULO ARMARURA AGOTAMIENTO

| | | |
|---|---|---|
| Uc | 1133.33 | tm |
| 0.35*Uc*d | 317.33 | mtm |
| Us | 78.66 | tm |
| Usmin,0 | 56.67 | tm |
| alpha | 0.81 | |
| Us | 78.66 | tm |
| As | 17.74 | cm2 |

CONTROL FISURACIÓN
(1 capa armadura)

| | | |
|---|---|---|
| bef | 20.00 | cm |
| hef,0 | 23.00 | cm |
| hef | 21.25 | cm |
| sm | 208.23 | mm |
| fctm | 26.15 | kp/cm2 |
| sig, sr | 2004.37 | kp/cm2 |
| sig, s | 2578.04 | kp/cm2 |
| k red | 0.70 | |
| eps sm | 856.60 | *10^6 |
| wk | 0.30 | mm |

## Calculo de Esfuerzos en Muros:

Proyecto: **LAV. MARTORELL.**
Elemento: **ODT300.4. E2**
corte de cercos

### Geometría

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | **5.40** | **0.85** | Zapata | **4.60** | **1.60** | **1.00** |
| eso especif. | **2.50** | | | **2.50** | | |

### Terreno

| | Densidad [tm/m³] | φ [º] | δ [º] | β [º] | α [º] |
|---|---|---|---|---|---|
| Relleno | **2.00** | **30.00** | **5.00** | **25.23** | **0.00** |

| | σ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | **2.00** | **1.30** | **0.57** |

### Hipótesis de cálculo

| | | | Cargas Tablero | | | | Sismo | |
|---|---|---|---|---|---|---|---|---|
| Hip | γf | SC terraplén [tm/m²] | Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | ac horiz. [1/g] | ac vert. [1/g] |
| 1 | **1.50** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |
| 2 | **1.50** | **3.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

### Control Estabilidad

| Hip | γdes | γvuelco | σmin | σmax | σmed | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 2.26 | 7.52 | 11.24 | 11.62 | 11.43 | 7.05 |
| 2 | 1.82 | 5.33 | 11.57 | 15.44 | 13.50 | 7.05 |

### Esfuerzos de Armado

| | Arranque Fuste | | | Talón | | Puntera | | |
|---|---|---|---|---|---|---|---|---|
| Hip | Vd | Nd | Md | Vd | Md | Vd | Md | |
| 1 | 21.68 | 19.11 | 38.22 | -13.38 | -31.44 | 15.65 | 20.34 | Tipo I |
| 2 | 33.73 | 20.16 | 70.29 | -23.94 | -61.75 | 21.56 | 28.25 | Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. E2: FUSTE**

### MATERIALES

| | fk | gamma | fd | |
|---|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 | kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 | kp/cm2 |

### SECCION

| | | |
|---|---|---|
| Título | | |
| Ancho | **1.000** | m |
| Canto | **0.850** | m |
| C, util | **0.800** | m |

### ESFUERZOS

| | | |
|---|---|---|
| Título | | |
| Mserv | **46.86** | mtm |
| Md | **70.29** | mtm |
| Vd | **33.73** | tm |
| min geo | **0.90** | /mil |

### ARMADO

| | | |
|---|---|---|
| diam | **25.00** | mm |
| sep | **10.00** | cm |
| recub, c | **3.00** | cm |
| wk | 0.13 | mm |

### CONTROL FLEXION

| | Cálculo | | Dispuesto | |
|---|---|---|---|---|
| min geom | 7.65 | | | |
| As, calc | 20.65 | cm2 | **49.09** | cm2 |
| num. | 4.21 | | | |
| sep. | 23.77 | cm | | |

### CONTROL CORTANTE

| | | |
|---|---|---|
| Vcu | 51.64 | tm |
| Vu2a | 33.74 | tm |
| coef. | **1.00** | |

Cuantía de cercos necesaria cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | | |
|---|---|---|
| Uc | 1133.33 | tm |
| 0.35*Uc*d | 317.33 | mtm |
| Us | 91.57 | tm |
| Usmin,0 | 56.67 | tm |
| alpha | 0.69 | |
| Us | 91.57 | tm |
| As | 20.65 | cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | | |
|---|---|---|
| bef | 10.00 | cm |
| hef,0 | 23.00 | cm |
| hef | 21.25 | cm |
| sm | 134.11 | mm |
| fctm | 26.15 | kp/cm2 |
| sig, sr | 1002.19 | kp/cm2 |
| sig, s | 1491.70 | kp/cm2 |
| k red | 0.77 | |
| eps sm | 550.02 | *10^6 |
| wk | 0.13 | mm |

## Calculo de Esfuerzos en Muros:

Proyecto: **LAV. MARTORELL.**
Elemento: **ODT300.4. S1 y S2**

### Geometria

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | 7.75 | 0.80 | Zapata | 3.50 | 1.60 | 1.00 |
| eso especif. | 2.50 | | | 2.50 | | |

### Terreno

| | Densidad [tm/m³] | ϕ [°] | δ [°] | β [°] | α [°] |
|---|---|---|---|---|---|
| Relleno | 2.00 | 30.00 | 0.00 | 0.00 | 0.00 |

| | σ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | 2.00 | 1.30 | 0.57 |

### Hipótesis de cálculo

| | | | Cargas Tablero | | | | Sismo | |
|---|---|---|---|---|---|---|---|---|
| Hip | γf | SC terraplén [tm/m²] | Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | ac horiz. [1/g] | ac vert. [1/g] |
| 1 | 1.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 1.50 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

### Control Estabilidad

| Hip | γdes | γvuelco | σmin | σmax | σmed | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 1.89 | 4.03 | 10.17 | 18.47 | 14.32 | 5.90 |
| 2 | 1.58 | 3.05 | 7.53 | 24.68 | 16.10 | 5.90 |

### Esfuerzos de Armado

| | Arranque Fuste | | | Talón | | Puntera | | |
|---|---|---|---|---|---|---|---|---|
| Hip | Vd | Nd | Md | Vd | Md | Vd | Md | |
| 1 | 30.03 | 23.25 | 77.58 | -28.17 | -56.83 | 25.61 | 33.64 | Tipo I |
| 2 | 41.66 | 23.25 | 122.63 | -44.03 | -92.62 | 34.24 | 45.51 | Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. S1 y S2: FUSTE**

### MATERIALES

| | fk | gamma | fd | |
|---|---|---|---|---|
| Hormigón | 250 | 1.500 | 166.67 | kp/cm2 |
| Acero | 5100 | 1.150 | 4434.78 | kp/cm2 |

### SECCION

| | | |
|---|---|---|
| Título | | |
| Ancho | 1.000 | m |
| Canto | 0.800 | m |
| C, util | 0.725 | m |

### ESFUERZOS

| | | |
|---|---|---|
| Título | | |
| Mserv | 81.75 | mtm |
| Md | 122.63 | mtm |
| Vd | 41.66 | tm |
| min geo | 0.90 | /mil |

### ARMADO

| | | |
|---|---|---|
| diam | 25.00 | mm |
| sep | 10.00 | cm |
| recub, c | 3.00 | cm |
| wk | 0.29 | mm |

### CONTROL FLEXION

| | Cálculo | | Dispuesto |
|---|---|---|---|
| min geom | 7.2 | | |
| As, calc | 41.94 | cm2 | 49.09 cm2 |
| num. | 8.54 | | |
| sep. | 11.71 | cm | |

### CONTROL CORTANTE

| | | |
|---|---|---|
| Vcu | 46.80 | tm |
| Vu2a | 31.32 | tm |
| coef. | 0.75 | |

Cuantía de cercos necesaria 8.13 cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | | |
|---|---|---|
| Uc | 1027.08 | tm |
| 0.35*Uc*d | 260.62 | mtm |
| Us | 185.98 | tm |
| Usmin,0 | 53.33 | tm |
| alpha | -0.24 | |
| Us | 185.98 | tm |
| As | 41.94 | cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | | |
|---|---|---|
| bef | 10.00 | cm |
| hef,0 | 23.00 | cm |
| hef | 20.00 | cm |
| sm | 130.93 | mm |
| fctm | 26.15 | kp/cm2 |
| sig, sr | 979.59 | kp/cm2 |
| sig, s | 2871.44 | kp/cm2 |
| k red | 0.94 | |
| eps sm | 1287.78 | *10^6 |
| wk | 0.29 | mm |

**CALCULO FISURACION LOSAS**
Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. S1 y S2: TALON**

**MATERIALES**

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

**SECCION**

| | | |
|---|---|---|
| Título | | |
| Ancho | **1.000** | m |
| Canto | **1.000** | m |
| C, util | **0.900** | m |

| **ESFUERZOS** | | **ARMADO** | |
|---|---|---|---|
| Título | | | |
| Mserv | **61.75** mtm | diam | **20.00** mm |
| Md | **92.62** mtm | sep | **10.00** cm |
| Vd | **44.03** tm | recub, c | **3.50** cm |
| min geo | **0.90** /mil | wk | 0.25 mm |

| **CONTROL FLEXION** | | | **CONTROL CORTANTE** | | |
|---|---|---|---|---|---|
| | Cálculo | Dispuesto | | | |
| min geom | 9 | | Vcu | 58.09 tm | |
| As, calc | 24.23 cm2 | **31.42** cm2 | Vu2a | 34.12 tm | |
| num. | 7.71 | | coef. | **0.77** | |
| sep. | 12.97 cm | | Cuantía de cercos necesaria | | 8.13 cm2/m |

CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1275.00 tm |
| 0.35*Uc*d | 401.63 mtm |
| Us | 107.44 tm |
| Usmin,0 | 66.67 tm |
| alpha | 0.69 |
| Us | 107.44 tm |
| As | 24.23 cm2 |

CONTROL FISURACIÓN
(1 capa armadura)

| | |
|---|---|
| bef | 10.00 cm |
| hef,0 | 19.50 cm |
| hef | 19.50 cm |
| sm | 152.07 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 1926.54 kp/cm2 |
| sig, s | 2729.86 kp/cm2 |
| k red | 0.75 |
| eps sm | 976.21 *10^6 |
| wk | 0.25 mm |

**CALCULO FISURACION LOSAS**
Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. S1 y S2: TALON**

**MATERIALES**

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

**SECCION**

| | | |
|---|---|---|
| Título | | |
| Ancho | **1.000** | m |
| Canto | **1.000** | m |
| C, util | **0.900** | m |

| **ESFUERZOS** | | **ARMADO** | |
|---|---|---|---|
| Título | | | |
| Mserv | **61.75** mtm | diam | **20.00** mm |
| Md | **92.62** mtm | sep | **10.00** cm |
| Vd | **44.03** tm | recub, c | **3.50** cm |
| min geo | **0.90** /mil | wk | 0.25 mm |

| **CONTROL FLEXION** | | | **CONTROL CORTANTE** | | |
|---|---|---|---|---|---|
| | Cálculo | Dispuesto | | | |
| min geom | 9 | | Vcu | 58.09 tm | |
| As, calc | 24.23 cm2 | **31.42** cm2 | Vu2a | 34.12 tm | |
| num. | 7.71 | | coef. | **0.77** | |
| sep. | 12.97 cm | | Cuantía de cercos necesaria | | 8.13 cm2/m |

CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1275.00 tm |
| 0.35*Uc*d | 401.63 mtm |
| Us | 107.44 tm |
| Usmin,0 | 66.67 tm |
| alpha | 0.69 |
| Us | 107.44 tm |
| As | 24.23 cm2 |

CONTROL FISURACIÓN
(1 capa armadura)

| | |
|---|---|
| bef | 10.00 cm |
| hef,0 | 19.50 cm |
| hef | 19.50 cm |
| sm | 152.07 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 1926.54 kp/cm2 |
| sig, s | 2729.86 kp/cm2 |
| k red | 0.75 |
| eps sm | 976.21 *10^6 |
| wk | 0.25 mm |

PROYECTO LAV. MARTORELL.
ZAPATA ODT300.4. S1 y S2: PUNTERA

**CALCULO DE ZAPATAS RIGIDAS SEGÚN EHE-98**

**DIMENSIONES**

| | LONG | TRANS | CANTO | UTIL | | HORMIGON | | ACERO | |
|---|---|---|---|---|---|---|---|---|---|
| Pilar | 0.80 | 1.00 | | | [m] | fkc | 250 [kp/cm2] | fyk | 4080 [kp/cm2] |
| Zapata | 4.00 | 1.00 | 1.00 | 0.90 | [m] | gamma,c | 1.5 | gamma,s | 1 |

**TENSIONES TERRENO**
(Descontado el peso de la Zapata)

| | LONG | TRANS | |
|---|---|---|---|
| Tensión | 30.76 | 30.76 | [tm/m2] |
| gamma,f | 1.00 | | |

**COMPROBACION A FLEXION**

| | LONG | TRANS | |
|---|---|---|---|
| vd | 1.80 | 0.25 | [m] |
| z max | 0.88 | 0.90 | [m] |
| z | 0.77 | 0.77 | [m] |
| Armadura | 15.77 | 0.00 | [cm2] |
| | 15.97 | 1.23 | |

| ontrol zapata alargada | LONG Zona Pilar | LONG Resto | TRANS Zona Pilar | TRANS Resto | |
|---|---|---|---|---|---|
| dimensión | 1.00 | 0.00 | 2.80 | 1.20 | [m] |
| Armadura | 15.77 | 0.00 | 0.00 | 0.00 | [cm2] |
| Mínima mecánica | 16.05 | 0.00 | 0.00 | 0.00 | [cm2] |
| Mínima geométrica | 18.00 | 0.00 | 50.40 | 21.60 | [cm2] |
| Armadura inferior | 16.05 | 0.00 | 9.00 | 9.00 | [cm2/m] |
| Armadura superior | 6.00 | 0.00 | 9.00 | 9.00 | [cm2/m] |

**COMPROBACION A CORTANTE**

| | LONG | | | TRANS | | | |
|---|---|---|---|---|---|---|---|
| Zona comprimida | | 0.27 | | | 0.27 | | [m] |
| Reacción total | 49.223272 | 49.223272 | | 0.00 | 0.00 | | [tm] |
| | α | β | θ | α | β | θ | |
| Ángulos | 34.02 | 18.56 | 37.42 | 28.37 | -10.27 | 71.90 | [°] |
| | Ancho | Canto | | Ancho | Canto | | |
| Biela, horizontal | 1.00 | 0.27 | | 1.07 | 0.27 | | [m] |
| Biela, superior | 1.00 | 0.46 | | 1.07 | 0.56 | | [m] |
| Bilea, Inferior | 1.00 | 0.97 | | 2.80 | 0.00 | | [m] |

| Control validez | Tensión | Admisible | | Tensión | Admisible | |
|---|---|---|---|---|---|---|
| Horizontal | 238.31 | 1666.67 | **CUMPLE** | 0.00 | 1666.67 | **CUMPLE** |
| Superior | 177.08 | 1666.67 | **CUMPLE** | 0.00 | 1666.67 | **CUMPLE** |
| Inferior | 83.33 | 1166.67 | **CUMPLE** | 0.00 | 1166.67 | **CUMPLE** |

## Calculo de Esfuerzos en Muros:

Proyecto: **LAV. MARTORELL.**
Elemento: **ODT300.4. S1 y S2**
corte de armado

**Geometría**

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | 5.70 | 0.80 | Zapata | 3.50 | 1.60 | 1.00 |
| eso especif. | 2.50 | | | 2.50 | | |

**Terreno**

| | Densidad [tm/m³] | φ [º] | δ [º] | β [º] | α [º] |
|---|---|---|---|---|---|
| Relleno | 2.00 | 30.00 | 0.00 | 0.00 | 0.00 |

| | σ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | 2.00 | 1.30 | 0.57 |

**Hipótesis de cálculo**

| | | | Cargas Tablero | | | Sismo | |
|---|---|---|---|---|---|---|---|
| Hip | γf | SC terraplén [tm/m²] | Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | ac horiz. [1/g] | ac vert. [1/g] |
| 1 | 1.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 1.50 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Control Estabilidad**

| Hip | γdes | γvuelco | σmin | σmax | σmed | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 2.52 | 6.94 | 11.82 | 10.57 | 11.19 | 5.90 |
| 2 | 2.01 | 4.93 | 11.90 | 14.05 | 12.97 | 5.90 |

**Esfuerzos de Armado**

| | Arranque Fuste | | | Talón | | Puntera | |
|---|---|---|---|---|---|---|---|
| Hip | Vd | Nd | Md | Vd | Md | Vd | Md |
| 1 | 16.25 | 17.10 | 30.87 | -12.86 | -21.38 | 14.21 | 18.17 Tipo I |
| 2 | 24.80 | 17.10 | 55.23 | -22.90 | -42.01 | 19.42 | 25.16 Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. S1 y S2: FUSTE**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

### SECCION

| | |
|---|---|
| Título | |
| Ancho | **1.000** m |
| Canto | **0.800** m |
| C, util | **0.725** m |

### ESFUERZOS

| | |
|---|---|
| Título | |
| Mserv | **36.82** mtm |
| Md | **55.23** mtm |
| Vd | **24.80** tm |
| min geo | **0.90** /mil |

### ARMADO

| | |
|---|---|
| diam | **25.00** mm |
| sep | **20.00** cm |
| recub, c | **3.00** cm |
| wk | 0.30 mm |

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 7.2 | |
| As, calc | 17.87 cm2 | **24.54** cm2 |
| num. | 3.64 | |
| sep. | 27.47 cm | |

### CONTROL CORTANTE

| | |
|---|---|
| Vcu | 46.80 tm |
| Vu2a | 27.36 tm |
| coef. | **1.10** |

Cuantía de cercos necesaria cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1027.08 tm |
| 0.35*Uc*d | 260.62 mtm |
| Us | 79.24 tm |
| Usmin,0 | 53.33 tm |
| alpha | 0.76 |
| Us | 79.24 tm |
| As | 17.87 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 20.00 cm |
| hef,0 | 23.00 cm |
| hef | 20.00 cm |
| sm | 201.86 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 1959.17 kp/cm2 |
| sig, s | 2586.66 kp/cm2 |
| k red | 0.71 |
| eps sm | 878.43 *10^6 |
| wk | 0.30 mm |

## Calculo de Esfuerzos en Muros:

Proyecto: **LAV. MARTORELL.**
Elemento: **ODT300.4. S1 y S2**
corte de cercos

### Geometría

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | **6.50** | **0.80** | Zapata | **3.50** | **1.60** | **1.00** |
| eso específ. | **2.50** | | | **2.50** | | |

### Terreno

| | Densidad [tm/m³] | ϕ [º] | δ [º] | β [º] | α [º] |
|---|---|---|---|---|---|
| Relleno | **2.00** | **30.00** | **0.00** | **0.00** | **0.00** |

| | σ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | **2.00** | **1.30** | **0.57** |

### Hipótesis de cálculo

| | | | Cargas Tablero | | | | Sismo | |
|---|---|---|---|---|---|---|---|---|
| Hip | γf | SC terraplén [tm/m²] | Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | ac horiz. [1/g] | ac vert. [1/g] |
| 1 | **1.50** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |
| 2 | **1.50** | **3.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

### Control Estabilidad

| Hip | γdes | γvuelco | σmin | σmax | σmed | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 2.23 | 5.51 | 11.62 | 13.21 | 12.42 | 5.90 |
| 2 | 1.82 | 4.03 | 10.72 | 17.67 | 14.19 | 5.90 |

### Esfuerzos de Armado

| | Arranque Fuste | | | Talón | | Puntera | | |
|---|---|---|---|---|---|---|---|---|
| Hip | Vd | Nd | Md | Vd | Md | Vd | Md | |
| 1 | 21.13 | 19.50 | 45.77 | -17.90 | -32.77 | 18.11 | 23.43 | Tipo I |
| 2 | 30.88 | 19.50 | 77.46 | -30.02 | -58.84 | 24.54 | 32.16 | Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.4. S1 y S2: FUSTE**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

### SECCION

| | |
|---|---|
| Título | |
| Ancho | **1.000** m |
| Canto | **0.800** m |
| C, util | **0.725** m |

### ESFUERZOS

| | |
|---|---|
| Título | |
| Mserv | **51.64** mtm |
| Md | **77.46** mtm |
| Vd | **30.88** tm |
| min geo | **0.90** /mil |

### ARMADO

| | |
|---|---|
| diam | **25.00** mm |
| sep | **10.00** cm |
| recub, c | **3.00** cm |
| wk | 0.16 mm |

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 7.2 | |
| As, calc | 25.49 cm2 | **49.09** cm2 |
| num. | 5.19 | |
| sep. | 19.25 cm | |

### CONTROL CORTANTE

| | |
|---|---|
| Vcu | 46.80 tm |
| Vu2a | 31.32 tm |
| coef. | **1.01** |

Cuantía de cercos necesaria cm2/m

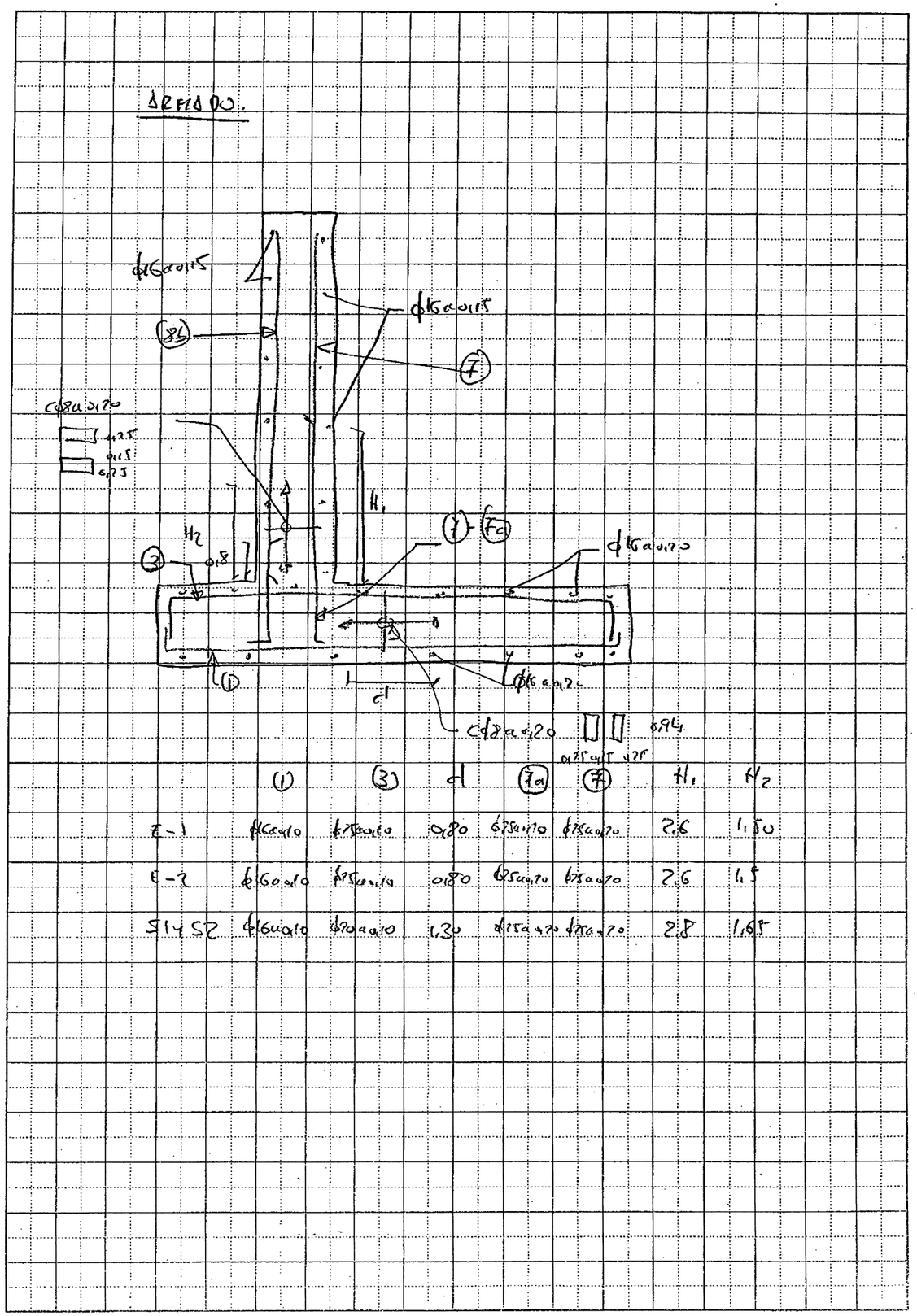
### CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1027.08 tm |
| 0.35*Uc*d | 260.62 mtm |
| Us | 113.06 tm |
| Usmin,0 | 53.33 tm |
| alpha | 0.44 |
| Us | 113.06 tm |
| As | 25.49 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 10.00 cm |
| hef,0 | 23.00 cm |
| hef | 20.00 cm |
| sm | 130.93 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 979.59 kp/cm2 |
| sig, s | 1813.76 kp/cm2 |
| k red | 0.85 |
| eps sm | 737.73 *10^6 |
| wk | 0.16 mm |



# Listado de Datos de la Obra

Proyecto: ODT 300.40
CONSTRUCTORA HISPANICA

Fecha:03/09/03

## 1.DATOS GENERALES DE LA ESTRUCTURA

Proyecto: ODT 300.40
CONSTRUCTORA HISPANICA

Clave: JC968_B

## 2.DATOS GEOMÉTRICOS DE GRUPOS Y PLANTAS

| Grupo | NOMBRE DEL GRUPO | Planta | NOMBRE PLANTA | Altura | Cota |
|---|---|---|---|---|---|
| 1 | VIAL | 1 | VIAL | 6.40 | 6.40 |
| 0 | Cimentación | | | | 0.00 |

## 3.LOSAS Y ELEMENTOS DE CIMENTACIÓN

| Losas Cimentación | Canto (cm) | Módulo Balasto (Tn/m3) | Tensión Admisible (Tn/m2) |
|---|---|---|---|
| Todas | 100 | 1500.00 | 29.00 |

## 4.ACCIONES CONSIDERADAS

### 4.1 GRAVITATORIAS

| NOMBRE DEL GRUPO | S.C.U | CARGAS MUERTAS |
|---|---|---|
| VIAL | 0.00 | 0.00 |

### 4.2 VIENTO

Sin acción de viento

### 4.3 SISMO

Sin acción de sismo

### 4.4 CJTO.CARGAS ESPECIALES

| NºCCE | HIPOTESIS |
|---|---|
| 1 | Peso propio |
| 2 | Sobrecarga |
| 3 | Sobrecarga separada |
| 4 | Sobrecarga separada |
| 5 | Sobrecarga separada |

### 4.5 CARGAS HORIZONTALES Y EN CABEZA DE PILARES

#### 4.5.1 CARGAS HORIZONTALES EN PILARES

| Referencia Pilar | Dirección de la Carga | Tipo de Carga | CCE | VALOR | COTA (m) |
|---|---|---|---|---|---|
| P1 | X Local | Carga Uniforme | Peso propio | 1.05 Tn/m | Desde: 4.30 Hasta: 6.40 |
| | X Local | Carga Uniforme | Peso propio | 3.20 Tn/m | Desde: 2.10 Hasta: 4.30 |
| | X Local | Carga Uniforme | Peso propio | 5.35 Tn/m | Desde: 0.00 Hasta: 2.10 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 6.40 |
| P4 | X Local | Carga Uniforme | Peso propio | 1.05 Tn/m | Desde: 4.30 Hasta: 6.40 |
| | X Local | Carga Uniforme | Peso propio | 3.20 Tn/m | Desde: 2.10 Hasta: 4.30 |
| | X Local | Carga Uniforme | Peso propio | 5.35 Tn/m | Desde: 0.00 Hasta: 2.10 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 6.40 |
| P7 | X Local | Carga Uniforme | Peso propio | -1.05 Tn/m | Desde: 4.30 Hasta: 6.40 |
| | X Local | Carga Uniforme | Peso propio | 3.20 Tn/m | Desde: 2.10 Hasta: 4.30 |
| | X Local | Carga Uniforme | Peso propio | 5.35 Tn/m | Desde: 0.00 Hasta: 2.10 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 6.40 |
| P10 | X Local | Carga Uniforme | Peso propio | 1.05 Tn/m | Desde: 4.30 Hasta: 6.40 |
| | X Local | Carga Uniforme | Peso propio | 3.20 Tn/m | Desde: 2.10 Hasta: 4.30 |
| | X Local | Carga Uniforme | Peso propio | 5.35 Tn/m | Desde: 0.00 Hasta: 2.10 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 6.40 |
| P13 | X Local | Carga Uniforme | Peso propio | 1.05 Tn/m | Desde: 4.30 Hasta: 6.40 |
| | X Local | Carga Uniforme | Peso propio | 3.20 Tn/m | Desde: 2.10 Hasta: 4.30 |
| | X Local | Carga Uniforme | Peso propio | 5.35 Tn/m | Desde: 0.00 Hasta: 2.10 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 6.40 |
| P16 | X Local | Carga Uniforme | Peso propio | 1.05 Tn/m | Desde: 4.30 Hasta: 6.40 |
| | X Local | Carga Uniforme | Peso propio | 3.20 Tn/m | Desde: 2.10 Hasta: 4.30 |
| | X Local | Carga Uniforme | Peso propio | 5.35 Tn/m | Desde: 0.00 Hasta: 2.10 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 6.40 |
| P19 | X Local | Carga Uniforme | Peso propio | -1.05 Tn/m | Desde: 4.30 Hasta: 6.40 |
| | X Local | Carga Uniforme | Peso propio | -3.20 Tn/m | Desde: 2.10 Hasta: 4.30 |
| | X Local | Carga Uniforme | Peso propio | -5.35 Tn/m | Desde: 0.00 Hasta: 2.10 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 6.40 |
| P20 | X Local | Carga Uniforme | Peso propio | -1.05 Tn/m | Desde: 4.30 Hasta: 6.40 |
| | X Local | Carga Uniforme | Peso propio | -3.20 Tn/m | Desde: 2.10 Hasta: 4.30 |
| | X Local | Carga Uniforme | Peso propio | -5.35 Tn/m | Desde: 0.00 Hasta: 2.10 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 6.40 |
| P21 | X Local | Carga Uniforme | Peso propio | -1.05 Tn/m | Desde: 4.30 Hasta: 6.40 |
| | X Local | Carga Uniforme | Peso propio | -3.20 Tn/m | Desde: 2.10 Hasta: 4.30 |
| | X Local | Carga Uniforme | Peso propio | -5.35 Tn/m | Desde: 0.00 Hasta: 2.10 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 6.40 |
| P22 | X Local | Carga Uniforme | Peso propio | -1.05 Tn/m | Desde: 4.30 Hasta: 6.40 |
| | X Local | Carga Uniforme | Peso propio | -3.20 Tn/m | Desde: 2.10 Hasta: 4.30 |
| | X Local | Carga Uniforme | Peso propio | -5.35 Tn/m | Desde: 0.00 Hasta: 2.10 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 6.40 |
| P23 | X Local | Carga Uniforme | Peso propio | -1.05 Tn/m | Desde: 4.30 Hasta: 6.40 |
| | X Local | Carga Uniforme | Peso propio | -3.20 Tn/m | Desde: 2.10 Hasta: 4.30 |
| | X Local | Carga Uniforme | Peso propio | -5.35 Tn/m | Desde: 0.00 Hasta: 2.10 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 6.40 |
| P24 | X Local | Carga Uniforme | Peso propio | -1.05 Tn/m | Desde: 4.30 Hasta: 6.40 |
| | X Local | Carga Uniforme | Peso propio | -3.20 Tn/m | Desde: 2.10 Hasta: 4.30 |
| | X Local | Carga Uniforme | Peso propio | -5.35 Tn/m | Desde: 0.00 Hasta: 2.10 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 6.40 |

### 4.6 LISTADO DE CARGAS

CARGAS ESPECIALES INTRODUCIDAS (en Tm, Tm/m y Tm/m2)

| GRUPO | C.C.E. | TIPO | VALOR | COORDENADAS |
|---|---|---|---|---|
| 0 | 1 | Superficial | 2.00 | ( 8.59, 0.36) ( 8.69, -5.39) ( 17.34, -5.31) ( 17.47, 0.31) |

| | | | | |
|---|---|---|---|---|
| | 2 | Puntual | 10.00 | ( 11.83, -1.18) |
| | 2 | Puntual | 10.00 | ( 14.02, -3.82) |
| | 2 | Puntual | 10.00 | ( 11.86, -2.49) |
| | 2 | Puntual | 10.00 | ( 14.04, -1.16) |
| | 2 | Puntual | 10.00 | ( 11.81, -3.71) |
| | 2 | Puntual | 10.00 | ( 13.96, -2.46) |
| | 2 | Superficial | 0.40 | ( 0.27, 0.41) ( 8.85, 0.20) ( 8.70, -5.35) ( 0.22, -5.33) |
| 1 | 1 | Superficial | 2.00 | ( -0.32, 0.43) ( 17.46, 0.35) ( 17.49, -5.35) ( -0.36, -5.45) |
| | 2 | Puntual | 30.00 | ( 0.45, -2.50) |
| | 2 | Puntual | 30.00 | ( 2.95, -2.50) |
| | 2 | Puntual | 30.00 | ( 1.75, -2.50) |
| | 2 | Puntual | 30.00 | ( 11.77, -2.49) |
| | 2 | Puntual | 30.00 | ( 12.90, -2.49) |
| | 2 | Puntual | 30.00 | ( 14.21, -2.50) |
| | 2 | Lineal | 12.00 | ( 0.25, -2.50) ( 17.23, -2.51) |
| | 3 | Puntual | 30.00 | ( 3.16, -2.53) |
| | 3 | Puntual | 30.00 | ( 4.38, -2.53) |
| | 3 | Puntual | 30.00 | ( 5.53, -2.52) |
| | 3 | Puntual | 30.00 | ( 14.48, -2.49) |
| | 3 | Puntual | 30.00 | ( 15.77, -2.51) |
| | 3 | Puntual | 30.00 | ( 16.81, -2.49) |
| | 4 | Puntual | 30.00 | ( 8.17, -2.50) |
| | 4 | Puntual | 30.00 | ( 6.94, -2.55) |
| | 4 | Puntual | 30.00 | ( 5.71, -2.56) |
| | 5 | Puntual | 30.00 | ( 8.93, -2.48) |
| | 5 | Puntual | 30.00 | ( 10.20, -2.48) |
| | 5 | Puntual | 30.00 | ( 11.66, -2.49) |

## 5.COMBINACIONES CONSIDERADAS

HORMIGON.....: EHE, Control normal
ACEROS CONFORMADOS.....: EA-95
ACEROS LAMINADOS.....: EA-95
DESPLAZAMIENTOS.....: Acciones Caracteristicas
TENSION DEL TERRENO.....: Acciones Caracteristicas
DIMENS. DE VIGAS CENTRADORAS...: EHE, Control normal
EQUILIBRIO DE CIMENTACIONES....: EHE, Control normal

## 6.MATERIALES UTILIZADOS

### 6.1 HORMIGONES

| ELEMENTO | HORMIGON | PLANTAS | FCK Kp/cm2 | GAMMA C |
|---|---|---|---|---|
| Forjados | HA-25 , Control Estadístico | Todas | 255 | 1.50 |
| Cimentación | HA-25 , Control Estadístico | Todas | 255 | 1.50 |
| Pilares y Pantallas | HA-25 , Control Estadístico | Todas | 255 | 1.50 |
| Muros | HA-25 , Control Estadístico | Todas | 255 | 1.50 |

### 6.2 ACEROS POR ELEMENTO Y POSICION

#### 6.2.1.ACEROS EN BARRAS

| ELEMENTO | POSICION | ACERO | FYK Kp/cm2 | GAMMA S |
|---|---|---|---|---|
| Pilares y Pantallas | Barras(Verticales) | B 500 S , Control Normal | 5097 | 1.15 |
| | Estribos(Horizontales) | B 500 S , Control Normal | 5097 | 1.15 |
| Vigas | Negativos(Superior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Positivos(Inferior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Montaje(Superior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Piel(Lateral) | B 500 S , Control Normal | 5097 | 1.15 |
| | Estribos | B 500 S , Control Normal | 5097 | 1.15 |
| Vigas de cimentación | Refuerzo Inferior | B 500 S , Control Normal | 5097 | 1.15 |
| | Superior | B 500 S , Control Normal | 5097 | 1.15 |
| | Inferior | B 500 S , Control Normal | 5097 | 1.15 |
| | Piel | B 500 S , Control Normal | 5097 | 1.15 |
| | Estribos | B 500 S , Control Normal | 5097 | 1.15 |
| Forjados | Punzonamiento | B 500 S , Control Normal | 5097 | 1.15 |
| | Negativos(Superior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Positivos(Inferior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Nervios Negativos | B 500 S , Control Normal | 5097 | 1.15 |
| | Nervios Positivos | B 500 S , Control Normal | 5097 | 1.15 |
| Losas de cimentación | Punzonamiento | B 500 S , Control Normal | 5097 | 1.15 |
| | Negativos(Superior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Positivos(Inferior) | B 500 S , Control Normal | 5097 | 1.15 |

#### 6.2.2.ACEROS EN PERFILES

| TIPO ACERO | ACERO | LIM. ELÁSTICO Kp/cm2 | MÓDULO DE ELASTICIDAD Kp/cm2 |
|---|---|---|---|
| Aceros Conformados | S275 | 2806 | 2100000 |
| Aceros Laminados | S275 | 2806 | 2100000 |

Nombre Obra: ODT 300.40
CONSTRUCTORA HISPANICA

Fecha:03/09/03

## 1. ESFUERZOS DE PILARES, PANTALLAS Y MUROS POR HIPOTESIS

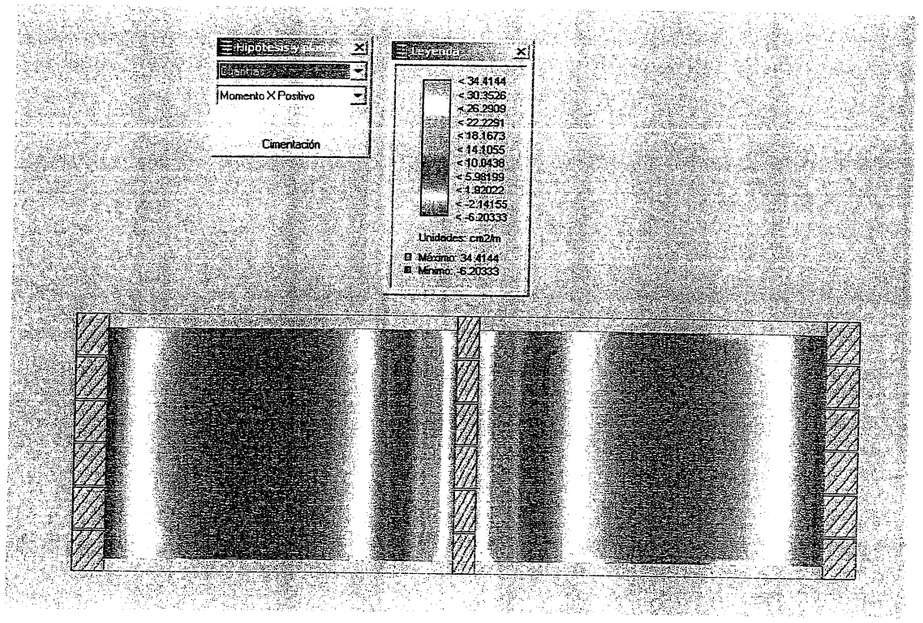
Pl: nº de planta
Tramo: nivel inicial / nivel final del tramo entre plantas.
Los esfuerzos de pilares son en ejes locales.
El sistema de unidades utilizado es
N,Qx,Qy: (Tn) Mx,My,T: (Tn·m)

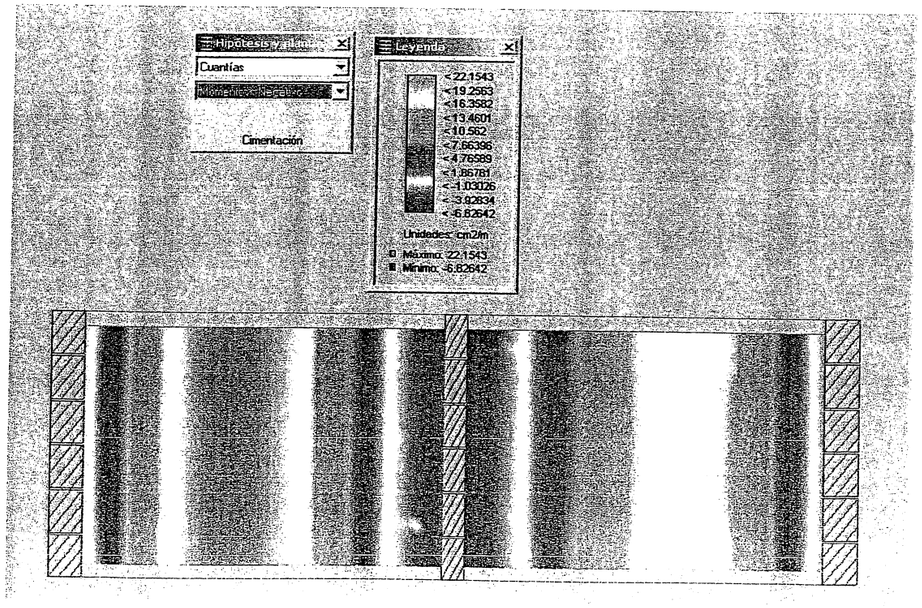
| Pilar | Pl | TRAMO | Hipótesis | Base | | | | | | Cabeza | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | N | Mx | My | Qx | Qy | T | N | Mx | My | Qx | Qy | T |
| P1 | 1 | 0.00/5.70 | Peso propio | 24.49 | -20.79 | 0.07 | -14.96 | 0.02 | -0.00 | 14.34 | -6.40 | -0.02 | 4.79 | 0.02 | -0.00 |
| | | | Sobrecarga uso 1 | 7.56 | -9.51 | -1.12 | -4.81 | -0.36 | -0.00 | 7.56 | -6.46 | 0.91 | 3.74 | -0.36 | -0.00 |
| | | | Sobrecarga uso 2 | 3.43 | -3.69 | -0.22 | 0.04 | -0.07 | -0.01 | 3.43 | -3.93 | 0.20 | 0.04 | -0.07 | -0.01 |
| | | | Sobrecarga uso 3 | 2.13 | 2.22 | -0.02 | 1.07 | -0.01 | -0.00 | 2.13 | -3.90 | 0.03 | 1.07 | -0.01 | -0.00 |
| | | | Sobrecarga uso 4 | -0.33 | 3.19 | -0.04 | 0.62 | -0.01 | -0.00 | -0.33 | -0.34 | 0.02 | 0.62 | -0.01 | -0.00 |
| P3 | 1 | 0.00/5.70 | Peso propio | 44.13 | 1.30 | 0.02 | 0.30 | 0.01 | -0.00 | 37.36 | -0.42 | -0.03 | 0.30 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 24.16 | 2.21 | -0.87 | 0.63 | -0.28 | -0.00 | 24.16 | -1.41 | 0.74 | 0.63 | -0.28 | -0.00 |
| | | | Sobrecarga uso 2 | 11.32 | -1.65 | -0.22 | -0.52 | -0.07 | -0.00 | 11.32 | 1.32 | 0.19 | -0.52 | -0.07 | -0.00 |
| | | | Sobrecarga uso 3 | 5.79 | -1.01 | -0.64 | -0.42 | -0.21 | -0.00 | 5.79 | 1.39 | 0.53 | -0.42 | -0.21 | -0.00 |
| | | | Sobrecarga uso 4 | 6.68 | 1.03 | -0.53 | 0.43 | -0.18 | -0.00 | 6.68 | -1.40 | 0.48 | 0.43 | -0.18 | -0.00 |
| P4 | 1 | 0.00/5.70 | Peso propio | 24.65 | -20.81 | 0.07 | -14.96 | 0.02 | -0.00 | 14.50 | -6.39 | -0.02 | 4.78 | 0.02 | -0.00 |
| | | | Sobrecarga uso 1 | 18.53 | -9.04 | -0.97 | -4.60 | -0.31 | -0.00 | 18.53 | -7.17 | 0.79 | 3.95 | -0.31 | -0.00 |
| | | | Sobrecarga uso 2 | 5.92 | -3.55 | -0.17 | 0.11 | -0.06 | -0.01 | 5.92 | -4.18 | 0.15 | 0.11 | -0.06 | -0.01 |
| | | | Sobrecarga uso 3 | 2.73 | 2.24 | -0.01 | 1.09 | -0.01 | -0.00 | 2.73 | -3.95 | 0.02 | 1.09 | -0.01 | -0.00 |
| | | | Sobrecarga uso 4 | -0.35 | 3.18 | -0.05 | 0.62 | -0.01 | -0.00 | -0.35 | -0.34 | 0.02 | 0.62 | -0.01 | -0.00 |
| P6 | 1 | 0.00/5.70 | Peso propio | 43.75 | 1.29 | 0.01 | 0.30 | 0.00 | -0.00 | 36.98 | -0.41 | -0.01 | 0.30 | 0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 33.68 | 2.26 | -0.74 | 0.65 | -0.24 | -0.00 | 33.68 | -1.46 | 0.64 | 0.65 | -0.24 | -0.00 |
| | | | Sobrecarga uso 2 | 13.87 | -1.72 | -0.19 | -0.55 | -0.06 | -0.00 | 13.87 | 1.40 | 0.16 | -0.55 | -0.06 | -0.00 |
| | | | Sobrecarga uso 3 | 12.80 | -1.12 | -0.57 | -0.46 | -0.19 | -0.00 | 12.80 | 1.53 | 0.49 | -0.46 | -0.19 | -0.00 |
| | | | Sobrecarga uso 4 | 13.51 | 1.12 | -0.45 | 0.46 | -0.15 | -0.00 | 13.51 | -1.52 | 0.43 | 0.46 | -0.15 | -0.00 |
| P7 | 1 | 0.00/5.70 | Peso propio | 24.75 | -20.02 | 0.06 | -14.53 | 0.02 | -0.00 | 14.60 | -6.01 | -0.02 | 2.27 | 0.02 | -0.00 |
| | | | Sobrecarga uso 1 | 26.76 | -8.47 | -0.46 | -4.35 | -0.15 | -0.00 | 26.76 | -8.01 | 0.40 | 4.20 | -0.15 | -0.00 |
| | | | Sobrecarga uso 2 | 7.33 | -3.45 | -0.06 | 0.17 | -0.02 | -0.01 | 7.33 | -4.39 | 0.06 | 0.17 | -0.02 | -0.01 |
| | | | Sobrecarga uso 3 | 3.07 | 2.26 | 0.01 | 1.10 | 0.00 | -0.00 | 3.07 | -4.00 | 0.00 | 1.10 | 0.00 | -0.00 |
| | | | Sobrecarga uso 4 | -0.37 | 3.18 | -0.05 | 0.62 | -0.01 | -0.00 | -0.37 | -0.33 | 0.02 | 0.62 | -0.01 | -0.00 |
| P9 | 1 | 0.00/5.70 | Peso propio | 43.77 | 1.28 | 0.00 | 0.30 | 0.00 | -0.00 | 37.01 | -0.41 | 0.00 | 0.30 | 0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 40.52 | 2.29 | -0.30 | 0.67 | -0.10 | -0.00 | 40.52 | -1.50 | 0.28 | 0.67 | -0.10 | -0.00 |
| | | | Sobrecarga uso 2 | 15.53 | -1.78 | -0.09 | -0.57 | -0.03 | -0.00 | 15.53 | 1.46 | 0.08 | -0.57 | -0.03 | -0.00 |
| | | | Sobrecarga uso 3 | 18.39 | -1.25 | -0.31 | -0.52 | -0.10 | -0.00 | 18.39 | 1.70 | 0.27 | -0.52 | -0.10 | -0.00 |
| | | | Sobrecarga uso 4 | 18.90 | 1.22 | -0.17 | 0.50 | -0.06 | -0.00 | 18.90 | -1.66 | 0.20 | 0.50 | -0.06 | -0.00 |
| P10 | 1 | 0.00/5.70 | Peso propio | 24.83 | -20.86 | 0.06 | -14.98 | 0.01 | -0.00 | 14.67 | -6.36 | -0.03 | 4.77 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 26.76 | -8.47 | 0.41 | -4.36 | 0.14 | -0.00 | 26.76 | -8.01 | -0.38 | 4.19 | 0.14 | -0.00 |
| | | | Sobrecarga uso 2 | 7.43 | -3.47 | 0.07 | 0.16 | 0.02 | -0.01 | 7.43 | -4.41 | -0.05 | 0.16 | 0.02 | -0.01 |
| | | | Sobrecarga uso 3 | 3.13 | 2.26 | 0.04 | 1.10 | 0.01 | -0.00 | 3.13 | -4.01 | -0.02 | 1.10 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | -0.38 | 3.17 | -0.05 | 0.61 | -0.01 | -0.00 | -0.38 | -0.33 | 0.02 | 0.61 | -0.01 | -0.00 |
| P12 | 1 | 0.00/5.70 | Peso propio | 43.80 | 1.27 | 0.00 | 0.29 | 0.00 | -0.00 | 37.03 | -0.40 | -0.00 | 0.29 | 0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 40.51 | 2.28 | 0.37 | 0.66 | 0.12 | -0.00 | 40.51 | -1.49 | -0.32 | 0.66 | 0.12 | -0.00 |
| | | | Sobrecarga uso 2 | 15.65 | -1.80 | 0.03 | -0.58 | 0.01 | -0.00 | 15.65 | 1.48 | -0.04 | -0.58 | 0.01 | -0.00 |
| | | | Sobrecarga uso 3 | 18.67 | -1.27 | 0.18 | -0.52 | 0.07 | -0.00 | 18.67 | 1.72 | -0.19 | -0.52 | 0.07 | -0.00 |
| | | | Sobrecarga uso 4 | 18.39 | 1.19 | 0.34 | 0.49 | 0.11 | -0.00 | 18.39 | -1.62 | -0.30 | 0.49 | 0.11 | -0.00 |
| P13 | 1 | 0.00/5.70 | Peso propio | 24.80 | -20.91 | 0.05 | -14.99 | 0.01 | -0.00 | 14.64 | -6.32 | -0.03 | 4.75 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 18.52 | -9.05 | 0.92 | -4.61 | 0.30 | -0.00 | 18.52 | -7.16 | -0.77 | 3.94 | 0.30 | -0.00 |
| | | | Sobrecarga uso 2 | 6.23 | -3.63 | 0.18 | 0.11 | 0.06 | -0.01 | 6.23 | -4.23 | -0.15 | 0.11 | 0.06 | -0.01 |
| | | | Sobrecarga uso 3 | 2.91 | 2.21 | 0.06 | 1.09 | 0.02 | -0.00 | 2.91 | -3.99 | -0.04 | 1.09 | 0.02 | -0.00 |
| | | | Sobrecarga uso 4 | -0.39 | 3.16 | -0.04 | 0.61 | -0.01 | -0.00 | -0.39 | -0.33 | 0.02 | 0.61 | -0.01 | -0.00 |
| P15 | 1 | 0.00/5.70 | Peso propio | 43.82 | 1.26 | -0.00 | 0.29 | -0.00 | -0.00 | 37.06 | -0.39 | 0.01 | 0.29 | -0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 33.56 | 2.22 | 0.81 | 0.64 | 0.26 | -0.00 | 33.56 | -1.44 | -0.67 | 0.64 | 0.26 | -0.00 |
| | | | Sobrecarga uso 2 | 14.23 | -1.80 | 0.13 | -0.57 | 0.05 | -0.00 | 14.23 | 1.46 | -0.13 | -0.57 | 0.05 | -0.00 |
| | | | Sobrecarga uso 3 | 13.51 | -1.16 | 0.46 | -0.48 | 0.15 | -0.00 | 13.51 | 1.58 | -0.42 | -0.48 | 0.15 | -0.00 |
| | | | Sobrecarga uso 4 | 12.59 | 1.08 | 0.60 | 0.45 | 0.19 | -0.00 | 12.59 | -1.47 | -0.50 | 0.45 | 0.19 | -0.00 |
| P16 | 1 | 0.00/5.70 | Peso propio | 24.70 | -20.95 | 0.05 | -15.00 | 0.01 | -0.00 | 14.55 | -6.32 | -0.03 | 4.75 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 7.53 | -9.54 | 1.08 | -4.82 | 0.34 | -0.00 | 7.53 | -6.44 | -0.89 | 3.73 | 0.34 | -0.00 |
| | | | Sobrecarga uso 2 | 4.04 | -3.83 | 0.23 | 0.03 | 0.07 | -0.01 | 4.04 | -4.00 | -0.19 | 0.03 | 0.07 | -0.01 |
| | | | Sobrecarga uso 3 | 2.51 | 2.17 | 0.07 | 1.07 | 0.02 | -0.00 | 2.51 | -3.95 | -0.05 | 1.07 | 0.02 | -0.00 |
| | | | Sobrecarga uso 4 | -0.40 | 3.15 | -0.04 | 0.61 | -0.01 | -0.00 | -0.40 | -0.32 | 0.02 | 0.61 | -0.01 | -0.00 |
| P18 | 1 | 0.00/5.70 | Peso propio | 44.26 | 1.24 | -0.02 | 0.29 | -0.01 | -0.00 | 37.49 | -0.39 | 0.03 | 0.29 | -0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 23.94 | 2.16 | 0.94 | 0.62 | 0.30 | -0.00 | 23.94 | -1.38 | -0.77 | 0.62 | 0.30 | -0.00 |
| | | | Sobrecarga uso 2 | 11.92 | -1.78 | 0.16 | -0.56 | 0.06 | -0.00 | 11.92 | 1.42 | -0.16 | -0.56 | 0.06 | -0.00 |
| | | | Sobrecarga uso 3 | 6.79 | -1.08 | 0.53 | -0.44 | 0.18 | -0.00 | 6.79 | 1.46 | -0.48 | -0.44 | 0.18 | -0.00 |
| | | | Sobrecarga uso 4 | 5.65 | 0.98 | 0.66 | 0.41 | 0.21 | -0.00 | 5.65 | -1.35 | -0.54 | 0.41 | 0.21 | -0.00 |
| P19 | 1 | 0.00/5.70 | Peso propio | 23.91 | 21.87 | -0.12 | 15.37 | -0.03 | -0.00 | 13.75 | 5.14 | 0.06 | -4.38 | -0.03 | -0.00 |
| | | | Sobrecarga uso 1 | 8.08 | 7.29 | -0.73 | 4.11 | -0.23 | -0.00 | 8.08 | 8.21 | 0.56 | -4.44 | -0.23 | -0.00 |
| | | | Sobrecarga uso 2 | 3.60 | 5.20 | -0.73 | 0.62 | -0.23 | -0.01 | 3.60 | 1.68 | 0.61 | 0.62 | -0.23 | -0.01 |
| | | | Sobrecarga uso 3 | -0.43 | -3.17 | 0.04 | -0.60 | 0.01 | -0.00 | -0.43 | 0.28 | -0.02 | -0.60 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 2.47 | -2.14 | -0.08 | -1.06 | -0.02 | -0.00 | 2.47 | 3.90 | 0.05 | -1.06 | -0.02 | -0.00 |
| P20 | 1 | 0.00/5.70 | Peso propio | 24.09 | 21.81 | -0.10 | 15.36 | -0.03 | -0.00 | 13.94 | 5.14 | 0.05 | -4.39 | -0.03 | -0.00 |
| | | | Sobrecarga uso 1 | 14.27 | 6.86 | -0.61 | 3.94 | -0.19 | -0.00 | 14.27 | 8.75 | 0.47 | -4.61 | -0.19 | -0.00 |
| | | | Sobrecarga uso 2 | 11.22 | 4.87 | -0.63 | 0.48 | -0.20 | -0.01 | 11.22 | 2.15 | 0.53 | 0.48 | -0.20 | -0.01 |
| | | | Sobrecarga uso 3 | -0.42 | -3.18 | 0.04 | -0.61 | 0.01 | -0.00 | -0.42 | 0.28 | -0.02 | -0.61 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 2.90 | -2.18 | -0.07 | -1.07 | -0.02 | -0.00 | 2.90 | 3.94 | 0.05 | -1.07 | -0.02 | -0.00 |
| P21 | 1 | 0.00/5.70 | Peso propio | 24.22 | 21.75 | -0.08 | 15.34 | -0.02 | -0.00 | 14.06 | 5.17 | 0.04 | -4.40 | -0.02 | -0.00 |
| | | | Sobrecarga uso 1 | 18.39 | 6.46 | -0.27 | 3.78 | -0.08 | -0.00 | 18.39 | 9.26 | 0.21 | -4.77 | -0.08 | -0.00 |
| | | | Sobrecarga uso 2 | 17.10 | 4.42 | -0.28 | 0.29 | -0.09 | -0.01 | 17.10 | 2.77 | 0.26 | 0.29 | -0.09 | -0.01 |
| | | | Sobrecarga uso 3 | -0.42 | -3.20 | 0.04 | -0.61 | 0.01 | -0.00 | -0.42 | 0.28 | -0.02 | -0.61 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 3.13 | -2.22 | -0.05 | -1.09 | -0.01 | -0.00 | 3.13 | 3.97 | 0.03 | -1.09 | -0.01 | -0.00 |
| P22 | 1 | 0.00/5.70 | Peso propio | 24.24 | 21.72 | -0.04 | 15.34 | -0.01 | -0.00 | 14.08 | 5.18 | 0.02 | -4.41 | -0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 18.48 | 6.46 | 0.23 | 3.78 | 0.08 | -0.00 | 18.48 | 9.27 | -0.19 | -4.77 | 0.08 | -0.00 |
| | | | Sobrecarga uso 2 | 16.89 | 4.43 | 0.35 | 0.30 | 0.11 | -0.01 | 16.89 | 2.72 | -0.30 | 0.30 | 0.11 | -0.01 |
| | | | Sobrecarga uso 3 | -0.41 | -3.21 | 0.04 | -0.61 | 0.01 | -0.00 | -0.41 | 0.29 | -0.02 | -0.61 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 3.09 | -2.23 | -0.02 | -1.09 | -0.00 | -0.00 | 3.09 | 3.96 | 0.00 | -1.09 | -0.00 | -0.00 |
| P23 | 1 | 0.00/5.70 | Peso propio | 24.14 | 21.71 | -0.02 | 15.33 | -0.00 | -0.00 | 13.98 | 5.18 | 0.00 | -4.41 | -0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 14.38 | 6.86 | 0.58 | 3.94 | 0.18 | -0.00 | 14.38 | 8.77 | -0.46 | -4.61 | 0.18 | -0.00 |
| | | | Sobrecarga uso 2 | 10.96 | 4.77 | 0.69 | 0.46 | 0.22 | -0.01 | 10.96 | 2.16 | -0.56 | 0.46 | 0.22 | -0.01 |
| | | | Sobrecarga uso 3 | -0.39 | -3.21 | 0.04 | -0.61 | 0.01 | -0.00 | -0.39 | 0.29 | -0.02 | -0.61 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 2.75 | -2.20 | -0.00 | -1.07 | 0.00 | -0.00 | 2.75 | 3.91 | -0.02 | -1.07 | 0.00 | -0.00 |
| P24 | 1 | 0.00/5.70 | Peso propio | 23.97 | 21.72 | -0.00 | 15.33 | 0.00 | -0.00 | 13.81 | 5.20 | -0.01 | -4.41 | 0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 8.18 | 7.29 | 0.71 | 4.11 | 0.22 | -0.00 | 8.18 | 8.24 | -0.55 | -4.44 | 0.22 | -0.00 |
| | | | Sobrecarga uso 2 | 3.34 | 5.03 | 0.78 | 0.58 | 0.25 | -0.01 | 3.34 | 1.71 | -0.63 | 0.58 | 0.25 | -0.01 |
| | | | Sobrecarga uso 3 | -0.38 | -3.22 | 0.04 | -0.62 | 0.01 | -0.00 | -0.38 | 0.30 | -0.02 | -0.62 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 2.15 | -2.17 | 0.01 | -1.06 | 0.01 | -0.00 | 2.15 | 3.86 | -0.03 | -1.06 | 0.01 | -0.00 |

ODT 300.4

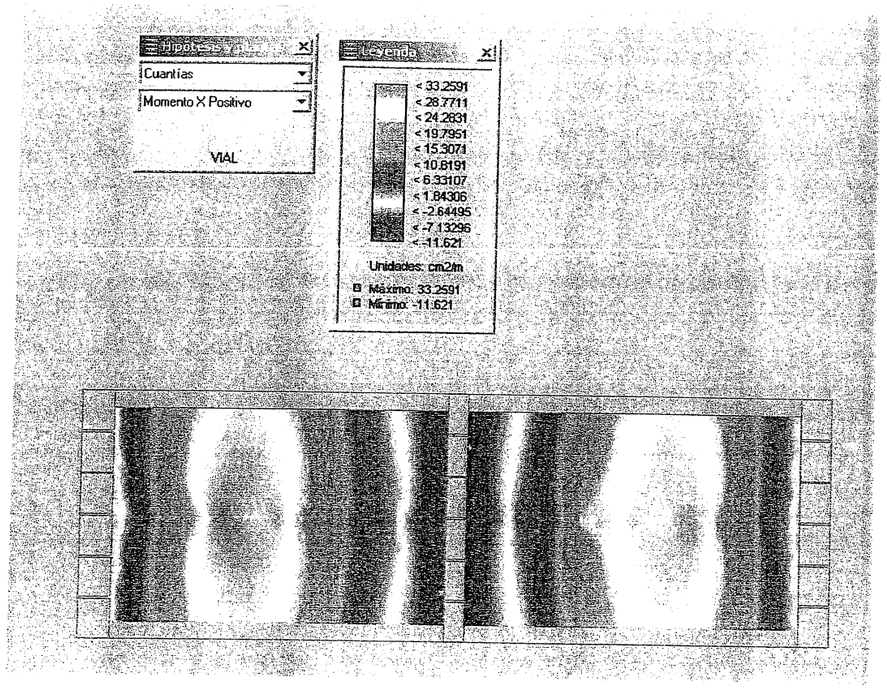
CUANTIAS

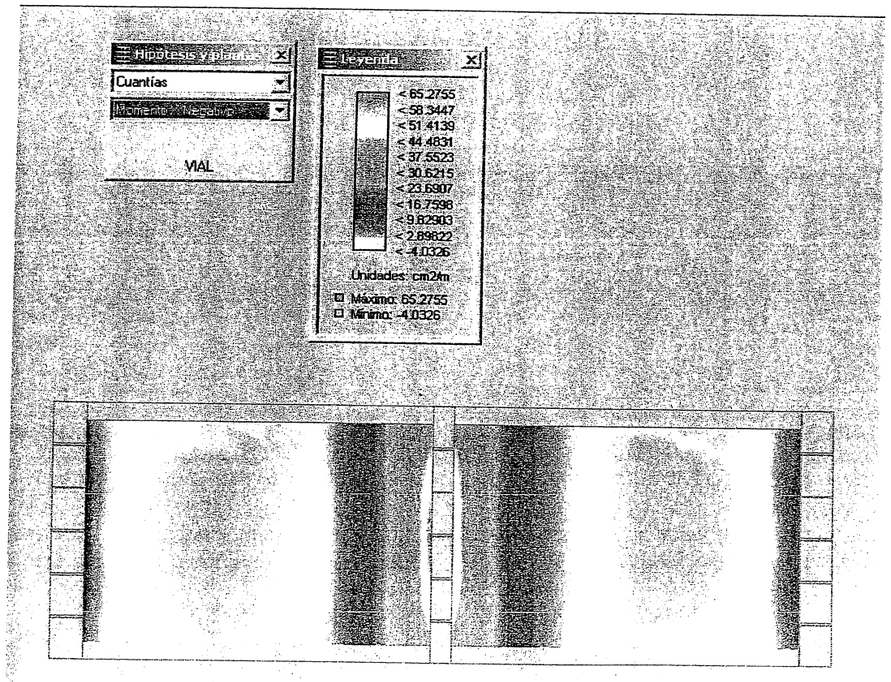
## LOSA CIMENTACIÓN




## LOSA SUPERIOR



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

Obra: AVE MARTORELL
Fecha: 04/12/2003
Hora: 13:49:16

ODT 300.4 y ODT 300.9

## Cálculo de secciones a cortante

### 1 Datos

- Materiales

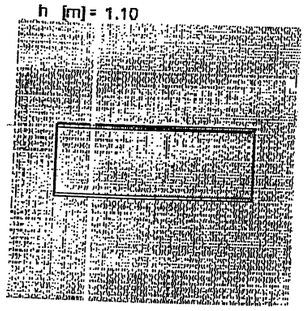
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : LOSA110
b0 [m] = 3.00
h [m] = 1.10



### 2 Dimensionamiento

Esfuerzo cortante de cálculo Vd [kN] = 1900

Inclinación de las bielas [°] = 45
Inclinación de los cercos [°] = 90.0
ρ [-1.E-3] = 4
Nd [kN] = 0.0
σxd [MPa] = 0.0
σyd [MPa] = 0
θe [°] = 45.0



| ϕ [mm] | Separación [mm] | nº ramas | Area [cm²/m] | Tipo | Vsu [kN] | Vu2 [kN] |
|---|---|---|---|---|---|---|
| ø 6 | --- | --- | --- | --- | --- | --- |
| ø 8 | --- | --- | --- | --- | --- | --- |
| ø 10 | 0.10 | 4 | 31.4 | 2 | 1193.8 | --- |
| ø 12 | 0.15 | 4 | 30.2 | 2 | 1146.1 | --- |

Área estricta [cm²/m] = 25.0
(Cuantía mínima)
Vu1 [kN] = 15750.0
Vcu [kN] = 974.8

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

Obra: AVE MARTORELL
Fecha: 04/12/2003
Hora: 13:51:52

ODT 300.4 y ODT 300.9

## Cálculo de secciones a cortante

### 1 Datos

- Materiales

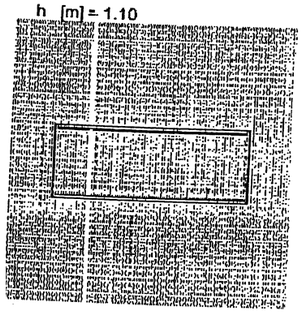
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : LOSA110
b0 [m] = 3.00
h [m] = 1.10



### 2 Dimensionamiento

Esfuerzo cortante de cálculo Vd [kN] = 1750

Inclinación de las bielas [°] = 45
Inclinación de los cercos [°] = 90.0
ρ [·1.E-3] = 4
Nd [kN] = 0.0
σxd [MPa] = 0.0
σyd [MPa] = 0
θe [°] = 45.0



| ϕ [mm] | Separación [mm] | nº ramas | Area [cm²/m] | Tipo | Vsu [kN] | Vu2 [kN] |
|---|---|---|---|---|---|---|
| ø 6 | --- | --- | --- | --- | --- | --- |
| ø 8 | --- | --- | --- | --- | --- | --- |
| ø 10 | 0.10 | 4 | 31.4 | 2 | 1193.8 | --- |
| ø 12 | 0.15 | 4 | 30.2 | 2 | 1146.1 | --- |

Área estricta [cm²/m] = 25.0
(Cuantía mínima)
Vu1 [kN] = 15750.0
Vcu [kN] = 974.8

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

Obra: AVE MARTORELL
Fecha: 04/12/2003
Hora: 14:10:32

ODT 300.4 y ODT 300.9

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

## 1 Datos

- Materiales

Tipo de hormigón: HA-25
Tipo de acero: B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00

- Ambiente

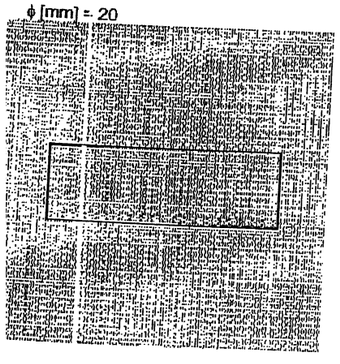
Clase general de exposición : I
Clases específicas de exposición : Qb

- Geometría de la sección

Sección : LOSA100
b [m] = 3.00
h [m] = 1.00

- Armado de la sección

ϕ [mm] = 20



| Capa | nº barras | Separación [mm] |
|---|---|---|
| 1 | 21 | 55.0 |
| 2 | 21 | 55 |

As [cm²] = 131.9
Ac,ef [cm²] = 6975.0



## 2 Resultados

Mk [kN·m] = 1900

Separación media entre fisuras sm [mm] = 172.0
Deformación media de las armaduras εsm [·1.E-3] = 0.64
Tensión en las armaduras en el instante de fisuración σsr [MPa] = 130.4
Tensión en las armaduras en servicio σs [MPa] = 176.5
Abertura característica de fisura wk [mm] = 0.19

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

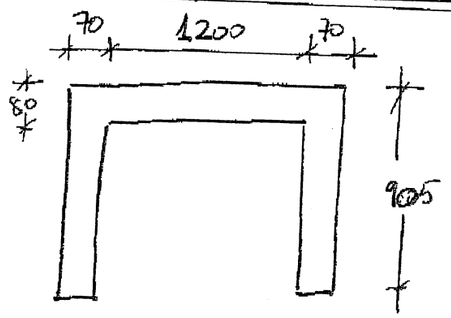
JC-968 | __/__/03 | Ingeniería y Arquitectura

OBRA: TUNELES L.A.V. -MARTORELL-
CLIENTE: CONSTRUCTORA HISPANICA

VALLADARES

Cálculo hastiales obra singular

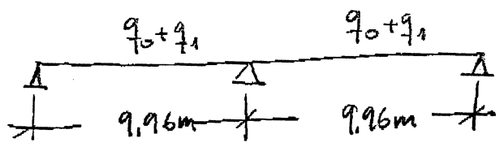
Hoja 1 de 2



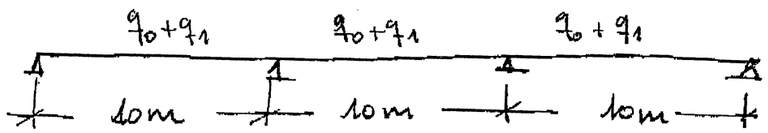

Cargas permanentes: $0,80 \times 2,50 + 2 = 4\ t/m^2$

Sobrecargas: $0,50\ t/m^2$

ODT 300.4 - ODT 300.9




ODT 300.2




$q_0 = 4 \times \frac{12}{2} + 0,70 \times 9,05 \times 2,50 = 39,84\ t/m$

$q_1 = 0,50 \times \frac{(12 + 2 \times 0,70)}{2} = 3,35\ t/m$

OBSERVACIONES



JC-968 | __/__/03 | Ingeniería y Arquitectura

OBRA: TUNELES L.A.V. -MARTORELL-
CLIENTE: CONSTRUCTORA HISPANICA

VALLADARES

Cálculo hastiales obra singular

Hoja 2 de 2

Calculamos los hastiales como vigas de gran canto (viga pared) continuas.

Según la Instrucción EHE las tracciones producidas bajo carga uniformemente distribuida de valor $p_d$

Son:

$T_{1d} = 0,16\ p_d \cdot l$

$T_{2d} = 0,20 \times p_d \cdot l$

$P_d = 1,50 \times 39,84 + 1,6 \times 3,35 = 65,20\ t/m$

$l = 10\ m$

* $T_{1d} = 0,16 \times 65,2 \times 10 = 104,33\ t$

$T_{1d} = A_s \times f_{yd}$ con $f_{yd} \leq 400\ N/mm^2$

$A_s = \frac{T_{1d}}{f_{yd}} = \frac{104,33 \times 1000\ kg}{4000\ kg/cm^2} = 26,08\ cm^2 \Rightarrow 6\phi 25$

* $T_{2d} = 0,20 \times 65,20 \times 10 = 130,4\ t$

$T_{2d} = A_s \times f_{yd}$ con $f_{yd} \leq 400\ N/mm^2$

$A_s = \frac{130,40 \times 1000\ kg}{4000\ kg/cm^2} = 32,60\ cm^2 \rightarrow 7\phi 25$

Esta armadura ha de repartirse en una altura $0,6 \times l = 6\ m$

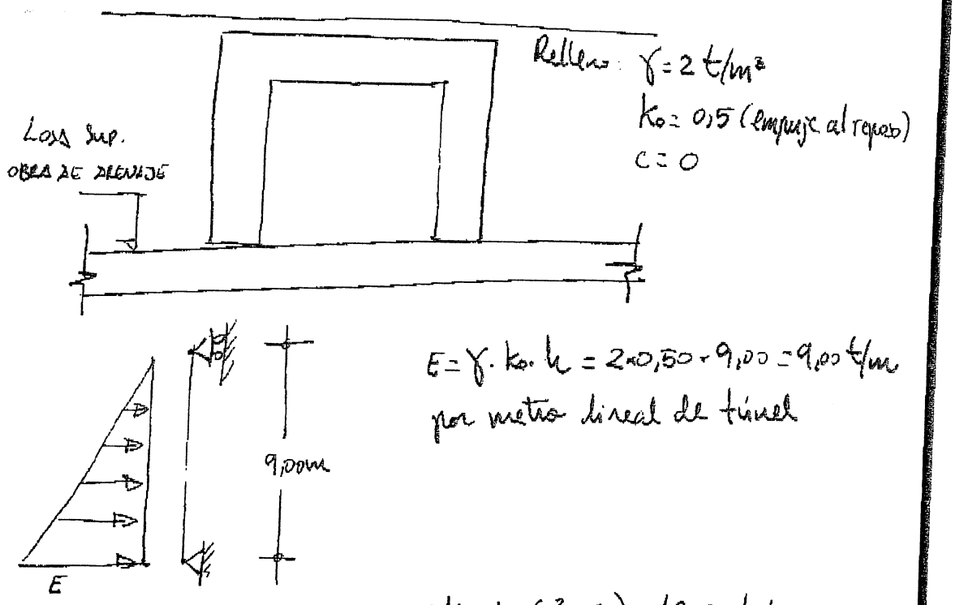
OBSERVACIONES

JC-968 | __/__/03 | Ingeniería y Arquitectura

OBRA: TUNELES L.A.V. -MARTORELL -
CLIENTE: CONSTRUCTORA HISPANICA

VALLADARES

Hoja 1 de 1




$E = \gamma \cdot k_0 \cdot h = 2 \times 0{,}50 \times 9{,}00 = 9{,}00$ t/m por metro lineal de túnel

Reacción en el apoyo inferior: $V_d = 1{,}6 \times \left(\frac{q^2}{2} \times \frac{2}{3}\right) = 43{,}20$ t/m

$$V_d = A_{s90} \times \frac{f_{yd}}{\sqrt{3}}$$

$$A_{s90} = \frac{43{,}20 \times 1000 \text{ kg}}{\frac{5100/1{,}15}{\sqrt{3}}} = 16{,}87 \text{ cm}^2 \text{ por metro lineal}$$

OBSERVACIONES

**O.D.T- 300.9.**

# LINEA DE ALTA VELOCIDAD. MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA

## TRAMO: SANT ESTEVE SESROVIRES-MARTORELL

**ANEJO DE CALCULO:**

**O.D.T.300.9.**

# O.D.T. 300.9

## ÍNDICE


1. INTRODUCCIÓN
2. BASES DE CÁLCULO
3. INSTRUCCIONES Y NORMAS CONSIDERADAS
4. DESCRIPCIÓN DE LOS PROGRAMAS DE ORDENADOR UTILIZADOS
5. MATERIALES Y COEFICIENTES DE MAYORACIÓN
6. ACCIONES
   - ACCIÓN PERMANENTE (G): PESO PROPIO
   - ACCIÓN PERMANENTE DE VALOR NO CONSTANTE (G*): ACCIONES DEBIDAS AL TERRENO
   - ACCIÓN VARIABLE (Q): SOBRECARGAS DE USO
   - ACCIONES ACCIDENTALES (A)
     - ACCIONES SÍSMICAS
7. HIPÓTESIS DE CARGA Y COEFICIENTES DE MAYORACIÓN
   - 7.1. VALORES REPRESENTATIVOS DE LAS ACCIONES
   - 7.2. VALORES DE CÁLCULO DE LAS ACCIONES
   - 7.3. COMBINACIÓN DE ACCIONES
8. MODELO DE CÁLCULO
9. O.D.T. 300.9
   - 9.1. GEOMETRÍA BÁSICA
   - 9.2. ANÁLISIS DE ESFUERZOS
   - 9.3. ARMADO GENERAL
   - 9.4. EMBOCADURAS

# 1.- INTRODUCCIÓN

Se trata de marco bicelular m, por el que pasa el Camino de Torrent del Llops, y por el otro el propio Torrent del Llops. El punto de intersección entre el Camino y el tronco de la L.A.V. son los:

$$P.K._{LAV}\ 300+920.475\text{-}P.K._{CAMINO}\ 0+707.251$$

Presenta un esviaje respecto a la L.A.V. de 33.4317$^g$, tiene una longitud de 52.78m, con una distancia mínima desde carril hasta superficie del dintel de 1.10 m. La sección transversal del marco es la siguiente:

Gálibo vertical: 5.30 m
Gálibo horizontal: 2x8.00 m
Canto cimentación: 1.00 m
Espesor hastiales extremos: 0.75 m
Espesor hastial intermedio: 0.50 m
Canto dintel: 0.70 m

El marco presenta unas cartelas superiores tanto en los hastiales exteriores como en el interior de 0.70 m V: 1.10 m H. Y unas catelas inferiores en el hastial central de 0.55 m V: 1.10 m H.

El marco se realizará horizontal en toda su longitud, por lo que para el caso del Torrent del Llops se colocará sobre la solera un hormigón de forma con pendiente longitudinal del 0.50%, para adaptarse correctamente al terreno. Para el marco del camino, se colocará la sub-base necesaria sobre la losa para alcanzar su rasante. La cota de la superficie de la solera es la 59.484. Con esta cota y con el gálibo vertical de 4.30 m se consigue un gálibo de 3.80 m para el camino como la distancia mínima de 1.10 m entre el dintel del marco y el carril.

Como ya se ha explicado en apartados anteriores, el marco tendrá unos voladizos en la zona de cruce con el tronco de la L.A.V., para apoyar los muretes guía de la estructura tipo viga del tramo cubierto. La longitud de estos voladizos es variable desde 0.73 a 2.80 m (según la dirección de esviaje).

El condicionante para el dimensionamiento del marco es en este caso el recubrimiento de tierras (10.05 m) que viene del vertido de la estructura del tramo cubierto.

El Marco tendrá unas aletas orientadas entre 12.00° y 46.50° respecto al eje del marco, según las necesidades del terreno en cada punto. El hastial intermedio conectará con unos muretes que avanzan con el camino del Torrent del LLops.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. Fecha JUNIO-2002 Página de

El Bloque Técnico esta formado por una cuña de transición compuesta por material granular y material granular tratado con cemento, que ocupa 14.00m desde el eje de la L.A.V. y que se extiende 20.00 m a cada lado del mismo, acabando con un talud 3H:2V.

Tanto a la entrada como a la salida de las obras de drenaje se colocarán unas losas de hormigón, y unos rastrillos de 1.00 m de profundidad para evitar la erosión del cauce.

Madrid, Mayo de 2002

## 2.- BASES DE CÁLCULO

El dimensionamiento de las estructuras se ha realizado según los principios de mecánica racional, con su adaptación al diseño estructural, establecida por la práctica ingenieril. Se han tenido en cuenta las normas de obligado cumplimiento en el territorio español, así como las recomendaciones y la normativa internacional de aplicación, cuando proceda. De acuerdo con ellas, el cálculo se ha realizado siguiendo el principio de los Estados Límites, que establece que la seguridad de la estructura en conjunto, o cualquiera de sus partes, se garantiza comprobando que la solicitación no supera la respuesta última de las mismas. Este formato de seguridad se expresa sintéticamente mediante la siguiente desigualdad:

$$Sd \leq Rd$$

Donde Sd representa la solicitación de cálculo aplicable en cada caso, y Rd la respuesta última de la sección o elemento.

Para la aplicación de este criterio de seguridad, se consideran tanto situaciones de servicio, como de agotamiento, esto es, Estados Límites de Servicio (ELS) y de Agotamiento (ELU), de acuerdo con las definiciones dadas para los mismos en las normativas de referencia. En principio, los Estados Límites Ultimos están asociados a la Rotura de las secciones o elementos. Para ellos, se evalúan las solicitaciones mediante la mayoración de los valores representativos de las acciones (en general característicos) utilizando los oportunos coeficientes parciales que luego se detallan. Las resistencias de las secciones o elementos se estiman mediante las características geométricas, y las resistencias minoradas de los materiales.

Por el contrario, los Estados Límites de Servicio están asociados a la pérdida de funcionalidad de la estructura. Las solicitaciones se evalúan mediante sus valores representativos, en general sin mayorar, afectados de los oportunos coeficientes de combinación, para tener en cuenta la probabilidad de ocurrencia simultanea de varias acciones. Las resistencias se estiman a partir de los valores nominales de las dimensiones y resistencias de los elementos o secciones de la estructura, sin minorar.

Los cálculos se realizará mediante programas informáticas de aplicación general al cálculo de estructuras, así como mediante programas propios de diseño de elementos particulares. Los cálculos por ordenador se justifican mediante los oportunos listados de datos y resultados incluidos en el presente anejo. Adicionalmente, cuando sea preciso para la correcta comprensión de los resultados, así como para su oportuno chequeo, se realizarán comprobaciones manuales aproximadas, que justifiquen los órdenes de magnitud.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. | Fecha JUNIO-2002 | Página de

## 3.- INSTRUCCIONES Y NORMAS APLICADAS

El dimensionamiento general de las estructuras se ha realizado conforme a las instrucciones principales siguientes:

| | |
|---|---|
| Acciones : | IAP-98 |
| Hormigón Armado: | EHE-98 |
| Estructura Metálica y Mixta: | NBE-EA-95,RPM-95,RPX-95 |

No obstante, para realizar el dimensionamiento completo, se han considerado una lista de normas e instrucciones de referencia más amplia, que se detallan a continuación.

* EHE-98, Instrucción de Hormigón Estructural. Real Decreto 2661/1998, de 11 de Diciembre.
* Instrucción relativa a las acciones a considerar en el Proyecto de Puentes de Ferrocarril, aprobada por Orden de 25 de Junio de 1975.
* IAP-98, Instrucción sobre las acciones a considerar en el Proyecto de puentes de carretera
  * Instrucción para el proyecto y ejecución de las obras de hormigón en masa o armado, EH-91, aprobada por Real Decreto 1039/1991 de 28 de Junio.
  * Instrucción para el proyecto y la ejecución de obras de hormigón pretensado, EP-93, aprobada por Real Decreto 805/1993, de 28 de Mayo.
  * Norma de Construcción Sismorresistente NCSE-94: Parte General y Edificación.
  * Norma sismorresistente PDS-1 (1974), aprobada por Decreto 3209/1974, de 30 de Agosto.
  * Recomendaciones para el proyecto y ejecución de pruebas de carga en puentes de carreteras, publicadas en 1988 por el MOPU.
  * Recomendaciones para el proyecto y ejecución de pruebas de carga en puentes de ferrocarril.
  * Instrucción EM-62 para Estructuras de Acero. Instituto Eduardo Torroja.
  * Cálculo de Estructuras de Acero Laminado en Edificación. NB-MV-103/72.
  * European Recomendations for Steel Construction. ECCS/CECM/EKS. 1.978.
  * Recomendaciones para el cálculo de Estructuras Mixtas de la Comisión Conjunta IABSE-CEB-FIP-CECM(1975).
  * Eurocódigos
    ENV 1991 : EC1 - Bases de diseño y acciones
    ENV 1992 : EC2 - Estructuras de Hormigón
    ENV 1993 : EC3 - Estructuras Metálicas
    ENV 1994 : EC4 - Estructuras Mixtas.
  * Código Modelo CEB-FIP para Estructuras de Hormigón MC-90 .
  * Recomendaciones para el Proyecto de Puentes Metálicos de Carretera. RPM-95. Ministerio de Fomento.
  * Recomendaciones para el Proyecto de Puentes Mixtos de Carretera. RPX-95. Ministerio de Fomento.
  * Recomendaciones CIRIA para el diseño de bloques de anclaje de pretensado.
  * Recomendaciones para el cálculo de apoyos del Ministerio de Fomento.

## 4.- DESCRIPCIÓN DE LOS PROGRAMAS DE ORDENADOR UTILIZADOS

Para el desarrollo de los cálculos estructurales se han empleado fundamentalmente dos programas comerciales, suficientemente conocidos y sancionados por la práctica:

1. GT-Strudl:
   Cálculo matricial de estructuras de barras, por el método de los elementos finitos.
   Cálculo tridimensional.

2. FAGUS-2/3:
   Control de secciones de hormigón armado o pretensado, implementando los diagramas tensión-deformación y dominios de rotura que se establecen en la Instrucción EHE

Adicionalmente se emplean programas propios de preprocesamiento y postproceso de los anteriores, cuya única misión es la de agilizar la manipulación de datos y resultados.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. Fecha JUNIO-2002 Página de

## 5.- MATERIALES Y COEFICIENTES DE PONDERACIÓN.

Las características de los materiales que se consideran en el presente Anejo son las detalladas en la siguiente tabla:

**Hormigones:**

Según EHE, control de ejecución Intenso para el tablero y normal para el resto:

| ELEMENTO | HORMIGON | $\gamma_c$ | *Recubrimiento [mm]* | $E_c$ *[kp/cm²]* |
|---|---|---|---|---|
| CIMENTACIONES | HA-25/P/20/IIa | 1.50 | 30 | 278 000 |
| ALZADOS | HA-25/P/20/IIa | 1.50 | 30 | 278 000 |
| DINTELES | HA-25/P/20/IIa | 1.50 | 30 | 278 000 |
| NIVELACION Y LIMPIEZA | HM-15 | | No estructural | |

**Acero Pasivo:**

Todos los elementos serán del tipo: **B 500-S**, de acuerdo con EHE

El límite elástico del acero será
$f_y$ = 5100 kp/cm²
El coeficiente de minoración del acero adoptado es $\gamma_s$ = 1.15

# 6.- ACCIONES

Las acciones consideradas en el dimensionamiento del Marco se expresan a continuación:

## ACCIÓN PERMANENTE (G): PESO PROPIO

Peso Propio: Según sección, con $\gamma$=2.50 Tn/m$^3$

## ACCIÓN PERMANENTE DE VALOR NO CONSTANTE (G*): ACCIONES DEBIDAS AL TERRENO

Se realizan los cálculos considerando dos posibles situaciones en cuanto al empuje de Tierras:

*a) Fases Constructivas:*

Marco "in situ": Tiene en cuenta la posibilidad de un llenado parcial del trasdós del marco (no hasta cota final), considerando un posible desequilibrio entre un hastial y otro, por haberse colocado una tongada más en un lado que en otro. El número de fases constructivas debido a este fenómeno viene determinado por la altura del Marco y el espesor de la tongada en desequilibrio, que en nuestro caso ha sido fijada en e=0.80m.

b) Marco en Servicio:

Se considera el empuje provocado por el relleno de tierras hasta cota final, así como su peso sobre el dintel.

En ambas situaciones (constructiva o servicio) el Coeficiente de empuje tomado será el pésimo entre activo y reposo, en función de la envolvente de esfuerzos estudiada.

El ángulo de rozamiento interno del terreno se fija en $\phi$=30°.

El peso de las tierras se estima con $\gamma$=2.00 Tn/m3.

Tal y como se vio en el Anejo de cálculo de la ODT 300.4, es mas desfavorable la acción del relleno de tierras proviniente de la estructura del túnel artificial tramo cubierto, que el pequeño relleno de tierras del balasto más la carga ferroviaria, por lo que solo se considerara la primera, con un relleno de tierras de 10.15 m

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. Fecha JUNIO-2002 Página de

## ACCIÓN VARIABLE (Q): SOBRECARGAS DE USO

Se consideran dos situaciones en cuanto a las sobrecargas:

*a) Construcción:*

Se considera la actuación de una sobrecarga durante fases constructivas de 1.0 Tn/m$^2$ para el caso del Marco "in situ".

*b) Marco en Servicio:*

S.C. en rellenos laterales:

Para la hipótesis de relleno de 10.15 m se considera 1.0 Tn/m$^2$.

S.C. sobre Marco:

Para la hipótesis de relleno de 10.15 m se considera 1.0 Tn/m$^2$.

S.C. en Losa Inferior:

Se considera una SCU de 0.40 Tn/m$^2$ sobre la Solera.

Igualmente se considera un paseo del V.P. en de 60 T.

Adicionalmente se considera una sobrecarga accidental por inundación del marco.

### ACCIONES ACCIDENTALES (A)

ACCIONES SÍSMICAS

Según las Bases de Cálculo y la norma NCSE-94, los parámetros a considerar son los siguientes:

- $a_b < 0.04 \cdot g$ (aceleración sísmica máxima en el tramo).

El coeficiente de nivel de daño, $\gamma_i = 1.0$ (Período de retorno de 50 años)

- $a_c = \gamma_i \cdot a_b = 0.04 \cdot g$ (aceleración sísmica de cálculo).

***No es necesario considerar esta acción por ser $a_c = \gamma_i \cdot a_b < 0.06g$***



# 7.- HIPÓTESIS DE CARGA Y COEFICIENTES DE MAYORACIÓN

## 7.1.- VALORES REPRESENTATIVOS DE LAS ACCIONES.

Según EHE: Acciones Variables; Coeficientes de Combinación.

| | $\Psi_{0,i}$ (Valor de Combinación) | $\Psi_{1,i}$ (Valor Frecuente) | $\Psi_{2,i}$ (Valor Cuasi-Permanente) |
|---|---|---|---|
| Sobrecargas. | 0.60 | 0.50 | 0.20 |

## 7.2.- VALORES DE CÁLCULO DE LAS ACCIONES.

De acuerdo con EHE, para control de ejecución Intenso

ESTADO LÍMITE ÚLTIMO:

| | $\gamma_{desfavorable}$ | | $\gamma_{favorable}$ | |
|---|---|---|---|---|
| | Construcción | Servicio | Construcción | Servicio |
| Permanentes. | 1.35 | 1.35 | 1.00 | 1.00 |
| Peso y Empuje de Tierras. | 1.35 | 1.50 | 1.00 | 1.00 |
| Sobrecargas. | 1.35 | 1.50 | 0.00 | 0.00 |

Nota: Para el empuje de tierras se toma siempre el empuje más desfavorable entre el activo y el reposo

ESTADO LÍMITE SERVICIO :

| | $\gamma_{desfavorable}$ | $\gamma_{favorable}$ |
|---|---|---|
| Permanentes. | 1.00 | 1.00 |
| Peso y Empuje de Tierras. | 1.00 | 1.00 |
| Sobrecargas. | 1.00 | 0.00 |

Nota: Para el empuje de tierras se toma siempre el empuje más desfavorable entre el activo y el reposo

### 7.3.- COMBINACIÓN DE ACCIONES.

ESTADO LÍMITE ÚLTIMO:

Según EHE:

$$\sum_{j\geq 1}\gamma_{G,j}\cdot G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\gamma_{Q,1}\cdot Q_{K,1}+\sum_{i>1}\gamma_{Q,i}\cdot\Psi_{0,i}\cdot Q_{K,i}$$

Donde:

$G_{K,j}$ = *Valor Representativo de cada Acción Permanente.*

$G^*_{K,j}$ = *Valor Representativo de cada Acción Permanente de Valor no Constante.*

$P_K$ = *Valor Representativo de la Acción del Pretensado.*

$Q_{K,1}$ = *Valor Representativo (Valor Característico) de la Acción Variable Dominante.*

$\Psi_{0,i}\cdot Q_{K,i}$ = *Valor Representativos (Valores de Combinación) de las Acciones Variables Concomitantes con la Acción Variable Dominante.*

- *Si la Acción de Sobrecarga es considerada como Dominante, se tomará ésta con su Valor Representativo y la Acción del Viento con su Valor Reducido (reducción del 50%), aplicándose además los coeficientes $\psi_i$ pertinentes.*

- *Si la Acción del Viento es considerada como Dominante, se tomará ésta con su Valor Representativo y NO se considerará la actuación simultanea de la Acción de la Sobrecarga de Uso.*



ESTADO LÍMITE DE SERVICIO:

Según EHE:

- *Combinación Característica.(poco probable o rara)*

$$\sum_{j\geq 1}G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\gamma_{Q,1}\cdot Q_{K,1}+\sum_{i>1}\gamma_{Q,i}\cdot\Psi_{0,i}\cdot Q_{K,i}$$

- *Combinación Frecuente.*

$$\sum_{j\geq 1}G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\gamma_{Q,1}\cdot\Psi_{1,1}\cdot Q_{K,1}+\sum_{i>1}\gamma_{Q,i}\cdot\Psi_{2,i}\cdot Q_{K,i}$$

- *Combinación Cuasi-Permanente.*

$$\sum_{j\geq 1}G_{K,j}+\sum_{i\geq 1}\gamma_{G^*,j}\cdot G^*_{K,i}+\gamma_P\cdot P_K+\sum_{i\geq 1}\gamma_{Q,i}\cdot\Psi_{2,i}\cdot Q_{K,i}$$

En cuanto al Viento, es de aplicación lo dicho para el Estado Límite Último.

# 8.- MODELO DE CÁLCULO

El cálculo se realiza mediante un proceso automático, de tal forma que tras la introducción de la geometría básica mediante una serie de dimensiones que la definen, se procede a formar un modelo con barras de iguales características mecánicas que las secciones que representan.

También se introducen en dicho cálculo automático las situaciones de carga descritas en el apartado anterior, de tal forma que el programa procede a formar los ficheros de cálculo necesarios para ser procesados por el programa de cálculo matricial de estructuras.

Así mismo produce una serie de ficheros de postproceso de resultados.

A continuación se ofrecen los parámetros introducidos para el cálculo de la estructura, que se particularizarán para cada una de las estructuras consideradas.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. Fecha JUNIO-2002 Página de

# 9. O.D.T. 300.9

## 9.1. GEOMETRÍA BÁSICA

El marco a calcular tiene las dimensiones siguientes:

Gálibo horizontal, según la normal: 8.00 m
Gálibo esviado ($\alpha$=30.09°): 9.25 m
Gálibo vertical: 4.30
Espesor de Solera: 1.00 m
Espesor de Hastiales exteriores: 0.75 m
Espesor de Hastial interior: 0.50 m
Espesor de Dintel: 0.70 m
Cartelas superiores: 1.10 m H: 0.70 m V
Cartelas superiores: 1.10 m H: 0.55 m V

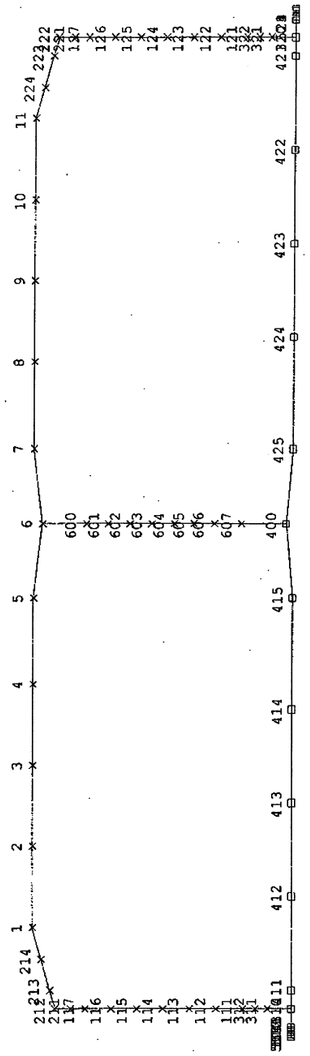
Dadas las características de la cimentación y su variación de propiedades a lo largo del conjunto de la estructura, se ha considerado conservadoramente un coeficiente de balasto vertical de 1.50 kp/cm$^3$

Las hojas siguientes resumen recogen los datos geométricos y de cargas considerados.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. Fecha JUNIO-2002 Página de

# MODELO NUMÉRICO.



Meters Metric Tons

**Fichero: MARCO.GEO**

```
STRUDL 'GEO' 'L.A.V.MARTORELL. : ODT 300.9.'
 UNITS  M MTON RADIANS CENTIGRADE SECONDS
TYPE SPACE FRAME
$ COORDENADAS
JOINT COORDS
$ NUDO   X    Y    Z
1 -8.240 5.750 0.000
2 -6.592 5.750 0.000
3 -4.944 5.750 0.000
4 -3.296 5.750 0.000
5 -1.520 5.750 0.000
6 0.000 5.575 0.000
7 1.520 5.750 0.000
8 3.296 5.750 0.000
9 4.944 5.750 0.000
10 6.592 5.750 0.000
11 8.240 5.750 0.000
111 -9.885 1.500 0.000
112 -9.885 2.033 0.000
113 -9.885 2.567 0.000
114 -9.885 3.100 0.000
115 -9.885 3.633 0.000
116 -9.885 4.167 0.000
117 -9.885 4.700 0.000
121 9.885 1.500 0.000
122 9.885 2.033 0.000
123 9.885 2.567 0.000
124 9.885 3.100 0.000
125 9.885 3.633 0.000
126 9.885 4.167 0.000
127 9.885 4.700 0.000
211 -9.885 4.998 0.000
212 -9.885 5.297 0.000
213 -9.510 5.400 0.000
214 -8.875 5.575 0.000
221 9.885 4.998 0.000
222 9.885 5.297 0.000
223 9.510 5.400 0.000
224 8.875 5.575 0.000
310 -9.885 0.500 0.000
311 -9.885 1.000 0.000
312 -9.885 1.250 0.000
320 9.885 0.500 0.000
321 9.885 1.000 0.000
```

```
322 9.885 1.250 0.000
400 0.000 0.6375 0.000
411 -9.510 0.500 0.000
412 -7.608 0.500 0.000
413 -5.706 0.500 0.000
414 -3.804 0.500 0.000
415 -1.520 0.500 0.000
421 9.510 0.500 0.000
422 7.608 0.500 0.000
423 5.706 0.500 0.000
424 3.804 0.500 0.000
425 1.520 0.500 0.000
511 -10.260 0.500 0.000
512 -10.310 0.500 0.000
513 -10.360 0.500 0.000
514 -10.410 0.500 0.000
515 -10.460 0.500 0.000
521 10.260 0.500 0.000
522 10.310 0.500 0.000
523 10.360 0.500 0.000
524 10.410 0.500 0.000
525 10.460 0.500 0.000
600 0.000 4.700 0.000
601 0.000 4.250 0.000
602 0.000 3.800 0.000
603 0.000 3.350 0.000
604 0.000 2.900 0.000
605 0.000 2.500 0.000
606 0.000 2.100 0.000
607 0.000 1.550 0.000


$ CONECTIVIDAD DE ELEMENTOS
MEMBER INCI
$ Dintel
 1              1              2
 2              2              3
 3              3              4
 4              4              5
 5              5              6
 6              6              7
 7              7              8
 8              8              9
 9              9              10
 10             10             11
$ Hastiales
 111            111            112
```

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. Fecha JUNIO-2002 Página de

```
 112            112            113
 113            113            114
 114            114            115
 115            115            116
 116            116            117
 121            121            122
 122            122            123
 123            123            124
 124            124            125
 125            125            126
 126            126            127
 600            600            6
 601            601            600
 602            602            601
 603            603            602
 604            604            603
 605            605            604
 606            606            605
 607            607            606
 608            400            607
$ Cartelas superiores
 210            117            211
 211            211            212
 212            212            213
 213            213            214
 214            214            1
 220            127            221
 221            221            222
 222            222            223
 223            223            224
 224            224            11
$ Cartelas Inferiores
 310            310            311
 311            311            312
 312            312            111
 320            320            321
 321            321            322
 322            322            121
$ Talones Zapata
 510            310            511
 511            511            512
 512            512            513
 513            513            514
 514            514            515
 520            320            521
 521            521            522
 522            522            523
```

```
 523            523            524
 524            524            525
$ Punteras Zapata
 410            310            411
 411            411            412
 412            412            413
 413            413            414
 414            414            415
 415            415            400
 420            320            421
 421            421            422
 422            422            423
 423            423            424
 424            424            425
 425            425            400

$ CARACTERÍSTICAS MECÁNICAS DE LOS ELEMENTOS
MEMBER PROPERTIES
1 TO 4 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.7000 YC 0.35
5 TO 6 PRIS AX 1.0500 IX 1.0000 IY 1.0000 IZ 0.25727 YD 1.050 YC 0.525
7 TO 10 PRIS AX 0.7000 IX 1.0000 IY 1.0000 IZ 0.0286 YD 0.7000 YC 0.35
$ Hastiales
111 121 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
112 122  PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
113 123 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
114 124 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
115 125 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
116 126 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
210 220 PRIS AX 1.0206 IX 1.0000 IY 1.0000 IZ 0.1073 YD 1.02 YC 0.51
600 608 PRIS AX 2.020 IX 1.0000 IY 1.0000 IZ 1.8536 YD 2.02 YC 1.01
601 TO 607 PRIS AX 0.5000 IX 1.0000 IY 1.0000 IZ 0.0104 YD 0.5000 YC
0.25
$ Cartelas
211 221 PRIS AX 1.5619 IX 1.0000 IY 1.0000 IZ 0.3461 YD 1.56 YC 0.78
212 222  PRIS AX 1.4000 IX 1.0000 IY 1.0000 IZ 0.2287 YD 1.40 YC 0.7
213 223 PRIS AX 1.2250 IX 1.0000 IY 1.0000 IZ 0.1626 YD 1.23 YC 0.615
214 224 PRIS AX 0.8750 IX 1.0000 IY 1.0000 IZ 0.0625 YD 0.88 YC 0.44
310 320 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
311 321 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
312 322 PRIS AX 0.7500 IX 1.0000 IY 1.0000 IZ 0.0352 YD 0.75 YC 0.375
$ Zapata
510 TO 514 PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5
520 TO 524 PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5
410 TO 414 PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5
415    425 PRIS AX 1.2750 IX 1.0000 IY 1.0000 IZ 0.1968 YD 1.28 YC 0.6
420 TO 424 PRIS AX 1.0000 IX 1.0000 IY 1.0000 IZ 0.0833 YD 1.00 YC 0.5

$ CARACTERISTICAS DE LOS MATERIALES
```



```
 UNITS  M MTON DEGREES CENTIGRADE SECONDS
CONST
$ TODAS LAS BARRAS
E 2781000.00 ALL
G 1158750.00 ALL
CTE 1.00E-05 ALL
BETA 180.0 MEMB 222 TO 224
 UNITS  M MTON RADIANS CENTIGRADE SECONDS

$ APOYOS
STATUS SUP  511 TO 515 521 TO 525 310 320 411 TO 415 421 TO 425 400
$ LIBERACIONES DE APOYOS
 JOINT RELEASES
515 525 FORCE X MOMENT Z KFY 37.500
514 524 FORCE X MOMENT Z KFY 75.000
513 523 FORCE X MOMENT Z KFY 75.000
512 522 FORCE X MOMENT Z KFY 75.000
511 521 FORCE X MOMENT Z KFY 318.750
310 FORCE X MOMENT Z KFY 562.500
320 MOMENT Z KFY 562.500
411 421 FORCE X MOMENT Z KFY 1707.750
412 422 FORCE X MOMENT Z KFY 2853.000
413 423 FORCE X MOMENT Z KFY 2853.000
414 424 FORCE X MOMENT Z KFY 2853.000
415 425 FORCE X MOMENT Z KFY 2566.500
400 FORCE X MOMENT Z KFY 2280.000
```

### 9.2. ANÁLISIS DE ESFUERZOS

De las acciones introducidas en el modelo, se obtienen sus esfuerzos correspondientes y las combinaciones de servicio y rotura. A continuación se listan ambas envolventes, generadas de acuerdo con los siguientes criterios:

***E.L.U.:**

Cajón hincado en Servicio:

Rotura en Servicio, sin Sismo

Rotura con Sismo

Estas envolventes se envuelven obteniéndose una envolvente total para el cajón hincado en servicio.

***E.L.S.:**

A partir de los estados elementales (y sus envolventes parciales), se realiza una envolvente única de Servicio, en combinación característica.

Las reacciones y esfuerzos de esta envolvente nos permitirán comprobar el estado de la cimentación del cajón hincado en servicio. Según estas reacciones es necesario una tensión mínima de 2.50 Kp/cm$^2$.

Los esfuerzos y reacciones de dicha envolvente pueden observarse a continuación.

Para la comprobación del estado de fisuración del cajón hincado, se realiza la envolvente con sobrecargas frecuentes. Dicha envolvente así como las comprobaciones pertinentes se explicitan más adelante en el presente Anejo.

Los listados que aparecen a continuación son los de definición de los estados de cargas.

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. | Fecha JUNIO-2002 | Página de

# GENERACIÓN DE ENVOLVENTES.

*Marco.gec*: Define los estados de carga elementales y envolventes totales, tanto en servicio como en rotura. Importa estados de carga calculados en el archivo: *Ma2.gec*, para realizar las envolventes totales.

*Ma2.gec:* Genera todos los posibles estados elementales de sobrecarga uniforme y sobrecaga puntual, colocándolas en distintas posiciones de la estructura y obtiene una envolvente de sobrecargas que se exporta al *"Marco.Gec"*.

**Fichero: MARCO.GEC**

```
"
" Proyecto:L.A.V.MARTORELL.
" Elemento:ODT 300.9.
" Cliente:INOCSA
"
" Creado por ALEPH-MARCOS 4.2.1
" Fecha: 09.05.02 Hora: 13:13:47
"
" Generación de envolventes Totales.
"         Servicio y Rotura.



* TIT
L.A.V.MARTORELL. - ODT 300.9.
Envolventes totales
* DIRESF ESF
* SDF MARCO.SDF

* EC
" ---- ESTADOS DE CARGA MARCO EN SERVICIO -----
   1   MA1001      0   Peso Propio
   2   MA1002      0   Empuje Activo
   3   MA1003      0   Empuje Reposo
   4   MA1004      0   Sismo en Tierras
   5   SC_S_ACT    1   Envolvente S.C.U. Dintel (Empuje Activo)
   6   SC_S_REP    1   Envolvente S.C.U. Dintel (Empuje Reposo)
   8   SC_S_INF    1   Envolvente S.C.U. Zapata
   9   VP_INF      1   Envolvente Vehiculo Pesado Zapata
  10   MA2113      0   Sobre elevacion nivel de agua

" ---- ESTADOS DE CARGA MARCO EN CONSTRUCCION -----
  20    EM_C_ACT     1    Envolvente Empujes Activo (Construccion Por
Tongadas)
  21    EM_C_REP     1    Envolvente Empujes Reposo (Construccion Por
Tongadas)
  22   SC_C_ACT     1   Envolvente S.C.U. Dintel (Marco Constru., Empuje
Activo)
  23   SC_C_REP     1   Envolvente S.C.U. Dintel (Marco Constru., Empuje Reposo)
  24   SC_C_INF     1   Envolvente S.C.U. Zapata (Marco Construccion)

* ENV

   30   MA_SERV  1    Envolvente de Servicio (Marco en Servicio)

   incomp 2 3  " Empujes
```



```
   incomp 4 5  " Sobrecargas
   ec1   1.00  1.00   " Peso Propio
   ec2   1.00  1.00   " Empuje Activo
   ec3   1.00  1.00   " Empuje Reposo
   ec5   0.00  1.00   " Envolvente S.C.U. Dintel (Empuje Activo)
   ec6   0.00  1.00   " Envolvente S.C.U. Dintel (Empuje Reposo)
   ec8   0.00  1.00   " Envolvente S.C.U. Zapata
   ec9   0.00  1.00   " Envolvente Vehiculo Pesado Zapata

   31   MA_RO1  1    Envolvente de Rotura (Marco en Servicio)

   incomp 2 3  " Empujes
   incomp 4 5  " Sobrecargas
   ec1   1.00  1.35   " Peso Propio
   ec2   1.00  1.50   " Empuje Activo
   ec3   1.00  1.50   " Empuje Reposo
   ec5   0.00  1.50   " Envolvente S.C.U. Dintel (Empuje Activo)
   ec6   0.00  1.50   " Envolvente S.C.U. Dintel (Empuje Reposo)
   ec8   0.00  1.50   " Envolvente S.C.U. Zapata
   ec9   0.00  1.50   " Envolvente Vehiculo Pesado Zapata

   32   MA_SIS  1    Envolvente de Rotura en SOBRE-ELEVACION NIVEL DE
AGUA (Marco en Servicio)

   incomp 2 3  " Empujes
   incomp 5 6  " Sobrecargas
   ec1   1.00  1.35   " Peso Propio
   ec2   1.00  1.50   " Empuje Activo
   ec3   1.00  1.50   " Empuje Reposo
   ec4  -1.00  1.00   " Sismo en Tierras
   ec5   0.00  0.20   " Envolvente S.C.U. Dintel (Empuje Activo)
   ec6   0.00  0.20   " Envolvente S.C.U. Dintel (Empuje Reposo)
   ec8   0.00  0.20   " Envolvente S.C.U. Zapata
   ec9   0.00  0.20   " Envolvente Vehiculo Pesado Zapata
   ec10  0.00  1.00   "  Sobre elevacion nivel de agua

   33   MA_ROT  1    Envolvente de Rotura (Envolvente Servicio-Sismo)

   incomp todos
   ec31  1.00  1.00   " Marco en Servicio
   ec32  1.00  1.00   " Marco en Sismo

   34   MA_C1  1    Envolvente de Rotura en Construccion (Tongadas)

   incomp 2 3  " Empujes
   ec1   1.00  1.35   " Peso Propio
   ec20  1.00  1.35   " Empuje Activo (Tongadas, incluye SCU 1.0 Tn/m2)
   ec21  1.00  1.35   " Empuje Reposo (Tongadas, incluye SCU 1.0 Tn/m2)
   ec24  0.00  1.35   " Envolvente S.C.U. Zapata (construccion)

   35   MA_C2   1     Envolvente de Rotura en Construccion (Terraplen
Terminado)

   incomp 2 3  " Empujes
   incomp 4 5  " Sobrecargas
   ec1   1.00  1.35   " Peso Propio
   ec2   1.00  1.35   " Empuje Activo
   ec3   1.00  1.35   " Empuje Reposo
   ec22  0.00  1.35   " Envolvente S.C.U. Dintel (Construccion, Empuje
Activo)
   ec23  0.00  1.35   " Envolvente S.C.U. Dintel (Construccion, Empuje
Reposo)
   ec24  0.00  1.35   " Envolvente S.C.U. Zapata (Construccion)
```

```
   36   MA_CON  1    Envolvente de Rotura en Construccion (Envolvente)
   incomp todos
   ec34  1.00  1.00   " Tongadas
    ec35  1.00  1.00   " Terraplen Terminado

* SELECT
  mbdesel todos
  nddesel todos

"  Seleccionamos medio Marco.
  mbsel i 1 a 6       " Dintel
  mbsel i 111 a 116  " Hastial
  mbsel d 116         " Hastial
   mbsel i 211 a 214   " Cartela Sup
  mbsel i 311 312     " Cartela Inf
  mbsel i 511 a 514   " Talon Zapata
   mbsel d 514         " Talon Zapata
   mbsel i 411 a 415   " Puntera Zapata
  mbsel d 415         " Puntera Zapata
  mbsel i 410 520     " Empotramiento Hastial-Zapata
  ndmb

  esfsel x y zz

  ressel Esfuerzos Reacciones Desplazamientos


* PRINT

  output -r MA_ELE.LST
  grupos si

  tit Estados Elementales. Proyecto: L.A.V.MARTORELL. - ODT 300.4.
  ec(1 a 29) x+ x- y+ y- zz+ zz-

  output -a MA_ELE.LST
  grupos si

  tit  Estados  Envolventes  secundarias.  Proyecto:  L.A.V.MARTORELL.  -
ODT 300.4.
  ec(31 32 34 35) x+ x- y+ y- zz+ zz-


* PRINT

  output -r MA_SER.LST
  grupos si

  tit Estado Servicio. Proyecto: L.A.V.MARTORELL. - ODT 300.4.
  ec(30) x+ x- y+ y- zz+ zz-


* PRINT

  output -r MA_ROT.LST
  grupos si

  tit Estados Rotura. Proyecto: L.A.V.MARTORELL. - ODT 300.4.
  ec(33 36) x+ x- y+ y- zz+ zz-
```

**Fichero: MA2.GEC**

```
"
" Proyecto:L.A.V.MARTORELL.
" Elemento:ODT 300.9.
" Cliente:INOCSA
"
" Creado por ALEPH-MARCOS 4.2.1
" Creado por ALEPH-MARCOS 1.0.2.
" Fecha: 09.05.02 Hora: 13:12:56
"
" Generación de envolvente de Sobrecargas Servicio.



* TIT
L.A.V.MARTORELL. - ODT 300.9.
Paseo de Sobrecargas


* DIRESF ESF
* SDF MARCO.SDF

* EC
    1   MA2001  0  PASEO SCU Posicion 1 (Activo)
    2   MA2002  0  PASEO SCU Posicion 18 (Activo)
    3   MA2003  0  PASEO SCU Posicion 1 (Reposo)
    4   MA2004  0  PASEO SCU Posicion 18 (Reposo)
    5   MA2005  0  PASEO SCU Posicion 2
    6   MA2006  0  PASEO SCU Posicion 3
    7   MA2007  0  PASEO SCU Posicion 4
    8   MA2008  0  PASEO SCU Posicion 5
    9   MA2009  0  PASEO SCU Posicion 6
   10   MA2010  0  PASEO SCU Posicion 7
   11   MA2011  0  PASEO SCU Posicion 8
   12   MA2012  0  PASEO SCU Posicion 9
   13   MA2013  0  PASEO SCU Posicion 10
   14   MA2014  0  PASEO SCU Posicion 11
   15   MA2015  0  PASEO SCU Posicion 12
   16   MA2016  0  PASEO SCU Posicion 13
   17   MA2017  0  PASEO SCU Posicion 14
   18   MA2018  0  PASEO SCU Posicion 15
   19   MA2019  0  PASEO SCU Posicion 16
   20   MA2020  0  PASEO SCU Posicion 17
   21   MA2021  0  PASEO SCU INF. Posicion 1
   22   MA2022  0  PASEO SCU INF. Posicion 2
   23   MA2023  0  PASEO SCU INF. Posicion 3
   24   MA2024  0  PASEO SCU INF. Posicion 4
   25   MA2025  0  PASEO SCU INF. Posicion 5
   26   MA2026  0  PASEO SCU INF. Posicion 6
   27   MA2027  0  PASEO SCU INF. Posicion 7
   28   MA2028  0  PASEO SCU INF. Posicion 8
   29   MA2029  0  PASEO SCU INF. Posicion 9
   30   MA2030  0  PASEO SCU INF. Posicion 10
   95   MA2095  0  PASEO VP INFERIOR. Posicion 1
   96   MA2096  0  PASEO VP INFERIOR. Posicion 2
   97   MA2097  0  PASEO VP INFERIOR. Posicion 3
   98   MA2098  0  PASEO VP INFERIOR. Posicion 4
   99   MA2099  0  PASEO VP INFERIOR. Posicion 5
  100   MA2100  0  PASEO VP INFERIOR. Posicion 6
  101   MA2101  0  PASEO VP INFERIOR. Posicion 7
  102   MA2102  0  PASEO VP INFERIOR. Posicion 8
  103   MA2103  0  PASEO VP INFERIOR. Posicion 9
  104   MA2104  0  PASEO VP INFERIOR. Posicion 10
  105   MA2105  0  PASEO VP INFERIOR. Posicion 11
  106   MA2106  0  PASEO VP INFERIOR. Posicion 12
  107   MA2107  0  PASEO VP INFERIOR. Posicion 13
  108   MA2108  0  PASEO VP INFERIOR. Posicion 14
  109   MA2109  0  PASEO VP INFERIOR. Posicion 15
  110   MA2110  0  PASEO VP INFERIOR. Posicion 16
  111   MA2111  0  PASEO VP INFERIOR. Posicion 17
  112   MA2112  0  PASEO VP INFERIOR. Posicion 18
```

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. Fecha JUNIO-2002 Página de

```
* ENV
113  SC_S_ACT   1   Envolvente Paseo SCU (ACTIVO)

     ec1   0.00  1.00
     ec2   0.00  1.00
     ec5   0.00  1.00
     ec6   0.00  1.00
     ec7   0.00  1.00
     ec8   0.00  1.00
     ec9   0.00  1.00
    ec10   0.00  1.00
    ec11   0.00  1.00
    ec12   0.00  1.00
    ec13   0.00  1.00
    ec14   0.00  1.00
    ec15   0.00  1.00
    ec16   0.00  1.00
    ec17   0.00  1.00
    ec18   0.00  1.00
    ec19   0.00  1.00
    ec20   0.00  1.00


114  SC_S_REP   1   Envolvente Paseo SCU (REPOSO)

     ec3   0.00  1.00
     ec4   0.00  1.00
     ec5   0.00  1.00
     ec6   0.00  1.00
     ec7   0.00  1.00
     ec8   0.00  1.00
     ec9   0.00  1.00
    ec10   0.00  1.00
    ec11   0.00  1.00
    ec12   0.00  1.00
    ec13   0.00  1.00
    ec14   0.00  1.00
    ec15   0.00  1.00
    ec16   0.00  1.00
    ec17   0.00  1.00
    ec18   0.00  1.00
    ec19   0.00  1.00
    ec20   0.00  1.00


115  SC_S_INF   1   Envolvente Paseo SCU Inferior

    ec21   0.00  1.00
    ec22   0.00  1.00
    ec23   0.00  1.00
    ec24   0.00  1.00
    ec25   0.00  1.00
    ec26   0.00  1.00
    ec27   0.00  1.00
    ec28   0.00  1.00
    ec29   0.00  1.00
    ec30   0.00  1.00


117  VP_INF   1   Envolvente Paseo VP INFERIOR
incomp todos

    ec95   0.00  1.00
    ec96   0.00  1.00
    ec97   0.00  1.00
    ec98   0.00  1.00
    ec99   0.00  1.00
   ec100   0.00  1.00
   ec101   0.00  1.00
   ec102   0.00  1.00
   ec103   0.00  1.00
   ec104   0.00  1.00
   ec105   0.00  1.00
   ec106   0.00  1.00
   ec107   0.00  1.00
   ec108   0.00  1.00
   ec109   0.00  1.00
   ec110   0.00  1.00
   ec111   0.00  1.00
```

```
    ec112   0.00  1.00

* BORRA EC 1 a 112
```



# ENVOLVENTES DE ROTURA.

**Fichero: MA_ROT.LST**

LISTADO DE ESTADOS DE CARGA
Fecha : 09.05.2002 14:03:17
T¡tulo: L.A.V.MARTORELL. - ODT 300.9.
Coment: Envolventes totales
Titlst: Estados Rotura. Proyecto: L.A.V.MARTORELL. - ODT 3

Tabla de estados de carga a listar
ec Fichero tipo T¡tulo
33 MA_ROT 1 [Envolvente de Rotura (Envolvente Servicio-Sismo) ]
36 MA_CON 1 [Envolvente de Rotura en Construccion (Envolvente) ]

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Mz |
|---|---|---|---|---|---|---|
| 1 | 1 | 33 | Nx+ | -39.58 | -52.02 | 14.22 |
| | | 33 | Fy+ | -47.26 | -49.86 | 14.70 |
| | | 33 | Mz+ | -68.79 | -78.01 | 18.09 |
| | | 33 | Nx- | -103.10 | -87.04 | -10.64 |
| | | 33 | Fy- | -95.43 | -89.49 | -11.62 |
| | | 33 | Mz- | -96.03 | -86.59 | -14.64 |
| | | 36 | Nx+ | 1.63 | -4.01 | 6.64 |
| | | 36 | Fy+ | -1.92 | -2.39 | 3.62 |
| | | 36 | Mz+ | -59.90 | -72.34 | 11.58 |
| | | 36 | Nx- | -84.89 | -77.26 | -3.92 |
| | | 36 | Fy- | -82.45 | -78.70 | -3.00 |
| | | 36 | Mz- | -82.66 | -76.02 | -5.54 |
| 2 | 2 | 33 | Nx+ | -39.58 | -15.00 | 69.47 |
| | | 33 | Fy+ | -47.45 | -13.19 | 69.13 |
| | | 33 | Mz+ | -69.93 | -24.82 | 103.13 |
| | | 33 | Nx- | -103.10 | -32.00 | 87.46 |
| | | 33 | Fy- | -95.24 | -34.10 | 87.77 |
| | | 33 | Mz- | -64.78 | -21.89 | 55.29 |
| | | 36 | Nx+ | 1.63 | -0.12 | 10.04 |
| | | 36 | Fy+ | -4.81 | 0.56 | 6.99 |
| | | 36 | Mz+ | -60.93 | -24.10 | 91.34 |
| | | 36 | Nx- | -84.89 | -27.44 | 82.37 |
| | | 36 | Fy- | -82.27 | -28.47 | 83.08 |
| | | 36 | Mz- | -4.37 | -0.16 | 3.85 |



| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 3 | 33 | Nx+ | -39.58 | 22.01 | 63.67 |
| | | 33 | Fy+ | -69.73 | 32.77 | 94.02 |
| | | 33 | Mz+ | -68.16 | 26.45 | 101.02 |
| | | 33 | Nx- | -103.10 | 23.04 | 94.85 |
| | | 33 | Fy- | -65.04 | 12.59 | 65.53 |
| | | 33 | Mz- | -69.24 | 17.63 | 58.70 |
| | | 36 | Nx+ | 1.63 | 3.78 | 7.03 |
| | | 36 | Fy+ | -60.33 | 28.07 | 86.20 |
| | | 36 | Mz+ | -60.03 | 25.32 | 90.68 |
| | | 36 | Nx- | -84.89 | 22.39 | 86.52 |
| | | 36 | Fy- | -2.29 | 1.89 | 4.67 |
| | | 36 | Mz- | -4.37 | 2.73 | 1.73 |
| 4 | 4 | 33 | Nx+ | -39.58 | 59.03 | -3.10 |
| | | 33 | Fy+ | -70.29 | 87.87 | -2.49 |
| | | 33 | Mz+ | -95.43 | 76.08 | 16.00 |
| | | 33 | Nx- | -103.10 | 78.09 | 11.53 |
| | | 33 | Fy- | -64.48 | 49.55 | 11.49 |
| | | 33 | Mz- | -47.16 | 60.76 | -6.59 |
| | | 36 | Nx+ | 1.63 | 7.67 | -2.41 |
| | | 36 | Fy+ | -60.81 | 78.04 | 1.33 |
| | | 36 | Mz+ | -82.66 | 71.24 | 9.90 |
| | | 36 | Nx- | -84.89 | 72.22 | 8.56 |
| | | 36 | Fy- | -2.29 | 4.78 | -0.82 |
| | | 36 | Mz- | -4.43 | 10.96 | -9.33 |
| 5 | 5 | 33 | Nx+ | -50.63 | 93.76 | -143.37 |
| | | 33 | Fy+ | -86.73 | 138.62 | -208.58 |
| | | 33 | Mz+ | -74.46 | 83.06 | -113.36 |
| | | 33 | Nx- | -118.12 | 124.72 | -179.80 |
| | | 33 | Fy- | -74.12 | 81.04 | -114.45 |
| | | 33 | Mz- | -86.46 | 136.61 | -209.80 |
| | | 36 | Nx+ | 0.27 | 11.97 | -19.75 |
| | | 36 | Fy+ | -76.01 | 124.41 | -183.33 |
| | | 36 | Mz+ | -3.17 | 7.57 | -12.08 |
| | | 36 | Nx- | -98.74 | 115.38 | -167.37 |
| | | 36 | Fy- | -3.17 | 7.57 | -12.08 |
| | | 36 | Mz- | -75.33 | 122.62 | -183.79 |
| 6 | 6 | 33 | Nx+ | -54.49 | -123.90 | -302.47 |
| | | 33 | Fy+ | -77.76 | -114.49 | -265.34 |
| | | 33 | Mz+ | -77.36 | -114.52 | -264.79 |
| | | 33 | Nx- | -124.04 | -179.49 | -419.92 |
| | | 33 | Fy- | -92.86 | -190.06 | -458.69 |
| | | 33 | Mz- | -93.34 | -190.04 | -459.38 |
| | | 36 | Nx+ | -0.09 | -11.56 | -30.37 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Fy+ | -3.54 | -10.21 | -25.68 |
| | | 36 | Mz+ | -3.54 | -10.21 | -25.68 |
| | | 36 | Nx- | -104.09 | -165.35 | -389.51 |
| | | 36 | Fy- | -81.62 | -171.06 | -408.19 |
| | | 36 | Mz- | -81.62 | -171.06 | -408.19 |
| 111 | 111 | 33 | Nx+ | -105.01 | -12.42 | -51.28 |
| | | 33 | Fy+ | -115.77 | 3.57 | -41.20 |
| | | 33 | Mz+ | -111.54 | -6.11 | -36.21 |
| | | 33 | Nx- | -171.94 | -10.13 | -65.30 |
| | | 33 | Fy- | -160.90 | -26.14 | -74.34 |
| | | 33 | Mz- | -163.93 | -13.27 | -79.95 |
| | | 36 | Nx+ | -15.35 | -5.77 | -6.50 |
| | | 36 | Fy+ | -113.10 | -0.86 | -47.84 |
| | | 36 | Mz+ | -16.00 | -7.16 | -5.02 |
| | | 36 | Nx- | -154.65 | -12.56 | -63.34 |
| | | 36 | Fy- | -148.67 | -17.61 | -63.00 |
| | | 36 | Mz- | -151.37 | -6.06 | -68.01 |
| 112 | 112 | 33 | Nx+ | -104.02 | -6.11 | -46.35 |
| | | 33 | Fy+ | -160.89 | 10.04 | -63.93 |
| | | 33 | Mz+ | -108.98 | -4.23 | -34.08 |
| | | 33 | Nx- | -170.59 | 1.37 | -62.98 |
| | | 33 | Fy- | -159.55 | -13.44 | -63.82 |
| | | 33 | Mz- | -164.15 | 1.39 | -76.21 |
| | | 36 | Nx+ | -14.35 | -3.92 | -3.93 |
| | | 36 | Fy+ | -144.38 | 5.20 | -62.38 |
| | | 36 | Mz+ | -18.06 | -5.66 | -1.86 |
| | | 36 | Nx- | -153.30 | -2.21 | -59.43 |
| | | 36 | Fy- | -20.04 | -7.71 | -7.19 |
| | | 36 | Mz- | -150.84 | 3.23 | -67.12 |
| 113 | 113 | 33 | Nx+ | -103.01 | 0.02 | -44.72 |
| | | 33 | Fy+ | -159.89 | 17.43 | -71.27 |
| | | 33 | Mz+ | -107.38 | 3.66 | -33.89 |
| | | 33 | Nx- | -169.24 | 12.46 | -66.68 |
| | | 33 | Fy- | -111.50 | -3.70 | -42.70 |
| | | 33 | Mz- | -163.35 | 9.44 | -79.14 |
| | | 36 | Nx+ | -13.35 | -2.34 | -2.28 |
| | | 36 | Fy+ | -143.38 | 11.85 | -66.94 |
| | | 36 | Mz+ | -17.06 | -2.71 | 0.36 |
| | | 36 | Nx- | -151.95 | 7.77 | -60.93 |
| | | 36 | Fy- | -18.69 | -4.97 | -3.82 |
| | | 36 | Mz- | -149.93 | 10.42 | -70.81 |
| 114 | 114 | 33 | Nx+ | -102.01 | 5.95 | -46.30 |
| | | 33 | Fy+ | -158.89 | 24.53 | -82.48 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.9.* Fecha JUNIO-2002 Página de

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Mz+ | -104.16 | 8.14 | -37.02 |
| | | 33 | Nx- | -167.89 | 23.11 | -76.18 |
| | | 33 | Fy- | -110.15 | 4.59 | -42.95 |
| | | 33 | Mz- | -165.72 | 22.26 | -88.54 |
| | | 36 | Nx+ | -12.35 | -1.01 | -1.39 |
| | | 36 | Fy+ | -142.38 | 18.24 | -74.98 |
| | | 36 | Mz+ | -16.06 | -0.14 | 1.11 |
| | | 36 | Nx- | -150.60 | 17.35 | -67.64 |
| | | 36 | Fy- | -17.34 | -2.62 | -1.81 |
| | | 36 | Mz- | -148.97 | 17.44 | -78.37 |
| 115 | 115 | 33 | Nx+ | -101.02 | 11.69 | -51.03 |
| | | 33 | Fy+ | -159.64 | 34.51 | -86.27 |
| | | 33 | Mz+ | -102.99 | 15.74 | -43.39 |
| | | 33 | Nx- | -166.54 | 33.33 | -91.22 |
| | | 33 | Fy- | -107.63 | 10.50 | -54.96 |
| | | 33 | Mz- | -164.75 | 29.94 | -102.42 |
| | | 36 | Nx+ | -11.35 | 0.06 | -1.14 |
| | | 36 | Fy+ | -142.96 | 27.22 | -76.33 |
| | | 36 | Mz+ | -11.80 | -0.26 | 1.19 |
| | | 36 | Nx- | -149.25 | 26.55 | -79.37 |
| | | 36 | Fy- | -16.10 | -1.63 | -8.19 |
| | | 36 | Mz- | -147.68 | 23.70 | -89.37 |
| 116 | 116 | 33 | Nx+ | -100.01 | 17.26 | -58.74 |
| | | 33 | Fy+ | -158.64 | 44.32 | -107.30 |
| | | 33 | Mz+ | -101.74 | 21.51 | -53.03 |
| | | 33 | Nx- | -165.19 | 43.14 | -111.66 |
| | | 33 | Fy- | -106.28 | 16.06 | -62.05 |
| | | 33 | Mz- | -162.90 | 36.72 | -120.22 |
| | | 36 | Nx+ | -10.35 | 0.87 | -1.40 |
| | | 36 | Fy+ | -141.96 | 36.05 | -93.25 |
| | | 36 | Mz+ | -10.79 | 1.32 | 0.89 |
| | | 36 | Nx- | -147.90 | 35.38 | -95.92 |
| | | 36 | Fy- | -14.75 | -1.63 | -7.32 |
| | | 36 | Mz- | -145.85 | 29.70 | -103.63 |
| 116 | 117 | 33 | Nx+ | -99.01 | 22.62 | -69.39 |
| | | 33 | Fy+ | -156.74 | 54.48 | -126.84 |
| | | 33 | Mz+ | -100.71 | 28.87 | -66.46 |
| | | 33 | Nx- | -163.84 | 52.51 | -137.15 |
| | | 33 | Fy- | -105.81 | 20.63 | -78.67 |
| | | 33 | Mz- | -161.56 | 43.07 | -141.51 |
| | | 36 | Nx+ | -9.35 | 1.44 | -2.03 |
| | | 36 | Fy+ | -140.69 | 44.72 | -112.74 |
| | | 36 | Mz+ | -9.79 | 2.52 | -0.16 |
| | | 36 | Nx- | -146.55 | 43.81 | -117.05 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Fy- | -13.40 | -1.63 | -6.44 |
| | | 36 | Mz- | -144.50 | 35.32 | -120.95 |
| 211 | 211 | 33 | Nx+ | -98.25 | 25.52 | -76.54 |
| | | 33 | Fy+ | -155.98 | 60.19 | -143.93 |
| | | 33 | Mz+ | -99.95 | 32.91 | -75.65 |
| | | 33 | Nx- | -162.81 | 57.56 | -153.53 |
| | | 33 | Fy- | -104.79 | 22.87 | -85.14 |
| | | 33 | Mz- | -160.51 | 46.84 | -154.86 |
| | | 36 | Nx+ | -8.59 | 1.64 | -2.49 |
| | | 36 | Fy+ | -139.93 | 49.47 | -126.77 |
| | | 36 | Mz+ | -9.03 | 3.02 | -0.98 |
| | | 36 | Nx- | -145.53 | 48.36 | -130.79 |
| | | 36 | Fy- | -12.38 | -1.63 | -5.96 |
| | | 36 | Mz- | -143.48 | 38.35 | -131.94 |
| 212 | 212 | 33 | Nx+ | -48.82 | -80.46 | -90.34 |
| | | 33 | Fy+ | -59.78 | -77.69 | -86.32 |
| | | 33 | Mz+ | -50.68 | -79.54 | -84.38 |
| | | 33 | Nx- | -102.18 | -126.39 | -165.74 |
| | | 33 | Fy- | -86.98 | -129.75 | -168.98 |
| | | 33 | Mz- | -100.31 | -127.35 | -171.80 |
| | | 36 | Nx+ | -0.90 | -8.02 | -3.95 |
| | | 36 | Fy+ | -5.37 | -6.68 | -1.94 |
| | | 36 | Mz+ | -5.37 | -6.68 | -1.94 |
| | | 36 | Nx- | -86.90 | -114.59 | -144.19 |
| | | 36 | Fy- | -74.74 | -116.57 | -143.73 |
| | | 36 | Mz- | -86.33 | -114.53 | -146.03 |
| 213 | 213 | 33 | Nx+ | -48.97 | -70.60 | -60.73 |
| | | 33 | Fy+ | -62.12 | -67.22 | -57.90 |
| | | 33 | Mz+ | -51.75 | -69.78 | -55.21 |
| | | 33 | Nx- | -105.52 | -110.51 | -119.89 |
| | | 33 | Fy- | -87.44 | -114.68 | -121.68 |
| | | 33 | Mz- | -102.71 | -111.38 | -125.51 |
| | | 36 | Nx+ | -0.49 | -6.50 | -1.15 |
| | | 36 | Fy+ | -5.34 | -5.06 | 0.34 |
| | | 36 | Mz+ | -5.34 | -5.06 | 0.34 |
| | | 36 | Nx- | -89.32 | -100.24 | -102.64 |
| | | 36 | Fy- | -75.10 | -102.78 | -101.30 |
| | | 36 | Mz- | -88.43 | -99.95 | -104.45 |
| 214 | 214 | 33 | Nx+ | -49.28 | -54.56 | -18.95 |
| | | 33 | Fy+ | -66.12 | -50.16 | -18.69 |
| | | 33 | Mz+ | -53.59 | -54.89 | -13.71 |
| | | 33 | Nx- | -111.00 | -84.68 | -56.26 |
| | | 33 | Fy- | -88.11 | -90.17 | -54.86 |



| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Mz- | -106.65 | -84.40 | -61.53 |
| | | 36 | Nx+ | 0.05 | -4.56 | 2.47 |
| | | 36 | Fy+ | -5.33 | -2.97 | 2.95 |
| | | 36 | Mz+ | -3.25 | -5.07 | 4.02 |
| | | 36 | Nx- | -93.33 | -76.96 | -44.86 |
| | | 36 | Fy- | -75.63 | -80.48 | -41.51 |
| | | 36 | Mz- | -91.89 | -75.24 | -47.24 |
| 311 | 311 | 33 | Nx+ | -105.95 | -18.51 | -59.00 |
| | | 33 | Fy+ | -116.71 | -1.40 | -40.64 |
| | | 33 | Mz+ | -112.10 | -2.81 | -38.53 |
| | | 33 | Nx- | -173.21 | -21.31 | -73.16 |
| | | 33 | Fy- | -162.17 | -38.44 | -90.47 |
| | | 33 | Mz- | -166.76 | -37.06 | -92.54 |
| | | 36 | Nx+ | -16.29 | -7.73 | -9.87 |
| | | 36 | Fy+ | -16.94 | -1.09 | -9.02 |
| | | 36 | Mz+ | -16.94 | -1.10 | -9.02 |
| | | 36 | Nx- | -155.92 | -22.62 | -72.12 |
| | | 36 | Fy- | -149.94 | -28.01 | -74.39 |
| | | 36 | Mz- | -154.04 | -26.78 | -76.23 |
| 312 | 312 | 33 | Nx+ | -105.48 | -15.45 | -54.77 |
| | | 33 | Fy+ | -116.24 | 1.11 | -40.63 |
| | | 33 | Mz+ | -111.03 | -0.87 | -38.02 |
| | | 33 | Nx- | -172.57 | -15.67 | -68.53 |
| | | 33 | Fy- | -161.53 | -32.23 | -81.65 |
| | | 33 | Mz- | -166.12 | -30.85 | -84.07 |
| | | 36 | Nx+ | -15.82 | -6.72 | -8.07 |
| | | 36 | Fy+ | -16.47 | -1.09 | -8.75 |
| | | 36 | Mz+ | -16.47 | -8.59 | -6.98 |
| | | 36 | Nx- | -155.29 | -17.55 | -67.11 |
| | | 36 | Fy- | -149.30 | -22.77 | -68.04 |
| | | 36 | Mz- | -153.41 | -21.54 | -70.19 |
| 511 | 511 | 33 | Nx+ | -10.43 | 0.10 | 0.11 |
| | | 33 | Fy+ | -10.43 | 0.65 | 0.17 |
| | | 33 | Mz+ | -10.43 | 0.63 | 0.17 |
| | | 33 | Nx- | -25.73 | -1.52 | -0.02 |
| | | 33 | Fy- | -25.73 | -3.01 | -0.20 |
| | | 33 | Mz- | -25.73 | -2.99 | -0.20 |
| | | 36 | Nx+ | 0.00 | 0.93 | 0.12 |
| | | 36 | Fy+ | 0.00 | 0.93 | 0.12 |
| | | 36 | Mz+ | -0.41 | 0.93 | 0.12 |
| | | 36 | Nx- | -21.80 | -1.25 | -0.02 |
| | | 36 | Fy- | -5.31 | -2.08 | -0.18 |
| | | 36 | Mz- | -7.56 | -2.07 | -0.18 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 512 | 512 | 33 | Nx+ | -10.43 | -0.17 | 0.06 |
| | | 33 | Fy+ | -10.43 | 0.23 | 0.09 |
| | | 33 | Mz+ | -10.43 | 0.19 | 0.09 |
| | | 33 | Nx- | -25.73 | -1.46 | -0.02 |
| | | 33 | Fy- | -25.73 | -2.53 | -0.11 |
| | | 33 | Mz- | -25.73 | -2.50 | -0.11 |
| | | 36 | Nx+ | 0.00 | 0.64 | 0.06 |
| | | 36 | Fy+ | 0.00 | 0.64 | 0.06 |
| | | 36 | Mz+ | -0.41 | 0.64 | 0.06 |
| | | 36 | Nx- | -21.80 | -1.21 | -0.01 |
| | | 36 | Fy- | -21.80 | -1.66 | -0.05 |
| | | 36 | Mz- | -5.31 | -1.61 | -0.11 |
| 513 | 513 | 33 | Nx+ | -10.43 | -0.43 | 0.03 |
| | | 33 | Fy+ | -10.43 | -0.19 | 0.04 |
| | | 33 | Mz+ | -15.65 | -0.25 | 0.04 |
| | | 33 | Nx- | -25.73 | -1.41 | -0.01 |
| | | 33 | Fy- | -25.73 | -2.05 | -0.04 |
| | | 33 | Mz- | -17.90 | -1.99 | -0.04 |
| | | 36 | Nx+ | 0.00 | 0.35 | 0.03 |
| | | 36 | Fy+ | 0.00 | 0.35 | 0.03 |
| | | 36 | Mz+ | -0.41 | 0.35 | 0.03 |
| | | 36 | Nx- | -21.80 | -1.18 | 0.00 |
| | | 36 | Fy- | -21.80 | -1.43 | -0.02 |
| | | 36 | Mz- | -7.56 | -1.12 | -0.05 |
| 514 | 514 | 33 | Nx+ | -10.43 | -0.70 | 0.00 |
| | | 33 | Fy+ | -10.43 | -0.62 | 0.00 |
| | | 33 | Mz+ | -15.65 | -0.70 | 0.00 |
| | | 33 | Nx- | -25.73 | -1.35 | 0.00 |
| | | 33 | Fy- | -25.73 | -1.56 | 0.00 |
| | | 33 | Mz- | -15.95 | -1.29 | 0.00 |
| | | 36 | Nx+ | 0.00 | 0.06 | 0.01 |
| | | 36 | Fy+ | 0.00 | 0.06 | 0.01 |
| | | 36 | Mz+ | -0.41 | 0.06 | 0.01 |
| | | 36 | Nx- | -21.80 | -1.15 | 0.00 |
| | | 36 | Fy- | -21.57 | -1.22 | 0.00 |
| | | 36 | Mz- | -5.31 | -0.67 | -0.01 |
| 514 | 515 | 33 | Nx+ | -10.43 | 0.98 | 0.00 |
| | | 33 | Fy+ | -15.65 | 1.39 | 0.00 |
| | | 33 | Mz+ | -23.78 | 1.29 | 0.00 |
| | | 33 | Nx- | -25.73 | 1.32 | 0.00 |
| | | 33 | Fy- | -17.90 | 0.75 | 0.00 |
| | | 33 | Mz- | -23.78 | 1.29 | 0.00 |
| | | 36 | Nx+ | 0.00 | 0.23 | 0.00 |
| | | 36 | Fy+ | -14.08 | 1.15 | 0.00 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. Fecha JUNIO-2002 Página de

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Mz+ | -21.80 | 1.13 | 0.00 |
| | | 36 | Nx- | -21.80 | 1.13 | 0.00 |
| | | 36 | Fy- | -0.41 | 0.17 | 0.00 |
| | | 36 | Mz- | -21.80 | 1.13 | 0.00 |
| 520 | 320 | 33 | Nx+ | -10.43 | 6.90 | 2.93 |
| | | 33 | Fy+ | -15.65 | 10.17 | 4.19 |
| | | 33 | Mz+ | -15.65 | 10.17 | 4.19 |
| | | 33 | Nx- | -25.73 | 6.99 | 2.79 |
| | | 33 | Fy- | -17.90 | 3.18 | 1.22 |
| | | 33 | Mz- | -17.90 | 3.18 | 1.22 |
| | | 36 | Nx+ | 0.00 | 1.60 | 0.95 |
| | | 36 | Fy+ | -14.08 | 7.55 | 3.10 |
| | | 36 | Mz+ | -14.08 | 7.55 | 3.10 |
| | | 36 | Nx- | -21.80 | 6.96 | 2.84 |
| | | 36 | Fy- | -7.56 | -1.57 | -0.60 |
| | | 36 | Mz- | -7.56 | -1.57 | -0.60 |
| 410 | 310 | 33 | Nx+ | -11.83 | 97.29 | 43.97 |
| | | 33 | Fy+ | -54.79 | 146.83 | 97.07 |
| | | 33 | Mz+ | -63.32 | 138.79 | 114.53 |
| | | 33 | Nx- | -64.16 | 135.94 | 112.76 |
| | | 33 | Fy- | -21.78 | 87.25 | 63.04 |
| | | 33 | Mz- | -12.69 | 94.41 | 42.16 |
| | | 36 | Nx+ | -1.10 | 13.26 | 10.29 |
| | | 36 | Fy+ | -46.68 | 132.05 | 89.23 |
| | | 36 | Mz+ | -49.08 | 130.32 | 92.56 |
| | | 36 | Nx- | -49.81 | 127.78 | 90.97 |
| | | 36 | Fy- | -1.44 | 13.24 | 10.43 |
| | | 36 | Mz- | -1.82 | 13.26 | 10.28 |
| 411 | 411 | 33 | Nx+ | -11.83 | 59.62 | 7.30 |
| | | 33 | Fy+ | -61.07 | 95.47 | 58.62 |
| | | 33 | Mz+ | -63.80 | 93.38 | 62.28 |
| | | 33 | Nx- | -64.16 | 92.27 | 61.55 |
| | | 33 | Fy- | -17.86 | 51.85 | 17.56 |
| | | 33 | Mz- | -12.22 | 58.44 | 6.57 |
| | | 36 | Nx+ | -1.10 | 6.78 | 5.14 |
| | | 36 | Fy+ | -46.75 | 84.50 | 39.60 |
| | | 36 | Mz+ | -49.50 | 83.15 | 43.46 |
| | | 36 | Nx- | -49.81 | 82.18 | 42.82 |
| | | 36 | Fy- | -2.18 | 6.78 | 5.13 |
| | | 36 | Mz- | -1.82 | 6.78 | 5.13 |
| 412 | 412 | 33 | Nx+ | -11.83 | 7.73 | -110.62 |
| | | 33 | Fy+ | -62.23 | 25.18 | -126.91 |
| | | 33 | Mz+ | -44.50 | 15.37 | -72.08 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Nx- | -64.16 | 19.37 | -121.14 |
| | | 33 | Fy- | -13.93 | 3.71 | -101.65 |
| | | 33 | Mz- | -21.53 | 16.93 | -158.60 |
| | | 36 | Nx+ | -1.10 | 0.32 | -12.28 |
| | | 36 | Fy+ | -48.58 | 20.33 | -123.10 |
| | | 36 | Mz+ | -21.28 | 2.27 | -6.61 |
| | | 36 | Nx- | -49.81 | 19.72 | -119.59 |
| | | 36 | Fy- | -2.18 | 0.32 | -12.29 |
| | | 36 | Mz- | -23.19 | 17.51 | -135.72 |
| 413 | 413 | 33 | Nx+ | -11.83 | -39.29 | -130.95 |
| | | 33 | Fy+ | -44.35 | -20.12 | -107.54 |
| | | 33 | Mz+ | -42.71 | -27.68 | -102.68 |
| | | 33 | Nx- | -64.16 | -37.75 | -182.11 |
| | | 33 | Fy- | -21.76 | -54.02 | -191.30 |
| | | 33 | Mz- | -26.24 | -43.90 | -201.23 |
| | | 36 | Nx+ | -1.10 | -5.40 | -17.40 |
| | | 36 | Fy+ | -21.28 | -3.81 | -15.46 |
| | | 36 | Mz+ | -21.28 | -3.81 | -15.46 |
| | | 36 | Nx- | -49.81 | -37.73 | -163.20 |
| | | 36 | Fy- | -23.42 | -41.75 | -174.74 |
| | | 36 | Mz- | -23.16 | -41.18 | -175.33 |
| 414 | 414 | 33 | Nx+ | -11.83 | -77.72 | -61.85 |
| | | 33 | Fy+ | -42.65 | -62.52 | -58.78 |
| | | 33 | Mz+ | -41.80 | -71.19 | -53.89 |
| | | 33 | Nx- | -64.16 | -105.09 | -116.41 |
| | | 33 | Fy- | -22.00 | -120.96 | -106.50 |
| | | 33 | Mz- | -26.57 | -112.17 | -124.48 |
| | | 36 | Nx+ | -1.10 | -11.03 | -11.65 |
| | | 36 | Fy+ | -21.28 | -9.64 | -12.75 |
| | | 36 | Mz+ | -12.32 | -14.00 | -10.53 |
| | | 36 | Nx- | -49.81 | -96.60 | -97.53 |
| | | 36 | Fy- | -23.42 | -102.44 | -101.42 |
| | | 36 | Mz- | -23.30 | -100.71 | -103.36 |
| 415 | 415 | 33 | Nx+ | -21.95 | -110.94 | 105.76 |
| | | 33 | Fy+ | -50.80 | -97.66 | 92.51 |
| | | 33 | Mz+ | -37.99 | -171.63 | 159.72 |
| | | 33 | Nx- | -79.13 | -162.86 | 116.79 |
| | | 33 | Fy- | -39.19 | -181.61 | 146.55 |
| | | 33 | Mz- | -56.20 | -109.72 | 68.81 |
| | | 36 | Nx+ | -2.45 | -14.84 | 7.02 |
| | | 36 | Fy+ | -22.43 | -11.71 | 2.74 |
| | | 36 | Mz+ | -37.97 | -156.05 | 125.54 |
| | | 36 | Nx- | -63.42 | -148.42 | 116.05 |
| | | 36 | Fy- | -37.84 | -157.61 | 123.73 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. Fecha JUNIO-2002 Página de

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Mz- | -24.83 | -17.16 | 1.47 |
| 415 | 400 | 33 | Nx+ | -21.50 | -106.05 | 272.09 |
| | | 33 | Fy+ | -50.31 | -93.19 | 240.01 |
| | | 33 | Mz+ | -36.99 | -164.40 | 419.61 |
| | | 33 | Nx- | -78.67 | -157.73 | 361.40 |
| | | 33 | Fy- | -38.83 | -175.70 | 416.71 |
| | | 33 | Mz- | -53.81 | -101.75 | 229.30 |
| | | 36 | Nx+ | -2.10 | -11.04 | 26.77 |
| | | 36 | Fy+ | -22.08 | -7.91 | 17.71 |
| | | 36 | Mz+ | -37.00 | -152.02 | 360.47 |
| | | 36 | Nx- | -62.96 | -143.29 | 338.66 |
| | | 36 | Fy- | -37.38 | -152.48 | 360.36 |
| | | 36 | Mz- | -22.08 | -7.91 | 17.71 |

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | éz |
|---|---|---|---|---|---|
| 1 | 33 | ux+ | 0.002535 | -0.031275 | -0.001992 |
| | 33 | uy+ | 0.002336 | -0.022068 | -0.001407 |
| | 33 | éz+ | -0.001516 | -0.026188 | -0.000918 |
| | 33 | ux- | -0.001883 | -0.029127 | -0.001123 |
| | 33 | uy- | -0.001743 | -0.038438 | -0.001746 |
| | 33 | éz- | 0.002109 | -0.034319 | -0.002235 |
| | 36 | ux+ | 0.000959 | -0.029099 | -0.001662 |
| | 36 | uy+ | 0.000022 | -0.004627 | -0.000106 |
| | 36 | éz+ | -0.000340 | -0.004938 | -0.000017 |
| | 36 | ux- | -0.000423 | -0.010696 | -0.000316 |
| | 36 | uy- | -0.000316 | -0.032678 | -0.001813 |
| | 36 | éz- | 0.000578 | -0.031983 | -0.001883 |
| 2 | 33 | ux+ | 0.002453 | -0.033868 | -0.000863 |
| | 33 | uy+ | 0.002281 | -0.023855 | -0.000570 |
| | 33 | éz+ | -0.001602 | -0.029381 | -0.000127 |
| | 33 | ux- | -0.001920 | -0.030422 | -0.000224 |
| | 33 | uy- | -0.001772 | -0.040565 | -0.000518 |
| | 33 | éz- | 0.001664 | -0.035445 | -0.001040 |
| | 36 | ux+ | 0.000888 | -0.031269 | -0.000698 |
| | 36 | uy+ | 0.000470 | -0.004646 | 0.000057 |
| | 36 | éz+ | 0.000294 | -0.006415 | 0.000073 |
| | 36 | ux- | -0.000432 | -0.011004 | 0.000005 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | uy- | -0.000370 | -0.034979 | -0.000687 |
| | 36 | éz- | 0.000727 | -0.032070 | -0.000779 |
| 3 | 33 | ux+ | 0.002373 | -0.033646 | 0.001123 |
| | 33 | uy+ | 0.002149 | -0.023637 | 0.000817 |
| | 33 | éz+ | -0.000412 | -0.038306 | 0.001799 |
| | 33 | ux- | -0.001958 | -0.029492 | 0.001353 |
| | 33 | uy- | -0.001780 | -0.039605 | 0.001683 |
| | 33 | éz- | 0.000619 | -0.025654 | 0.000613 |
| | 36 | ux+ | 0.000819 | -0.030942 | 0.001092 |
| | 36 | uy+ | 0.000467 | -0.004444 | 0.000178 |
| | 36 | éz+ | 0.000101 | -0.033691 | 0.001378 |
| | 36 | ux- | -0.000469 | -0.027443 | 0.001069 |
| | 36 | uy- | -0.000377 | -0.034460 | 0.001314 |
| | 36 | éz- | 0.000365 | -0.005319 | 0.000093 |
| 4 | 33 | ux+ | 0.002293 | -0.030687 | 0.002162 |
| | 33 | uy+ | 0.002095 | -0.021551 | 0.001494 |
| | 33 | éz+ | -0.001930 | -0.035010 | 0.003032 |
| | 33 | ux- | -0.001995 | -0.026323 | 0.002264 |
| | 33 | uy- | -0.000172 | -0.035556 | 0.002549 |
| | 33 | éz- | 0.001456 | -0.023044 | 0.001396 |
| | 36 | ux+ | 0.000748 | -0.028111 | 0.002074 |
| | 36 | uy+ | 0.000462 | -0.004111 | 0.000200 |
| | 36 | éz+ | -0.000470 | -0.030870 | 0.002508 |
| | 36 | ux- | -0.000506 | -0.024748 | 0.001975 |
| | 36 | uy- | -0.000427 | -0.031105 | 0.002468 |
| | 36 | éz- | 0.000358 | -0.005174 | 0.000046 |
| 5 | 33 | ux+ | 0.002207 | -0.027975 | 0.000172 |
| | 33 | uy+ | 0.000979 | -0.019516 | 0.000320 |
| | 33 | éz+ | -0.001999 | -0.030941 | 0.001145 |
| | 33 | ux- | -0.002042 | -0.022997 | 0.000948 |
| | 33 | uy- | -0.000077 | -0.032089 | 0.000657 |
| | 33 | éz- | 0.002145 | -0.020216 | -0.000019 |
| | 36 | ux+ | 0.000674 | -0.025373 | 0.000367 |
| | 36 | uy+ | 0.000458 | -0.003891 | -0.000002 |
| | 36 | éz+ | -0.000543 | -0.027458 | 0.000810 |
| | 36 | ux- | -0.000550 | -0.021930 | 0.000674 |
| | 36 | uy- | -0.000225 | -0.027703 | 0.000645 |
| | 36 | éz- | 0.000545 | -0.005336 | -0.000345 |
| 6 | 33 | ux+ | 0.002130 | -0.029504 | -0.000479 |
| | 33 | uy+ | 0.000888 | -0.019288 | -0.000098 |
| | 33 | éz+ | -0.001824 | -0.029631 | 0.000479 |
| | 33 | ux- | -0.001937 | -0.021863 | 0.000479 |
| | 33 | uy- | 0.000051 | -0.031511 | 0.000000 |



| | | | | | |
|---|---|---|---|---|---|
| | 33 | éz- | 0.002111 | -0.029615 | -0.000479 |
| | 36 | ux+ | 0.000644 | -0.026553 | -0.000208 |
| | 36 | uy+ | 0.000003 | -0.003886 | 0.000000 |
| | 36 | éz+ | -0.000383 | -0.007270 | 0.000429 |
| | 36 | ux- | -0.000496 | -0.021211 | 0.000208 |
| | 36 | uy- | 0.000043 | -0.027128 | 0.000000 |
| | 36 | éz- | 0.000475 | -0.007278 | -0.000429 |
| 111 | 33 | ux+ | -0.000304 | -0.019783 | 0.000275 |
| | 33 | uy+ | -0.000307 | -0.019623 | 0.000278 |
| | 33 | éz+ | -0.002053 | -0.035434 | 0.001735 |
| | 33 | ux- | -0.002053 | -0.035439 | 0.001734 |
| | 33 | uy- | -0.002050 | -0.035457 | 0.001729 |
| | 33 | éz- | -0.000304 | -0.019674 | 0.000272 |
| | 36 | ux+ | 0.000124 | -0.004481 | -0.000042 |
| | 36 | uy+ | -0.000147 | -0.004411 | 0.000106 |
| | 36 | éz+ | -0.001605 | -0.029569 | 0.001324 |
| | 36 | ux- | -0.001605 | -0.029569 | 0.001324 |
| | 36 | uy- | -0.001602 | -0.029585 | 0.001320 |
| | 36 | éz- | 0.000068 | -0.005051 | -0.000056 |
| 112 | 33 | ux+ | -0.000378 | -0.019682 | 0.000024 |
| | 33 | uy+ | -0.000384 | -0.019649 | 0.000029 |
| | 33 | éz+ | -0.002874 | -0.035480 | 0.001340 |
| | 33 | ux- | -0.002874 | -0.035480 | 0.001340 |
| | 33 | uy- | -0.002868 | -0.035503 | 0.001336 |
| | 33 | éz- | -0.000378 | -0.019682 | 0.000024 |
| | 36 | ux+ | 0.000157 | -0.004485 | -0.000078 |
| | 36 | uy+ | -0.000191 | -0.004415 | 0.000061 |
| | 36 | éz+ | -0.002215 | -0.029612 | 0.000968 |
| | 36 | ux- | -0.002215 | -0.029612 | 0.000968 |
| | 36 | uy- | -0.002211 | -0.029628 | 0.000965 |
| | 36 | éz- | 0.000107 | -0.005056 | -0.000088 |
| 113 | 33 | ux+ | -0.000336 | -0.019709 | -0.000184 |
| | 33 | uy+ | -0.000344 | -0.019676 | -0.000181 |
| | 33 | éz+ | -0.003476 | -0.035522 | 0.000926 |
| | 33 | ux- | -0.003476 | -0.035522 | 0.000926 |
| | 33 | uy- | -0.003469 | -0.035544 | 0.000923 |
| | 33 | éz- | -0.000336 | -0.019709 | -0.000184 |
| | 36 | ux+ | 0.000203 | -0.004488 | -0.000092 |
| | 36 | uy+ | -0.000211 | -0.004418 | 0.000018 |
| | 36 | éz+ | -0.002633 | -0.029650 | 0.000595 |
| | 36 | ux- | -0.002633 | -0.029650 | 0.000595 |
| | 36 | uy- | -0.002627 | -0.029666 | 0.000594 |
| | 36 | éz- | 0.000159 | -0.005059 | -0.000105 |

| | | | | | |
|---|---|---|---|---|---|
| 114 | 33 | ux+ | -0.000179 | -0.019737 | -0.000389 |
| | 33 | uy+ | -0.000190 | -0.019704 | -0.000386 |
| | 33 | éz+ | -0.003774 | -0.034011 | 0.000479 |
| | 33 | ux- | -0.003854 | -0.035566 | 0.000475 |
| | 33 | uy- | -0.003843 | -0.035589 | 0.000472 |
| | 33 | éz- | -0.000259 | -0.021292 | -0.000393 |
| | 36 | ux+ | 0.000254 | -0.004492 | -0.000095 |
| | 36 | uy+ | -0.000211 | -0.004422 | -0.000019 |
| | 36 | éz+ | -0.002763 | -0.028136 | 0.000191 |
| | 36 | ux- | -0.002843 | -0.029691 | 0.000186 |
| | 36 | uy- | -0.002836 | -0.029707 | 0.000185 |
| | 36 | éz- | 0.000138 | -0.006619 | -0.000120 |
| 115 | 33 | ux+ | 0.000086 | -0.019763 | -0.000614 |
| | 33 | uy+ | 0.000073 | -0.019729 | -0.000609 |
| | 33 | éz+ | -0.002854 | -0.025709 | 0.000135 |
| | 33 | ux- | -0.003972 | -0.035606 | -0.000026 |
| | 33 | uy- | -0.003958 | -0.035629 | -0.000030 |
| | 33 | éz- | -0.001032 | -0.029660 | -0.000774 |
| | 36 | ux+ | 0.000304 | -0.004495 | -0.000090 |
| | 36 | uy+ | -0.000192 | -0.004425 | -0.000054 |
| | 36 | éz+ | -0.000319 | -0.004905 | 0.000054 |
| | 36 | ux- | -0.002823 | -0.029727 | -0.000267 |
| | 36 | uy- | -0.002815 | -0.029743 | -0.000269 |
| | 36 | éz- | -0.001870 | -0.028045 | -0.000454 |
| 116 | 33 | ux+ | 0.000477 | -0.019790 | -0.000884 |
| | 33 | uy+ | 0.000462 | -0.019756 | -0.000875 |
| | 33 | éz+ | -0.002594 | -0.024949 | -0.000221 |
| | 33 | ux- | -0.003815 | -0.035648 | -0.000603 |
| | 33 | uy- | -0.003800 | -0.035670 | -0.000610 |
| | 33 | éz- | -0.000749 | -0.030495 | -0.001264 |
| | 36 | ux+ | 0.000349 | -0.004498 | -0.000083 |
| | 36 | uy+ | -0.000155 | -0.004428 | -0.000085 |
| | 36 | éz+ | -0.000341 | -0.004908 | 0.000029 |
| | 36 | ux- | -0.002546 | -0.029765 | -0.000790 |
| | 36 | uy- | -0.002538 | -0.029781 | -0.000792 |
| | 36 | éz- | -0.001729 | -0.028781 | -0.000927 |
| 117 | 33 | ux+ | 0.001035 | -0.019817 | -0.001207 |
| | 33 | uy+ | 0.001012 | -0.019784 | -0.001196 |
| | 33 | éz+ | -0.002285 | -0.024786 | -0.000628 |
| | 33 | ux- | -0.003315 | -0.035676 | -0.001272 |
| | 33 | uy- | -0.003293 | -0.035709 | -0.001283 |
| | 33 | éz- | -0.000038 | -0.030868 | -0.001851 |
| | 36 | ux+ | 0.000417 | -0.005075 | -0.000139 |
| | 36 | uy+ | -0.000101 | -0.004431 | -0.000113 |



| | | | | | |
|---|---|---|---|---|---|
| | 36 | éz+ | -0.000348 | -0.004911 | -0.000001 |
| | 36 | ux- | -0.001966 | -0.029801 | -0.001397 |
| | 36 | uy- | -0.001955 | -0.029817 | -0.001401 |
| | 36 | éz- | -0.001192 | -0.029117 | -0.001500 |
| 211 | 33 | ux+ | 0.001406 | -0.019827 | -0.001283 |
| | 33 | uy+ | 0.001382 | -0.019794 | -0.001271 |
| | 33 | éz+ | -0.002086 | -0.024796 | -0.000713 |
| | 33 | ux- | -0.002914 | -0.035692 | -0.001412 |
| | 33 | uy- | -0.002890 | -0.035725 | -0.001424 |
| | 33 | éz- | 0.000536 | -0.030885 | -0.001982 |
| | 36 | ux+ | 0.000458 | -0.005076 | -0.000142 |
| | 36 | uy+ | -0.000067 | -0.004432 | -0.000118 |
| | 36 | éz+ | -0.000348 | -0.004912 | -0.000007 |
| | 36 | ux- | -0.001530 | -0.029816 | -0.001524 |
| | 36 | uy- | -0.001519 | -0.029832 | -0.001528 |
| | 36 | éz- | -0.000725 | -0.029132 | -0.001624 |
| 212 | 33 | ux+ | 0.001792 | -0.019832 | -0.001311 |
| | 33 | uy+ | 0.001765 | -0.019799 | -0.001297 |
| | 33 | éz+ | -0.001870 | -0.024803 | -0.000744 |
| | 33 | ux- | -0.002486 | -0.035701 | -0.001462 |
| | 33 | uy- | -0.002459 | -0.035734 | -0.001475 |
| | 33 | éz- | 0.001134 | -0.030892 | -0.002029 |
| | 36 | ux+ | 0.000500 | -0.005076 | -0.000143 |
| | 36 | uy+ | -0.000032 | -0.004432 | -0.000119 |
| | 36 | éz+ | -0.000345 | -0.004912 | -0.000010 |
| | 36 | ux- | -0.001068 | -0.029824 | -0.001569 |
| | 36 | uy- | -0.001056 | -0.029840 | -0.001573 |
| | 36 | éz- | -0.000234 | -0.029138 | -0.001666 |
| 213 | 33 | ux+ | 0.001922 | -0.020335 | -0.001352 |
| | 33 | uy+ | 0.001894 | -0.020297 | -0.001339 |
| | 33 | éz+ | -0.001759 | -0.024953 | -0.000794 |
| | 33 | ux- | -0.002342 | -0.036271 | -0.001542 |
| | 33 | uy- | -0.002313 | -0.036308 | -0.001556 |
| | 33 | éz- | 0.001335 | -0.031672 | -0.002100 |
| | 36 | ux+ | 0.000515 | -0.005131 | -0.000145 |
| | 36 | uy+ | -0.000020 | -0.004477 | -0.000121 |
| | 36 | éz+ | -0.000345 | -0.004917 | -0.000013 |
| | 36 | ux- | -0.000910 | -0.030429 | -0.001643 |
| | 36 | uy- | -0.000898 | -0.030447 | -0.001647 |
| | 36 | éz- | -0.000066 | -0.029780 | -0.001736 |
| 214 | 33 | ux+ | 0.002211 | -0.030013 | -0.001940 |
| | 33 | uy+ | 0.002122 | -0.021169 | -0.001396 |
| | 33 | éz+ | -0.001655 | -0.025613 | -0.000868 |

| | | | | | |
|---|---|---|---|---|---|
| | 33 | ux- | -0.002072 | -0.037296 | -0.001654 |
| | 33 | uy- | -0.002040 | -0.037343 | -0.001667 |
| | 33 | éz- | 0.001699 | -0.033044 | -0.002195 |
| | 36 | ux+ | 0.000693 | -0.028052 | -0.001598 |
| | 36 | uy+ | 0.000003 | -0.004554 | -0.000120 |
| | 36 | éz+ | -0.000342 | -0.004926 | -0.000016 |
| | 36 | ux- | -0.000625 | -0.031514 | -0.001743 |
| | 36 | uy- | -0.000612 | -0.031535 | -0.001747 |
| | 36 | éz- | 0.000234 | -0.030922 | -0.001831 |
| 310 | 33 | ux+ | 0.000358 | -0.030430 | 0.001681 |
| | 33 | uy+ | 0.000264 | -0.019572 | 0.000909 |
| | 33 | éz+ | 0.000072 | -0.035220 | 0.002535 |
| | 33 | ux- | -0.000014 | -0.022785 | 0.001514 |
| | 33 | uy- | 0.000063 | -0.035380 | 0.002518 |
| | 33 | éz- | 0.000254 | -0.019732 | 0.000892 |
| | 36 | ux+ | 0.000257 | -0.028463 | 0.001743 |
| | 36 | uy+ | 0.000004 | -0.004403 | 0.000198 |
| | 36 | éz+ | 0.000068 | -0.029499 | 0.002036 |
| | 36 | ux- | 0.000001 | -0.004423 | 0.000203 |
| | 36 | uy- | 0.000065 | -0.029515 | 0.002029 |
| | 36 | éz- | 0.000063 | -0.005043 | 0.000061 |
| 311 | 33 | ux+ | -0.000095 | -0.019758 | 0.000549 |
| | 33 | uy+ | -0.000097 | -0.019598 | 0.000557 |
| | 33 | éz+ | -0.001091 | -0.035396 | 0.002120 |
| | 33 | ux- | -0.001091 | -0.035400 | 0.002119 |
| | 33 | uy- | -0.001089 | -0.035418 | 0.002113 |
| | 33 | éz- | -0.000095 | -0.019758 | 0.000549 |
| | 36 | ux+ | 0.000116 | -0.004477 | 0.000019 |
| | 36 | uy+ | -0.000084 | -0.004407 | 0.000150 |
| | 36 | éz+ | -0.000857 | -0.029534 | 0.001669 |
| | 36 | ux- | -0.000857 | -0.029534 | 0.001669 |
| | 36 | uy- | -0.000856 | -0.029550 | 0.001663 |
| | 36 | éz- | 0.000050 | -0.005047 | -0.000010 |
| 312 | 33 | ux+ | -0.000222 | -0.019770 | 0.000402 |
| | 33 | uy+ | -0.000223 | -0.019610 | 0.000408 |
| | 33 | éz+ | -0.001595 | -0.035415 | 0.001924 |
| | 33 | ux- | -0.001595 | -0.035420 | 0.001923 |
| | 33 | uy- | -0.001594 | -0.035438 | 0.001918 |
| | 33 | éz- | -0.000222 | -0.019770 | 0.000402 |
| | 36 | ux+ | 0.000117 | -0.004479 | -0.000016 |
| | 36 | uy+ | -0.000118 | -0.004409 | 0.000128 |
| | 36 | éz+ | -0.001253 | -0.029552 | 0.001496 |
| | 36 | ux- | -0.001253 | -0.029552 | 0.001496 |
| | 36 | uy- | -0.001251 | -0.029568 | 0.001492 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. Fecha JUNIO-2002 Página de

| | | | | | |
|---|---|---|---|---|---|
| | 36 | éz- | 0.000056 | -0.005049 | -0.000036 |
| 320 | 33 | ux+ | 0.000000 | -0.033116 | -0.001847 |
| | 33 | uy+ | 0.000000 | -0.019549 | -0.000901 |
| | 33 | éz+ | 0.000000 | -0.019710 | -0.000885 |
| | 33 | ux- | 0.000000 | -0.033116 | -0.001847 |
| | 33 | uy- | 0.000000 | -0.035403 | -0.002526 |
| | 33 | éz- | 0.000000 | -0.035242 | -0.002542 |
| | 36 | ux+ | 0.000000 | -0.029095 | -0.001802 |
| | 36 | uy+ | 0.000000 | -0.004405 | -0.000199 |
| | 36 | éz+ | 0.000000 | -0.005053 | -0.000065 |
| | 36 | ux- | 0.000000 | -0.029095 | -0.001802 |
| | 36 | uy- | 0.000000 | -0.029522 | -0.002032 |
| | 36 | éz- | 0.000000 | -0.029506 | -0.002039 |
| 400 | 33 | ux+ | 0.000213 | -0.028543 | -0.000182 |
| | 33 | uy+ | 0.000138 | -0.018627 | -0.000039 |
| | 33 | éz+ | 0.000068 | -0.029056 | 0.000236 |
| | 33 | ux- | -0.000031 | -0.022305 | 0.000188 |
| | 33 | uy- | 0.000043 | -0.030518 | -0.000006 |
| | 33 | éz- | 0.000197 | -0.029051 | -0.000236 |
| | 36 | ux+ | 0.000132 | -0.025619 | -0.000012 |
| | 36 | uy+ | 0.000003 | -0.003814 | 0.000000 |
| | 36 | éz+ | 0.000099 | -0.025847 | 0.000030 |
| | 36 | ux- | 0.000000 | -0.005150 | 0.000000 |
| | 36 | uy- | 0.000042 | -0.026186 | 0.000000 |
| | 36 | éz- | 0.000127 | -0.025842 | -0.000030 |
| 411 | 33 | ux+ | 0.000351 | -0.029767 | 0.001817 |
| | 33 | uy+ | 0.000258 | -0.019212 | 0.001004 |
| | 33 | éz+ | 0.000069 | -0.034247 | 0.002633 |
| | 33 | ux- | -0.000014 | -0.022405 | 0.001554 |
| | 33 | uy- | 0.000060 | -0.034414 | 0.002615 |
| | 33 | éz- | 0.000249 | -0.019379 | 0.000986 |
| | 36 | ux+ | 0.000250 | -0.027783 | 0.001854 |
| | 36 | uy+ | 0.000004 | -0.004326 | 0.000212 |
| | 36 | éz+ | 0.000065 | -0.028717 | 0.002119 |
| | 36 | ux- | 0.000001 | -0.004344 | 0.000216 |
| | 36 | uy- | 0.000062 | -0.028735 | 0.002113 |
| | 36 | éz- | 0.000060 | -0.005015 | 0.000081 |
| 412 | 33 | ux+ | 0.000306 | -0.026325 | 0.001554 |
| | 33 | uy+ | 0.000137 | -0.017217 | 0.000915 |
| | 33 | éz+ | 0.000053 | -0.029370 | 0.002188 |
| | 33 | ux- | -0.000022 | -0.020845 | 0.001222 |
| | 33 | uy- | 0.000179 | -0.029731 | 0.002086 |
| | 33 | éz- | 0.000216 | -0.017558 | 0.000821 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | ux+ | 0.000216 | -0.024342 | 0.001544 |
| | 36 | uy+ | 0.000003 | -0.003922 | 0.000188 |
| | 36 | éz+ | 0.000051 | -0.024835 | 0.001688 |
| | 36 | ux- | 0.000000 | -0.005310 | 0.000259 |
| | 36 | uy- | 0.000170 | -0.025002 | 0.001613 |
| | 36 | éz- | 0.000050 | -0.004848 | 0.000061 |
| 413 | 33 | ux+ | 0.000260 | -0.023280 | 0.000295 |
| | 33 | uy+ | 0.000117 | -0.016181 | 0.000127 |
| | 33 | éz+ | 0.000159 | -0.026430 | 0.000810 |
| | 33 | ux- | -0.000028 | -0.019616 | 0.000195 |
| | 33 | uy- | 0.000164 | -0.027151 | 0.000348 |
| | 33 | éz- | 0.000073 | -0.017642 | -0.000033 |
| | 36 | ux+ | 0.000180 | -0.021172 | 0.000351 |
| | 36 | uy+ | 0.000000 | -0.003666 | 0.000074 |
| | 36 | éz+ | 0.000149 | -0.022741 | 0.000444 |
| | 36 | ux- | -0.000001 | -0.004956 | 0.000104 |
| | 36 | uy- | 0.000138 | -0.023069 | 0.000359 |
| | 36 | éz- | 0.000040 | -0.004863 | -0.000085 |
| 414 | 33 | ux+ | 0.000216 | -0.024025 | -0.000838 |
| | 33 | uy+ | 0.000083 | -0.016709 | -0.000566 |
| | 33 | éz+ | 0.000078 | -0.018438 | -0.000216 |
| | 33 | ux- | -0.000034 | -0.020195 | -0.000725 |
| | 33 | uy- | 0.000129 | -0.027696 | -0.000819 |
| | 33 | éz- | 0.000065 | -0.026106 | -0.001090 |
| | 36 | ux+ | 0.000147 | -0.021657 | -0.000683 |
| | 36 | uy+ | -0.000001 | -0.003639 | -0.000039 |
| | 36 | éz+ | 0.000133 | -0.005664 | 0.000071 |
| | 36 | ux- | -0.000003 | -0.004914 | -0.000049 |
| | 36 | uy- | 0.000107 | -0.023537 | -0.000763 |
| | 36 | éz- | 0.000035 | -0.023211 | -0.000846 |
| 415 | 33 | ux+ | 0.000165 | -0.026399 | -0.000796 |
| | 33 | uy+ | 0.000120 | -0.018170 | -0.000484 |
| | 33 | éz+ | 0.000042 | -0.019671 | -0.000227 |
| | 33 | ux- | -0.000046 | -0.022034 | -0.000580 |
| | 33 | uy- | -0.000004 | -0.029898 | -0.000697 |
| | 33 | éz- | 0.000045 | -0.028302 | -0.000950 |
| | 36 | ux+ | 0.000112 | -0.005703 | -0.000048 |
| | 36 | uy+ | 0.000001 | -0.003770 | -0.000048 |
| | 36 | éz+ | 0.000038 | -0.003851 | -0.000028 |
| | 36 | ux- | -0.000014 | -0.020536 | -0.000516 |
| | 36 | uy- | -0.000011 | -0.025604 | -0.000666 |
| | 36 | éz- | 0.000012 | -0.025381 | -0.000698 |
| 511 | 33 | ux+ | 0.000361 | -0.031055 | 0.001680 |



| | | | | | |
|---|---|---|---|---|---|
| | 33 | uy+ | 0.000265 | -0.019912 | 0.000908 |
| | 33 | éz+ | 0.000073 | -0.036168 | 0.002530 |
| | 33 | ux- | -0.000013 | -0.023354 | 0.001510 |
| | 33 | uy- | 0.000064 | -0.036323 | 0.002514 |
| | 33 | éz- | 0.000256 | -0.020067 | 0.000892 |
| | 36 | ux+ | 0.000259 | -0.029115 | 0.001740 |
| | 36 | uy+ | 0.000004 | -0.004477 | 0.000197 |
| | 36 | éz+ | 0.000069 | -0.030262 | 0.002032 |
| | 36 | ux- | 0.000001 | -0.004499 | 0.000202 |
| | 36 | uy- | 0.000066 | -0.030275 | 0.002025 |
| | 36 | éz- | 0.000063 | -0.005066 | 0.000062 |
| 512 | 33 | ux+ | 0.000363 | -0.031143 | 0.001680 |
| | 33 | uy+ | 0.000267 | -0.019959 | 0.000908 |
| | 33 | éz+ | 0.000073 | -0.036296 | 0.002530 |
| | 33 | ux- | -0.000013 | -0.023428 | 0.001510 |
| | 33 | uy- | 0.000064 | -0.036449 | 0.002514 |
| | 33 | éz- | 0.000258 | -0.020112 | 0.000892 |
| | 36 | ux+ | 0.000261 | -0.029205 | 0.001740 |
| | 36 | uy+ | 0.000004 | -0.004487 | 0.000197 |
| | 36 | éz+ | 0.000069 | -0.030363 | 0.002032 |
| | 36 | ux- | 0.000001 | -0.004509 | 0.000202 |
| | 36 | uy- | 0.000066 | -0.030375 | 0.002025 |
| | 36 | éz- | 0.000063 | -0.005068 | 0.000062 |
| 513 | 33 | ux+ | 0.000363 | -0.031220 | 0.001680 |
| | 33 | uy+ | 0.000267 | -0.019998 | 0.000908 |
| | 33 | éz+ | 0.000075 | -0.036417 | 0.002530 |
| | 33 | ux- | -0.000011 | -0.023497 | 0.001510 |
| | 33 | uy- | 0.000066 | -0.036569 | 0.002514 |
| | 33 | éz- | 0.000258 | -0.020150 | 0.000892 |
| | 36 | ux+ | 0.000261 | -0.029287 | 0.001740 |
| | 36 | uy+ | 0.000004 | -0.004497 | 0.000197 |
| | 36 | éz+ | 0.000070 | -0.030461 | 0.002032 |
| | 36 | ux- | 0.000001 | -0.004519 | 0.000202 |
| | 36 | uy- | 0.000068 | -0.030474 | 0.002025 |
| | 36 | éz- | 0.000063 | -0.005071 | 0.000062 |
| 514 | 33 | ux+ | 0.000363 | -0.031308 | 0.001680 |
| | 33 | uy+ | 0.000267 | -0.020048 | 0.000908 |
| | 33 | éz+ | 0.000075 | -0.036545 | 0.002530 |
| | 33 | ux- | -0.000011 | -0.023576 | 0.001510 |
| | 33 | uy- | 0.000066 | -0.036696 | 0.002514 |
| | 33 | éz- | 0.000258 | -0.020199 | 0.000892 |
| | 36 | ux+ | 0.000261 | -0.029376 | 0.001740 |
| | 36 | uy+ | 0.000004 | -0.004507 | 0.000197 |
| | 36 | éz+ | 0.000070 | -0.030564 | 0.002032 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | ux- | 0.000001 | -0.004529 | 0.000202 |
| | 36 | uy- | 0.000068 | -0.030576 | 0.002025 |
| | 36 | éz- | 0.000063 | -0.005074 | 0.000062 |
| 515 | 33 | ux+ | 0.000363 | -0.031394 | 0.001680 |
| | 33 | uy+ | 0.000267 | -0.020093 | 0.000908 |
| | 33 | éz+ | 0.000075 | -0.036672 | 0.002530 |
| | 33 | ux- | -0.000011 | -0.023654 | 0.001510 |
| | 33 | uy- | 0.000066 | -0.036824 | 0.002514 |
| | 33 | éz- | 0.000258 | -0.020245 | 0.000892 |
| | 36 | ux+ | 0.000261 | -0.029464 | 0.001740 |
| | 36 | uy+ | 0.000004 | -0.004516 | 0.000197 |
| | 36 | éz+ | 0.000070 | -0.030665 | 0.002032 |
| | 36 | ux- | 0.000001 | -0.004539 | 0.000202 |
| | 36 | uy- | 0.000068 | -0.030677 | 0.002025 |
| | 36 | éz- | 0.000063 | -0.005078 | 0.000062 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 310 | 33 | Fx+ | 0.00 | 18.78 | 0.00 |
| | 33 | Fy+ | 0.00 | 19.91 | 0.00 |
| | 33 | Mz+ | 0.00 | 18.78 | 0.00 |
| | 33 | Fx- | 0.00 | 18.78 | 0.00 |
| | 33 | Fy- | 0.00 | 11.01 | 0.00 |
| | 33 | Mz- | 0.00 | 18.78 | 0.00 |
| | 36 | Fx+ | 0.00 | 16.37 | 0.00 |
| | 36 | Fy+ | 0.00 | 16.61 | 0.00 |
| | 36 | Mz+ | 0.00 | 16.37 | 0.00 |
| | 36 | Fx- | 0.00 | 16.37 | 0.00 |
| | 36 | Fy- | 0.00 | 2.47 | 0.00 |
| | 36 | Mz- | 0.00 | 16.37 | 0.00 |
| 320 | 33 | Fx+ | 16.54 | 17.59 | 0.00 |
| | 33 | Fy+ | -16.54 | 19.92 | 0.00 |
| | 33 | Mz+ | 0.00 | 18.63 | 0.00 |
| | 33 | Fx- | -16.54 | 18.12 | 0.00 |
| | 33 | Fy- | 16.54 | 10.99 | 0.00 |
| | 33 | Mz- | 0.00 | 18.63 | 0.00 |
| | 36 | Fx+ | 12.91 | 5.59 | 0.00 |
| | 36 | Fy+ | -4.97 | 16.61 | 0.00 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.9.* Fecha JUNIO-*2002* Página de

| | | | | | |
|---|---|---|---|---|---|
| | 36 | Mz+ | 0.00 | 16.37 | 0.00 |
| | 36 | Fx- | -12.91 | 3.78 | 0.00 |
| | 36 | Fy- | -1.70 | 2.47 | 0.00 |
| | 36 | Mz- | 0.00 | 16.37 | 0.00 |
| 400 | 33 | Fx+ | 0.00 | 69.28 | 0.00 |
| | 33 | Fy+ | 0.00 | 69.58 | 0.00 |
| | 33 | Mz+ | 0.00 | 69.28 | 0.00 |
| | 33 | Fx- | 0.00 | 69.28 | 0.00 |
| | 33 | Fy- | 0.00 | 42.47 | 0.00 |
| | 33 | Mz- | 0.00 | 69.28 | 0.00 |
| | 36 | Fx+ | 0.00 | 59.58 | 0.00 |
| | 36 | Fy+ | 0.00 | 59.71 | 0.00 |
| | 36 | Mz+ | 0.00 | 59.58 | 0.00 |
| | 36 | Fx- | 0.00 | 59.58 | 0.00 |
| | 36 | Fy- | 0.00 | 8.70 | 0.00 |
| | 36 | Mz- | 0.00 | 59.58 | 0.00 |
| 411 | 33 | Fx+ | 0.00 | 55.79 | 0.00 |
| | 33 | Fy+ | 0.00 | 58.76 | 0.00 |
| | 33 | Mz+ | 0.00 | 55.79 | 0.00 |
| | 33 | Fx- | 0.00 | 55.79 | 0.00 |
| | 33 | Fy- | 0.00 | 32.81 | 0.00 |
| | 33 | Mz- | 0.00 | 55.79 | 0.00 |
| | 36 | Fx+ | 0.00 | 48.49 | 0.00 |
| | 36 | Fy+ | 0.00 | 49.07 | 0.00 |
| | 36 | Mz+ | 0.00 | 48.49 | 0.00 |
| | 36 | Fx- | 0.00 | 48.49 | 0.00 |
| | 36 | Fy- | 0.00 | 7.39 | 0.00 |
| | 36 | Mz- | 0.00 | 48.49 | 0.00 |
| 412 | 33 | Fx+ | 0.00 | 82.87 | 0.00 |
| | 33 | Fy+ | 0.00 | 84.82 | 0.00 |
| | 33 | Mz+ | 0.00 | 82.87 | 0.00 |
| | 33 | Fx- | 0.00 | 82.87 | 0.00 |
| | 33 | Fy- | 0.00 | 49.12 | 0.00 |
| | 33 | Mz- | 0.00 | 82.87 | 0.00 |
| | 36 | Fx+ | 0.00 | 71.01 | 0.00 |
| | 36 | Fy+ | 0.00 | 71.32 | 0.00 |
| | 36 | Mz+ | 0.00 | 71.01 | 0.00 |
| | 36 | Fx- | 0.00 | 71.01 | 0.00 |
| | 36 | Fy- | 0.00 | 11.20 | 0.00 |
| | 36 | Mz- | 0.00 | 71.01 | 0.00 |
| 413 | 33 | Fx+ | 0.00 | 77.42 | 0.00 |
| | 33 | Fy+ | 0.00 | 77.46 | 0.00 |
| | 33 | Mz+ | 0.00 | 77.42 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| | 33 | Fx- | 0.00 | 77.42 | 0.00 |
| | 33 | Fy- | 0.00 | 46.16 | 0.00 |
| | 33 | Mz- | 0.00 | 77.42 | 0.00 |
| | 36 | Fx+ | 0.00 | 65.71 | 0.00 |
| | 36 | Fy+ | 0.00 | 65.82 | 0.00 |
| | 36 | Mz+ | 0.00 | 65.71 | 0.00 |
| | 36 | Fx- | 0.00 | 65.71 | 0.00 |
| | 36 | Fy- | 0.00 | 10.46 | 0.00 |
| | 36 | Mz- | 0.00 | 65.71 | 0.00 |
| 414 | 33 | Fx+ | 0.00 | 78.94 | 0.00 |
| | 33 | Fy+ | 0.00 | 79.02 | 0.00 |
| | 33 | Mz+ | 0.00 | 78.94 | 0.00 |
| | 33 | Fx- | 0.00 | 78.94 | 0.00 |
| | 33 | Fy- | 0.00 | 47.67 | 0.00 |
| | 33 | Mz- | 0.00 | 78.94 | 0.00 |
| | 36 | Fx+ | 0.00 | 67.10 | 0.00 |
| | 36 | Fy+ | 0.00 | 67.15 | 0.00 |
| | 36 | Mz+ | 0.00 | 67.10 | 0.00 |
| | 36 | Fx- | 0.00 | 67.10 | 0.00 |
| | 36 | Fy- | 0.00 | 10.38 | 0.00 |
| | 36 | Mz- | 0.00 | 67.10 | 0.00 |
| 415 | 33 | Fx+ | 0.00 | 76.48 | 0.00 |
| | 33 | Fy+ | 0.00 | 76.74 | 0.00 |
| | 33 | Mz+ | 0.00 | 76.48 | 0.00 |
| | 33 | Fx- | 0.00 | 76.48 | 0.00 |
| | 33 | Fy- | 0.00 | 46.64 | 0.00 |
| | 33 | Mz- | 0.00 | 76.48 | 0.00 |
| | 36 | Fx+ | 0.00 | 65.57 | 0.00 |
| | 36 | Fy+ | 0.00 | 65.72 | 0.00 |
| | 36 | Mz+ | 0.00 | 65.57 | 0.00 |
| | 36 | Fx- | 0.00 | 65.57 | 0.00 |
| | 36 | Fy- | 0.00 | 9.68 | 0.00 |
| | 36 | Mz- | 0.00 | 65.57 | 0.00 |
| 511 | 33 | Fx+ | 0.00 | 10.87 | 0.00 |
| | 33 | Fy+ | 0.00 | 11.57 | 0.00 |
| | 33 | Mz+ | 0.00 | 10.87 | 0.00 |
| | 33 | Fx- | 0.00 | 10.87 | 0.00 |
| | 33 | Fy- | 0.00 | 6.36 | 0.00 |
| | 33 | Mz- | 0.00 | 10.87 | 0.00 |
| | 36 | Fx+ | 0.00 | 9.49 | 0.00 |
| | 36 | Fy+ | 0.00 | 9.65 | 0.00 |
| | 36 | Mz+ | 0.00 | 9.49 | 0.00 |
| | 36 | Fx- | 0.00 | 9.49 | 0.00 |
| | 36 | Fy- | 0.00 | 1.42 | 0.00 |

ALEPH consultores

Asunto LAV-MARTORELL. ODT 300.9. Fecha JUNIO-2002 Página de

| | | | | | |
|---|---|---|---|---|---|
| | 36 | Mz- | 0.00 | 9.49 | 0.00 |
| 512 | 33 | Fx+ | 0.00 | 2.56 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.73 | 0.00 |
| | 33 | Mz+ | 0.00 | 2.56 | 0.00 |
| | 33 | Fx- | 0.00 | 2.56 | 0.00 |
| | 33 | Fy- | 0.00 | 1.50 | 0.00 |
| | 33 | Mz- | 0.00 | 2.56 | 0.00 |
| | 36 | Fx+ | 0.00 | 2.24 | 0.00 |
| | 36 | Fy+ | 0.00 | 2.28 | 0.00 |
| | 36 | Mz+ | 0.00 | 2.24 | 0.00 |
| | 36 | Fx- | 0.00 | 2.24 | 0.00 |
| | 36 | Fy- | 0.00 | 0.34 | 0.00 |
| | 36 | Mz- | 0.00 | 2.24 | 0.00 |
| 513 | 33 | Fx+ | 0.00 | 2.57 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.74 | 0.00 |
| | 33 | Mz+ | 0.00 | 2.57 | 0.00 |
| | 33 | Fx- | 0.00 | 2.57 | 0.00 |
| | 33 | Fy- | 0.00 | 1.50 | 0.00 |
| | 33 | Mz- | 0.00 | 2.57 | 0.00 |
| | 36 | Fx+ | 0.00 | 2.25 | 0.00 |
| | 36 | Fy+ | 0.00 | 2.28 | 0.00 |
| | 36 | Mz+ | 0.00 | 2.25 | 0.00 |
| | 36 | Fx- | 0.00 | 2.25 | 0.00 |
| | 36 | Fy- | 0.00 | 0.34 | 0.00 |
| | 36 | Mz- | 0.00 | 2.25 | 0.00 |
| 514 | 33 | Fx+ | 0.00 | 2.58 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.75 | 0.00 |
| | 33 | Mz+ | 0.00 | 2.58 | 0.00 |
| | 33 | Fx- | 0.00 | 2.58 | 0.00 |
| | 33 | Fy- | 0.00 | 1.51 | 0.00 |
| | 33 | Mz- | 0.00 | 2.58 | 0.00 |
| | 36 | Fx+ | 0.00 | 2.25 | 0.00 |
| | 36 | Fy+ | 0.00 | 2.29 | 0.00 |
| | 36 | Mz+ | 0.00 | 2.25 | 0.00 |
| | 36 | Fx- | 0.00 | 2.25 | 0.00 |
| | 36 | Fy- | 0.00 | 0.34 | 0.00 |
| | 36 | Mz- | 0.00 | 2.25 | 0.00 |
| 515 | 33 | Fx+ | 0.00 | 1.29 | 0.00 |
| | 33 | Fy+ | 0.00 | 1.39 | 0.00 |
| | 33 | Mz+ | 0.00 | 1.29 | 0.00 |
| | 33 | Fx- | 0.00 | 1.29 | 0.00 |
| | 33 | Fy- | 0.00 | 0.75 | 0.00 |
| | 33 | Mz- | 0.00 | 1.29 | 0.00 |

| | | | | |
|---|---|---|---|---|
| 36 | Fx+ | 0.00 | 1.13 | 0.00 |
| 36 | Fy+ | 0.00 | 1.15 | 0.00 |
| 36 | Mz+ | 0.00 | 1.13 | 0.00 |
| 36 | Fx- | 0.00 | 1.13 | 0.00 |
| 36 | Fy- | 0.00 | 0.17 | 0.00 |
| 36 | Mz- | 0.00 | 1.13 | 0.00 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.9.* | Fecha JUNIO-*2002* | Página de

# ENVOLVENTE DE SERVICIO.



**Fichero: MA_SER.LST**

```
      LISTADO DE ESTADOS DE CARGA
      Fecha : 09.05.2002 14:03:16
      Titulo: L.A.V.MARTORELL. - ODT 300.9.
      Coment: Envolventes totales
      Titlst: Estado Servicio. Proyecto: L.A.V.MARTORELL. - ODT

Tabla de estados de carga a listar
 ec Fichero    tipo  Titulo
 30 MA_SERV       1  [Envolvente de Servicio (Marco en Servicio)        ]

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

 MEMB   JT   EC  ENV     Nx        Fy        Mz

   1    1   30  Nx+    -41.08    -51.79     10.21
            30  Fy+    -45.94    -51.06     11.63
            30  Mz+    -45.75    -52.31     12.53
            30  Nx-    -68.36    -59.04     -5.52
            30  Fy-    -63.51    -59.97     -7.28
            30  Mz-    -63.65    -58.74     -8.18

   2    2   30  Nx+    -41.08    -15.78     65.90
            30  Fy+    -46.07    -14.61     67.39
            30  Mz+    -46.51    -16.56     69.49
            30  Nx-    -68.36    -21.39     60.76
            30  Fy-    -63.38    -22.75     59.25
            30  Mz-    -62.90    -20.80     57.15

   3    3   30  Nx+    -41.08     20.23     62.22
            30  Fy+    -46.38     22.12     63.20
            30  Mz+    -45.33     17.91     67.87
            30  Nx-    -68.36     16.27     64.98
            30  Fy-    -63.07     14.19     64.31
            30  Mz-    -65.87     17.55     59.76

   4    4   30  Nx+    -41.08     56.24     -0.78
            30  Fy+    -46.75     59.14     -1.82
            30  Mz+    -63.25     52.59     10.12
            30  Nx-    -68.36     53.93      7.14
            30  Fy-    -62.70     50.84      8.83
            30  Mz-    -46.13     57.39     -3.11

   5    5   30  Nx+    -51.67     89.73   -135.12
            30  Fy+    -57.81     93.29   -140.49
            30  Mz+    -72.74     83.66   -117.50
            30  Nx-    -78.71     86.08   -124.65
            30  Fy-    -72.51     82.31   -118.23
            30  Mz-    -57.63     91.95   -141.30

   6    6   30  Nx+    -55.50   -122.94   -297.80
            30  Fy+    -76.22   -115.68   -270.57
            30  Mz+    -75.95   -115.70   -270.20
            30  Nx-    -82.72   -120.81   -282.93
            30  Fy-    -61.93   -127.85   -308.78
            30  Mz-    -62.25   -127.84   -309.24

 111  111   30  Nx+   -106.09     -9.45    -49.96
            30  Fy+   -113.26      1.21    -43.24
            30  Mz+   -110.83     -7.76    -39.29
            30  Nx-   -116.23     -6.87    -44.38
            30  Fy-   -108.87    -17.54    -50.41
            30  Mz-   -110.89     -8.96    -54.15

 112  112   30  Nx+   -105.09     -3.54    -46.51
            30  Fy+   -112.26      6.32    -45.26
            30  Mz+   -108.79     -3.95    -36.59
            30  Nx-   -115.23      0.80    -42.78
            30  Fy-   -107.87     -9.07    -43.34
            30  Mz-   -110.93      0.82    -51.60

 113  113   30  Nx+   -104.09      2.20    -46.15
```

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Fy+ | -111.26 | 11.25 | -49.95 |
| | | 30 | Mz+ | -107.39 | 3.78 | -36.52 |
| | | 30 | Nx- | -114.23 | 8.20 | -45.18 |
| | | 30 | Fy- | -106.87 | -0.87 | -40.69 |
| | | 30 | Mz- | -110.30 | 6.19 | -53.49 |
| 114 | 114 | 30 | Nx+ | -103.09 | 7.73 | -48.79 |
| | | 30 | Fy+ | -110.26 | 15.99 | -57.23 |
| | | 30 | Mz+ | -104.91 | 9.13 | -39.96 |
| | | 30 | Nx- | -113.23 | 15.29 | -51.46 |
| | | 30 | Fy- | -105.87 | 7.02 | -42.35 |
| | | 30 | Mz- | -111.78 | 14.73 | -59.70 |
| 115 | 115 | 30 | Nx+ | -102.09 | 13.07 | -54.35 |
| | | 30 | Fy+ | -110.43 | 22.64 | -59.56 |
| | | 30 | Mz+ | -103.80 | 16.47 | -46.79 |
| | | 30 | Nx- | -112.23 | 22.11 | -61.43 |
| | | 30 | Fy- | -103.70 | 12.53 | -55.54 |
| | | 30 | Mz- | -111.03 | 19.85 | -68.89 |
| 116 | 116 | 30 | Nx+ | -101.09 | 18.23 | -62.70 |
| | | 30 | Fy+ | -109.43 | 29.18 | -73.38 |
| | | 30 | Mz+ | -102.63 | 22.50 | -56.99 |
| | | 30 | Nx- | -111.23 | 28.65 | -74.99 |
| | | 30 | Fy- | -102.70 | 17.69 | -63.61 |
| | | 30 | Mz- | -109.70 | 24.37 | -80.70 |
| 116 | 117 | 30 | Nx+ | -100.09 | 23.19 | -73.76 |
| | | 30 | Fy+ | -107.83 | 35.95 | -86.21 |
| | | 30 | Mz+ | -101.61 | 29.48 | -70.85 |
| | | 30 | Nx- | -110.23 | 34.89 | -91.93 |
| | | 30 | Fy- | -102.29 | 22.12 | -78.79 |
| | | 30 | Mz- | -108.71 | 28.60 | -94.84 |
| 211 | 211 | 30 | Nx+ | -99.33 | 25.88 | -81.06 |
| | | 30 | Fy+ | -107.07 | 39.76 | -97.50 |
| | | 30 | Mz+ | -100.85 | 33.30 | -80.20 |
| | | 30 | Nx- | -109.47 | 38.26 | -102.82 |
| | | 30 | Fy- | -101.53 | 24.37 | -85.71 |
| | | 30 | Mz- | -107.93 | 31.12 | -103.71 |
| 212 | 212 | 30 | Nx+ | -49.99 | -80.92 | -93.01 |
| | | 30 | Fy+ | -60.16 | -78.69 | -90.87 |
| | | 30 | Mz+ | -51.23 | -80.31 | -89.04 |
| | | 30 | Nx- | -68.23 | -85.07 | -110.92 |
| | | 30 | Fy- | -58.09 | -87.31 | -113.08 |
| | | 30 | Mz- | -66.98 | -85.71 | -114.96 |
| 213 | 213 | 30 | Nx+ | -50.18 | -71.07 | -63.31 |
| | | 30 | Fy+ | -62.26 | -68.30 | -62.13 |
| | | 30 | Mz+ | -52.03 | -70.52 | -59.63 |
| | | 30 | Nx- | -70.41 | -74.33 | -80.07 |
| | | 30 | Fy- | -58.36 | -77.11 | -81.27 |
| | | 30 | Mz- | -68.54 | -74.91 | -83.82 |
| 214 | 214 | 30 | Nx+ | -50.54 | -55.06 | -21.41 |
| | | 30 | Fy+ | -65.83 | -51.41 | -22.35 |
| | | 30 | Mz+ | -53.38 | -54.20 | -18.42 |
| | | 30 | Nx- | -74.01 | -56.92 | -37.29 |
| | | 30 | Fy- | -58.75 | -60.58 | -36.36 |
| | | 30 | Mz- | -71.14 | -57.81 | -40.30 |
| 311 | 311 | 30 | Nx+ | -107.03 | -15.16 | -56.10 |
| | | 30 | Fy+ | -114.20 | -3.75 | -43.86 |
| | | 30 | Mz+ | -111.13 | -4.69 | -42.45 |
| | | 30 | Nx- | -117.17 | -14.32 | -49.68 |
| | | 30 | Fy- | -109.81 | -25.74 | -61.22 |
| | | 30 | Mz- | -112.87 | -24.82 | -62.60 |
| 312 | 312 | 30 | Nx+ | -106.56 | -12.29 | -52.68 |
| | | 30 | Fy+ | -113.73 | -1.25 | -43.25 |
| | | 30 | Mz+ | -110.26 | -2.57 | -41.51 |
| | | 30 | Nx- | -116.70 | -10.56 | -46.56 |
| | | 30 | Fy- | -109.34 | -21.60 | -55.31 |
| | | 30 | Mz- | -112.40 | -20.68 | -56.92 |
| 511 | 511 | 30 | Nx+ | -10.43 | -0.23 | 0.07 |
| | | 30 | Fy+ | -10.43 | -0.03 | 0.09 |
| | | 30 | Mz+ | -10.43 | -0.04 | 0.09 |
| | | 30 | Nx- | -17.15 | -0.95 | 0.00 |
| | | 30 | Fy- | -17.15 | -1.78 | -0.10 |
| | | 30 | Mz- | -17.15 | -1.77 | -0.10 |
| 512 | 512 | 30 | Nx+ | -10.43 | -0.40 | 0.04 |
| | | 30 | Fy+ | -10.43 | -0.25 | 0.05 |



| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Mz+ | -10.43 | -0.28 | 0.05 |
| | | 30 | Nx- | -17.15 | -0.93 | -0.01 |
| | | 30 | Fy- | -17.15 | -1.53 | -0.06 |
| | | 30 | Mz- | -17.15 | -1.51 | -0.06 |
| 513 | 513 | 30 | Nx+ | -10.43 | -0.56 | 0.02 |
| | | 30 | Fy+ | -10.43 | -0.47 | 0.02 |
| | | 30 | Mz+ | -15.65 | -0.51 | 0.02 |
| | | 30 | Nx- | -17.15 | -0.91 | 0.00 |
| | | 30 | Fy- | -17.15 | -1.28 | -0.02 |
| | | 30 | Mz- | -17.15 | -1.25 | -0.02 |
| 514 | 514 | 30 | Nx+ | -10.43 | -0.73 | 0.00 |
| | | 30 | Fy+ | -10.43 | -0.70 | 0.00 |
| | | 30 | Mz+ | -15.65 | -0.71 | 0.00 |
| | | 30 | Nx- | -17.15 | -0.89 | 0.00 |
| | | 30 | Fy- | -17.15 | -1.02 | 0.00 |
| | | 30 | Mz- | -17.15 | -0.97 | 0.00 |
| 514 | 515 | 30 | Nx+ | -10.43 | 0.91 | 0.00 |
| | | 30 | Fy+ | -10.43 | 0.94 | 0.00 |
| | | 30 | Mz+ | -17.15 | 0.90 | 0.00 |
| | | 30 | Nx- | -17.15 | 0.90 | 0.00 |
| | | 30 | Fy- | -17.15 | 0.77 | 0.00 |
| | | 30 | Mz- | -17.15 | 0.90 | 0.00 |
| 520 | 320 | 30 | Nx+ | -10.43 | 5.62 | 2.32 |
| | | 30 | Fy+ | -10.43 | 6.90 | 2.87 |
| | | 30 | Mz+ | -10.43 | 6.90 | 2.87 |
| | | 30 | Nx- | -17.15 | 4.78 | 1.93 |
| | | 30 | Fy- | -17.15 | 3.75 | 1.48 |
| | | 30 | Mz- | -17.15 | 3.75 | 1.48 |
| 410 | 310 | 30 | Nx+ | -14.19 | 95.69 | 48.17 |
| | | 30 | Fy+ | -36.64 | 99.21 | 65.75 |
| | | 30 | Mz+ | -42.33 | 93.85 | 77.39 |
| | | 30 | Nx- | -42.89 | 91.95 | 76.21 |
| | | 30 | Fy- | -20.82 | 89.00 | 60.88 |
| | | 30 | Mz- | -14.76 | 93.77 | 46.96 |
| 411 | 411 | 30 | Nx+ | -14.19 | 59.32 | 12.10 |
| | | 30 | Fy+ | -40.83 | 64.32 | 39.60 |
| | | 30 | Mz+ | -42.65 | 62.93 | 42.04 |
| | | 30 | Nx- | -42.89 | 62.19 | 41.55 |
| | | 30 | Fy- | -17.70 | 54.14 | 17.83 |
| | | 30 | Mz- | -14.45 | 58.53 | 11.61 |
| 412 | 412 | 30 | Nx+ | -14.19 | 9.43 | -105.24 |
| | | 30 | Fy+ | -41.60 | 16.82 | -85.84 |
| | | 30 | Mz+ | -41.05 | 14.92 | -78.04 |
| | | 30 | Nx- | -42.89 | 12.95 | -81.99 |
| | | 30 | Fy- | -15.59 | 6.75 | -99.26 |
| | | 30 | Mz- | -14.47 | 11.32 | -106.96 |
| 413 | 413 | 30 | Nx+ | -14.19 | -35.94 | -128.43 |
| | | 30 | Fy+ | -40.95 | -22.80 | -112.07 |
| | | 30 | Mz+ | -39.86 | -27.84 | -108.83 |
| | | 30 | Nx- | -42.89 | -25.71 | -123.15 |
| | | 30 | Fy- | -14.62 | -36.55 | -129.28 |
| | | 30 | Mz- | -17.61 | -29.80 | -135.90 |
| 414 | 414 | 30 | Nx+ | -14.19 | -75.93 | -65.33 |
| | | 30 | Fy+ | -39.82 | -65.45 | -63.21 |
| | | 30 | Mz+ | -39.25 | -71.23 | -59.95 |
| | | 30 | Nx- | -42.89 | -71.17 | -78.77 |
| | | 30 | Fy- | -14.78 | -81.74 | -72.17 |
| | | 30 | Mz- | -17.83 | -75.88 | -84.15 |
| 415 | 415 | 30 | Nx+ | -24.31 | -111.07 | 99.32 |
| | | 30 | Fy+ | -48.58 | -101.38 | 89.76 |
| | | 30 | Mz+ | -25.57 | -115.91 | 107.18 |
| | | 30 | Nx- | -53.00 | -110.05 | 78.56 |
| | | 30 | Fy- | -26.37 | -122.56 | 98.40 |
| | | 30 | Mz- | -52.18 | -109.42 | 73.96 |
| 415 | 400 | 30 | Nx+ | -23.90 | -106.54 | 265.87 |
| | | 30 | Fy+ | -48.14 | -97.13 | 242.49 |
| | | 30 | Mz+ | -24.87 | -110.71 | 282.41 |
| | | 30 | Nx- | -52.66 | -106.25 | 243.61 |
| | | 30 | Fy- | -26.10 | -118.24 | 280.48 |
| | | 30 | Mz- | -50.47 | -102.84 | 235.35 |

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | éz |
|---|---|---|---|---|---|
| 1 | 30 | ux+ | 0.001687 | -0.022397 | -0.001362 |
| | 30 | uy+ | 0.001652 | -0.022359 | -0.001348 |
| | 30 | éz+ | -0.000916 | -0.025105 | -0.001022 |
| | 30 | ux- | -0.001198 | -0.026051 | -0.001160 |
| | 30 | uy- | -0.001163 | -0.026089 | -0.001174 |
| | 30 | éz- | 0.001405 | -0.023343 | -0.001500 |
| 2 | 30 | ux+ | 0.001633 | -0.024148 | -0.000565 |
| | 30 | uy+ | 0.001599 | -0.024080 | -0.000544 |
| | 30 | éz+ | -0.001023 | -0.026752 | -0.000253 |
| | 30 | ux- | -0.001235 | -0.027446 | -0.000318 |
| | 30 | uy- | -0.001182 | -0.027514 | -0.000342 |
| | 30 | éz- | 0.001107 | -0.025199 | -0.000683 |
| 3 | 30 | ux+ | 0.001580 | -0.023943 | 0.000805 |
| | 30 | uy+ | 0.001494 | -0.023828 | 0.000839 |
| | 30 | éz+ | -0.000275 | -0.025991 | 0.001216 |
| | 30 | ux- | -0.001273 | -0.026742 | 0.001173 |
| | 30 | uy- | -0.001187 | -0.026857 | 0.001139 |
| | 30 | éz- | 0.000474 | -0.025173 | 0.000703 |
| 4 | 30 | ux+ | 0.001527 | -0.021858 | 0.001513 |
| | 30 | uy+ | 0.001441 | -0.021683 | 0.001550 |
| | 30 | éz+ | -0.001287 | -0.023760 | 0.002043 |
| | 30 | ux- | -0.001310 | -0.023923 | 0.002031 |
| | 30 | uy- | -0.001224 | -0.024098 | 0.001994 |
| | 30 | éz- | 0.001015 | -0.022678 | 0.001485 |
| 5 | 30 | ux+ | 0.001470 | -0.019959 | 0.000130 |
| | 30 | uy+ | 0.000679 | -0.019565 | 0.000355 |
| | 30 | éz+ | -0.001333 | -0.021020 | 0.000768 |
| | 30 | ux- | -0.001355 | -0.020988 | 0.000767 |
| | 30 | uy- | -0.000479 | -0.021543 | 0.000509 |
| | 30 | éz- | 0.001457 | -0.020032 | 0.000129 |
| 6 | 30 | ux+ | 0.001420 | -0.020058 | -0.000319 |
| | 30 | uy+ | 0.000620 | -0.019290 | -0.000065 |
| | 30 | éz+ | -0.001216 | -0.020143 | 0.000319 |
| | 30 | ux- | -0.001281 | -0.020115 | 0.000319 |
| | 30 | uy- | 0.000080 | -0.021061 | 0.000002 |
| | 30 | éz- | 0.001407 | -0.020132 | -0.000319 |
| 111 | 30 | ux+ | -0.000478 | -0.020137 | 0.000430 |
| | 30 | uy+ | -0.000480 | -0.020030 | 0.000432 |
| | 30 | éz+ | -0.001384 | -0.024066 | 0.001168 |
| | 30 | ux- | -0.001384 | -0.024069 | 0.001167 |
| | 30 | uy- | -0.001382 | -0.024081 | 0.001164 |
| | 30 | éz- | -0.000478 | -0.020064 | 0.000428 |
| 112 | 30 | ux+ | -0.000638 | -0.020079 | 0.000184 |
| | 30 | uy+ | -0.000642 | -0.020057 | 0.000187 |
| | 30 | éz+ | -0.001936 | -0.024097 | 0.000900 |
| | 30 | ux- | -0.001936 | -0.024097 | 0.000900 |
| | 30 | uy- | -0.001932 | -0.024112 | 0.000897 |
| | 30 | éz- | -0.000638 | -0.020079 | 0.000184 |
| 113 | 30 | ux+ | -0.000680 | -0.020106 | -0.000030 |
| | 30 | uy+ | -0.000685 | -0.020084 | -0.000028 |
| | 30 | éz+ | -0.002340 | -0.024125 | 0.000620 |
| | 30 | ux- | -0.002340 | -0.024125 | 0.000620 |
| | 30 | uy- | -0.002335 | -0.024140 | 0.000618 |
| | 30 | éz- | -0.000680 | -0.020106 | -0.000030 |
| 114 | 30 | ux+ | -0.000604 | -0.020134 | -0.000245 |
| | 30 | uy+ | -0.000611 | -0.020112 | -0.000243 |
| | 30 | éz+ | -0.002592 | -0.024155 | 0.000315 |
| | 30 | ux- | -0.002592 | -0.024155 | 0.000315 |
| | 30 | uy- | -0.002585 | -0.024170 | 0.000313 |
| | 30 | éz- | -0.000604 | -0.020134 | -0.000245 |
| 115 | 30 | ux+ | -0.000411 | -0.020160 | -0.000485 |
| | 30 | uy+ | -0.000420 | -0.020138 | -0.000482 |
| | 30 | éz+ | -0.002371 | -0.024124 | 0.000014 |
| | 30 | ux- | -0.002669 | -0.024182 | -0.000022 |
| | 30 | uy- | -0.002660 | -0.024197 | -0.000025 |
| | 30 | éz- | -0.000709 | -0.020218 | -0.000521 |
| 116 | 30 | ux+ | -0.000083 | -0.020187 | -0.000772 |
| | 30 | uy+ | -0.000093 | -0.020165 | -0.000766 |
| | 30 | éz+ | -0.002130 | -0.023627 | -0.000330 |
| | 30 | ux- | -0.002561 | -0.024210 | -0.000410 |
| | 30 | uy- | -0.002551 | -0.024225 | -0.000415 |
| | 30 | éz- | -0.000517 | -0.020775 | -0.000851 |
| 117 | 30 | ux+ | 0.000420 | -0.020214 | -0.001118 |
| | 30 | uy+ | 0.000405 | -0.020192 | -0.001111 |
| | 30 | éz+ | -0.001793 | -0.023527 | -0.000732 |
| | 30 | ux- | -0.002223 | -0.024229 | -0.000859 |
| | 30 | uy- | -0.002208 | -0.024251 | -0.000866 |
| | 30 | éz- | -0.000038 | -0.021024 | -0.001245 |
| 211 | 30 | ux+ | 0.000765 | -0.020224 | -0.001197 |
| | 30 | uy+ | 0.000749 | -0.020202 | -0.001189 |
| | 30 | éz+ | -0.001563 | -0.023537 | -0.000817 |
| | 30 | ux- | -0.001952 | -0.024240 | -0.000953 |
| | 30 | uy- | -0.001936 | -0.024262 | -0.000961 |
| | 30 | éz- | 0.000348 | -0.021035 | -0.001333 |
| 212 | 30 | ux+ | 0.001126 | -0.020230 | -0.001225 |
| | 30 | uy+ | 0.001108 | -0.020208 | -0.001216 |
| | 30 | éz+ | -0.001315 | -0.023544 | -0.000847 |
| | 30 | ux- | -0.001663 | -0.024246 | -0.000986 |
| | 30 | uy- | -0.001645 | -0.024268 | -0.000995 |
| | 30 | éz- | 0.000750 | -0.021040 | -0.001364 |
| 213 | 30 | ux+ | 0.001248 | -0.020701 | -0.001270 |
| | 30 | uy+ | 0.001229 | -0.020676 | -0.001261 |
| | 30 | éz+ | -0.001206 | -0.023780 | -0.000898 |
| | 30 | ux- | -0.001566 | -0.024630 | -0.001040 |
| | 30 | uy- | -0.001547 | -0.024655 | -0.001049 |
| | 30 | éz- | 0.000885 | -0.021564 | -0.001412 |
| 214 | 30 | ux+ | 0.001465 | -0.021532 | -0.001332 |
| | 30 | uy+ | 0.001444 | -0.021501 | -0.001323 |
| | 30 | éz+ | -0.001074 | -0.024464 | -0.000971 |
| | 30 | ux- | -0.001384 | -0.025321 | -0.001114 |
| | 30 | uy- | -0.001363 | -0.025352 | -0.001123 |
| | 30 | éz- | 0.001130 | -0.022486 | -0.001475 |
| 310 | 30 | ux+ | 0.000239 | -0.020729 | 0.001141 |
| | 30 | uy+ | 0.000232 | -0.019979 | 0.001033 |
| | 30 | éz+ | 0.000048 | -0.023922 | 0.001710 |
| | 30 | ux- | 0.000012 | -0.022141 | 0.001462 |
| | 30 | uy- | 0.000042 | -0.024029 | 0.001699 |
| | 30 | éz- | 0.000226 | -0.020086 | 0.001022 |
| 311 | 30 | ux+ | -0.000196 | -0.020112 | 0.000696 |
| | 30 | uy+ | -0.000197 | -0.020005 | 0.000701 |
| | 30 | éz+ | -0.000736 | -0.024040 | 0.001429 |
| | 30 | ux- | -0.000736 | -0.024043 | 0.001428 |
| | 30 | uy- | -0.000735 | -0.024055 | 0.001424 |
| | 30 | éz- | -0.000196 | -0.020112 | 0.000696 |
| 312 | 30 | ux+ | -0.000357 | -0.020124 | 0.000555 |
| | 30 | uy+ | -0.000358 | -0.020017 | 0.000559 |
| | 30 | éz+ | -0.001076 | -0.024053 | 0.001296 |
| | 30 | ux- | -0.001076 | -0.024056 | 0.001295 |
| | 30 | uy- | -0.001075 | -0.024068 | 0.001292 |
| | 30 | éz- | -0.000357 | -0.020124 | 0.000555 |
| 320 | 30 | ux+ | 0.000000 | -0.021616 | -0.001268 |
| | 30 | uy+ | 0.000000 | -0.019964 | -0.001028 |
| | 30 | éz+ | 0.000000 | -0.020071 | -0.001017 |
| | 30 | ux- | 0.000000 | -0.021616 | -0.001268 |
| | 30 | uy- | 0.000000 | -0.024044 | -0.001704 |
| | 30 | éz- | 0.000000 | -0.023937 | -0.001715 |
| 400 | 30 | ux+ | 0.000142 | -0.019410 | -0.000121 |
| | 30 | uy+ | 0.000120 | -0.018628 | -0.000026 |
| | 30 | éz+ | 0.000045 | -0.019752 | 0.000157 |
| | 30 | ux- | -0.000010 | -0.020204 | 0.000125 |
| | 30 | uy- | 0.000036 | -0.020370 | -0.000030 |
| | 30 | éz- | 0.000131 | -0.019749 | -0.000157 |
| 411 | 30 | ux+ | 0.000234 | -0.020279 | 0.001233 |
| | 30 | uy+ | 0.000227 | -0.019573 | 0.001122 |
| | 30 | éz+ | 0.000046 | -0.023266 | 0.001777 |

| | | | | | |
|---|---|---|---|---|---|
| | 30 | ux- | 0.000011 | -0.021713 | 0.001510 |
| | 30 | uy- | 0.000040 | -0.023377 | 0.001765 |
| | 30 | éz- | 0.000221 | -0.019684 | 0.001110 |
| 412 | 30 | ux+ | 0.000204 | -0.017943 | 0.001055 |
| | 30 | uy+ | 0.000107 | -0.017395 | 0.000986 |
| | 30 | éz+ | 0.000035 | -0.019973 | 0.001478 |
| | 30 | ux- | 0.000001 | -0.018896 | 0.001146 |
| | 30 | uy- | 0.000119 | -0.020214 | 0.001410 |
| | 30 | éz- | 0.000191 | -0.017636 | 0.000918 |
| 413 | 30 | ux+ | 0.000173 | -0.016744 | 0.000222 |
| | 30 | uy+ | 0.000089 | -0.016257 | 0.000165 |
| | 30 | éz+ | 0.000106 | -0.017987 | 0.000548 |
| | 30 | ux- | -0.000007 | -0.017691 | 0.000193 |
| | 30 | uy- | 0.000091 | -0.018392 | 0.000384 |
| | 30 | éz- | 0.000060 | -0.017231 | 0.000059 |
| 414 | 30 | ux+ | 0.000143 | -0.017230 | -0.000571 |
| | 30 | uy+ | 0.000062 | -0.016731 | -0.000562 |
| | 30 | éz+ | 0.000083 | -0.017887 | -0.000322 |
| | 30 | ux- | -0.000015 | -0.018206 | -0.000660 |
| | 30 | uy- | 0.000067 | -0.018577 | -0.000500 |
| | 30 | éz- | 0.000043 | -0.017768 | -0.000730 |
| 415 | 30 | ux+ | 0.000109 | -0.018856 | -0.000547 |
| | 30 | uy+ | 0.000102 | -0.018186 | -0.000477 |
| | 30 | éz+ | 0.000050 | -0.019187 | -0.000306 |
| | 30 | ux- | -0.000028 | -0.019893 | -0.000534 |
| | 30 | uy- | -0.000023 | -0.019986 | -0.000417 |
| | 30 | éz- | 0.000030 | -0.019245 | -0.000638 |
| 511 | 30 | ux+ | 0.000241 | -0.021153 | 0.001140 |
| | 30 | uy+ | 0.000234 | -0.020366 | 0.001032 |
| | 30 | éz+ | 0.000049 | -0.024562 | 0.001707 |
| | 30 | ux- | 0.000013 | -0.022690 | 0.001459 |
| | 30 | uy- | 0.000043 | -0.024665 | 0.001696 |
| | 30 | éz- | 0.000228 | -0.020469 | 0.001021 |
| 512 | 30 | ux+ | 0.000242 | -0.021213 | 0.001140 |
| | 30 | uy+ | 0.000235 | -0.020418 | 0.001032 |
| | 30 | éz+ | 0.000049 | -0.024648 | 0.001707 |
| | 30 | ux- | 0.000013 | -0.022762 | 0.001459 |
| | 30 | uy- | 0.000043 | -0.024750 | 0.001696 |
| | 30 | éz- | 0.000229 | -0.020520 | 0.001021 |
| 513 | 30 | ux+ | 0.000242 | -0.021265 | 0.001140 |
| | 30 | uy+ | 0.000235 | -0.020466 | 0.001032 |
| | 30 | éz+ | 0.000050 | -0.024730 | 0.001707 |
| | 30 | ux- | 0.000014 | -0.022830 | 0.001459 |
| | 30 | uy- | 0.000044 | -0.024831 | 0.001696 |
| | 30 | éz- | 0.000229 | -0.020567 | 0.001021 |
| 514 | 30 | ux+ | 0.000242 | -0.021325 | 0.001140 |
| | 30 | uy+ | 0.000235 | -0.020520 | 0.001032 |
| | 30 | éz+ | 0.000050 | -0.024816 | 0.001707 |
| | 30 | ux- | 0.000014 | -0.022906 | 0.001459 |
| | 30 | uy- | 0.000044 | -0.024917 | 0.001696 |
| | 30 | éz- | 0.000229 | -0.020621 | 0.001021 |
| 515 | 30 | ux+ | 0.000242 | -0.021383 | 0.001140 |
| | 30 | uy+ | 0.000235 | -0.020572 | 0.001032 |
| | 30 | éz+ | 0.000050 | -0.024902 | 0.001707 |
| | 30 | ux- | 0.000014 | -0.022980 | 0.001459 |
| | 30 | uy- | 0.000044 | -0.025003 | 0.001696 |
| | 30 | éz- | 0.000229 | -0.020673 | 0.001021 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 310 | 30 | Fx+ | 0.00 | 12.95 | 0.00 |
| | 30 | Fy+ | 0.00 | 13.52 | 0.00 |
| | 30 | Mz+ | 0.00 | 12.95 | 0.00 |
| | 30 | Fx- | 0.00 | 12.95 | 0.00 |
| | 30 | Fy- | 0.00 | 11.24 | 0.00 |
| | 30 | Mz- | 0.00 | 12.95 | 0.00 |
| 320 | 30 | Fx+ | 11.03 | 11.98 | 0.00 |



| | | | | | |
|---|---|---|---|---|---|
| | 30 | Fy+ | -11.03 | 13.53 | 0.00 |
| | 30 | Mz+ | 0.00 | 12.17 | 0.00 |
| | 30 | Fx- | -11.03 | 12.33 | 0.00 |
| | 30 | Fy- | 11.03 | 11.23 | 0.00 |
| | 30 | Mz- | 0.00 | 12.17 | 0.00 |
| 400 | 30 | Fx+ | 0.00 | 45.52 | 0.00 |
| | 30 | Fy+ | 0.00 | 46.44 | 0.00 |
| | 30 | Mz+ | 0.00 | 45.52 | 0.00 |
| | 30 | Fx- | 0.00 | 45.52 | 0.00 |
| | 30 | Fy- | 0.00 | 42.47 | 0.00 |
| | 30 | Mz- | 0.00 | 45.52 | 0.00 |
| 411 | 30 | Fx+ | 0.00 | 38.40 | 0.00 |
| | 30 | Fy+ | 0.00 | 39.92 | 0.00 |
| | 30 | Mz+ | 0.00 | 38.40 | 0.00 |
| | 30 | Fx- | 0.00 | 38.40 | 0.00 |
| | 30 | Fy- | 0.00 | 33.43 | 0.00 |
| | 30 | Mz- | 0.00 | 38.40 | 0.00 |
| 412 | 30 | Fx+ | 0.00 | 56.61 | 0.00 |
| | 30 | Fy+ | 0.00 | 57.67 | 0.00 |
| | 30 | Mz+ | 0.00 | 56.61 | 0.00 |
| | 30 | Fx- | 0.00 | 56.61 | 0.00 |
| | 30 | Fy- | 0.00 | 49.63 | 0.00 |
| | 30 | Mz- | 0.00 | 56.61 | 0.00 |
| 413 | 30 | Fx+ | 0.00 | 52.26 | 0.00 |
| | 30 | Fy+ | 0.00 | 52.46 | 0.00 |
| | 30 | Mz+ | 0.00 | 52.26 | 0.00 |
| | 30 | Fx- | 0.00 | 52.26 | 0.00 |
| | 30 | Fy- | 0.00 | 46.38 | 0.00 |
| | 30 | Mz- | 0.00 | 52.26 | 0.00 |
| 414 | 30 | Fx+ | 0.00 | 52.63 | 0.00 |
| | 30 | Fy+ | 0.00 | 53.00 | 0.00 |
| | 30 | Mz+ | 0.00 | 52.63 | 0.00 |
| | 30 | Fx- | 0.00 | 52.63 | 0.00 |
| | 30 | Fy- | 0.00 | 47.73 | 0.00 |
| | 30 | Mz- | 0.00 | 52.63 | 0.00 |
| 415 | 30 | Fx+ | 0.00 | 50.51 | 0.00 |
| | 30 | Fy+ | 0.00 | 51.30 | 0.00 |
| | 30 | Mz+ | 0.00 | 50.51 | 0.00 |
| | 30 | Fx- | 0.00 | 50.51 | 0.00 |
| | 30 | Fy- | 0.00 | 46.68 | 0.00 |
| | 30 | Mz- | 0.00 | 50.51 | 0.00 |
| 511 | 30 | Fx+ | 0.00 | 7.50 | 0.00 |
| | 30 | Fy+ | 0.00 | 7.86 | 0.00 |
| | 30 | Mz+ | 0.00 | 7.50 | 0.00 |
| | 30 | Fx- | 0.00 | 7.50 | 0.00 |
| | 30 | Fy- | 0.00 | 6.50 | 0.00 |
| | 30 | Mz- | 0.00 | 7.50 | 0.00 |
| 512 | 30 | Fx+ | 0.00 | 1.77 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.86 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.77 | 0.00 |
| | 30 | Fx- | 0.00 | 1.77 | 0.00 |
| | 30 | Fy- | 0.00 | 1.53 | 0.00 |
| | 30 | Mz- | 0.00 | 1.77 | 0.00 |
| 513 | 30 | Fx+ | 0.00 | 1.78 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.86 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.78 | 0.00 |
| | 30 | Fx- | 0.00 | 1.78 | 0.00 |
| | 30 | Fy- | 0.00 | 1.53 | 0.00 |
| | 30 | Mz- | 0.00 | 1.78 | 0.00 |
| 514 | 30 | Fx+ | 0.00 | 1.78 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.87 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.78 | 0.00 |
| | 30 | Fx- | 0.00 | 1.78 | 0.00 |
| | 30 | Fy- | 0.00 | 1.54 | 0.00 |
| | 30 | Mz- | 0.00 | 1.78 | 0.00 |
| 515 | 30 | Fx+ | 0.00 | 0.90 | 0.00 |
| | 30 | Fy+ | 0.00 | 0.94 | 0.00 |
| | 30 | Mz+ | 0.00 | 0.90 | 0.00 |
| | 30 | Fx- | 0.00 | 0.90 | 0.00 |
| | 30 | Fy- | 0.00 | 0.77 | 0.00 |

| | | | | |
|---|---|---|---|---|
| 30 | MZ- | 0.00 | 0.90 | 0.00 |

ALEPH consultores

Asunto *LAV-MARTORELL. ODT 300.9.* | Fecha JUNIO-*2002* | Página de

ESFUERZOS Y ARMADURA CONDICIONANTE PILOTA

| | | | |
|---|---|---|---|
| Dintel | Nd | Md | As c/2 |
| Exp. hast ext | -107.71 | -125.51 | 14.67 |
| cv | -68.16 | 161.62 | 32.48 |
| Exp. hast. int. | -93.84 | -659.38 | 77.39 |
| Hastial Ext | | | |
| Superior | -161.56 | 141.51 | 39.31 |
| Inferior | -155.8 | 111.31 | 24.89 |
| Zapata | | | |
| Inf ext | -33.32 | 114.53 | 22.13 |
| cv | -25.24 | -201.33 | 56.09 |
| Inf int | -365.99 | 419.61 | 67.89 |
| Hastial central | | | |
| -sup | -59.10 | -24.26 | mih |
| - inf | -391.78 | -21.14 | mih |

Los Resultados del Hastial Intermedio y del resto de Barras se lista en las paginas siguientes.

MA_ROT2.LST Sábado, 18 Mayo 2002 4:50am

LISTADO DE ESTADOS DE CARGA
Fecha : 09.05.2002 14:03:40
Título: L.A.V.MARTORELL. - ODT 300.9.
Coment: Envolventes totales
Titlst: Estados Rotura. Proyecto: L.A.V.MARTORELL. - ODT 3

Tabla de estados de carga a listar

| ec | Fichero | tipo | Título |
|---|---|---|---|
| 33 | MA_ROT | 1 | [Envolvente de Rotura (Envolvente Servicio-Sobreele] |
| 36 | MA_CON | 1 | [Envolvente de Rotura en Construccion (Envolvente) ] |

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Mz |
|---|---|---|---|---|---|---|
| 6 | 6 | 33 | Nx+ | -54.49 | -123.90 | -302.47 |
| | | 33 | Fy+ | -77.76 | -114.49 | -265.34 |
| | | 33 | Mz+ | -77.36 | -114.52 | -264.79 |
| | | 33 | Nx- | -124.04 | -179.49 | -419.92 |
| | | 33 | Fy- | -92.86 | -190.06 | -458.69 |
| | | 33 | Mz- | -93.34 | -190.04 | -459.38 |
| | | 36 | Nx+ | -0.09 | -11.56 | -30.37 |
| | | 36 | Fy+ | -3.54 | -10.21 | -25.68 |
| | | 36 | Mz+ | -3.54 | -10.21 | -25.68 |
| | | 36 | Nx- | -104.09 | -165.35 | -389.51 |
| | | 36 | Fy- | -81.62 | -171.06 | -408.19 |
| | | 36 | Mz- | -81.62 | -171.06 | -408.19 |
| 7 | 7 | 33 | Nx+ | -39.58 | -98.93 | -143.37 |
| | | 33 | Fy+ | -64.06 | -88.93 | -113.88 |
| | | 33 | Mz+ | -64.59 | -91.00 | -113.37 |
| | | 33 | Nx- | -103.10 | -137.41 | -179.80 |
| | | 33 | Fy- | -70.69 | -147.69 | -209.27 |
| | | 33 | Mz- | -70.18 | -145.64 | -209.78 |
| | | 36 | Nx+ | 1.62 | -11.87 | -19.75 |
| | | 36 | Fy+ | -2.34 | -7.87 | -12.09 |
| | | 36 | Mz+ | -2.34 | -7.87 | -12.09 |
| | | 36 | Nx- | -84.89 | -125.92 | -167.37 |
| | | 36 | Fy- | -61.25 | -132.31 | -183.33 |
| | | 36 | Mz- | -60.79 | -130.44 | -183.79 |
| 8 | 8 | 33 | Nx+ | -39.58 | -59.03 | -3.10 |
| | | 33 | Fy+ | -64.59 | -49.52 | 11.43 |
| | | 33 | Mz+ | -95.54 | -76.05 | 15.92 |
| | | 33 | Nx- | -103.10 | -78.09 | 11.53 |
| | | 33 | Fy- | -70.18 | -87.90 | -2.41 |
| | | 33 | Mz- | -47.05 | -60.79 | -6.53 |
| | | 36 | Nx+ | 1.62 | -7.67 | -2.41 |
| | | 36 | Fy+ | -2.34 | -4.76 | -0.86 |
| | | 36 | Mz+ | -82.69 | -71.23 | 9.89 |
| | | 36 | Nx- | -84.89 | -72.22 | 8.56 |
| | | 36 | Fy- | -60.79 | -78.05 | 1.36 |
| | | 36 | Mz- | -4.48 | -10.95 | -9.36 |
| 9 | 9 | 33 | Nx+ | -39.58 | -22.01 | 63.67 |
| | | 33 | Fy+ | -65.14 | -12.56 | 65.42 |
| | | 33 | Mz+ | -68.16 | -26.45 | 101.02 |
| | | 33 | Nx- | -103.10 | -23.04 | 94.85 |
| | | 33 | Fy- | -69.63 | -32.80 | 94.14 |
| | | 33 | Mz- | -69.24 | -17.63 | 58.70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Nx+ | 1.62 | -3.78 | 7.02 |
| | | 36 | Fy+ | -2.34 | -1.88 | 4.61 |
| | | 36 | Mz+ | -60.03 | -25.32 | 90.68 |
| | | 36 | Nx- | -84.89 | -22.39 | 86.52 |
| | | 36 | Fy- | -60.29 | -28.08 | 86.23 |
| | | 36 | Mz- | -4.45 | -2.70 | 1.65 |
| 10 | 10 | 33 | Nx+ | -39.58 | 15.00 | 69.47 |
| | | 33 | Fy+ | -95.34 | 34.13 | 87.61 |
| | | 33 | Mz+ | -69.82 | 24.79 | 103.30 |
| | | 33 | Nx- | -103.10 | 32.00 | 87.46 |
| | | 33 | Fy- | -47.35 | 13.16 | 69.30 |
| | | 33 | Mz- | -64.89 | 21.92 | 55.13 |
| | | 36 | Nx+ | 1.62 | 0.12 | 10.02 |
| | | 36 | Fy+ | -82.30 | 28.47 | 83.03 |
| | | 36 | Mz+ | -60.89 | 24.08 | 91.38 |
| | | 36 | Nx- | -84.89 | 27.44 | 82.37 |
| | | 36 | Fy- | -4.87 | -0.55 | 6.91 |
| | | 36 | Mz- | -4.45 | 0.18 | 3.73 |
| 121 | 121 | 33 | Nx+ | -104.98 | 12.53 | 51.46 |
| | | 33 | Fy+ | -160.87 | 26.24 | 74.54 |
| | | 33 | Mz+ | -163.90 | 13.37 | 80.14 |
| | | 33 | Nx- | -171.97 | 10.03 | 65.12 |
| | | 33 | Fy- | -115.80 | -3.67 | 41.02 |
| | | 33 | Mz- | -111.57 | 6.01 | 36.03 |
| | | 36 | Nx+ | -15.36 | 5.72 | 6.41 |
| | | 36 | Fy+ | -148.67 | 17.65 | 63.06 |
| | | 36 | Mz+ | -151.37 | 6.08 | 68.06 |
| | | 36 | Nx- | -154.67 | 12.52 | 63.29 |
| | | 36 | Fy- | -113.11 | 0.84 | 47.79 |
| | | 36 | Mz- | -16.02 | 7.08 | 4.87 |
| 122 | 122 | 33 | Nx+ | -103.99 | 6.22 | 46.48 |
| | | 33 | Fy+ | -159.52 | 13.54 | 63.96 |
| | | 33 | Mz+ | -164.15 | -1.39 | 76.21 |
| | | 33 | Nx- | -170.62 | -1.47 | 62.85 |
| | | 33 | Fy- | -160.92 | -10.14 | 63.81 |
| | | 33 | Mz- | -108.98 | 4.23 | 34.08 |
| | | 36 | Nx+ | -14.36 | 3.87 | 3.86 |
| | | 36 | Fy+ | -20.03 | 7.78 | 7.28 |
| | | 36 | Mz+ | -150.84 | -3.23 | 67.12 |
| | | 36 | Nx- | -153.32 | 2.17 | 59.39 |
| | | 36 | Fy- | -144.40 | -5.23 | 62.34 |
| | | 36 | Mz- | -18.08 | 5.58 | 1.77 |
| 123 | 123 | 33 | Nx+ | -102.98 | 0.08 | 44.80 |
| | | 33 | Fy+ | -111.47 | 3.81 | 42.78 |
| | | 33 | Mz+ | -163.35 | -9.44 | 79.14 |
| | | 33 | Nx- | -169.27 | -12.57 | 66.60 |
| | | 33 | Fy- | -159.92 | -17.54 | 71.20 |
| | | 33 | Mz- | -107.38 | -3.66 | 33.89 |
| | | 36 | Nx+ | -13.36 | 2.29 | 2.23 |
| | | 36 | Fy+ | -18.68 | 5.04 | 3.86 |
| | | 36 | Mz+ | -149.93 | -10.42 | 70.81 |
| | | 36 | Nx- | -151.97 | -7.81 | 60.91 |
| | | 36 | Fy- | -143.40 | -11.88 | 66.92 |
| | | 36 | Mz- | -17.08 | 2.64 | -0.41 |
| 124 | 124 | 33 | Nx+ | -101.98 | -5.85 | 46.32 |
| | | 33 | Fy+ | -110.12 | -4.49 | 42.98 |
| | | 33 | Mz+ | -165.75 | -22.36 | 88.53 |
| | | 33 | Nx- | -167.92 | -23.21 | 76.15 |

MA_ROT2.LST Sábado, 18 Mayo 2002 4:50am

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Fy- | -158.92 | -24.64 | 82.45 |
| | | 33 | Mz- | -104.13 | -8.04 | 37.03 |
| | | 36 | Nx+ | -12.36 | 0.97 | 1.38 |
| | | 36 | Fy+ | -17.33 | 2.69 | 1.83 |
| | | 36 | Mz+ | -148.98 | -17.46 | 78.36 |
| | | 36 | Nx- | -150.62 | -17.39 | 67.64 |
| | | 36 | Fy- | -142.40 | -18.27 | 74.96 |
| | | 36 | Mz- | -16.07 | 0.06 | -1.12 |
| 125 | 125 | 33 | Nx+ | -100.99 | -11.59 | 50.98 |
| | | 33 | Fy+ | -107.60 | -10.39 | 54.93 |
| | | 33 | Mz+ | -164.78 | -30.04 | 102.45 |
| | | 33 | Nx- | -166.57 | -33.43 | 91.25 |
| | | 33 | Fy- | -159.67 | -34.61 | 86.30 |
| | | 33 | Mz- | -102.96 | -15.63 | 43.34 |
| | | 36 | Nx+ | -11.36 | -0.11 | 1.17 |
| | | 36 | Fy+ | -16.10 | 1.62 | 8.20 |
| | | 36 | Mz+ | -147.69 | -23.75 | 89.38 |
| | | 36 | Nx- | -149.27 | -26.59 | 79.38 |
| | | 36 | Fy- | -142.98 | -27.25 | 76.34 |
| | | 36 | Mz- | -11.78 | 0.33 | -1.21 |
| 126 | 126 | 33 | Nx+ | -99.98 | -17.15 | 58.65 |
| | | 33 | Fy+ | -106.25 | -15.95 | 61.96 |
| | | 33 | Mz+ | -162.93 | -36.83 | 120.31 |
| | | 33 | Nx- | -165.22 | -43.25 | 111.75 |
| | | 33 | Fy- | -158.67 | -44.43 | 107.39 |
| | | 33 | Mz- | -101.71 | -21.41 | 52.94 |
| | | 36 | Nx+ | -10.36 | -0.92 | 1.46 |
| | | 36 | Fy+ | -14.75 | 1.62 | 7.33 |
| | | 36 | Mz+ | -145.87 | -29.73 | 103.65 |
| | | 36 | Nx- | -147.92 | -35.42 | 95.95 |
| | | 36 | Fy- | -141.97 | -36.08 | 93.28 |
| | | 36 | Mz- | -10.78 | -1.26 | -0.94 |
| 126 | 127 | 33 | Nx+ | -98.98 | -22.51 | 69.25 |
| | | 33 | Fy+ | -105.81 | -20.63 | 78.67 |
| | | 33 | Mz+ | -161.59 | -43.18 | 141.64 |
| | | 33 | Nx- | -163.87 | -52.61 | 137.30 |
| | | 33 | Fy- | -156.74 | -54.48 | 126.85 |
| | | 33 | Mz- | -100.68 | -28.76 | 66.32 |
| | | 36 | Nx+ | -9.36 | -1.49 | 2.11 |
| | | 36 | Fy+ | -13.40 | 1.62 | 6.47 |
| | | 36 | Mz+ | -144.52 | -35.35 | 121.01 |
| | | 36 | Nx- | -146.57 | -43.85 | 117.09 |
| | | 36 | Fy- | -140.69 | -44.72 | 112.74 |
| | | 36 | Mz- | -9.78 | -2.45 | 0.06 |
| 600 | 600 | 33 | Nx+ | -250.42 | 0.41 | -0.21 |
| | | 33 | Fy+ | -384.99 | 8.36 | -12.78 |
| | | 33 | Mz+ | -385.00 | -8.31 | 12.87 |
| | | 33 | Nx- | -401.23 | -0.46 | 0.29 |
| | | 33 | Fy- | -384.93 | -8.36 | 12.78 |
| | | 33 | Mz- | -385.06 | 8.31 | -12.87 |
| | | 36 | Nx+ | -25.34 | -2.23 | 3.20 |
| | | 36 | Fy+ | -63.41 | 8.45 | -16.86 |
| | | 36 | Mz+ | -63.37 | -8.45 | 16.86 |
| | | 36 | Nx- | -362.17 | 0.00 | 0.00 |
| | | 36 | Fy- | -63.37 | -8.45 | 16.86 |
| | | 36 | Mz- | -63.41 | 8.45 | -16.86 |
| 600 | 6 | 33 | Nx+ | -247.23 | 0.41 | -0.57 |
| | | 33 | Fy+ | -380.68 | 8.36 | -20.09 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Nx+ | 1.62 | -3.78 | 7.02 |
| | | 36 | Fy+ | -2.34 | -1.88 | 4.61 |
| | | 36 | Mz+ | -60.03 | -25.32 | 90.68 |
| | | 36 | Nx- | -84.89 | -22.39 | 86.52 |
| | | 36 | Fy- | -60.29 | -28.08 | 86.23 |
| | | 36 | Mz- | -4.45 | -2.70 | 1.65 |
| 10 | 10 | 33 | Nx+ | -39.58 | 15.00 | 69.47 |
| | | 33 | Fy+ | -95.34 | 34.13 | 87.61 |
| | | 33 | Mz+ | -69.82 | 24.79 | 103.30 |
| | | 33 | Nx- | -103.10 | 32.00 | 87.46 |
| | | 33 | Fy- | -47.35 | 13.16 | 69.30 |
| | | 33 | Mz- | -64.89 | 21.92 | 55.13 |
| | | 36 | Nx+ | 1.62 | 0.12 | 10.02 |
| | | 36 | Fy+ | -82.30 | 28.47 | 83.03 |
| | | 36 | Mz+ | -60.89 | 24.08 | 91.38 |
| | | 36 | Nx- | -84.89 | 27.44 | 82.37 |
| | | 36 | Fy- | -4.87 | -0.55 | 6.91 |
| | | 36 | Mz- | -4.45 | 0.18 | 3.73 |
| 121 | 121 | 33 | Nx+ | -104.98 | 12.53 | 51.46 |
| | | 33 | Fy+ | -160.87 | 26.24 | 74.54 |
| | | 33 | Mz+ | -163.90 | 13.37 | 80.14 |
| | | 33 | Nx- | -171.97 | 10.03 | 65.12 |
| | | 33 | Fy- | -115.80 | -3.67 | 41.02 |
| | | 33 | Mz- | -111.57 | 6.01 | 36.03 |
| | | 36 | Nx+ | -15.36 | 5.72 | 6.41 |
| | | 36 | Fy+ | -148.67 | 17.65 | 63.06 |
| | | 36 | Mz+ | -151.37 | 6.08 | 68.06 |
| | | 36 | Nx- | -154.67 | 12.52 | 63.29 |
| | | 36 | Fy- | -113.11 | 0.84 | 47.79 |
| | | 36 | Mz- | -16.02 | 7.08 | 4.87 |
| 122 | 122 | 33 | Nx+ | -103.99 | 6.22 | 46.48 |
| | | 33 | Fy+ | -159.52 | 13.54 | 63.96 |
| | | 33 | Mz+ | -164.15 | -1.39 | 76.21 |
| | | 33 | Nx- | -170.62 | -1.47 | 62.85 |
| | | 33 | Fy- | -160.92 | -10.14 | 63.81 |
| | | 33 | Mz- | -108.98 | 4.23 | 34.08 |
| | | 36 | Nx+ | -14.36 | 3.87 | 3.86 |
| | | 36 | Fy+ | -20.03 | 7.78 | 7.28 |
| | | 36 | Mz+ | -150.84 | -3.23 | 67.12 |
| | | 36 | Nx- | -153.32 | 2.17 | 59.39 |
| | | 36 | Fy- | -144.40 | -5.23 | 62.34 |
| | | 36 | Mz- | -18.08 | 5.58 | 1.77 |
| 123 | 123 | 33 | Nx+ | -102.98 | 0.08 | 44.80 |
| | | 33 | Fy+ | -111.47 | 3.81 | 42.78 |
| | | 33 | Mz+ | -163.35 | -9.44 | 79.14 |
| | | 33 | Nx- | -169.27 | -12.57 | 66.60 |
| | | 33 | Fy- | -159.92 | -17.54 | 71.20 |
| | | 33 | Mz- | -107.38 | -3.66 | 33.89 |
| | | 36 | Nx+ | -13.36 | 2.29 | 2.23 |
| | | 36 | Fy+ | -18.68 | 5.04 | 3.86 |
| | | 36 | Mz+ | -149.93 | -10.42 | 70.81 |
| | | 36 | Nx- | -151.97 | -7.81 | 60.91 |
| | | 36 | Fy- | -143.40 | -11.88 | 66.92 |
| | | 36 | Mz- | -17.08 | 2.64 | -0.41 |
| 124 | 124 | 33 | Nx+ | -101.98 | -5.85 | 46.32 |
| | | 33 | Fy+ | -110.12 | -4.49 | 42.98 |
| | | 33 | Mz+ | -165.75 | -22.36 | 88.53 |
| | | 33 | Nx- | -167.92 | -23.21 | 76.15 |

MA_ROT2.LST Sábado, 18 Mayo 2002 4:50am

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Fy- | -158.92 | -24.64 | 82.45 |
| | | 33 | Mz- | -104.13 | -8.04 | 37.03 |
| | | 36 | Nx+ | -12.36 | 0.97 | 1.38 |
| | | 36 | Fy+ | -17.33 | 2.69 | 1.83 |
| | | 36 | Mz+ | -148.98 | -17.46 | 78.36 |
| | | 36 | Nx- | -150.62 | -17.39 | 67.64 |
| | | 36 | Fy- | -142.40 | -18.27 | 74.96 |
| | | 36 | Mz- | -16.07 | 0.06 | -1.12 |
| 125 | 125 | 33 | Nx+ | -100.99 | -11.59 | 50.98 |
| | | 33 | Fy+ | -107.60 | -10.39 | 54.93 |
| | | 33 | Mz+ | -164.78 | -30.04 | 102.45 |
| | | 33 | Nx- | -166.57 | -33.43 | 91.25 |
| | | 33 | Fy- | -159.67 | -34.61 | 86.30 |
| | | 33 | Mz- | -102.96 | -15.63 | 43.34 |
| | | 36 | Nx+ | -11.36 | -0.11 | 1.17 |
| | | 36 | Fy+ | -16.10 | 1.62 | 8.20 |
| | | 36 | Mz+ | -147.69 | -23.75 | 89.38 |
| | | 36 | Nx- | -149.27 | -26.59 | 79.38 |
| | | 36 | Fy- | -142.98 | -27.25 | 76.34 |
| | | 36 | Mz- | -11.78 | 0.33 | -1.21 |
| 126 | 126 | 33 | Nx+ | -99.98 | -17.15 | 58.65 |
| | | 33 | Fy+ | -106.25 | -15.95 | 61.96 |
| | | 33 | Mz+ | -162.93 | -36.83 | 120.31 |
| | | 33 | Nx- | -165.22 | -43.25 | 111.75 |
| | | 33 | Fy- | -158.67 | -44.43 | 107.39 |
| | | 33 | Mz- | -101.71 | -21.41 | 52.94 |
| | | 36 | Nx+ | -10.36 | -0.92 | 1.46 |
| | | 36 | Fy+ | -14.75 | 1.62 | 7.33 |
| | | 36 | Mz+ | -145.87 | -29.73 | 103.65 |
| | | 36 | Nx- | -147.92 | -35.42 | 95.95 |
| | | 36 | Fy- | -141.97 | -36.08 | 93.28 |
| | | 36 | Mz- | -10.78 | -1.26 | -0.94 |
| 126 | 127 | 33 | Nx+ | -98.98 | -22.51 | 69.25 |
| | | 33 | Fy+ | -105.81 | -20.63 | 78.67 |
| | | 33 | Mz+ | -161.59 | -43.18 | 141.64 |
| | | 33 | Nx- | -163.87 | -52.61 | 137.30 |
| | | 33 | Fy- | -156.74 | -54.48 | 126.85 |
| | | 33 | Mz- | -100.68 | -28.76 | 66.32 |
| | | 36 | Nx+ | -9.36 | -1.49 | 2.11 |
| | | 36 | Fy+ | -13.40 | 1.62 | 6.47 |
| | | 36 | Mz+ | -144.52 | -35.35 | 121.01 |
| | | 36 | Nx- | -146.57 | -43.85 | 117.09 |
| | | 36 | Fy- | -140.69 | -44.72 | 112.74 |
| | | 36 | Mz- | -9.78 | -2.45 | 0.06 |
| 600 | 600 | 33 | Nx+ | -250.42 | 0.41 | -0.21 |
| | | 33 | Fy+ | -384.99 | 8.36 | -12.78 |
| | | 33 | Mz+ | -385.00 | -8.31 | 12.87 |
| | | 33 | Nx- | -401.23 | -0.46 | 0.29 |
| | | 33 | Fy- | -384.93 | -8.36 | 12.78 |
| | | 33 | Mz- | -385.06 | 8.31 | -12.87 |
| | | 36 | Nx+ | -25.34 | -2.23 | 3.20 |
| | | 36 | Fy+ | -63.41 | 8.45 | -16.86 |
| | | 36 | Mz+ | -63.37 | -8.45 | 16.86 |
| | | 36 | Nx- | -362.17 | 0.00 | 0.00 |
| | | 36 | Fy- | -63.37 | -8.45 | 16.86 |
| | | 36 | Mz- | -63.41 | 8.45 | -16.86 |
| 600 | 6 | 33 | Nx+ | -247.23 | 0.41 | -0.57 |
| | | 33 | Fy+ | -380.68 | 8.36 | -20.09 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Mz+ | -380.62 | -8.32 | 20.14 |
| | | 33 | Nx- | -396.92 | -0.46 | 0.69 |
| | | 33 | Fy- | -380.62 | -8.36 | 20.09 |
| | | 33 | Mz- | -380.68 | 8.32 | -20.14 |
| | | 36 | Nx+ | -22.15 | -2.23 | 5.16 |
| | | 36 | Fy+ | -59.10 | 8.45 | -24.26 |
| | | 36 | Mz+ | -59.06 | -8.45 | 24.26 |
| | | 36 | Nx- | -357.86 | 0.00 | 0.00 |
| | | 36 | Fy- | -59.06 | -8.45 | 24.26 |
| | | 36 | Mz- | -59.10 | 8.45 | -24.26 |
| 601 | 601 | 33 | Nx+ | -250.98 | 0.41 | -0.02 |
| | | 33 | Fy+ | -385.75 | 8.36 | -9.03 |
| | | 33 | Mz+ | -387.23 | -7.75 | 9.15 |
| | | 33 | Nx- | -401.99 | -0.46 | 0.06 |
| | | 33 | Fy- | -385.69 | -8.36 | 9.03 |
| | | 33 | Mz- | -387.29 | 7.75 | -9.15 |
| | | 36 | Nx+ | -25.90 | -2.23 | 2.20 |
| | | 36 | Fy+ | -64.17 | 8.45 | -13.05 |
| | | 36 | Mz+ | -64.13 | -8.45 | 13.05 |
| | | 36 | Nx- | -362.93 | 0.00 | 0.00 |
| | | 36 | Fy- | -64.13 | -8.45 | 13.05 |
| | | 36 | Mz- | -64.17 | 8.45 | -13.05 |
| 602 | 602 | 33 | Nx+ | -251.55 | 0.41 | 0.17 |
| | | 33 | Fy+ | -386.51 | 8.36 | -5.28 |
| | | 33 | Mz+ | -385.35 | -5.39 | 6.03 |
| | | 33 | Nx- | -402.75 | -0.46 | -0.15 |
| | | 33 | Fy- | -386.45 | -8.36 | 5.28 |
| | | 33 | Mz- | -385.41 | 5.39 | -6.01 |
| | | 36 | Nx+ | -26.47 | -2.23 | 1.19 |
| | | 36 | Fy+ | -64.93 | 8.45 | -9.25 |
| | | 36 | Mz+ | -64.89 | -8.45 | 9.25 |
| | | 36 | Nx- | -363.69 | 0.00 | 0.00 |
| | | 36 | Fy- | -64.89 | -8.45 | 9.25 |
| | | 36 | Mz- | -64.93 | 8.45 | -9.25 |
| 603 | 603 | 33 | Nx+ | -252.11 | 0.41 | 0.35 |
| | | 33 | Fy+ | -387.26 | 8.36 | -1.52 |
| | | 33 | Mz+ | -386.11 | -5.30 | 3.62 |
| | | 33 | Nx- | -403.51 | -0.46 | -0.36 |
| | | 33 | Fy- | -387.20 | -8.36 | 1.52 |
| | | 33 | Mz- | -386.17 | 5.30 | -3.62 |
| | | 36 | Nx+ | -27.03 | -2.23 | 0.19 |
| | | 36 | Fy+ | -65.69 | 8.45 | -5.45 |
| | | 36 | Mz+ | -65.65 | -8.45 | 5.45 |
| | | 36 | Nx- | -364.45 | 0.00 | 0.00 |
| | | 36 | Fy- | -65.65 | -8.45 | 5.45 |
| | | 36 | Mz- | -65.69 | 8.45 | -5.45 |
| 604 | 604 | 33 | Nx+ | -252.67 | 0.41 | 0.54 |
| | | 33 | Fy+ | -388.02 | 8.36 | 2.23 |
| | | 33 | Mz+ | -388.02 | 3.93 | 4.35 |
| | | 33 | Nx- | -404.27 | -0.46 | -0.57 |
| | | 33 | Fy- | -387.96 | -8.36 | -2.23 |
| | | 33 | Mz- | -387.96 | -3.93 | -4.35 |
| | | 36 | Nx+ | -27.59 | -2.23 | -0.81 |
| | | 36 | Fy+ | -66.45 | 8.45 | -1.65 |
| | | 36 | Mz+ | -67.34 | -7.25 | 2.07 |
| | | 36 | Nx- | -365.21 | 0.00 | 0.00 |
| | | 36 | Fy- | -66.41 | -8.45 | 1.65 |
| | | 36 | Mz- | -67.36 | 7.25 | -2.07 |

MA_ROT2.LST Sábado, 18 Mayo 2002 4:50am

| | | | | | | |
|---|---|---|---|---|---|---|
| 605 | 605 | 33 | Nx+ | -253.17 | 0.41 | 0.71 |
| | | 33 | Fy+ | -388.70 | 8.36 | 5.58 |
| | | 33 | Mz+ | -388.70 | 5.07 | 5.94 |
| | | 33 | Nx- | -404.94 | -0.46 | -0.77 |
| | | 33 | Fy- | -388.64 | -8.36 | -5.58 |
| | | 33 | Mz- | -388.64 | -5.07 | -5.94 |
| | | 36 | Nx+ | -28.09 | -2.23 | -1.71 |
| | | 36 | Fy+ | -67.12 | 8.45 | 1.74 |
| | | 36 | Mz+ | -50.31 | 6.49 | 2.04 |
| | | 36 | Nx- | -365.88 | 0.00 | 0.00 |
| | | 36 | Fy- | -67.08 | -8.45 | -1.74 |
| | | 36 | Mz- | -50.27 | -6.49 | -2.04 |
| 606 | 606 | 33 | Nx+ | -253.67 | 0.41 | 0.87 |
| | | 33 | Fy+ | -389.37 | 8.36 | 8.93 |
| | | 33 | Mz+ | -389.37 | 8.27 | 8.99 |
| | | 33 | Nx- | -405.62 | -0.46 | -0.96 |
| | | 33 | Fy- | -389.31 | -8.36 | -8.93 |
| | | 33 | Mz- | -389.31 | -8.27 | -8.99 |
| | | 36 | Nx+ | -28.59 | -2.23 | -2.61 |
| | | 36 | Fy+ | -67.80 | 8.45 | 5.13 |
| | | 36 | Mz+ | -67.80 | 8.45 | 5.13 |
| | | 36 | Nx- | -366.56 | 0.00 | 0.00 |
| | | 36 | Fy- | -67.76 | -8.45 | -5.13 |
| | | 36 | Mz- | -67.76 | -8.45 | -5.13 |
| 607 | 607 | 33 | Nx+ | -254.36 | 0.41 | 1.09 |
| | | 33 | Fy+ | -390.30 | 8.36 | 13.52 |
| | | 33 | Mz+ | -390.30 | 8.27 | 13.52 |
| | | 33 | Nx- | -406.54 | -0.46 | -1.22 |
| | | 33 | Fy- | -390.24 | -8.36 | -13.52 |
| | | 33 | Mz- | -390.24 | -8.27 | -13.52 |
| | | 36 | Nx+ | -29.28 | -2.23 | -3.83 |
| | | 36 | Fy+ | -68.72 | 8.45 | 9.77 |
| | | 36 | Mz+ | -68.72 | 8.45 | 9.77 |
| | | 36 | Nx- | -367.48 | 0.00 | 0.00 |
| | | 36 | Fy- | -68.68 | -8.45 | -9.77 |
| | | 36 | Mz- | -68.68 | -8.45 | -9.77 |
| 608 | 400 | 33 | Nx+ | -255.50 | 0.41 | 1.47 |
| | | 33 | Fy+ | -391.84 | 8.36 | 21.14 |
| | | 33 | Mz+ | -391.84 | 8.36 | 21.14 |
| | | 33 | Nx- | -408.08 | -0.46 | -1.65 |
| | | 33 | Fy- | -391.78 | -8.36 | -21.14 |
| | | 33 | Mz- | -391.78 | -8.36 | -21.14 |
| | | 36 | Nx+ | -30.42 | -2.23 | -5.86 |
| | | 36 | Fy+ | -70.26 | 8.45 | 17.50 |
| | | 36 | Mz+ | -70.26 | 8.45 | 17.50 |
| | | 36 | Nx- | -369.03 | 0.00 | 0.00 |
| | | 36 | Fy- | -70.22 | -8.45 | -17.50 |
| | | 36 | Mz- | -70.22 | -8.45 | -17.50 |
| 221 | 221 | 33 | Nx+ | -98.22 | -25.43 | 76.38 |
| | | 33 | Fy+ | -104.79 | -22.87 | 85.14 |
| | | 33 | Mz+ | -160.54 | -46.95 | 155.04 |
| | | 33 | Nx- | -162.84 | -57.66 | 153.71 |
| | | 33 | Fy- | -155.98 | -60.19 | 143.93 |
| | | 33 | Mz- | -99.92 | -32.81 | 75.48 |
| | | 36 | Nx+ | -8.60 | -1.69 | 2.58 |
| | | 36 | Fy+ | -12.38 | 1.62 | 5.99 |
| | | 36 | Mz+ | -143.49 | -38.38 | 132.00 |
| | | 36 | Nx- | -145.54 | -48.40 | 130.84 |
| | | 36 | Fy- | -139.93 | -49.47 | 126.77 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Mz- | -9.02 | -2.96 | 0.87 |
| 222 | 222 | 33 | Nx+ | -48.82 | 80.46 | 90.34 |
| | | 33 | Fy+ | -87.09 | 129.76 | 169.18 |
| | | 33 | Mz+ | -100.43 | 127.35 | 172.01 |
| | | 33 | Nx- | -102.18 | 126.39 | 165.74 |
| | | 33 | Fy- | -59.67 | 77.69 | 86.12 |
| | | 33 | Mz- | -50.57 | 79.54 | 84.17 |
| | | 36 | Nx+ | -0.91 | 8.02 | 3.99 |
| | | 36 | Fy+ | -74.78 | 116.57 | 143.78 |
| | | 36 | Mz+ | -86.36 | 114.53 | 146.10 |
| | | 36 | Nx- | -86.90 | 114.59 | 144.19 |
| | | 36 | Fy- | -5.30 | 6.68 | 1.81 |
| | | 36 | Mz- | -5.30 | 6.68 | 1.81 |
| 223 | 223 | 33 | Nx+ | -48.97 | 70.60 | 60.73 |
| | | 33 | Fy+ | -87.55 | 114.69 | 121.89 |
| | | 33 | Mz+ | -102.82 | 111.38 | 125.72 |
| | | 33 | Nx- | -105.52 | 110.51 | 119.89 |
| | | 33 | Fy- | -62.02 | 67.22 | 57.69 |
| | | 33 | Mz- | -51.64 | 69.78 | 55.02 |
| | | 36 | Nx+ | -0.50 | 6.50 | 1.18 |
| | | 36 | Fy+ | -75.13 | 102.78 | 101.35 |
| | | 36 | Mz+ | -88.46 | 99.95 | 104.52 |
| | | 36 | Nx- | -89.32 | 100.24 | 102.64 |
| | | 36 | Fy- | -5.27 | 5.06 | -0.46 |
| | | 36 | Mz- | -5.27 | 5.06 | -0.46 |
| 224 | 224 | 33 | Nx+ | -49.28 | 54.56 | 18.95 |
| | | 33 | Fy+ | -88.21 | 90.19 | 55.07 |
| | | 33 | Mz+ | -106.75 | 84.40 | 61.74 |
| | | 33 | Nx- | -111.00 | 84.68 | 56.26 |
| | | 33 | Fy- | -66.01 | 50.16 | 18.49 |
| | | 33 | Mz- | -53.48 | 54.89 | 13.51 |
| | | 36 | Nx+ | 0.03 | 4.56 | -2.45 |
| | | 36 | Fy+ | -75.66 | 80.48 | 41.58 |
| | | 36 | Mz+ | -91.93 | 75.25 | 47.31 |
| | | 36 | Nx- | -93.33 | 76.96 | 44.86 |
| | | 36 | Fy- | -5.26 | 2.97 | -3.08 |
| | | 36 | Mz- | -3.21 | 5.07 | -4.11 |
| 320 | 320 | 33 | Nx+ | -105.92 | 18.62 | 68.56 |
| | | 33 | Fy+ | -162.14 | 38.54 | 109.99 |
| | | 33 | Mz+ | -165.77 | 37.70 | 111.59 |
| | | 33 | Nx- | -173.24 | 21.20 | 83.53 |
| | | 33 | Fy- | -116.74 | 1.29 | 41.05 |
| | | 33 | Mz- | -113.08 | 2.15 | 39.43 |
| | | 36 | Nx+ | -16.30 | 7.68 | 13.58 |
| | | 36 | Fy+ | -149.94 | 28.05 | 88.48 |
| | | 36 | Mz+ | -153.18 | 27.31 | 89.91 |
| | | 36 | Nx- | -155.93 | 22.58 | 83.35 |
| | | 36 | Fy- | -16.94 | 1.09 | 9.57 |
| | | 36 | Mz- | -16.94 | 1.10 | 9.57 |
| 321 | 321 | 33 | Nx+ | -105.92 | 18.62 | 59.24 |
| | | 33 | Fy+ | -162.14 | 38.54 | 90.69 |
| | | 33 | Mz+ | -166.73 | 37.16 | 92.78 |
| | | 33 | Nx- | -173.24 | 21.20 | 72.92 |
| | | 33 | Fy- | -116.74 | 1.29 | 40.40 |
| | | 33 | Mz- | -112.13 | 2.70 | 38.30 |
| | | 36 | Nx+ | -16.30 | 7.68 | 9.75 |
| | | 36 | Fy+ | -149.94 | 28.05 | 74.46 |
| | | 36 | Mz+ | -154.04 | 26.81 | 76.30 |

MA_ROT2.LST Sábado, 18 Mayo 2002 4:50am

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Nx- | -155.93 | 22.58 | 72.06 |
| | | 36 | Fy- | -16.94 | 1.09 | 9.02 |
| | | 36 | Mz- | -16.94 | 1.10 | 9.02 |
| 322 | 322 | 33 | Nx+ | -105.45 | 15.56 | 54.98 |
| | | 33 | Fy+ | -161.50 | 32.34 | 81.86 |
| | | 33 | Mz+ | -166.09 | 30.96 | 84.28 |
| | | 33 | Nx- | -172.60 | 15.57 | 68.32 |
| | | 33 | Fy- | -116.27 | -1.21 | 40.40 |
| | | 33 | Mz- | -111.06 | 0.77 | 37.81 |
| | | 36 | Nx+ | -15.83 | 6.66 | 7.95 |
| | | 36 | Fy+ | -149.30 | 22.80 | 68.11 |
| | | 36 | Mz+ | -153.41 | 21.57 | 70.26 |
| | | 36 | Nx- | -155.30 | 17.51 | 67.04 |
| | | 36 | Fy- | -16.47 | 1.09 | 8.75 |
| | | 36 | Mz- | -16.49 | 8.51 | 6.82 |
| 520 | 320 | 33 | Nx+ | -10.43 | 6.90 | 2.93 |
| | | 33 | Fy+ | -15.65 | 10.17 | 4.19 |
| | | 33 | Mz+ | -15.65 | 10.17 | 4.19 |
| | | 33 | Nx- | -25.73 | 6.99 | 2.79 |
| | | 33 | Fy- | -17.90 | 3.18 | 1.22 |
| | | 33 | Mz- | -17.90 | 3.18 | 1.22 |
| | | 36 | Nx+ | 0.00 | 1.60 | 0.95 |
| | | 36 | Fy+ | -14.08 | 7.55 | 3.10 |
| | | 36 | Mz+ | -14.08 | 7.55 | 3.10 |
| | | 36 | Nx- | -21.80 | 6.96 | 2.84 |
| | | 36 | Fy- | -7.56 | -1.57 | -0.60 |
| | | 36 | Mz- | -7.56 | -1.57 | -0.60 |
| 521 | 521 | 33 | Nx+ | -10.43 | 0.02 | 0.10 |
| | | 33 | Fy+ | -10.43 | 0.65 | 0.17 |
| | | 33 | Mz+ | -10.43 | 0.65 | 0.17 |
| | | 33 | Nx- | -25.73 | -2.08 | -0.09 |
| | | 33 | Fy- | -25.73 | -3.02 | -0.20 |
| | | 33 | Mz- | -25.73 | -2.99 | -0.20 |
| | | 36 | Nx+ | 0.00 | 0.93 | 0.12 |
| | | 36 | Fy+ | -1.08 | 0.93 | 0.12 |
| | | 36 | Mz+ | -1.08 | 0.93 | 0.12 |
| | | 36 | Nx- | -21.80 | -1.25 | -0.02 |
| | | 36 | Fy- | -5.31 | -2.08 | -0.18 |
| | | 36 | Mz- | -7.56 | -2.07 | -0.18 |
| 522 | 522 | 33 | Nx+ | -10.43 | -0.22 | 0.06 |
| | | 33 | Fy+ | -10.43 | 0.23 | 0.09 |
| | | 33 | Mz+ | -10.43 | 0.20 | 0.09 |
| | | 33 | Nx- | -25.73 | -1.87 | -0.05 |
| | | 33 | Fy- | -25.73 | -2.53 | -0.11 |
| | | 33 | Mz- | -25.73 | -2.51 | -0.11 |
| | | 36 | Nx+ | 0.00 | 0.64 | 0.06 |
| | | 36 | Fy+ | -1.08 | 0.64 | 0.06 |
| | | 36 | Mz+ | -1.08 | 0.64 | 0.06 |
| | | 36 | Nx- | -21.80 | -1.21 | -0.01 |
| | | 36 | Fy- | -21.80 | -1.66 | -0.05 |
| | | 36 | Mz- | -5.31 | -1.61 | -0.11 |
| 523 | 523 | 33 | Nx+ | -10.43 | -0.47 | 0.03 |
| | | 33 | Fy+ | -10.43 | -0.19 | 0.04 |
| | | 33 | Mz+ | -15.65 | -0.25 | 0.04 |
| | | 33 | Nx- | -25.73 | -1.66 | -0.02 |
| | | 33 | Fy- | -25.73 | -2.05 | -0.04 |
| | | 33 | Mz- | -17.90 | -1.99 | -0.04 |
| | | 36 | Nx+ | 0.00 | 0.35 | 0.03 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 36 | Fy+ | -1.08 | 0.35 | 0.03 |
| | | 36 | Mz+ | -1.08 | 0.35 | 0.03 |
| | | 36 | Nx- | -21.80 | -1.18 | 0.00 |
| | | 36 | Fy- | -21.80 | -1.45 | -0.02 |
| | | 36 | Mz- | -7.56 | -1.12 | -0.05 |
| 524 | 524 | 33 | Nx+ | -10.43 | -0.72 | 0.00 |
| | | 33 | Fy+ | -10.43 | -0.62 | 0.00 |
| | | 33 | Mz+ | -15.65 | -0.70 | 0.00 |
| | | 33 | Nx- | -25.73 | -1.44 | 0.00 |
| | | 33 | Fy- | -25.73 | -1.56 | 0.00 |
| | | 33 | Mz- | -15.95 | -1.30 | 0.00 |
| | | 36 | Nx+ | 0.00 | 0.06 | 0.01 |
| | | 36 | Fy+ | -1.08 | 0.06 | 0.01 |
| | | 36 | Mz+ | -1.08 | 0.06 | 0.01 |
| | | 36 | Nx- | -21.80 | -1.15 | 0.00 |
| | | 36 | Fy- | -21.57 | -1.22 | 0.00 |
| | | 36 | Mz- | -5.04 | -0.64 | -0.01 |
| 524 | 525 | 33 | Nx+ | -10.43 | 0.97 | 0.00 |
| | | 33 | Fy+ | -15.65 | 1.39 | 0.00 |
| | | 33 | Mz+ | -23.78 | 1.28 | 0.00 |
| | | 33 | Nx- | -25.73 | 1.23 | 0.00 |
| | | 33 | Fy- | -17.90 | 0.75 | 0.00 |
| | | 33 | Mz- | -23.78 | 1.28 | 0.00 |
| | | 36 | Nx+ | 0.00 | 0.23 | 0.00 |
| | | 36 | Fy+ | -14.08 | 1.15 | 0.00 |
| | | 36 | Mz+ | -21.80 | 1.13 | 0.00 |
| | | 36 | Nx- | -21.80 | 1.13 | 0.00 |
| | | 36 | Fy- | -7.56 | 0.17 | 0.00 |
| | | 36 | Mz- | -21.80 | 1.13 | 0.00 |
| 420 | 320 | 33 | Nx+ | -7.30 | 97.05 | 57.79 |
| | | 33 | Fy+ | -54.79 | 146.83 | 97.09 |
| | | 33 | Mz+ | -46.88 | 138.79 | 114.82 |
| | | 33 | Nx- | -68.69 | 136.18 | 98.95 |
| | | 33 | Fy- | -21.78 | 87.25 | 63.04 |
| | | 33 | Mz- | -29.13 | 94.41 | 41.88 |
| | | 36 | Nx+ | -1.10 | 13.26 | 10.29 |
| | | 36 | Fy+ | -46.68 | 132.05 | 89.23 |
| | | 36 | Mz+ | -44.14 | 130.32 | 92.64 |
| | | 36 | Nx- | -51.17 | 127.86 | 86.83 |
| | | 36 | Fy- | -3.13 | 13.24 | 10.40 |
| | | 36 | Mz- | -1.82 | 13.26 | 10.28 |
| 421 | 421 | 33 | Nx+ | -7.30 | 60.73 | 21.21 |
| | | 33 | Fy+ | -44.63 | 95.51 | 58.89 |
| | | 33 | Mz+ | -47.35 | 93.41 | 62.57 |
| | | 33 | Nx- | -68.69 | 91.15 | 47.63 |
| | | 33 | Fy- | -28.81 | 51.82 | 17.38 |
| | | 33 | Mz- | -28.66 | 58.41 | 6.28 |
| | | 36 | Nx+ | -1.10 | 6.78 | 5.14 |
| | | 36 | Fy+ | -42.45 | 84.51 | 41.10 |
| | | 36 | Mz+ | -44.56 | 83.16 | 43.56 |
| | | 36 | Nx- | -51.17 | 81.85 | 38.64 |
| | | 36 | Fy- | -4.10 | 6.78 | 5.22 |
| | | 36 | Mz- | -1.82 | 6.78 | 5.13 |
| 422 | 422 | 33 | Nx+ | -7.30 | 10.10 | -98.83 |
| | | 33 | Fy+ | -45.79 | 25.22 | -126.69 |
| | | 33 | Mz+ | -28.06 | 15.43 | -71.86 |
| | | 33 | Nx- | -68.69 | 17.02 | -132.91 |
| | | 33 | Fy- | -30.37 | 3.65 | -101.88 |

MA_ROT2.LST Sábado, 18 Mayo 2002 4:50am

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 33 | Mz- | -37.97 | 16.87 | -158.83 |
| | | 36 | Nx+ | -1.10 | 0.32 | -12.28 |
| | | 36 | Fy+ | -43.65 | 20.35 | -123.03 |
| | | 36 | Mz+ | -11.05 | 2.30 | -6.48 |
| | | 36 | Nx- | -51.17 | 19.00 | -123.13 |
| | | 36 | Fy- | -2.18 | 0.32 | -12.29 |
| | | 36 | Mz- | -28.12 | 17.49 | -135.79 |
| 423 | 423 | 33 | Nx+ | -7.30 | -36.22 | -123.66 |
| | | 33 | Fy+ | -27.89 | -20.06 | -107.40 |
| | | 33 | Mz+ | -26.27 | -27.63 | -102.54 |
| | | 33 | Nx- | -68.69 | -40.83 | -189.42 |
| | | 33 | Fy- | -38.20 | -54.08 | -191.42 |
| | | 33 | Mz- | -42.68 | -43.94 | -201.35 |
| | | 36 | Nx+ | -1.10 | -5.40 | -17.40 |
| | | 36 | Fy+ | -11.05 | -3.77 | -15.38 |
| | | 36 | Mz+ | -11.05 | -3.77 | -15.38 |
| | | 36 | Nx- | -51.17 | -38.66 | -165.39 |
| | | 36 | Fy- | -28.34 | -41.76 | -174.78 |
| | | 36 | Mz- | -28.09 | -41.19 | -175.36 |
| 424 | 424 | 33 | Nx+ | -7.30 | -74.18 | -60.38 |
| | | 33 | Fy+ | -26.20 | -62.49 | -58.75 |
| | | 33 | Mz+ | -25.36 | -71.16 | -53.86 |
| | | 33 | Nx- | -68.69 | -108.65 | -117.86 |
| | | 33 | Fy- | -38.44 | -120.97 | -106.53 |
| | | 33 | Mz- | -43.01 | -112.20 | -124.51 |
| | | 36 | Nx+ | -1.10 | -11.03 | -11.65 |
| | | 36 | Fy+ | -11.05 | -9.61 | -12.73 |
| | | 36 | Mz+ | -20.77 | -14.01 | -10.55 |
| | | 36 | Nx- | -51.17 | -97.65 | -97.96 |
| | | 36 | Fy- | -28.34 | -102.44 | -101.43 |
| | | 36 | Mz- | -28.22 | -100.72 | -103.38 |
| 425 | 425 | 33 | Nx+ | -17.09 | -107.57 | 99.12 |
| | | 33 | Fy+ | -34.42 | -99.16 | 92.48 |
| | | 33 | Mz+ | -54.36 | -170.15 | 159.75 |
| | | 33 | Nx- | -83.99 | -166.23 | 123.44 |
| | | 33 | Fy- | -55.56 | -180.11 | 146.58 |
| | | 33 | Mz- | -39.82 | -111.21 | 68.78 |
| | | 36 | Nx+ | -2.45 | -14.84 | 7.02 |
| | | 36 | Fy+ | -12.24 | -12.64 | 2.71 |
| | | 36 | Mz+ | -42.88 | -155.61 | 125.55 |
| | | 36 | Nx- | -64.88 | -149.44 | 118.05 |
| | | 36 | Fy- | -42.76 | -157.16 | 123.73 |
| | | 36 | Mz- | -12.20 | -18.32 | 1.46 |
| 425 | 400 | 33 | Nx+ | -16.64 | -102.67 | 260.29 |
| | | 33 | Fy+ | -33.93 | -94.69 | 242.24 |
| | | 33 | Mz+ | -53.37 | -162.90 | 417.37 |
| | | 33 | Nx- | -83.53 | -161.10 | 373.21 |
| | | 33 | Fy- | -55.20 | -174.20 | 414.48 |
| | | 33 | Mz- | -37.42 | -103.25 | 231.53 |
| | | 36 | Nx+ | -2.10 | -11.04 | 26.77 |
| | | 36 | Fy+ | -11.89 | -8.84 | 19.10 |
| | | 36 | Mz+ | -41.92 | -151.57 | 359.79 |
| | | 36 | Nx- | -64.42 | -144.31 | 342.20 |
| | | 36 | Fy- | -42.29 | -152.03 | 359.69 |
| | | 36 | Mz- | -11.89 | -8.84 | 19.10 |

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | θz |
|---|---|---|---|---|---|
| 6 | 33 | ux+ | 0.002130 | -0.029504 | -0.000479 |
| | 33 | uy+ | 0.000888 | -0.019288 | -0.000098 |
| | 33 | θz+ | -0.001824 | -0.029631 | 0.000479 |
| | 33 | ux- | -0.001937 | -0.021863 | 0.000479 |
| | 33 | uy- | 0.000051 | -0.031511 | 0.000000 |
| | 33 | θz- | 0.002111 | -0.029615 | -0.000479 |
| | 36 | ux+ | 0.000644 | -0.026553 | -0.000208 |
| | 36 | uy+ | 0.000003 | -0.003886 | 0.000000 |
| | 36 | θz+ | -0.000383 | -0.007270 | 0.000429 |
| | 36 | ux- | -0.000496 | -0.021211 | 0.000208 |
| | 36 | uy- | 0.000043 | -0.027128 | 0.000000 |
| | 36 | θz- | 0.000475 | -0.007278 | -0.000429 |
| 7 | 33 | ux+ | 0.002222 | -0.030794 | -0.001127 |
| | 33 | uy+ | -0.000780 | -0.019534 | -0.000320 |
| | 33 | θz+ | -0.001946 | -0.020234 | 0.000019 |
| | 33 | ux- | -0.002006 | -0.020179 | 0.000007 |
| | 33 | uy- | 0.000160 | -0.032087 | -0.000657 |
| | 33 | θz- | 0.002123 | -0.030924 | -0.001145 |
| | 36 | ux+ | 0.000689 | -0.027378 | -0.000795 |
| | 36 | uy+ | -0.000345 | -0.003901 | 0.000002 |
| | 36 | θz+ | -0.000454 | -0.005327 | 0.000345 |
| | 36 | ux- | -0.000516 | -0.019926 | -0.000245 |
| | 36 | uy- | 0.000306 | -0.027698 | -0.000645 |
| | 36 | θz- | 0.000629 | -0.027452 | -0.000810 |
| 8 | 33 | ux+ | 0.002137 | -0.035061 | -0.002936 |
| | 33 | uy+ | -0.001883 | -0.021568 | -0.001494 |
| | 33 | θz+ | -0.001290 | -0.023060 | -0.001396 |
| | 33 | ux- | -0.002051 | -0.030880 | -0.002240 |
| | 33 | uy- | 0.000261 | -0.035553 | -0.002549 |
| | 33 | θz- | 0.002060 | -0.034993 | -0.003032 |
| | 36 | ux+ | 0.000612 | -0.030835 | -0.002430 |
| | 36 | uy+ | -0.000348 | -0.004121 | -0.000200 |
| | 36 | θz+ | -0.000214 | -0.005162 | -0.000048 |
| | 36 | ux- | -0.000557 | -0.028276 | -0.002144 |
| | 36 | uy- | 0.000508 | -0.031100 | -0.002468 |
| | 36 | θz- | 0.000558 | -0.030865 | -0.002508 |
| 9 | 33 | ux+ | 0.002070 | -0.029272 | -0.001307 |
| | 33 | uy+ | -0.001935 | -0.023651 | -0.000816 |
| | 33 | θz+ | -0.000448 | -0.025641 | -0.000615 |
| | 33 | ux- | -0.002108 | -0.033970 | -0.001195 |
| | 33 | uy- | 0.001898 | -0.039591 | -0.001686 |
| | 33 | θz- | 0.000539 | -0.038315 | -0.001797 |
| | 36 | ux+ | 0.000549 | -0.027232 | -0.001022 |
| | 36 | uy+ | -0.000352 | -0.004452 | -0.000177 |
| | 36 | θz+ | -0.000221 | -0.005308 | -0.000095 |
| | 36 | ux- | -0.000609 | -0.031225 | -0.001159 |
| | 36 | uy- | 0.000456 | -0.034456 | -0.001315 |
| | 36 | θz- | -0.000012 | -0.033693 | -0.001378 |
| 10 | 33 | ux+ | 0.002021 | -0.030157 | 0.000225 |
| | 33 | uy+ | -0.002071 | -0.023862 | 0.000575 |
| | 33 | θz+ | -0.001421 | -0.035445 | 0.001044 |
| | 33 | ux- | -0.002169 | -0.034263 | 0.000857 |
| | 33 | uy- | 0.001895 | -0.040557 | 0.000512 |
| | 33 | θz- | 0.001710 | -0.029374 | 0.000120 |
| | 36 | ux+ | 0.000524 | -0.011007 | -0.000003 |
| | 36 | uy+ | -0.000355 | -0.004650 | -0.000053 |
| | 36 | θz+ | -0.000505 | -0.032071 | 0.000780 |
| | 36 | ux- | -0.000660 | -0.031619 | 0.000690 |
| | 36 | uy- | 0.000452 | -0.034976 | 0.000686 |
| | 36 | θz- | 0.000459 | -0.006554 | -0.000077 |
| 121 | 33 | ux+ | 0.002134 | -0.035455 | -0.001746 |
| | 33 | uy+ | 0.000559 | -0.019600 | -0.000267 |
| | 33 | θz+ | 0.000552 | -0.019651 | -0.000261 |
| | 33 | ux- | 0.000552 | -0.019761 | -0.000264 |
| | 33 | uy- | 0.002126 | -0.035478 | -0.001740 |
| | 33 | θz- | 0.002134 | -0.035455 | -0.001746 |
| | 36 | ux+ | 0.001674 | -0.029576 | -0.001327 |
| | 36 | uy+ | 0.000152 | -0.004413 | -0.000106 |
| | 36 | θz+ | -0.000001 | -0.005063 | 0.000051 |
| | 36 | ux- | -0.000001 | -0.005063 | 0.000051 |
| | 36 | uy- | 0.001669 | -0.029592 | -0.001323 |
| | 36 | θz- | 0.001674 | -0.029576 | -0.001327 |
| 122 | 33 | ux+ | 0.002958 | -0.035503 | -0.001351 |
| | 33 | uy+ | 0.000634 | -0.019628 | -0.000018 |
| | 33 | θz+ | 0.000625 | -0.019661 | -0.000013 |
| | 33 | ux- | 0.000625 | -0.019724 | -0.000018 |
| | 33 | uy- | 0.002949 | -0.035525 | -0.001346 |
| | 33 | θz- | 0.002958 | -0.035503 | -0.001351 |
| | 36 | ux+ | 0.002288 | -0.029619 | -0.000972 |
| | 36 | uy+ | 0.000196 | -0.004417 | -0.000061 |
| | 36 | θz+ | -0.000017 | -0.004471 | 0.000085 |
| | 36 | ux- | -0.000037 | -0.005067 | 0.000083 |
| | 36 | uy- | 0.002282 | -0.029635 | -0.000969 |
| | 36 | θz- | 0.002288 | -0.029619 | -0.000972 |
| 123 | 33 | ux+ | 0.003567 | -0.035544 | -0.000937 |
| | 33 | uy+ | 0.000587 | -0.019655 | 0.000192 |
| | 33 | θz+ | 0.000575 | -0.019688 | 0.000195 |
| | 33 | ux- | 0.000575 | -0.019688 | 0.000195 |
| | 33 | uy- | 0.003555 | -0.035567 | -0.000934 |
| | 33 | θz- | 0.003567 | -0.035544 | -0.000937 |
| | 36 | ux+ | 0.002704 | -0.029657 | -0.000599 |
| | 36 | uy+ | 0.000218 | -0.004420 | -0.000020 |
| | 36 | θz+ | -0.000086 | -0.005071 | 0.000099 |
| | 36 | ux- | -0.000086 | -0.005071 | 0.000099 |
| | 36 | uy- | 0.002696 | -0.029673 | -0.000598 |
| | 36 | θz- | 0.002704 | -0.029657 | -0.000599 |
| 124 | 33 | ux+ | 0.003950 | -0.035587 | -0.000487 |
| | 33 | uy+ | 0.000427 | -0.019682 | 0.000396 |
| | 33 | θz+ | 0.000495 | -0.021269 | 0.000404 |
| | 33 | ux- | 0.000414 | -0.019715 | 0.000399 |
| | 33 | uy- | 0.003936 | -0.035610 | -0.000484 |
| | 33 | θz- | 0.003869 | -0.034032 | -0.000492 |
| | 36 | ux+ | 0.002920 | -0.029696 | -0.000189 |
| | 36 | uy+ | 0.000218 | -0.004424 | 0.000019 |
| | 36 | θz+ | -0.000061 | -0.006630 | 0.000113 |
| | 36 | ux- | -0.000141 | -0.005075 | 0.000109 |
| | 36 | uy- | 0.002912 | -0.029712 | -0.000188 |
| | 36 | θz- | 0.002840 | -0.028141 | -0.000194 |
| 125 | 33 | ux+ | 0.004081 | -0.035627 | 0.000015 |
| | 33 | uy+ | 0.000159 | -0.019707 | 0.000621 |
| | 33 | θz+ | 0.001183 | -0.029638 | 0.000786 |

| | | | | | |
|---|---|---|---|---|---|
| | 33 | ux- | 0.000142 | -0.019740 | 0.000626 |
| | 33 | uy- | 0.004065 | -0.035650 | 0.000020 |
| | 33 | θz- | 0.003040 | -0.025730 | -0.000145 |
| | 36 | ux+ | 0.002903 | -0.029732 | 0.000265 |
| | 36 | uy+ | 0.000198 | -0.004427 | 0.000053 |
| | 36 | θz+ | 0.001963 | -0.028038 | 0.000458 |
| | 36 | ux- | -0.000200 | -0.005079 | 0.000115 |
| | 36 | uy- | 0.002893 | -0.029749 | 0.000266 |
| | 36 | θz- | 0.000417 | -0.004919 | -0.000060 |
| 126 | 33 | ux+ | 0.003920 | -0.035660 | 0.000591 |
| | 33 | uy+ | -0.000240 | -0.019734 | 0.000886 |
| | 33 | θz+ | 0.000884 | -0.030473 | 0.001275 |
| | 33 | ux- | -0.000261 | -0.019767 | 0.000895 |
| | 33 | uy- | 0.003899 | -0.035693 | 0.000600 |
| | 33 | θz- | 0.002778 | -0.024972 | 0.000210 |
| | 36 | ux+ | 0.002623 | -0.029772 | 0.000787 |
| | 36 | uy+ | 0.000162 | -0.004430 | 0.000084 |
| | 36 | θz+ | 0.001814 | -0.028774 | 0.000931 |
| | 36 | ux- | -0.000263 | -0.005083 | 0.000121 |
| | 36 | uy- | 0.002612 | -0.029788 | 0.000790 |
| | 36 | θz- | 0.000443 | -0.004922 | -0.000036 |
| 127 | 33 | ux+ | 0.003431 | -0.035698 | 0.001262 |
| | 33 | uy+ | -0.000795 | -0.019761 | 0.001207 |
| | 33 | θz+ | 0.000167 | -0.030846 | 0.001862 |
| | 33 | ux- | -0.000819 | -0.019794 | 0.001217 |
| | 33 | uy- | 0.003407 | -0.035731 | 0.001272 |
| | 33 | θz- | 0.002486 | -0.024809 | 0.000617 |
| | 36 | ux+ | 0.002048 | -0.029808 | 0.001395 |
| | 36 | uy+ | 0.000109 | -0.004433 | 0.000112 |
| | 36 | θz+ | 0.001272 | -0.029110 | 0.001503 |
| | 36 | ux- | -0.000331 | -0.005087 | 0.000133 |
| | 36 | uy- | 0.002036 | -0.029824 | 0.001399 |
| | 36 | θz- | 0.000455 | -0.004925 | -0.000006 |
| 221 | 33 | ux+ | 0.003034 | -0.035715 | 0.001402 |
| | 33 | uy+ | -0.001165 | -0.019771 | 0.001282 |
| | 33 | θz+ | -0.000410 | -0.030862 | 0.001993 |
| | 33 | ux- | -0.001195 | -0.019804 | 0.001293 |
| | 33 | uy- | 0.003004 | -0.035748 | 0.001414 |
| | 33 | θz- | 0.002290 | -0.024819 | 0.000702 |
| | 36 | ux+ | 0.001612 | -0.029823 | 0.001521 |
| | 36 | uy+ | 0.000075 | -0.004434 | 0.000117 |
| | 36 | θz+ | 0.000805 | -0.029125 | 0.001627 |
| | 36 | ux- | -0.000371 | -0.005088 | 0.000137 |
| | 36 | uy- | 0.001598 | -0.029839 | 0.001526 |
| | 36 | θz- | 0.000457 | -0.004926 | 0.000001 |
| 222 | 33 | ux+ | 0.002607 | -0.035724 | 0.001451 |
| | 33 | uy+ | -0.001551 | -0.019778 | 0.001308 |
| | 33 | θz+ | -0.001010 | -0.030871 | 0.002039 |
| | 33 | ux- | -0.001584 | -0.019811 | 0.001321 |
| | 33 | uy- | 0.002574 | -0.035757 | 0.001465 |
| | 33 | θz- | 0.002074 | -0.024825 | 0.000733 |
| | 36 | ux+ | 0.001150 | -0.029831 | 0.001566 |
| | 36 | uy+ | 0.000040 | -0.004434 | 0.000118 |
| | 36 | θz+ | 0.000313 | -0.029133 | 0.001670 |
| | 36 | ux- | -0.000413 | -0.005088 | 0.000137 |
| | 36 | uy- | 0.001135 | -0.029847 | 0.001570 |
| | 36 | θz- | 0.000456 | -0.004926 | 0.000003 |
| 223 | 33 | ux+ | 0.002462 | -0.036289 | 0.001532 |

MA_ROT2.LST Sábado, 18 Mayo 2002 4:50am

| | | | | | |
|---|---|---|---|---|---|
| | 33 | uy+ | -0.001684 | -0.020279 | 0.001349 |
| | 33 | θz+ | -0.001218 | -0.031654 | 0.002111 |
| | 33 | ux- | -0.001717 | -0.020317 | 0.001363 |
| | 33 | uy- | 0.002429 | -0.036326 | 0.001545 |
| | 33 | θz- | 0.001966 | -0.024971 | 0.000784 |
| | 36 | ux+ | 0.000992 | -0.030434 | 0.001640 |
| | 36 | uy+ | 0.000028 | -0.004480 | 0.000120 |
| | 36 | θz+ | 0.000142 | -0.029774 | 0.001740 |
| | 36 | ux- | -0.000426 | -0.005140 | 0.000140 |
| | 36 | uy- | 0.000977 | -0.030452 | 0.001644 |
| | 36 | θz- | 0.000454 | -0.004928 | 0.000006 |
| 224 | 33 | ux+ | 0.002198 | -0.037308 | 0.001645 |
| | 33 | uy+ | -0.001915 | -0.021159 | 0.001406 |
| | 33 | θz+ | -0.001584 | -0.033033 | 0.002206 |
| | 33 | ux- | -0.001951 | -0.021205 | 0.001419 |
| | 33 | uy- | 0.002162 | -0.037355 | 0.001658 |
| | 33 | θz- | 0.001868 | -0.025625 | 0.000859 |
| | 36 | ux+ | 0.000709 | -0.031518 | 0.001740 |
| | 36 | uy+ | 0.000006 | -0.004555 | 0.000119 |
| | 36 | θz+ | -0.000158 | -0.030918 | 0.001833 |
| | 36 | ux- | -0.000482 | -0.021890 | 0.001229 |
| | 36 | uy- | 0.000693 | -0.031539 | 0.001744 |
| | 36 | θz- | 0.000455 | -0.004933 | 0.000011 |
| 320 | 33 | ux+ | 0.000000 | -0.033116 | -0.001847 |
| | 33 | uy+ | 0.000000 | -0.019549 | -0.000901 |
| | 33 | θz+ | 0.000000 | -0.019710 | -0.000885 |
| | 33 | ux- | 0.000000 | -0.033116 | -0.001847 |
| | 33 | uy- | 0.000000 | -0.035403 | -0.002526 |
| | 33 | θz- | 0.000000 | -0.035242 | -0.002542 |
| | 36 | ux+ | 0.000000 | -0.029095 | -0.001802 |
| | 36 | uy+ | 0.000000 | -0.004405 | -0.000199 |
| | 36 | θz+ | 0.000000 | -0.005053 | -0.000065 |
| | 36 | ux- | 0.000000 | -0.029095 | -0.001802 |
| | 36 | uy- | 0.000000 | -0.029522 | -0.002032 |
| | 36 | θz- | 0.000000 | -0.029506 | -0.002039 |
| 321 | 33 | ux+ | 0.001167 | -0.035417 | -0.002129 |
| | 33 | uy+ | 0.000358 | -0.019575 | -0.000548 |
| | 33 | θz+ | 0.000354 | -0.019736 | -0.000540 |
| | 33 | ux- | 0.000354 | -0.019736 | -0.000540 |
| | 33 | uy- | 0.001163 | -0.035439 | -0.002122 |
| | 33 | θz- | 0.001167 | -0.035417 | -0.002129 |
| | 36 | ux+ | 0.000926 | -0.029541 | -0.001671 |
| | 36 | uy+ | 0.000086 | -0.004409 | -0.000151 |
| | 36 | θz+ | 0.000013 | -0.005057 | 0.000004 |
| | 36 | ux- | 0.000013 | -0.005057 | 0.000004 |
| | 36 | uy- | 0.000923 | -0.029557 | -0.001666 |
| | 36 | θz- | 0.000926 | -0.029541 | -0.001671 |
| 322 | 33 | ux+ | 0.001676 | -0.035436 | -0.001935 |
| | 33 | uy+ | 0.000479 | -0.019587 | -0.000399 |
| | 33 | θz+ | 0.000473 | -0.019748 | -0.000393 |
| | 33 | ux- | 0.000473 | -0.019748 | -0.000393 |
| | 33 | uy- | 0.001670 | -0.035459 | -0.001929 |
| | 33 | θz- | 0.001676 | -0.035436 | -0.001935 |
| | 36 | ux+ | 0.001324 | -0.029558 | -0.001500 |
| | 36 | uy+ | 0.000123 | -0.004411 | -0.000129 |
| | 36 | θz+ | 0.000010 | -0.005061 | 0.000030 |
| | 36 | ux- | 0.000010 | -0.005061 | 0.000030 |
| | 36 | uy- | 0.001320 | -0.029574 | -0.001496 |
| | 36 | θz- | 0.001324 | -0.029558 | -0.001500 |

| | | | | | |
|---|---|---|---|---|---|
| 400 | 33 | ux+ | 0.000213 | -0.028543 | -0.000182 |
| | 33 | uy+ | 0.000138 | -0.018627 | -0.000039 |
| | 33 | θz+ | 0.000068 | -0.029056 | 0.000236 |
| | 33 | ux- | -0.000031 | -0.022305 | 0.000188 |
| | 33 | uy- | 0.000043 | -0.030518 | -0.000006 |
| | 33 | θz- | 0.000197 | -0.029051 | -0.000236 |
| | 36 | ux+ | 0.000132 | -0.025619 | -0.000012 |
| | 36 | uy+ | 0.000003 | -0.003814 | 0.000000 |
| | 36 | θz+ | 0.000099 | -0.025847 | 0.000030 |
| | 36 | ux- | 0.000000 | -0.005150 | 0.000000 |
| | 36 | uy- | 0.000042 | -0.026186 | 0.000000 |
| | 36 | θz- | 0.000127 | -0.025842 | -0.000030 |
| 421 | 33 | ux+ | 0.000008 | -0.031397 | -0.002128 |
| | 33 | uy+ | 0.000003 | -0.019193 | -0.000996 |
| | 33 | θz+ | 0.000003 | -0.019359 | -0.000979 |
| | 33 | ux- | 0.000001 | -0.022637 | -0.001368 |
| | 33 | uy- | 0.000005 | -0.034433 | -0.002623 |
| | 33 | θz- | 0.000005 | -0.034267 | -0.002641 |
| | 36 | ux+ | 0.000005 | -0.028396 | -0.001906 |
| | 36 | uy+ | 0.000000 | -0.004328 | -0.000212 |
| | 36 | θz+ | 0.000003 | -0.005024 | -0.000085 |
| | 36 | ux- | 0.000000 | -0.005994 | -0.000288 |
| | 36 | uy- | 0.000003 | -0.028740 | -0.002115 |
| | 36 | θz- | 0.000003 | -0.028723 | -0.002122 |
| 422 | 33 | ux+ | 0.000055 | -0.029646 | -0.002035 |
| | 33 | uy+ | 0.000012 | -0.017210 | -0.000909 |
| | 33 | θz+ | 0.000024 | -0.017551 | -0.000815 |
| | 33 | ux- | 0.000008 | -0.019022 | -0.001052 |
| | 33 | uy- | 0.000055 | -0.029739 | -0.002092 |
| | 33 | θz- | 0.000037 | -0.029377 | -0.002194 |
| | 36 | ux+ | 0.000042 | -0.024943 | -0.001574 |
| | 36 | uy+ | 0.000002 | -0.003924 | -0.000189 |
| | 36 | θz+ | 0.000019 | -0.004852 | -0.000064 |
| | 36 | ux- | 0.000001 | -0.003995 | -0.000204 |
| | 36 | uy- | 0.000042 | -0.025003 | -0.001615 |
| | 36 | θz- | 0.000026 | -0.024836 | -0.001689 |
| 423 | 33 | ux+ | 0.000102 | -0.026796 | -0.000668 |
| | 33 | uy+ | 0.000022 | -0.016181 | -0.000123 |
| | 33 | θz+ | 0.000014 | -0.017603 | 0.000036 |
| | 33 | ux- | 0.000013 | -0.018054 | -0.000110 |
| | 33 | uy- | 0.000078 | -0.027151 | -0.000348 |
| | 33 | θz- | 0.000100 | -0.026428 | -0.000815 |
| | 36 | ux+ | 0.000077 | -0.022877 | -0.000344 |
| | 36 | uy+ | 0.000005 | -0.003666 | -0.000074 |
| | 36 | θz+ | 0.000036 | -0.004862 | 0.000082 |
| | 36 | ux- | 0.000002 | -0.003671 | -0.000077 |
| | 36 | uy- | 0.000074 | -0.023069 | -0.000360 |
| | 36 | θz- | 0.000076 | -0.022741 | -0.000446 |
| 424 | 33 | ux+ | 0.000147 | -0.026738 | 0.000617 |
| | 33 | uy+ | 0.000026 | -0.016716 | 0.000568 |
| | 33 | θz+ | 0.000040 | -0.026081 | 0.001093 |
| | 33 | ux- | 0.000017 | -0.018975 | 0.000731 |
| | 33 | uy- | 0.000111 | -0.027695 | 0.000818 |
| | 33 | θz- | 0.000107 | -0.018430 | 0.000213 |
| | 36 | ux+ | 0.000109 | -0.023270 | 0.000763 |
| | 36 | uy+ | 0.000006 | -0.003639 | 0.000037 |
| | 36 | θz+ | 0.000049 | -0.023213 | 0.000846 |
| | 36 | ux- | 0.000002 | -0.003640 | 0.000036 |

MA_ROT2.LST Sábado, 18 Mayo 2002 4:50am

| | | | | | |
|---|---|---|---|---|---|
| | 36 | uy- | 0.000105 | -0.023536 | 0.000763 |
| | 36 | θz- | 0.000026 | -0.005669 | -0.000068 |
| 425 | 33 | ux+ | 0.000202 | -0.028410 | 0.000545 |
| | 33 | uy+ | 0.000083 | -0.018184 | 0.000487 |
| | 33 | θz+ | 0.000060 | -0.028306 | 0.000953 |
| | 33 | ux- | 0.000026 | -0.020751 | 0.000536 |
| | 33 | uy- | 0.000085 | -0.029896 | 0.000696 |
| | 33 | θz- | 0.000140 | -0.019666 | 0.000225 |
| | 36 | ux+ | 0.000151 | -0.025173 | 0.000636 |
| | 36 | uy+ | 0.000006 | -0.003770 | 0.000048 |
| | 36 | θz+ | 0.000068 | -0.025385 | 0.000698 |
| | 36 | ux- | 0.000003 | -0.003771 | 0.000048 |
| | 36 | uy- | 0.000085 | -0.025599 | 0.000664 |
| | 36 | θz- | 0.000071 | -0.003841 | 0.000025 |
| 521 | 33 | ux+ | -0.000001 | -0.025508 | -0.001382 |
| | 33 | uy+ | -0.000002 | -0.019887 | -0.000899 |
| | 33 | θz+ | -0.000002 | -0.020042 | -0.000883 |
| | 33 | ux- | -0.000003 | -0.033806 | -0.001844 |
| | 33 | uy- | -0.000002 | -0.036347 | -0.002521 |
| | 33 | θz- | -0.000002 | -0.036192 | -0.002538 |
| | 36 | ux+ | 0.000000 | -0.006198 | -0.000265 |
| | 36 | uy+ | 0.000000 | -0.004480 | -0.000198 |
| | 36 | θz+ | -0.000001 | -0.005078 | -0.000066 |
| | 36 | ux- | -0.000003 | -0.029770 | -0.001798 |
| | 36 | uy- | -0.000001 | -0.030282 | -0.002028 |
| | 36 | θz- | -0.000001 | -0.030268 | -0.002034 |
| 522 | 33 | ux+ | -0.000002 | -0.025484 | -0.001305 |
| | 33 | uy+ | -0.000002 | -0.019933 | -0.000899 |
| | 33 | θz+ | -0.000002 | -0.020086 | -0.000883 |
| | 33 | ux- | -0.000003 | -0.033898 | -0.001844 |
| | 33 | uy- | -0.000003 | -0.036473 | -0.002521 |
| | 33 | θz- | -0.000003 | -0.036320 | -0.002538 |
| | 36 | ux+ | 0.000000 | -0.006211 | -0.000265 |
| | 36 | uy+ | 0.000000 | -0.004490 | -0.000198 |
| | 36 | θz+ | -0.000001 | -0.005081 | -0.000066 |
| | 36 | ux- | -0.000003 | -0.029986 | -0.001902 |
| | 36 | uy- | -0.000003 | -0.030383 | -0.002028 |
| | 36 | θz- | -0.000003 | -0.030371 | -0.002034 |
| 523 | 33 | ux+ | -0.000002 | -0.025645 | -0.001382 |
| | 33 | uy+ | -0.000003 | -0.019973 | -0.000899 |
| | 33 | θz+ | -0.000003 | -0.020124 | -0.000883 |
| | 33 | ux- | -0.000005 | -0.033990 | -0.001844 |
| | 33 | uy- | -0.000003 | -0.036594 | -0.002521 |
| | 33 | θz- | -0.000003 | -0.036443 | -0.002538 |
| | 36 | ux+ | 0.000000 | -0.006228 | -0.000279 |
| | 36 | uy+ | 0.000000 | -0.004500 | -0.000198 |
| | 36 | θz+ | -0.000001 | -0.005085 | -0.000066 |
| | 36 | ux- | -0.000004 | -0.029943 | -0.001798 |
| | 36 | uy- | -0.000003 | -0.030480 | -0.002028 |
| | 36 | θz- | -0.000003 | -0.030468 | -0.002034 |
| 524 | 33 | ux+ | -0.000002 | -0.025715 | -0.001382 |
| | 33 | uy+ | -0.000003 | -0.020021 | -0.000899 |
| | 33 | θz+ | -0.000003 | -0.020172 | -0.000883 |
| | 33 | ux- | -0.000005 | -0.034083 | -0.001844 |
| | 33 | uy- | -0.000003 | -0.036723 | -0.002521 |
| | 33 | θz- | -0.000003 | -0.036572 | -0.002538 |
| | 36 | ux+ | 0.000000 | -0.006241 | -0.000279 |
| | 36 | uy+ | 0.000000 | -0.004509 | -0.000198 |

| | | | | | |
|---|---|---|---|---|---|
| | 36 | θz+ | -0.000001 | -0.005088 | -0.000066 |
| | 36 | ux- | -0.000004 | -0.030038 | -0.001798 |
| | 36 | uy- | -0.000003 | -0.030584 | -0.002028 |
| | 36 | θz- | -0.000003 | -0.030572 | -0.002034 |
| 525 | 33 | ux+ | -0.000002 | -0.025784 | -0.001382 |
| | 33 | uy+ | -0.000003 | -0.020067 | -0.000899 |
| | 33 | θz+ | -0.000003 | -0.020218 | -0.000883 |
| | 33 | ux- | -0.000005 | -0.034175 | -0.001844 |
| | 33 | uy- | -0.000003 | -0.036851 | -0.002521 |
| | 33 | θz- | -0.000003 | -0.036699 | -0.002538 |
| | 36 | ux+ | 0.000000 | -0.006255 | -0.000279 |
| | 36 | uy+ | 0.000000 | -0.004519 | -0.000198 |
| | 36 | θz+ | -0.000001 | -0.005091 | -0.000066 |
| | 36 | ux- | -0.000004 | -0.030128 | -0.001798 |
| | 36 | uy- | -0.000003 | -0.030686 | -0.002028 |
| | 36 | θz- | -0.000003 | -0.030673 | -0.002034 |
| 600 | 33 | ux+ | 0.001712 | -0.029446 | -0.000479 |
| | 33 | uy+ | 0.000803 | -0.019249 | -0.000099 |
| | 33 | θz+ | -0.001406 | -0.029573 | 0.000479 |
| | 33 | ux- | -0.001519 | -0.021823 | 0.000479 |
| | 33 | uy- | 0.000052 | -0.031453 | 0.000000 |
| | 33 | θz- | 0.001692 | -0.029557 | -0.000479 |
| | 36 | ux+ | 0.000463 | -0.026501 | -0.000207 |
| | 36 | uy+ | 0.000003 | -0.003883 | 0.000000 |
| | 36 | θz+ | -0.000009 | -0.007260 | 0.000427 |
| | 36 | ux- | -0.000316 | -0.021171 | 0.000207 |
| | 36 | uy- | 0.000042 | -0.027076 | 0.000000 |
| | 36 | θz- | 0.000100 | -0.007270 | -0.000427 |
| 601 | 33 | ux+ | 0.001508 | -0.029320 | -0.000390 |
| | 33 | uy+ | 0.000737 | -0.019166 | -0.000186 |
| | 33 | θz+ | -0.001185 | -0.029447 | 0.000498 |
| | 33 | ux- | -0.001316 | -0.021941 | 0.000375 |
| | 33 | uy- | 0.000052 | -0.031328 | 0.000001 |
| | 33 | θz- | 0.001470 | -0.029431 | -0.000498 |
| | 36 | ux+ | 0.000409 | -0.006091 | 0.000049 |
| | 36 | uy+ | 0.000003 | -0.003874 | 0.000000 |
| | 36 | θz+ | 0.000134 | -0.007239 | 0.000216 |
| | 36 | ux- | -0.000279 | -0.006103 | -0.000049 |
| | 36 | uy- | 0.000039 | -0.026960 | 0.000000 |
| | 36 | θz- | -0.000042 | -0.007248 | -0.000216 |
| 602 | 33 | ux+ | 0.001328 | -0.029192 | -0.000433 |
| | 33 | uy+ | 0.000639 | -0.019083 | -0.000242 |
| | 33 | θz+ | -0.000947 | -0.029360 | 0.000494 |
| | 33 | ux- | -0.001139 | -0.021642 | 0.000433 |
| | 33 | uy- | 0.000052 | -0.031205 | 0.000001 |
| | 33 | θz- | 0.001227 | -0.029344 | -0.000494 |
| | 36 | ux+ | 0.000401 | -0.006075 | -0.000074 |
| | 36 | uy+ | 0.000003 | -0.003865 | 0.000000 |
| | 36 | θz+ | -0.000081 | -0.026275 | 0.000134 |
| | 36 | ux- | -0.000273 | -0.006089 | 0.000074 |
| | 36 | uy- | 0.000039 | -0.026839 | 0.000000 |
| | 36 | θz- | 0.000308 | -0.026271 | -0.000134 |
| 603 | 33 | ux+ | 0.001124 | -0.029066 | -0.000475 |
| | 33 | uy+ | 0.000525 | -0.019001 | -0.000264 |
| | 33 | θz+ | -0.000800 | -0.029537 | 0.000475 |
| | 33 | ux- | -0.000934 | -0.021552 | 0.000475 |
| | 33 | uy- | 0.000052 | -0.031081 | 0.000000 |
| | 33 | θz- | 0.001076 | -0.029520 | -0.000475 |

MA_ROT2.LST Sábado, 18 Mayo 2002 4:50am

| | | | | | |
|---|---|---|---|---|---|
| | 36 | ux+ | 0.000348 | -0.006060 | -0.000151 |
| | 36 | uy+ | 0.000003 | -0.003857 | 0.000000 |
| | 36 | θz+ | -0.000220 | -0.006074 | 0.000151 |
| | 36 | ux- | -0.000220 | -0.006074 | 0.000151 |
| | 36 | uy- | 0.000042 | -0.026722 | 0.000000 |
| | 36 | θz- | 0.000348 | -0.006060 | -0.000151 |
| 604 | 33 | ux+ | 0.000905 | -0.028937 | -0.000477 |
| | 33 | uy+ | 0.000407 | -0.018918 | -0.000256 |
| | 33 | θz+ | -0.000617 | -0.029003 | 0.000477 |
| | 33 | ux- | -0.000715 | -0.021460 | 0.000477 |
| | 33 | uy- | 0.000052 | -0.030956 | -0.000001 |
| | 33 | θz- | 0.000900 | -0.028985 | -0.000477 |
| | 36 | ux+ | 0.000273 | -0.006044 | -0.000182 |
| | 36 | uy+ | 0.000003 | -0.003848 | 0.000000 |
| | 36 | θz+ | -0.000143 | -0.006057 | 0.000182 |
| | 36 | ux- | -0.000143 | -0.006057 | 0.000182 |
| | 36 | uy- | -0.000057 | -0.026598 | 0.000077 |
| | 36 | θz- | 0.000273 | -0.006044 | -0.000182 |
| 605 | 33 | ux+ | 0.000723 | -0.028826 | -0.000438 |
| | 33 | uy+ | 0.000310 | -0.018844 | -0.000222 |
| | 33 | θz+ | -0.000437 | -0.028843 | 0.000438 |
| | 33 | ux- | -0.000533 | -0.021697 | 0.000351 |
| | 33 | uy- | 0.000052 | -0.030845 | -0.000002 |
| | 33 | θz- | 0.000723 | -0.028826 | -0.000438 |
| | 36 | ux+ | 0.000227 | -0.025940 | -0.000107 |
| | 36 | uy+ | 0.000003 | -0.003839 | 0.000000 |
| | 36 | θz+ | -0.000050 | -0.007150 | 0.000178 |
| | 36 | ux- | -0.000081 | -0.020734 | 0.000107 |
| | 36 | uy- | -0.000024 | -0.026496 | 0.000066 |
| | 36 | θz- | 0.000193 | -0.007136 | -0.000178 |
| 606 | 33 | ux+ | 0.000569 | -0.029038 | -0.000317 |
| | 33 | uy+ | 0.000233 | -0.018770 | -0.000162 |
| | 33 | θz+ | -0.000276 | -0.028729 | 0.000363 |
| | 33 | ux- | -0.000398 | -0.021817 | 0.000309 |
| | 33 | uy- | 0.000050 | -0.030733 | -0.000004 |
| | 33 | θz- | 0.000561 | -0.028711 | -0.000363 |
| | 36 | ux+ | 0.000188 | -0.025836 | -0.000084 |
| | 36 | uy+ | 0.000003 | -0.003831 | 0.000000 |
| | 36 | θz+ | 0.000012 | -0.007131 | 0.000130 |
| | 36 | ux- | -0.000043 | -0.020835 | 0.000077 |
| | 36 | uy- | -0.000003 | -0.026387 | 0.000049 |
| | 36 | θz- | 0.000130 | -0.007117 | -0.000130 |
| 607 | 33 | ux+ | 0.000414 | -0.028887 | -0.000239 |
| | 33 | uy+ | 0.000174 | -0.018670 | -0.000040 |
| | 33 | θz+ | -0.000150 | -0.029025 | 0.000239 |
| | 33 | ux- | -0.000245 | -0.021812 | 0.000234 |
| | 33 | uy- | 0.000048 | -0.030581 | -0.000006 |
| | 33 | θz- | 0.000413 | -0.029009 | -0.000239 |
| | 36 | ux+ | 0.000157 | -0.025696 | -0.000031 |
| | 36 | uy+ | 0.000003 | -0.003819 | 0.000000 |
| | 36 | θz+ | 0.000070 | -0.025811 | 0.000031 |
| | 36 | ux- | -0.000012 | -0.020818 | 0.000028 |
| | 36 | uy- | 0.000039 | -0.026243 | 0.000000 |
| | 36 | θz- | 0.000155 | -0.025805 | -0.000031 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

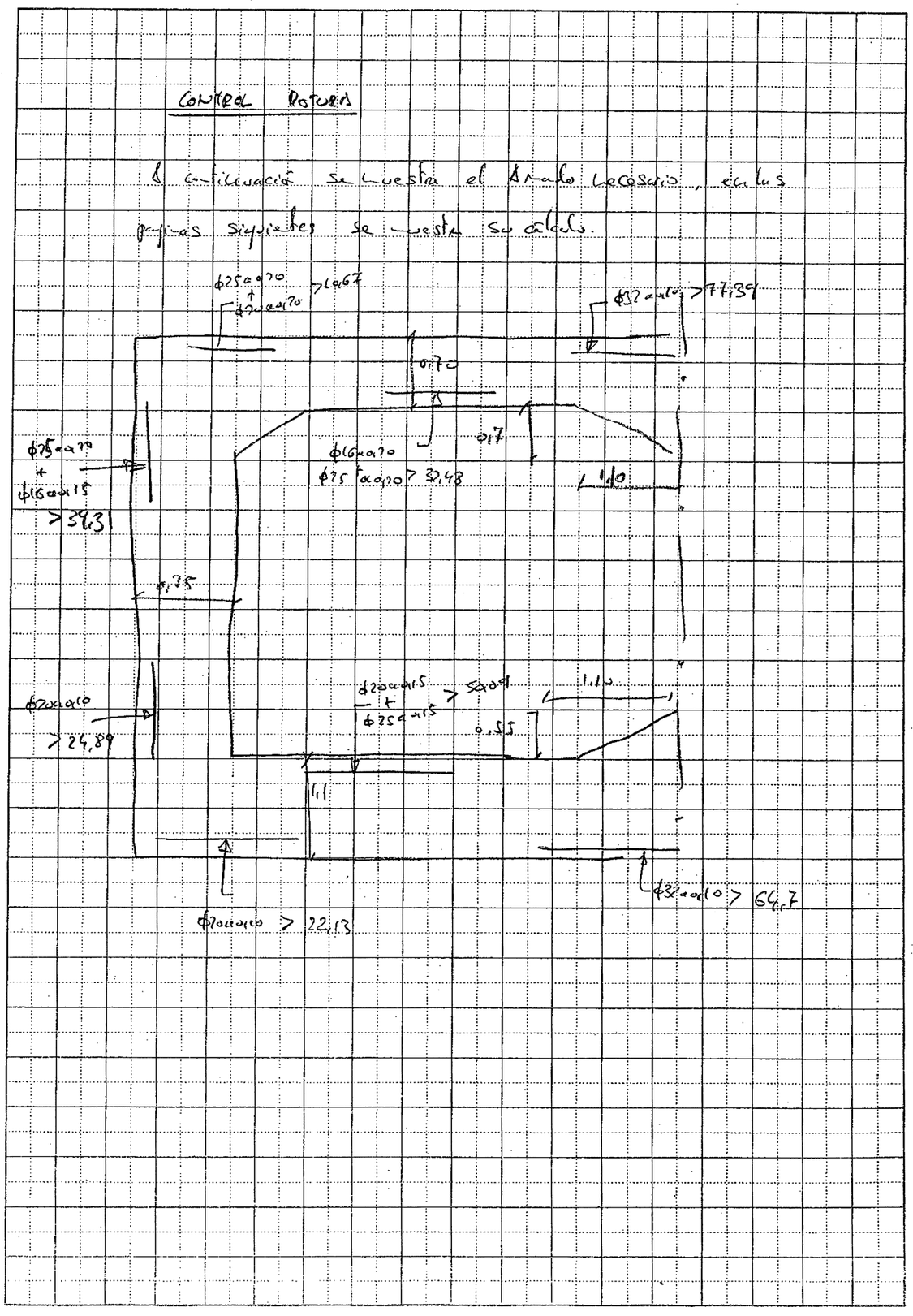
| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 320 | 33 | Fx+ | 16.54 | 17.59 | 0.00 |
| | 33 | Fy+ | -16.54 | 19.92 | 0.00 |
| | 33 | Mz+ | 0.00 | 18.63 | 0.00 |
| | 33 | Fx- | -16.54 | 18.12 | 0.00 |
| | 33 | Fy- | 16.54 | 10.99 | 0.00 |
| | 33 | Mz- | 0.00 | 18.63 | 0.00 |
| | 36 | Fx+ | 12.91 | 5.59 | 0.00 |
| | 36 | Fy+ | -4.97 | 16.61 | 0.00 |
| | 36 | Mz+ | 0.00 | 16.37 | 0.00 |
| | 36 | Fx- | -12.91 | 3.78 | 0.00 |
| | 36 | Fy- | -1.70 | 2.47 | 0.00 |
| | 36 | Mz- | 0.00 | 16.37 | 0.00 |
| 400 | 33 | Fx+ | 0.00 | 69.28 | 0.00 |
| | 33 | Fy+ | 0.00 | 69.58 | 0.00 |
| | 33 | Mz+ | 0.00 | 69.28 | 0.00 |
| | 33 | Fx- | 0.00 | 69.28 | 0.00 |
| | 33 | Fy- | 0.00 | 42.47 | 0.00 |
| | 33 | Mz- | 0.00 | 69.28 | 0.00 |
| | 36 | Fx+ | 0.00 | 59.58 | 0.00 |
| | 36 | Fy+ | 0.00 | 59.71 | 0.00 |
| | 36 | Mz+ | 0.00 | 59.58 | 0.00 |
| | 36 | Fx- | 0.00 | 59.58 | 0.00 |
| | 36 | Fy- | 0.00 | 8.70 | 0.00 |
| | 36 | Mz- | 0.00 | 59.58 | 0.00 |
| 421 | 33 | Fx+ | 0.00 | 55.33 | 0.00 |
| | 33 | Fy+ | 0.00 | 58.79 | 0.00 |
| | 33 | Mz+ | 0.00 | 55.33 | 0.00 |
| | 33 | Fx- | 0.00 | 55.33 | 0.00 |
| | 33 | Fy- | 0.00 | 32.78 | 0.00 |
| | 33 | Mz- | 0.00 | 55.33 | 0.00 |
| | 36 | Fx+ | 0.00 | 48.49 | 0.00 |
| | 36 | Fy+ | 0.00 | 49.08 | 0.00 |
| | 36 | Mz+ | 0.00 | 48.49 | 0.00 |
| | 36 | Fx- | 0.00 | 48.49 | 0.00 |
| | 36 | Fy- | 0.00 | 7.39 | 0.00 |
| | 36 | Mz- | 0.00 | 48.49 | 0.00 |
| 422 | 33 | Fx+ | 0.00 | 82.18 | 0.00 |
| | 33 | Fy+ | 0.00 | 84.84 | 0.00 |
| | 33 | Mz+ | 0.00 | 82.18 | 0.00 |
| | 33 | Fx- | 0.00 | 82.18 | 0.00 |
| | 33 | Fy- | 0.00 | 49.10 | 0.00 |
| | 33 | Mz- | 0.00 | 82.18 | 0.00 |
| | 36 | Fx+ | 0.00 | 71.01 | 0.00 |
| | 36 | Fy+ | 0.00 | 71.34 | 0.00 |
| | 36 | Mz+ | 0.00 | 71.01 | 0.00 |
| | 36 | Fx- | 0.00 | 71.01 | 0.00 |
| | 36 | Fy- | 0.00 | 11.20 | 0.00 |
| | 36 | Mz- | 0.00 | 71.01 | 0.00 |
| 423 | 33 | Fx+ | 0.00 | 76.85 | 0.00 |
| | 33 | Fy+ | 0.00 | 77.46 | 0.00 |
| | 33 | Mz+ | 0.00 | 76.85 | 0.00 |
| | 33 | Fx- | 0.00 | 76.85 | 0.00 |
| | 33 | Fy- | 0.00 | 46.16 | 0.00 |
| | 33 | Mz- | 0.00 | 76.85 | 0.00 |

MA_ROT2.LST Sábado, 18 Mayo 2002 4:50am

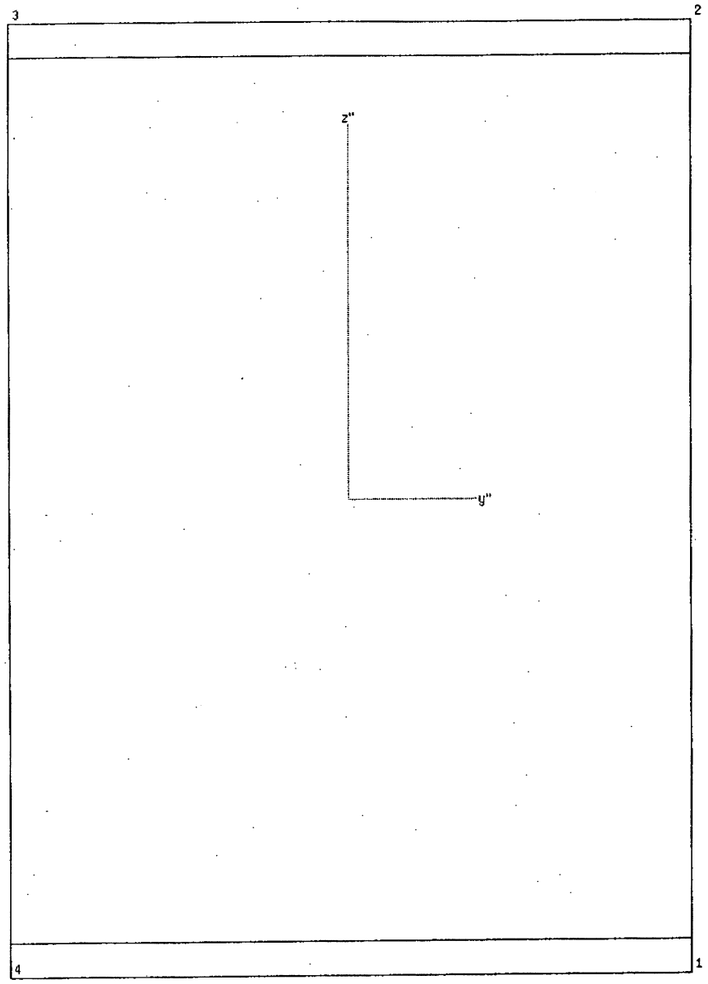
| | | | | | |
|---|---|---|---|---|---|
| | 36 | Fx+ | 0.00 | 65.71 | 0.00 |
| | 36 | Fy+ | 0.00 | 65.82 | 0.00 |
| | 36 | Mz+ | 0.00 | 65.71 | 0.00 |
| | 36 | Fx- | 0.00 | 65.71 | 0.00 |
| | 36 | Fy- | 0.00 | 10.46 | 0.00 |
| | 36 | Mz- | 0.00 | 65.71 | 0.00 |
| 424 | 33 | Fx+ | 0.00 | 78.56 | 0.00 |
| | 33 | Fy+ | 0.00 | 79.02 | 0.00 |
| | 33 | Mz+ | 0.00 | 78.56 | 0.00 |
| | 33 | Fx- | 0.00 | 78.56 | 0.00 |
| | 33 | Fy- | 0.00 | 47.68 | 0.00 |
| | 33 | Mz- | 0.00 | 78.56 | 0.00 |
| | 36 | Fx+ | 0.00 | 67.10 | 0.00 |
| | 36 | Fy+ | 0.00 | 67.15 | 0.00 |
| | 36 | Mz+ | 0.00 | 67.10 | 0.00 |
| | 36 | Fx- | 0.00 | 67.10 | 0.00 |
| | 36 | Fy- | 0.00 | 10.38 | 0.00 |
| | 36 | Mz- | 0.00 | 67.10 | 0.00 |
| 425 | 33 | Fx+ | 0.00 | 76.34 | 0.00 |
| | 33 | Fy+ | 0.00 | 76.73 | 0.00 |
| | 33 | Mz+ | 0.00 | 76.34 | 0.00 |
| | 33 | Fx- | 0.00 | 76.34 | 0.00 |
| | 33 | Fy- | 0.00 | 46.67 | 0.00 |
| | 33 | Mz- | 0.00 | 76.34 | 0.00 |
| | 36 | Fx+ | 0.00 | 65.57 | 0.00 |
| | 36 | Fy+ | 0.00 | 65.70 | 0.00 |
| | 36 | Mz+ | 0.00 | 65.57 | 0.00 |
| | 36 | Fx- | 0.00 | 65.57 | 0.00 |
| | 36 | Fy- | 0.00 | 9.68 | 0.00 |
| | 36 | Mz- | 0.00 | 65.57 | 0.00 |
| 521 | 33 | Fx+ | 0.00 | 10.78 | 0.00 |
| | 33 | Fy+ | 0.00 | 11.59 | 0.00 |
| | 33 | Mz+ | 0.00 | 10.78 | 0.00 |
| | 33 | Fx- | 0.00 | 10.78 | 0.00 |
| | 33 | Fy- | 0.00 | 6.35 | 0.00 |
| | 33 | Mz- | 0.00 | 10.78 | 0.00 |
| | 36 | Fx+ | 0.00 | 9.49 | 0.00 |
| | 36 | Fy+ | 0.00 | 9.65 | 0.00 |
| | 36 | Mz+ | 0.00 | 9.49 | 0.00 |
| | 36 | Fx- | 0.00 | 9.49 | 0.00 |
| | 36 | Fy- | 0.00 | 1.43 | 0.00 |
| | 36 | Mz- | 0.00 | 9.49 | 0.00 |
| 522 | 33 | Fx+ | 0.00 | 2.54 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.73 | 0.00 |
| | 33 | Mz+ | 0.00 | 2.54 | 0.00 |
| | 33 | Fx- | 0.00 | 2.54 | 0.00 |
| | 33 | Fy- | 0.00 | 1.50 | 0.00 |
| | 33 | Mz- | 0.00 | 2.54 | 0.00 |
| | 36 | Fx+ | 0.00 | 2.24 | 0.00 |
| | 36 | Fy+ | 0.00 | 2.28 | 0.00 |
| | 36 | Mz+ | 0.00 | 2.24 | 0.00 |
| | 36 | Fx- | 0.00 | 2.24 | 0.00 |
| | 36 | Fy- | 0.00 | 0.34 | 0.00 |
| | 36 | Mz- | 0.00 | 2.24 | 0.00 |
| 523 | 33 | Fx+ | 0.00 | 2.55 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.74 | 0.00 |
| | 33 | Mz+ | 0.00 | 2.55 | 0.00 |
| | 33 | Fx- | 0.00 | 2.55 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| | 33 | Fy- | 0.00 | 1.50 | 0.00 |
| | 33 | Mz- | 0.00 | 2.55 | 0.00 |
| | 36 | Fx+ | 0.00 | 2.25 | 0.00 |
| | 36 | Fy+ | 0.00 | 2.28 | 0.00 |
| | 36 | Mz+ | 0.00 | 2.25 | 0.00 |
| | 36 | Fx- | 0.00 | 2.25 | 0.00 |
| | 36 | Fy- | 0.00 | 0.34 | 0.00 |
| | 36 | Mz- | 0.00 | 2.25 | 0.00 |
| 524 | 33 | Fx+ | 0.00 | 2.56 | 0.00 |
| | 33 | Fy+ | 0.00 | 2.75 | 0.00 |
| | 33 | Mz+ | 0.00 | 2.56 | 0.00 |
| | 33 | Fx- | 0.00 | 2.56 | 0.00 |
| | 33 | Fy- | 0.00 | 1.51 | 0.00 |
| | 33 | Mz- | 0.00 | 2.56 | 0.00 |
| | 36 | Fx+ | 0.00 | 2.25 | 0.00 |
| | 36 | Fy+ | 0.00 | 2.29 | 0.00 |
| | 36 | Mz+ | 0.00 | 2.25 | 0.00 |
| | 36 | Fx- | 0.00 | 2.25 | 0.00 |
| | 36 | Fy- | 0.00 | 0.34 | 0.00 |
| | 36 | Mz- | 0.00 | 2.25 | 0.00 |
| 525 | 33 | Fx+ | 0.00 | 1.28 | 0.00 |
| | 33 | Fy+ | 0.00 | 1.39 | 0.00 |
| | 33 | Mz+ | 0.00 | 1.28 | 0.00 |
| | 33 | Fx- | 0.00 | 1.28 | 0.00 |
| | 33 | Fy- | 0.00 | 0.75 | 0.00 |
| | 33 | Mz- | 0.00 | 1.28 | 0.00 |
| | 36 | Fx+ | 0.00 | 1.13 | 0.00 |
| | 36 | Fy+ | 0.00 | 1.15 | 0.00 |
| | 36 | Mz+ | 0.00 | 1.13 | 0.00 |
| | 36 | Fx- | 0.00 | 1.13 | 0.00 |
| | 36 | Fy- | 0.00 | 0.17 | 0.00 |
| | 36 | Mz- | 0.00 | 1.13 | 0.00 |





>. 1 : 9.0




ción :"DINTELC" Armadura :"B1"
o : tipo viga/ Rectángulo Unidades :[cm]
erial :"HA_25"

ho = 100.00 cm Canto = 140.00 cm

acterísticas mecánicas de la sección:
a : Ax= 1.400 [m2]
entos de inercia : Iy= 0.228666 [m4] Iz= 0.116667 [m4]
rcia a torsión : Ix= 0.261179 [m4]

ición del centro de gravedad: ys= 0.000 [m] zs= 0.700000 [m]

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| . | Iz | -0.500 | -0.233333 | 0.167 |
| . | Iz | 0.500 | 0.233333 | -0.167 |



Dimensionamiento : Viga "H-7"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -161.560 | | | | 141.510 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. As-nuevo [cm2] | [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 70.0 | 50.0 | 70.0 | 0.05 | - | 0.05 |
| 2 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.05 | 39.26 | 39.26 |

Cuantía arm. 0.52 [o/o] Suma 39.31

Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | -50.00 | 75.00 | -3.500 | -141.667 | "HA_25" |
| Armadura-Min | -50.00 | 70.00 | -2.904 | -4434.780 | "B500S" |
| Hormigón-Max | 50.00 | 0.00 | 5.442 | 0.000 | "HA_25" |
| Armadura-Max | 50.00 | 5.00 | 4.846 | 4434.780 | "B500S" |

Fibra neutra zn 45.65 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 29.35 cm Zona comprimida/Canto útil 0.42

Dimensionamiento : Viga "H-7"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -165.800 | | | | 111.600 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. As-nuevo [cm2] | [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 70.0 | 50.0 | 70.0 | 0.05 | - | 0.05 |
| 2 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.05 | 24.84 | 24.84 |

Cuantía arm. 0.33 [o/o] Suma 24.89

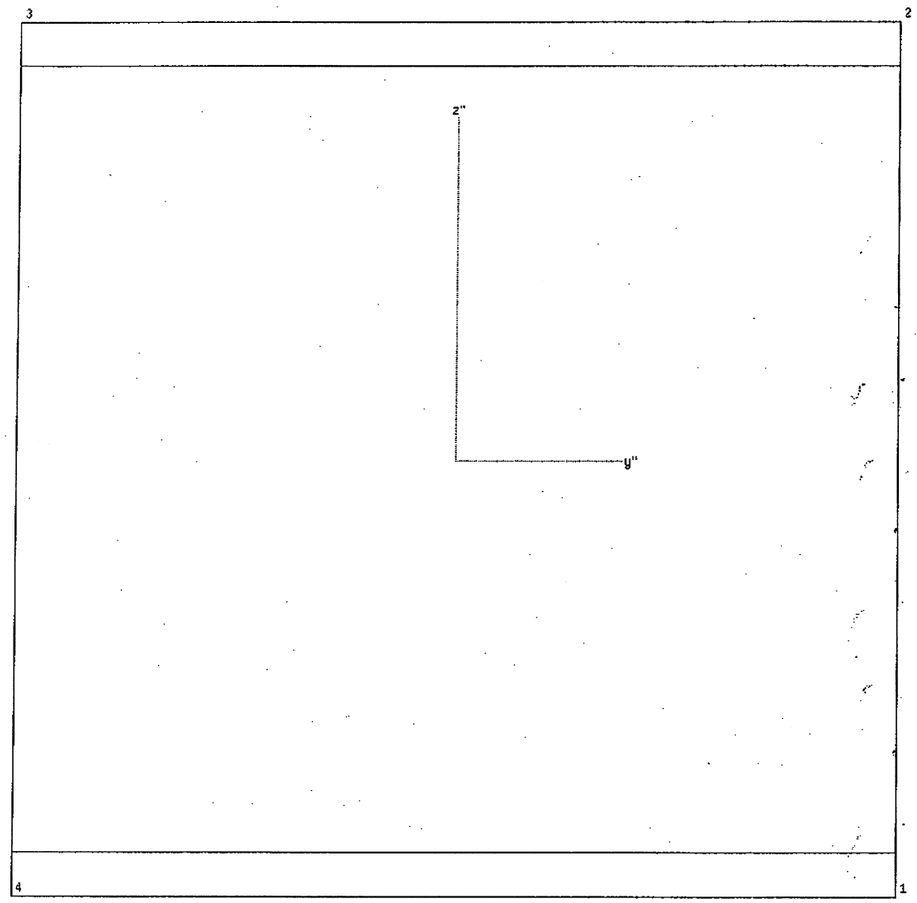
eformaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| ormigón-Min | -50.00 | 75.00 | -3.500 | -141.667 | "HA_25" |
| rmadura-Min | -50.00 | 70.00 | -2.775 | -4434.780 | "B500S" |
| ormigón-Max | 50.00 | 0.00 | 7.371 | 0.000 | "HA_25" |
| rmadura-Max | 50.00 | 5.00 | 6.646 | 4434.780 | "B500S" |

ibra neutra zn 50.85 cm yn -0.00 cm Angulo 0.0
ncho zona comprim. 24.15 cm Zona comprimida/Canto útil 0.34



Mstb. 1 : 7.0




Sección :"ZAP" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"HA_25"

Ancho = 100.00 cm Canto = 100.00 cm

Características mecánicas de la sección:
Area : Ax= 1.000 [m2]
Momentos de inercia : Iy= 0.083333 [m4] Iz= 0.083333 [m4]
Inercia a torsión : Ix= 0.140667 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.500000 [m]

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| izq. | Iz | -0.500 | -0.166667 | 0.167 |
| dch. | Iz | 0.500 | 0.166667 | -0.167 |
| abajo | Iy | -0.500 | -0.166667 | 0.167 |
| arriba | Iy | 0.500 | 0.166667 | -0.167 |

madura: "B1"

| | Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|---|
| 1 | B500S | (2) | 0.05 | -50.00 | 95.00 | 50.00 | 95.00 |
| 2 | B500S | (2) | 0.05 | -50.00 | 5.00 | 50.00 | 5.00 |
| | Total: | | 0.10 | Cuantía de armadura: 0.001 [o/o] | | | |

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

mens. a cortante (valores por defecto): (Acero"B500S"/Hormigón"HA_25")

| rtante | Area mín.cercos | Ancho alma ideal | Canto útil | Incl.bielas |
|---|---|---|---|---|
| z | 0.00 [cm2/m] | 100.00 [cm] | 96.00 [cm] | 0.00 |
| y | 0.00 [cm2/m] | 100.00 [cm] | 96.00 [cm] | 0.00 |

racterísticas del material:

| n.Mat. | Módulo E | 0.85*fcd,fyd | eps-fc | fct | fcv | fcw,mín |
|---|---|---|---|---|---|---|
| | [ kp/cm2] | [ kp/cm2] | [o/oo] | [ kp/cm2] | [ kp/cm2] | [ kp/cm2] |
| _25" | 278100.0 | -141.667 | -2.000 | 0.0 | 6.460 | 250.000 |
| 500S" | 2.10E+06 | 4434.780 | | | | |

/enda:
i,fyd resistencia de cálculo del hormigón,acero
:-fc deformación al final de la parábola (fig.2.3, cap.2.2)
: resistencia de cálculo a tracción del hormigón
' resistencia virtual de cálculo del hormigón a esfuerzo cortante



Dimensionamiento : Viga "ZAP"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -26.240 | | | | 201.230 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. As [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 95.0 | 50.0 | 95.0 | 0.05 | - | 0.05 |
| 2 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.05 | 50.04 | 50.04 |
| | | | | Cuantía arm. 0.50 [o/o] | | Suma | 50.09 |

Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | -50.00 | 100.00 | -3.100 | -141.667 | "HA_25" |
| Armadura-Min | -50.00 | 95.00 | -2.411 | -4434.780 | "B500S" |
| Hormigón-Max | 50.00 | 0.00 | 10.689 | 0.000 | "HA_25" |
| Armadura-Max | 50.00 | 5.00 | 10.000 | 4434.780 | "B500S" |

Fibra neutra zn 77.52 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 22.48 cm Zona comprimida/Canto útil 0.24

Dimensionamiento : Viga "ZAP"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -63.320 | | | | 114.530 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. As [cm2] | As-nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 95.0 | 50.0 | 95.0 | 0.05 | - | 0.05 |
| 2 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.05 | 22.08 | 22.08 |
| | | | | Cuantía arm. 0.22 [o/o] | | Suma | 22.13 |

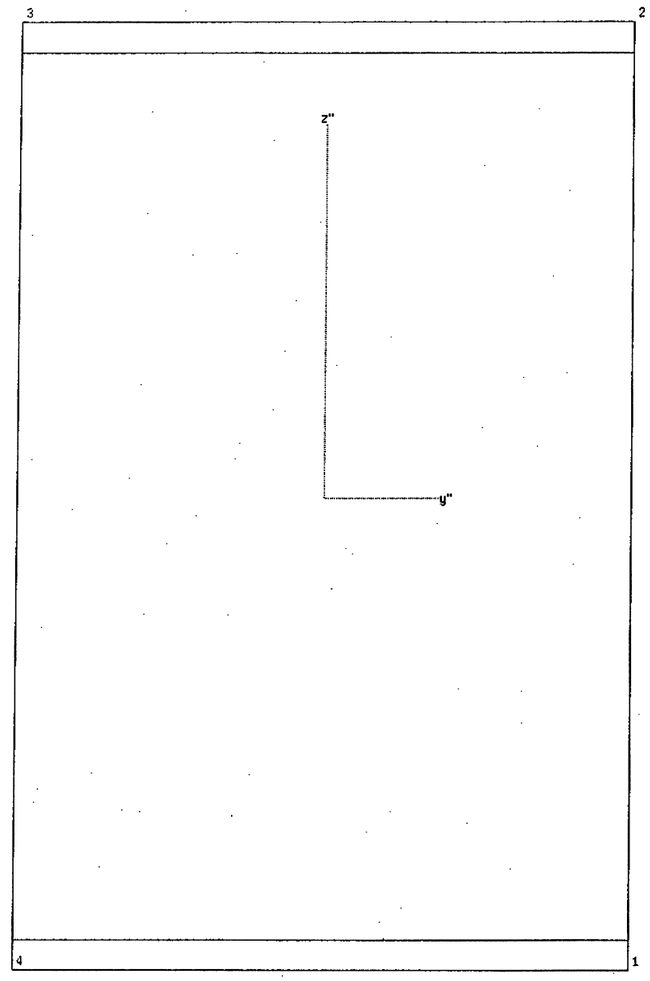
eformaciones y tensiones extremas (Rotura):

| | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| ormigón-Min | -50.00 | 100.00 | -2.125 | -141.667 | "HA_25" |
| madura-Min | -50.00 | 95.00 | -1.487 | -3122.679 | "B500S" |
| ormigón-Max | 50.00 | 0.00 | 10.638 | 0.000 | "HA_25" |
| madura-Max | 50.00 | 5.00 | 10.000 | 4434.780 | "B500S" |

bra neutra zn 83.35 cm yn -0.00 cm Angulo 0.0
ncho zona comprim. 16.65 cm Zona comprimida/Canto útil 0.18



Mstb. 1 : 10.0




Sección :"ZAPC" Armadura :"B1"
Tipo : tipo viga/ Rectángulo Unidades :[cm]
Material :"HA_25"

Ancho = 100.00 cm Canto = 155.00 cm

Características mecánicas de la sección:
Area : Ax= 1.550 [m2]
Momentos de inercia : Iy= 0.310323 [m4] Iz= 0.129167 [m4]
Inercia a torsión : Ix= 0.309670 [m4]

Posición del centro de gravedad: ys= 0.000 [m] zs= 0.775000 [m]

| | I: | R=dist.borde [m] | W=I/R [m3] | W/Ax [m] |
|---|---|---|---|---|
| izq. | Iz | -0.500 | -0.258333 | 0.167 |
| dch. | Iz | 0.500 | 0.258333 | -0.167 |

```
ɔajo Iy -0.775        -0.400416      0.258
ɔriba Iy  0.775        0.400416     -0.258
```

ɔmadura: "B1"

| | Nom.mat | Cod.dim. | Area [cm2] | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] |
|---|---|---|---|---|---|---|---|
| 1 | B500S | (2) | 0.01 | -50.00 | 150.00 | 50.00 | 150.00 |
| 2 | B500S | (2) | 0.01 | -50.00 | 5.00 | 50.00 | 5.00 |

Total: 0.02 Cuantía de armadura: 0.000 [o/o]

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

mens. a cortante (valores por defecto): (Acero"B500S"/Hormigón"HA_25")

| rtante | Area mín.cercos | Ancho alma ideal | Canto útil | Incl.bielas |
|---|---|---|---|---|
| z | 0.00 [cm2/m] | 100.00 [cm] | 151.00 [cm] | 0.00 |
| y | 0.00 [cm2/m] | 155.00 [cm] | 96.00 [cm] | 0.00 |

ɔacterísticas del material:

| n.Mat. | Módulo E [ kp/cm2] | 0.85*fcd,fyd [ kp/cm2] | eps-fc [o/oo] | fct [ kp/cm2] | fcv [ kp/cm2] | fcw,mín [ kp/cm2] |
|---|---|---|---|---|---|---|
| _25" | 278100.0 | -141.667 | -2.000 | 0.0 | 6.460 | 250.000 |
| )0S" | 2.10E+06 | 4434.780 | | | | |

ɔenda:
l,fyd resistencia de cálculo del hormigón,acero
;-fc deformación al final de la parábola (fig.2.3, cap.2.2)
: resistencia de cálculo a tracción del hormigón
' resistencia virtual de cálculo del hormigón a esfuerzo cortante



Dimensionamiento : Viga "ZAPC"/"B1"

Esfuerzos (Rotura) Unidades : [tm]

| N | Vy | Vz | Mx | My | Mz | Alpha |
|---|---|---|---|---|---|---|
| -36.990 | | | | 419.610 | | 45.0 |

| Armadura Longitudinal: | y1 [cm] | z1 [cm] | y2 [cm] | z2 [cm] | dado [cm2] | dimens. As [cm2] | nuevo [cm2] |
|---|---|---|---|---|---|---|---|
| 1 "B500S" | -50.0 | 150.0 | 50.0 | 150.0 | 0.01 | - | 0.01 |
| 2 "B500S" | -50.0 | 5.0 | 50.0 | 5.0 | 0.01 | 64.68 | 64.68 |

Cuantía arm. 0.42 [o/o] Suma 64.69

Deformaciones y tensiones extremas (Rotura):

| 1 | Coordenadas y [cm] | z [cm] | Eps [o/oo] | Estado-II [kp/cm2] | |
|---|---|---|---|---|---|
| Hormigón-Min | -50.00 | 155.00 | -2.589 | -141.667 | "HA_25" |
| Armadura-Min | -50.00 | 150.00 | -2.170 | -4434.780 | "B500S" |
| Hormigón-Max | 50.00 | 0.00 | 10.420 | 0.000 | "HA_25" |
| Armadura-Max | 50.00 | 5.00 | 10.000 | 4434.780 | "B500S" |

Fibra neutra zn 124.15 cm yn -0.00 cm Angulo 0.0
Ancho zona comprim. 30.85 cm Zona comprimida/Canto útil 0.21

Control Seccion

Pesa

| | Nser | Mser | σs | | σsr |
|---|---|---|---|---|---|
| Dint. | | | | | |
| Emp lastd. | -68,54 | -83,82 | 2710,25 | | 416 |
| cdv | -45,33 | 67,87 | 2434,67 | (ok) | |
| Emp. hastial | -67,95 | -309,29 | 2787,85 | | 545 |
| Hast ext | | | | | |
| Sup. | -108,71 | -94,84 | 2702,54 | | 672 |
| Inf | -112,87 | 62,60 | 1565 | ok | |
| Zapata | | | | | |
| Inf ext | -42,33 | 77,89 | 2124,60 | ok | |
| cdv | -17,61 | -135,90 | 2733,16 | | 852 |
| Inf int | -24,87 | 788,41 | 2417 | ok | |

Wk

| | | |
|---|---|---|
| Dintelep. ext | 0,33 | |
| Dintel emp int | 0,32 | Debidos al tener contacto |
| Hastial sup. | 0,29 | Con apertura en frecuentes |
| Zapata | 0,29 | Cuando la EHE dicta Cuasipermanentes |

El resto de Barras se Cosen en los pagros siguientes

## FISURACIÓN EN SECCIONES RECTANGULARES DE HORMIGÓN. (EHE-98)

VER 1.0.0

**Características Generales:**

| | |
|---|---|
| Es [Kp/cm2]: | 2.10E+06 |
| Canto [m]: | 0.700 |
| Tipo de Hormigón: | HA-25 |
| Tipo de Barras : | Corrugada |
| Tipo de Sección: | Losa |
| o de Diagra. Tens. : | Flexo-Tracc |

**SECCION:** **Dintel.empotramiento**

**Características de Armadura:**

| | f | c | s | σs | σsr |
|---|---|---|---|---|---|
| CAPAS | [mm] | [cm] | [cm] | [Kp/cm2] | [Kp/cm2] |
| Capa 1 | 20 | 3 | 20 | 2710 | 496 |
| Capa 2 | 25 | 3 | 20 | | |
| Capa 3 | | | | | |

**RESULTADOS:**

| | |
|---|---|
| Ac,eficaz = | 0.1750 m2 |
| Sm = | 154.3456 mm |
| esm = | 1.2689E-03 |
| Wk = | 0.3329 mm |

## FISURACIÓN EN SECCIONES RECTANGULARES DE HORMIGÓN. (EHE-98)

VER 1.0.0

**Características Generales:**

| | |
|---|---|
| Es [Kp/cm2]: | 2.10E+06 |
| Canto [m]: | 1.550 |
| Tipo de Hormigón: | HA-25 |
| Tipo de Barras : | Corrugada |
| Tipo de Sección: | Losa |
| o de Diagra. Tens. : | Flexo-Tracc |

**SECCION:** Zapata

**Características de Armadura:**

| | f | c | s | σs | σsr |
|---|---|---|---|---|---|
| CAPAS | [mm] | [cm] | [cm] | [Kp/cm2] | [Kp/cm2] |
| Capa 1 | 20 | 3 | 15 | 2733.16 | 862 |
| Capa 2 | 25 | 3 | 15 | | |
| Capa 3 | | | | | |

**RESULTADOS:**

| | |
|---|---|
| Ac,eficaz = | 0.2175 m2 |
| Sm = | 140.6579 mm |
| esm = | 1.2368E-03 |
| Wk = | 0.2957 mm |



LISTADO DE ESTADOS DE CARGA
Fecha : 09.05.2002 14:03:39
Título: L.A.V.MARTORELL. - ODT 300.9.
Coment: Envolventes totales
Titlst: Estado Servicio. Proyecto: L.A.V.MARTORELL. - ODT

Tabla de estados de carga a listar

| ec | Fichero | tipo | Título |
|---|---|---|---|
| 30 | MA_SERV | 1 | [Envolvente de Servicio (Marco en Servicio) ] |

ESFUERZOS EN ELEMENTOS SELECCIONADOS [m,tm]
Listado por Grupos

| MEMB | JT | EC | ENV | Nx | Fy | Mz |
|---|---|---|---|---|---|---|
| 6 | 6 | 30 | Nx+ | -55.50 | -122.94 | -297.80 |
| | | 30 | Fy+ | -76.22 | -115.68 | -270.57 |
| | | 30 | Mz+ | -75.95 | -115.70 | -270.20 |
| | | 30 | Nx- | -82.72 | -120.81 | -282.93 |
| | | 30 | Fy- | -61.93 | -127.85 | -308.78 |
| | | 30 | Mz- | -62.25 | -127.84 | -309.24 |
| 7 | 7 | 30 | Nx+ | -41.08 | -95.04 | -135.12 |
| | | 30 | Fy+ | -62.42 | -90.03 | -117.85 |
| | | 30 | Mz+ | -62.77 | -91.41 | -117.51 |
| | | 30 | Nx- | -68.36 | -94.52 | -124.65 |
| | | 30 | Fy- | -47.02 | -99.33 | -140.95 |
| | | 30 | Mz- | -46.68 | -97.96 | -141.29 |
| 8 | 8 | 30 | Nx+ | -41.08 | -56.24 | -0.78 |
| | | 30 | Fy+ | -62.77 | -50.82 | 8.79 |
| | | 30 | Mz+ | -63.32 | -52.57 | 10.07 |
| | | 30 | Nx- | -68.36 | -53.93 | 7.14 |
| | | 30 | Fy- | -46.68 | -59.16 | -1.77 |
| | | 30 | Mz- | -46.06 | -57.41 | -3.07 |
| 9 | 9 | 30 | Nx+ | -41.08 | -20.23 | 62.22 |
| | | 30 | Fy+ | -63.14 | -14.17 | 64.24 |
| | | 30 | Mz+ | -45.33 | -17.91 | 67.87 |
| | | 30 | Nx- | -68.36 | -16.27 | 64.98 |
| | | 30 | Fy- | -46.31 | -22.14 | 63.28 |
| | | 30 | Mz- | -65.87 | -17.55 | 59.76 |
| 10 | 10 | 30 | Nx+ | -41.08 | 15.78 | 65.90 |
| | | 30 | Fy+ | -63.45 | 22.77 | 59.14 |
| | | 30 | Mz+ | -46.44 | 16.54 | 69.60 |
| | | 30 | Nx- | -68.36 | 21.39 | 60.76 |
| | | 30 | Fy- | -46.00 | 14.59 | 67.50 |
| | | 30 | Mz- | -62.97 | 20.82 | 57.04 |
| 121 | 121 | 30 | Nx+ | -106.07 | 9.52 | 50.08 |
| | | 30 | Fy+ | -108.85 | 17.61 | 50.54 |
| | | 30 | Mz+ | -110.87 | 9.03 | 54.28 |
| | | 30 | Nx- | -116.25 | 6.80 | 44.26 |
| | | 30 | Fy- | -113.28 | -1.28 | 43.12 |
| | | 30 | Mz- | -110.85 | 7.69 | 39.17 |
| 122 | 122 | 30 | Nx+ | -105.07 | 3.61 | 46.60 |
| | | 30 | Fy+ | -107.85 | 9.14 | 43.43 |
| | | 30 | Mz+ | -110.93 | -0.82 | 51.60 |
| | | 30 | Nx- | -115.25 | -0.87 | 42.69 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Fy- | -112.28 | -6.39 | 45.18 |
| | | 30 | Mz- | -108.79 | 3.95 | 36.59 |
| 123 | 123 | 30 | Nx+ | -104.07 | -2.13 | 46.20 |
| | | 30 | Fy+ | -106.85 | 0.94 | 40.74 |
| | | 30 | Mz+ | -110.30 | -6.19 | 53.49 |
| | | 30 | Nx- | -114.25 | -8.27 | 45.13 |
| | | 30 | Fy- | -111.28 | -11.33 | 49.90 |
| | | 30 | Mz- | -107.39 | -3.78 | 36.52 |
| 124 | 124 | 30 | Nx+ | -103.07 | -7.66 | 48.80 |
| | | 30 | Fy+ | -105.85 | -6.95 | 42.37 |
| | | 30 | Mz+ | -111.80 | -14.80 | 59.69 |
| | | 30 | Nx- | -113.25 | -15.36 | 51.44 |
| | | 30 | Fy- | -110.28 | -16.06 | 57.21 |
| | | 30 | Mz- | -104.89 | -9.06 | 39.97 |
| 125 | 125 | 30 | Nx+ | -102.07 | -13.00 | 54.32 |
| | | 30 | Fy+ | -103.68 | -12.46 | 55.52 |
| | | 30 | Mz+ | -111.05 | -19.92 | 68.91 |
| | | 30 | Nx- | -112.25 | -22.18 | 61.45 |
| | | 30 | Fy- | -110.45 | -22.71 | 59.58 |
| | | 30 | Mz- | -103.78 | -16.40 | 46.76 |
| 126 | 126 | 30 | Nx+ | -101.07 | -18.16 | 62.64 |
| | | 30 | Fy+ | -102.68 | -17.62 | 63.55 |
| | | 30 | Mz+ | -109.72 | -24.44 | 80.76 |
| | | 30 | Nx- | -111.25 | -28.72 | 75.05 |
| | | 30 | Fy- | -109.45 | -29.25 | 73.44 |
| | | 30 | Mz- | -102.61 | -22.43 | 56.93 |
| 126 | 127 | 30 | Nx+ | -100.07 | -23.12 | 73.67 |
| | | 30 | Fy+ | -102.29 | -22.12 | 78.79 |
| | | 30 | Mz+ | -108.73 | -28.67 | 94.93 |
| | | 30 | Nx- | -110.25 | -34.96 | 92.03 |
| | | 30 | Fy- | -107.83 | -35.95 | 86.22 |
| | | 30 | Mz- | -101.59 | -29.41 | 70.76 |
| 600 | 600 | 30 | Nx+ | -251.78 | 0.27 | -0.14 |
| | | 30 | Fy+ | -259.26 | 5.57 | -8.52 |
| | | 30 | Mz+ | -259.27 | -5.54 | 8.58 |
| | | 30 | Nx- | -270.08 | -0.31 | 0.19 |
| | | 30 | Fy- | -259.22 | -5.57 | 8.52 |
| | | 30 | Mz- | -259.31 | 5.54 | -8.58 |
| 600 | 6 | 30 | Nx+ | -248.58 | 0.27 | -0.38 |
| | | 30 | Fy+ | -256.06 | 5.57 | -13.39 |
| | | 30 | Mz+ | -256.02 | -5.55 | 13.43 |
| | | 30 | Nx- | -266.89 | -0.31 | 0.46 |
| | | 30 | Fy- | -256.02 | -5.57 | 13.39 |
| | | 30 | Mz- | -256.06 | 5.55 | -13.43 |
| 601 | 601 | 30 | Nx+ | -252.34 | 0.27 | -0.01 |
| | | 30 | Fy+ | -259.82 | 5.57 | -6.02 |
| | | 30 | Mz+ | -260.81 | -5.17 | 6.10 |
| | | 30 | Nx- | -270.65 | -0.31 | 0.04 |
| | | 30 | Fy- | -259.78 | -5.57 | 6.02 |
| | | 30 | Mz- | -260.85 | 5.17 | -6.10 |
| 602 | 602 | 30 | Nx+ | -252.90 | 0.27 | 0.11 |
| | | 30 | Fy+ | -260.38 | 5.57 | -3.52 |
| | | 30 | Mz+ | -259.61 | -3.59 | 4.02 |
| | | 30 | Nx- | -271.21 | -0.31 | -0.10 |

MA_SER2.LST Sábado, 18 Mayo 2002 4:50am

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Fy- | -260.34 | -5.57 | 3.52 |
| | | 30 | Mz- | -259.65 | 3.59 | -4.01 |
| 603 | 603 | 30 | Nx+ | -253.46 | 0.27 | 0.23 |
| | | 30 | Fy+ | -260.94 | 5.57 | -1.01 |
| | | 30 | Mz+ | -260.17 | -3.53 | 2.41 |
| | | 30 | Nx- | -271.77 | -0.31 | -0.24 |
| | | 30 | Fy- | -260.90 | -5.57 | 1.01 |
| | | 30 | Mz- | -260.21 | 3.53 | -2.41 |
| 604 | 604 | 30 | Nx+ | -254.03 | 0.27 | 0.36 |
| | | 30 | Fy+ | -261.51 | 5.57 | 1.49 |
| | | 30 | Mz+ | -261.51 | 2.62 | 2.90 |
| | | 30 | Nx- | -272.33 | -0.31 | -0.38 |
| | | 30 | Fy- | -261.47 | -5.57 | -1.49 |
| | | 30 | Mz- | -261.47 | -2.62 | -2.90 |
| 605 | 605 | 30 | Nx+ | -254.53 | 0.27 | 0.47 |
| | | 30 | Fy+ | -262.01 | 5.57 | 3.72 |
| | | 30 | Mz+ | -262.01 | 3.38 | 3.96 |
| | | 30 | Nx- | -272.83 | -0.31 | -0.51 |
| | | 30 | Fy- | -261.97 | -5.57 | -3.72 |
| | | 30 | Mz- | -261.97 | -3.38 | -3.96 |
| 606 | 606 | 30 | Nx+ | -255.03 | 0.27 | 0.58 |
| | | 30 | Fy+ | -262.51 | 5.57 | 5.95 |
| | | 30 | Mz+ | -262.51 | 5.51 | 5.99 |
| | | 30 | Nx- | -273.33 | -0.31 | -0.64 |
| | | 30 | Fy- | -262.47 | -5.57 | -5.95 |
| | | 30 | Mz- | -262.47 | -5.51 | -5.99 |
| 607 | 607 | 30 | Nx+ | -255.71 | 0.27 | 0.73 |
| | | 30 | Fy+ | -263.19 | 5.57 | 9.01 |
| | | 30 | Mz+ | -263.19 | 5.51 | 9.01 |
| | | 30 | Nx- | -274.02 | -0.31 | -0.81 |
| | | 30 | Fy- | -263.15 | -5.57 | -9.01 |
| | | 30 | Mz- | -263.15 | -5.51 | -9.01 |
| 608 | 400 | 30 | Nx+ | -256.85 | 0.27 | 0.98 |
| | | 30 | Fy+ | -264.34 | 5.57 | 14.09 |
| | | 30 | Mz+ | -264.34 | 5.57 | 14.09 |
| | | 30 | Nx- | -275.16 | -0.31 | -1.10 |
| | | 30 | Fy- | -264.30 | -5.57 | -14.09 |
| | | 30 | Mz- | -264.30 | -5.57 | -14.09 |
| 221 | 221 | 30 | Nx+ | -99.31 | -25.82 | 80.95 |
| | | 30 | Fy+ | -101.53 | -24.37 | 85.71 |
| | | 30 | Mz+ | -107.95 | -31.19 | 103.83 |
| | | 30 | Nx- | -109.49 | -38.33 | 102.94 |
| | | 30 | Fy- | -107.07 | -39.76 | 97.50 |
| | | 30 | Mz- | -100.83 | -33.23 | 80.09 |
| 222 | 222 | 30 | Nx+ | -49.99 | 80.92 | 93.01 |
| | | 30 | Fy+ | -58.17 | 87.32 | 113.21 |
| | | 30 | Mz+ | -67.06 | 85.71 | 115.10 |
| | | 30 | Nx- | -68.23 | 85.07 | 110.92 |
| | | 30 | Fy- | -60.09 | 78.69 | 90.74 |
| | | 30 | Mz- | -51.16 | 80.31 | 88.90 |
| 223 | 223 | 30 | Nx+ | -50.18 | 71.07 | 63.31 |
| | | 30 | Fy+ | -58.43 | 77.12 | 81.41 |
| | | 30 | Mz+ | -68.61 | 74.91 | 83.96 |
| | | 30 | Nx- | -70.41 | 74.33 | 80.07 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Fy- | -62.19 | 68.30 | 61.99 |
| | | 30 | Mz- | -51.96 | 70.52 | 59.50 |
| 224 | 224 | 30 | Nx+ | -50.54 | 55.06 | 21.41 |
| | | 30 | Fy+ | -58.82 | 60.59 | 36.50 |
| | | 30 | Mz+ | -71.21 | 57.81 | 40.44 |
| | | 30 | Nx- | -74.01 | 56.92 | 37.29 |
| | | 30 | Fy- | -65.76 | 51.41 | 22.22 |
| | | 30 | Mz- | -53.31 | 54.20 | 18.29 |
| 320 | 320 | 30 | Nx+ | -107.01 | 15.23 | 63.88 |
| | | 30 | Fy+ | -109.79 | 25.81 | 74.28 |
| | | 30 | Mz+ | -112.21 | 25.25 | 75.35 |
| | | 30 | Nx- | -117.19 | 14.25 | 56.64 |
| | | 30 | Fy- | -114.22 | 3.68 | 45.54 |
| | | 30 | Mz- | -111.78 | 4.25 | 44.46 |
| 321 | 321 | 30 | Nx+ | -107.01 | 15.23 | 56.26 |
| | | 30 | Fy+ | -109.79 | 25.81 | 61.37 |
| | | 30 | Mz+ | -112.85 | 24.89 | 62.76 |
| | | 30 | Nx- | -117.19 | 14.25 | 49.52 |
| | | 30 | Fy- | -114.22 | 3.68 | 43.70 |
| | | 30 | Mz- | -111.15 | 4.62 | 42.30 |
| 322 | 322 | 30 | Nx+ | -106.54 | 12.36 | 52.82 |
| | | 30 | Fy+ | -109.32 | 21.67 | 55.45 |
| | | 30 | Mz+ | -112.38 | 20.75 | 57.06 |
| | | 30 | Nx- | -116.72 | 10.49 | 46.42 |
| | | 30 | Fy- | -113.75 | 1.18 | 43.10 |
| | | 30 | Mz- | -110.28 | 2.50 | 41.37 |
| 520 | 320 | 30 | Nx+ | -10.43 | 5.62 | 2.32 |
| | | 30 | Fy+ | -10.43 | 6.90 | 2.87 |
| | | 30 | Mz+ | -10.43 | 6.90 | 2.87 |
| | | 30 | Nx- | -17.15 | 4.78 | 1.93 |
| | | 30 | Fy- | -17.15 | 3.75 | 1.48 |
| | | 30 | Mz- | -17.15 | 3.75 | 1.48 |
| 521 | 521 | 30 | Nx+ | -10.43 | -0.61 | 0.02 |
| | | 30 | Fy+ | -10.43 | -0.03 | 0.09 |
| | | 30 | Mz+ | -10.43 | -0.03 | 0.09 |
| | | 30 | Nx- | -17.15 | -1.32 | -0.05 |
| | | 30 | Fy- | -17.15 | -1.79 | -0.10 |
| | | 30 | Mz- | -17.15 | -1.77 | -0.10 |
| 522 | 522 | 30 | Nx+ | -10.43 | -0.66 | 0.02 |
| | | 30 | Fy+ | -10.43 | -0.25 | 0.05 |
| | | 30 | Mz+ | -10.43 | -0.27 | 0.05 |
| | | 30 | Nx- | -17.15 | -1.20 | -0.03 |
| | | 30 | Fy- | -17.15 | -1.53 | -0.06 |
| | | 30 | Mz- | -17.15 | -1.52 | -0.06 |
| 523 | 523 | 30 | Nx+ | -10.43 | -0.73 | 0.01 |
| | | 30 | Fy+ | -10.43 | -0.47 | 0.02 |
| | | 30 | Mz+ | -15.65 | -0.51 | 0.02 |
| | | 30 | Nx- | -17.15 | -1.08 | -0.01 |
| | | 30 | Fy- | -17.15 | -1.28 | -0.02 |
| | | 30 | Mz- | -17.15 | -1.25 | -0.02 |
| 524 | 524 | 30 | Nx+ | -10.43 | -0.79 | 0.00 |
| | | 30 | Fy+ | -10.43 | -0.70 | 0.00 |
| | | 30 | Mz+ | -15.65 | -0.71 | 0.00 |
| | | 30 | Nx- | -17.15 | -0.95 | 0.00 |

MA_SER2.LST Sábado, 18 Mayo 2002 4:50am

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 30 | Fy- | -17.15 | -1.02 | 0.00 |
| | | 30 | Mz- | -17.15 | -0.98 | 0.00 |
| 524 | 525 | 30 | Nx+ | -10.43 | 0.85 | 0.00 |
| | | 30 | Fy+ | -10.43 | 0.94 | 0.00 |
| | | 30 | Mz+ | -17.15 | 0.84 | 0.00 |
| | | 30 | Nx- | -17.15 | 0.84 | 0.00 |
| | | 30 | Fy- | -17.15 | 0.77 | 0.00 |
| | | 30 | Mz- | -17.15 | 0.84 | 0.00 |
| 420 | 320 | 30 | Nx+ | -11.17 | 95.53 | 57.38 |
| | | 30 | Fy+ | -36.64 | 99.21 | 65.75 |
| | | 30 | Mz+ | -31.37 | 93.85 | 77.58 |
| | | 30 | Nx- | -45.91 | 92.11 | 67.00 |
| | | 30 | Fy- | -20.82 | 89.00 | 60.88 |
| | | 30 | Mz- | -25.72 | 93.77 | 46.77 |
| 421 | 421 | 30 | Nx+ | -11.17 | 60.06 | 21.37 |
| | | 30 | Fy+ | -29.87 | 64.35 | 39.78 |
| | | 30 | Mz+ | -31.68 | 62.95 | 42.23 |
| | | 30 | Nx- | -45.91 | 61.44 | 32.27 |
| | | 30 | Fy- | -28.66 | 54.12 | 17.64 |
| | | 30 | Mz- | -25.41 | 58.51 | 11.42 |
| 422 | 422 | 30 | Nx+ | -11.17 | 11.01 | -97.38 |
| | | 30 | Fy+ | -30.64 | 16.85 | -85.69 |
| | | 30 | Mz+ | -30.09 | 14.96 | -77.89 |
| | | 30 | Nx- | -45.91 | 11.38 | -89.84 |
| | | 30 | Fy- | -26.55 | 6.71 | -99.41 |
| | | 30 | Mz- | -25.43 | 11.28 | -107.11 |
| 423 | 423 | 30 | Nx+ | -11.17 | -33.89 | -123.57 |
| | | 30 | Fy+ | -29.98 | -22.76 | -111.98 |
| | | 30 | Mz+ | -28.90 | -27.81 | -108.74 |
| | | 30 | Nx- | -45.91 | -27.76 | -128.02 |
| | | 30 | Fy- | -25.58 | -36.59 | -129.36 |
| | | 30 | Mz- | -28.57 | -29.83 | -135.98 |
| 424 | 424 | 30 | Nx+ | -11.17 | -73.57 | -64.34 |
| | | 30 | Fy+ | -28.85 | -65.43 | -63.19 |
| | | 30 | Mz+ | -28.29 | -71.21 | -59.93 |
| | | 30 | Nx- | -45.91 | -73.54 | -79.74 |
| | | 30 | Fy- | -25.74 | -81.75 | -72.19 |
| | | 30 | Mz- | -28.79 | -75.90 | -84.18 |
| 425 | 425 | 30 | Nx+ | -21.07 | -108.82 | 94.89 |
| | | 30 | Fy+ | -37.66 | -102.38 | 89.74 |
| | | 30 | Mz+ | -36.48 | -114.92 | 107.20 |
| | | 30 | Nx- | -56.24 | -112.30 | 82.99 |
| | | 30 | Fy- | -37.28 | -121.56 | 98.42 |
| | | 30 | Mz- | -41.26 | -110.41 | 73.94 |
| 425 | 400 | 30 | Nx+ | -20.66 | -104.29 | 258.00 |
| | | 30 | Fy+ | -37.22 | -98.13 | 243.98 |
| | | 30 | Mz+ | -35.79 | -109.71 | 280.92 |
| | | 30 | Nx- | -55.90 | -108.50 | 251.48 |
| | | 30 | Fy- | -37.01 | -117.24 | 278.99 |
| | | 30 | Mz- | -39.55 | -103.84 | 236.84 |

DESPLAZAMIENTOS EN NUDOS SELECCIONADOS [m,rad]
Listado por Grupos

| Nudo | EC | ENV | ux | uy | Θz |
|---|---|---|---|---|---|
| 6 | 30 | ux+ | 0.001420 | -0.020058 | -0.000319 |
| | 30 | uy+ | 0.000620 | -0.019290 | -0.000065 |
| | 30 | Θz+ | -0.001216 | -0.020143 | 0.000319 |
| | 30 | ux- | -0.001281 | -0.020115 | 0.000319 |
| | 30 | uy- | 0.000080 | -0.021061 | 0.000002 |
| | 30 | Θz- | 0.001407 | -0.020132 | -0.000319 |
| 7 | 30 | ux+ | 0.001482 | -0.020922 | -0.000756 |
| | 30 | uy+ | -0.000490 | -0.019577 | -0.000355 |
| | 30 | Θz+ | -0.001267 | -0.020044 | -0.000129 |
| | 30 | ux- | -0.001322 | -0.020026 | -0.000141 |
| | 30 | uy- | 0.000533 | -0.021532 | -0.000509 |
| | 30 | Θz- | 0.001416 | -0.021009 | -0.000768 |
| 8 | 30 | ux+ | 0.001425 | -0.023794 | -0.001979 |
| | 30 | uy+ | -0.001243 | -0.021694 | -0.001550 |
| | 30 | Θz+ | -0.000848 | -0.022689 | -0.001485 |
| | 30 | ux- | -0.001365 | -0.021987 | -0.001565 |
| | 30 | uy- | 0.001303 | -0.024087 | -0.001994 |
| | 30 | Θz- | 0.001374 | -0.023749 | -0.002043 |
| 9 | 30 | ux+ | 0.001374 | -0.026526 | -0.001126 |
| | 30 | uy+ | -0.001295 | -0.023837 | -0.000838 |
| | 30 | Θz+ | -0.000303 | -0.025164 | -0.000704 |
| | 30 | ux- | -0.001403 | -0.024159 | -0.000853 |
| | 30 | uy- | 0.001266 | -0.026848 | -0.001141 |
| | 30 | Θz- | 0.000360 | -0.025997 | -0.001215 |
| 10 | 30 | ux+ | 0.001324 | -0.027183 | 0.000321 |
| | 30 | uy+ | -0.001402 | -0.024085 | 0.000547 |
| | 30 | Θz+ | -0.000945 | -0.025199 | 0.000686 |
| | 30 | ux- | -0.001443 | -0.024411 | 0.000561 |
| | 30 | uy- | 0.001264 | -0.027509 | 0.000338 |
| | 30 | Θz- | 0.001116 | -0.026747 | 0.000249 |
| 121 | 30 | ux+ | 0.001438 | -0.024080 | -0.001175 |
| | 30 | uy+ | 0.000705 | -0.020015 | -0.000425 |
| | 30 | Θz+ | 0.000700 | -0.020049 | -0.000421 |
| | 30 | ux- | 0.000700 | -0.020122 | -0.000423 |
| | 30 | uy- | 0.001433 | -0.024095 | -0.001171 |
| | 30 | Θz- | 0.001438 | -0.024080 | -0.001175 |
| 122 | 30 | ux+ | 0.001992 | -0.024112 | -0.000907 |
| | 30 | uy+ | 0.000865 | -0.020043 | -0.000180 |
| | 30 | Θz+ | 0.000859 | -0.020065 | -0.000177 |
| | 30 | ux- | 0.000859 | -0.020107 | -0.000180 |
| | 30 | uy- | 0.001986 | -0.024127 | -0.000904 |
| | 30 | Θz- | 0.001992 | -0.024112 | -0.000907 |
| 123 | 30 | ux+ | 0.002401 | -0.024140 | -0.000627 |
| | 30 | uy+ | 0.000903 | -0.020070 | 0.000035 |
| | 30 | Θz+ | 0.000895 | -0.020092 | 0.000037 |
| | 30 | ux- | 0.000895 | -0.020092 | 0.000037 |
| | 30 | uy- | 0.002393 | -0.024155 | -0.000625 |
| | 30 | Θz- | 0.002401 | -0.024140 | -0.000627 |
| 124 | 30 | ux+ | 0.002656 | -0.024169 | -0.000323 |
| | 30 | uy+ | 0.000826 | -0.020097 | 0.000250 |
| | 30 | Θz+ | 0.000817 | -0.020119 | 0.000252 |
| | 30 | ux- | 0.000817 | -0.020119 | 0.000252 |
| | 30 | uy- | 0.002647 | -0.024184 | -0.000321 |
| | 30 | Θz- | 0.002656 | -0.024169 | -0.000323 |
| 125 | 30 | ux+ | 0.002742 | -0.024196 | 0.000015 |
| | 30 | uy+ | 0.000631 | -0.020123 | 0.000490 |
| | 30 | Θz+ | 0.000810 | -0.020203 | 0.000529 |
| | 30 | ux- | 0.000620 | -0.020145 | 0.000493 |
| | 30 | uy- | 0.002731 | -0.024211 | 0.000018 |
| | 30 | Θz- | 0.002552 | -0.024138 | -0.000021 |
| 126 | 30 | ux+ | 0.002631 | -0.024218 | 0.000402 |
| | 30 | uy+ | 0.000297 | -0.020150 | 0.000773 |
| | 30 | Θz+ | 0.000607 | -0.020760 | 0.000858 |
| | 30 | ux- | 0.000283 | -0.020172 | 0.000779 |
| | 30 | uy- | 0.002617 | -0.024240 | 0.000408 |
| | 30 | Θz- | 0.002309 | -0.023642 | 0.000323 |
| 127 | 30 | ux+ | 0.002300 | -0.024244 | 0.000852 |
| | 30 | uy+ | -0.000204 | -0.020177 | 0.001118 |
| | 30 | Θz+ | 0.000124 | -0.021009 | 0.001252 |
| | 30 | ux- | -0.000220 | -0.020199 | 0.001125 |
| | 30 | uy- | 0.002284 | -0.024266 | 0.000859 |
| | 30 | Θz- | 0.001983 | -0.023542 | 0.000725 |
| 221 | 30 | ux+ | 0.002032 | -0.024255 | 0.000946 |
| | 30 | uy+ | -0.000548 | -0.020187 | 0.001196 |
| | 30 | Θz+ | -0.000264 | -0.021020 | 0.001340 |
| | 30 | ux- | -0.000568 | -0.020209 | 0.001204 |
| | 30 | uy- | 0.002012 | -0.024277 | 0.000954 |
| | 30 | Θz- | 0.001755 | -0.023552 | 0.000810 |
| 222 | 30 | ux+ | 0.001744 | -0.024261 | 0.000979 |
| | 30 | uy+ | -0.000909 | -0.020194 | 0.001223 |
| | 30 | Θz+ | -0.000667 | -0.021026 | 0.001371 |
| | 30 | ux- | -0.000931 | -0.020216 | 0.001232 |
| | 30 | uy- | 0.001722 | -0.024283 | 0.000988 |
| | 30 | Θz- | 0.001507 | -0.023559 | 0.000840 |
| 223 | 30 | ux+ | 0.001646 | -0.024642 | 0.001033 |
| | 30 | uy+ | -0.001033 | -0.020664 | 0.001268 |
| | 30 | Θz+ | -0.000807 | -0.021552 | 0.001419 |
| | 30 | ux- | -0.001055 | -0.020689 | 0.001277 |
| | 30 | uy- | 0.001624 | -0.024667 | 0.001042 |
| | 30 | Θz- | 0.001400 | -0.023792 | 0.000891 |
| 224 | 30 | ux+ | 0.001468 | -0.025329 | 0.001108 |
| | 30 | uy+ | -0.001250 | -0.021494 | 0.001330 |
| | 30 | Θz+ | -0.001053 | -0.022479 | 0.001482 |
| | 30 | ux- | -0.001274 | -0.021525 | 0.001339 |
| | 30 | uy- | 0.001444 | -0.025360 | 0.001117 |
| | 30 | Θz- | 0.001272 | -0.024472 | 0.000965 |
| 320 | 30 | ux+ | 0.000000 | -0.021616 | -0.001268 |
| | 30 | uy+ | 0.000000 | -0.019964 | -0.001028 |
| | 30 | Θz+ | 0.000000 | -0.020071 | -0.001017 |
| | 30 | ux- | 0.000000 | -0.021616 | -0.001268 |
| | 30 | uy- | 0.000000 | -0.024044 | -0.001704 |
| | 30 | Θz- | 0.000000 | -0.023937 | -0.001715 |
| 321 | 30 | ux+ | 0.000787 | -0.024054 | -0.001435 |
| | 30 | uy+ | 0.000427 | -0.019990 | -0.000695 |

| | | | | | |
|---|---|---|---|---|---|
| | 30 | θz+ | 0.000424 | -0.020097 | -0.000690 |
| | 30 | ux- | 0.000424 | -0.020097 | -0.000690 |
| | 30 | uy- | 0.000784 | -0.024069 | -0.001430 |
| | 30 | θz- | 0.000787 | -0.024054 | -0.001435 |
| 322 | 30 | ux+ | 0.001130 | -0.024067 | -0.001303 |
| | 30 | uy+ | 0.000585 | -0.020002 | -0.000553 |
| | 30 | θz+ | 0.000581 | -0.020109 | -0.000549 |
| | 30 | ux- | 0.000581 | -0.020109 | -0.000549 |
| | 30 | uy- | 0.001126 | -0.024082 | -0.001299 |
| | 30 | θz- | 0.001130 | -0.024067 | -0.001303 |
| 400 | 30 | ux+ | 0.000142 | -0.019410 | -0.000121 |
| | 30 | uy+ | 0.000120 | -0.018628 | -0.000026 |
| | 30 | θz+ | 0.000045 | -0.019752 | 0.000157 |
| | 30 | ux- | -0.000010 | -0.020204 | 0.000125 |
| | 30 | uy- | 0.000036 | -0.020370 | -0.000030 |
| | 30 | θz- | 0.000131 | -0.019749 | -0.000157 |
| 421 | 30 | ux+ | 0.000005 | -0.021366 | -0.001440 |
| | 30 | uy+ | 0.000003 | -0.019560 | -0.001117 |
| | 30 | θz+ | 0.000003 | -0.019671 | -0.001105 |
| | 30 | ux- | 0.000001 | -0.020854 | -0.001336 |
| | 30 | uy- | 0.000003 | -0.023390 | -0.001770 |
| | 30 | θz- | 0.000003 | -0.023279 | -0.001782 |
| 422 | 30 | ux+ | 0.000037 | -0.020157 | -0.001376 |
| | 30 | uy+ | 0.000013 | -0.017390 | -0.000982 |
| | 30 | θz+ | 0.000025 | -0.017631 | -0.000914 |
| | 30 | ux- | 0.000011 | -0.018598 | -0.001078 |
| | 30 | uy- | 0.000037 | -0.020219 | -0.001414 |
| | 30 | θz- | 0.000025 | -0.019978 | -0.001482 |
| 423 | 30 | ux+ | 0.000068 | -0.018231 | -0.000453 |
| | 30 | uy+ | 0.000024 | -0.016257 | -0.000163 |
| | 30 | θz+ | 0.000019 | -0.017205 | -0.000057 |
| | 30 | ux- | 0.000018 | -0.017506 | -0.000154 |
| | 30 | uy- | 0.000064 | -0.018391 | -0.000387 |
| | 30 | θz- | 0.000067 | -0.017986 | -0.000551 |
| 424 | 30 | ux+ | 0.000098 | -0.018189 | 0.000415 |
| | 30 | uy+ | 0.000031 | -0.016736 | 0.000564 |
| | 30 | θz+ | 0.000027 | -0.017751 | 0.000732 |
| | 30 | ux- | 0.000025 | -0.018242 | 0.000672 |
| | 30 | uy- | 0.000090 | -0.018572 | 0.000498 |
| | 30 | θz- | 0.000096 | -0.017882 | 0.000320 |
| 425 | 30 | ux+ | 0.000135 | -0.019317 | 0.000368 |
| | 30 | uy+ | 0.000089 | -0.018196 | 0.000479 |
| | 30 | θz+ | 0.000040 | -0.019248 | 0.000640 |
| | 30 | ux- | 0.000036 | -0.019917 | 0.000516 |
| | 30 | uy- | 0.000078 | -0.019976 | 0.000415 |
| | 30 | θz- | 0.000127 | -0.019184 | 0.000304 |
| 521 | 30 | ux+ | -0.000001 | -0.022179 | -0.001342 |
| | 30 | uy+ | -0.000002 | -0.020349 | -0.001026 |
| | 30 | θz+ | -0.000002 | -0.020452 | -0.001015 |
| | 30 | ux- | -0.000002 | -0.022090 | -0.001265 |
| | 30 | uy- | -0.000001 | -0.024681 | -0.001701 |
| | 30 | θz- | -0.000001 | -0.024578 | -0.001712 |
| 522 | 30 | ux+ | -0.000002 | -0.022153 | -0.001265 |
| | 30 | uy+ | -0.000002 | -0.020401 | -0.001026 |

MA_SER2.LST Sábado, 18 Mayo 2002 4:50am

| | | | | | |
|---|---|---|---|---|---|
| | 30 | θz+ | -0.000002 | -0.020503 | -0.001015 |
| | 30 | ux- | -0.000002 | -0.022153 | -0.001265 |
| | 30 | uy- | -0.000002 | -0.024766 | -0.001701 |
| | 30 | θz- | -0.000002 | -0.024664 | -0.001712 |
| 523 | 30 | ux+ | -0.000002 | -0.022308 | -0.001342 |
| | 30 | uy+ | -0.000003 | -0.020449 | -0.001026 |
| | 30 | θz+ | -0.000003 | -0.020550 | -0.001015 |
| | 30 | ux- | -0.000003 | -0.022212 | -0.001265 |
| | 30 | uy- | -0.000002 | -0.024848 | -0.001701 |
| | 30 | θz- | -0.000002 | -0.024747 | -0.001712 |
| 524 | 30 | ux+ | -0.000002 | -0.022378 | -0.001342 |
| | 30 | uy+ | -0.000003 | -0.020502 | -0.001026 |
| | 30 | θz+ | -0.000003 | -0.020603 | -0.001015 |
| | 30 | ux- | -0.000003 | -0.022278 | -0.001265 |
| | 30 | uy- | -0.000002 | -0.024935 | -0.001701 |
| | 30 | θz- | -0.000002 | -0.024834 | -0.001712 |
| 525 | 30 | ux+ | -0.000002 | -0.022447 | -0.001342 |
| | 30 | uy+ | -0.000003 | -0.020554 | -0.001026 |
| | 30 | θz+ | -0.000003 | -0.020655 | -0.001015 |
| | 30 | ux- | -0.000003 | -0.022343 | -0.001265 |
| | 30 | uy- | -0.000002 | -0.025021 | -0.001701 |
| | 30 | θz- | -0.000002 | -0.024920 | -0.001712 |
| 600 | 30 | ux+ | 0.001141 | -0.020019 | -0.000319 |
| | 30 | uy+ | 0.000563 | -0.019251 | -0.000066 |
| | 30 | θz+ | -0.000937 | -0.020104 | 0.000319 |
| | 30 | ux- | -0.001002 | -0.020076 | 0.000319 |
| | 30 | uy- | 0.000081 | -0.021022 | 0.000002 |
| | 30 | θz- | 0.001128 | -0.020093 | -0.000319 |
| 601 | 30 | ux+ | 0.001005 | -0.019934 | -0.000260 |
| | 30 | uy+ | 0.000519 | -0.019168 | -0.000124 |
| | 30 | θz+ | -0.000790 | -0.020019 | 0.000332 |
| | 30 | ux- | -0.000867 | -0.020129 | 0.000250 |
| | 30 | uy- | 0.000082 | -0.020936 | 0.000003 |
| | 30 | θz- | 0.000980 | -0.020008 | -0.000332 |
| 602 | 30 | ux+ | 0.000885 | -0.019848 | -0.000289 |
| | 30 | uy+ | 0.000454 | -0.019085 | -0.000161 |
| | 30 | θz+ | -0.000631 | -0.019960 | 0.000329 |
| | 30 | ux- | -0.000749 | -0.019904 | 0.000289 |
| | 30 | uy- | 0.000082 | -0.020848 | 0.000003 |
| | 30 | θz- | 0.000818 | -0.019949 | -0.000329 |
| 603 | 30 | ux+ | 0.000749 | -0.019763 | -0.000317 |
| | 30 | uy+ | 0.000378 | -0.019003 | -0.000176 |
| | 30 | θz+ | -0.000533 | -0.020077 | 0.000317 |
| | 30 | ux- | -0.000612 | -0.019818 | 0.000317 |
| | 30 | uy- | 0.000084 | -0.020762 | 0.000000 |
| | 30 | θz- | 0.000717 | -0.020066 | -0.000317 |
| 604 | 30 | ux+ | 0.000603 | -0.019676 | -0.000318 |
| | 30 | uy+ | 0.000299 | -0.018920 | -0.000171 |
| | 30 | θz+ | -0.000411 | -0.019720 | 0.000318 |
| | 30 | ux- | -0.000466 | -0.019731 | 0.000318 |
| | 30 | uy- | 0.000082 | -0.020671 | -0.000005 |
| | 30 | θz- | 0.000600 | -0.019708 | -0.000318 |
| 605 | 30 | ux+ | 0.000482 | -0.019601 | -0.000292 |
| | 30 | uy+ | 0.000235 | -0.018846 | -0.000148 |

| | | | | | |
|---|---|---|---|---|---|
| | 30 | θz+ | -0.000291 | -0.019613 | 0.000292 |
| | 30 | ux- | -0.000345 | -0.019866 | 0.000234 |
| | 30 | uy- | 0.000081 | -0.020597 | -0.000010 |
| | 30 | θz- | 0.000482 | -0.019601 | -0.000292 |
| 606 | 30 | ux+ | 0.000379 | -0.019742 | -0.000211 |
| | 30 | uy+ | 0.000183 | -0.018772 | -0.000108 |
| | 30 | θz+ | -0.000184 | -0.019536 | 0.000242 |
| | 30 | ux- | -0.000255 | -0.019923 | 0.000206 |
| | 30 | uy- | 0.000074 | -0.020516 | -0.000018 |
| | 30 | θz- | 0.000374 | -0.019524 | -0.000242 |
| 607 | 30 | ux+ | 0.000276 | -0.019640 | -0.000159 |
| | 30 | uy+ | 0.000144 | -0.018671 | -0.000027 |
| | 30 | θz+ | -0.000100 | -0.019732 | 0.000159 |
| | 30 | ux- | -0.000153 | -0.019888 | 0.000156 |
| | 30 | uy- | 0.000061 | -0.020412 | -0.000030 |
| | 30 | θz- | 0.000275 | -0.019721 | -0.000159 |

REACCIONES EN NUDOS SELECCIONADOS [m,tm]
Listado por Grupos

| Nudo | EC | ENV | Fx | Fy | Mz |
|---|---|---|---|---|---|
| 320 | 30 | Fx+ | 11.03 | 11.98 | 0.00 |
| | 30 | Fy+ | -11.03 | 13.53 | 0.00 |
| | 30 | Mz+ | 0.00 | 12.17 | 0.00 |
| | 30 | Fx- | -11.03 | 12.33 | 0.00 |
| | 30 | Fy- | 11.03 | 11.23 | 0.00 |
| | 30 | Mz- | 0.00 | 12.17 | 0.00 |
| 400 | 30 | Fx+ | 0.00 | 45.52 | 0.00 |
| | 30 | Fy+ | 0.00 | 46.44 | 0.00 |
| | 30 | Mz+ | 0.00 | 45.52 | 0.00 |
| | 30 | Fx- | 0.00 | 45.52 | 0.00 |
| | 30 | Fy- | 0.00 | 42.47 | 0.00 |
| | 30 | Mz- | 0.00 | 45.52 | 0.00 |
| 421 | 30 | Fx+ | 0.00 | 36.07 | 0.00 |
| | 30 | Fy+ | 0.00 | 39.94 | 0.00 |
| | 30 | Mz+ | 0.00 | 36.07 | 0.00 |
| | 30 | Fx- | 0.00 | 36.07 | 0.00 |
| | 30 | Fy- | 0.00 | 33.41 | 0.00 |
| | 30 | Mz- | 0.00 | 36.07 | 0.00 |
| 422 | 30 | Fx+ | 0.00 | 53.14 | 0.00 |
| | 30 | Fy+ | 0.00 | 57.68 | 0.00 |
| | 30 | Mz+ | 0.00 | 53.14 | 0.00 |
| | 30 | Fx- | 0.00 | 53.14 | 0.00 |
| | 30 | Fy- | 0.00 | 49.62 | 0.00 |
| | 30 | Mz- | 0.00 | 53.14 | 0.00 |
| 423 | 30 | Fx+ | 0.00 | 49.43 | 0.00 |
| | 30 | Fy+ | 0.00 | 52.46 | 0.00 |
| | 30 | Mz+ | 0.00 | 49.43 | 0.00 |
| | 30 | Fx- | 0.00 | 49.43 | 0.00 |
| | 30 | Fy- | 0.00 | 46.38 | 0.00 |
| | 30 | Mz- | 0.00 | 49.43 | 0.00 |

MA_SER2.LST Sábado, 18 Mayo 2002 4:50am

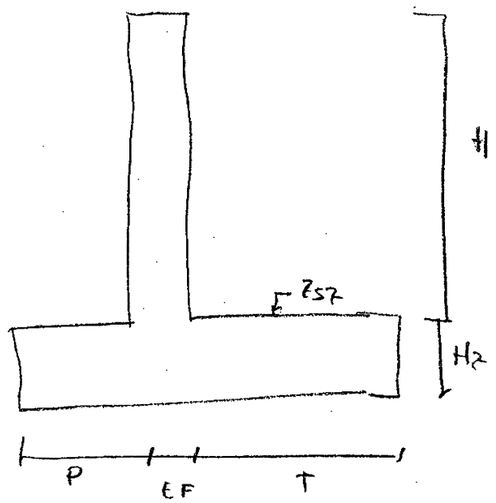
| | | | | | |
|---|---|---|---|---|---|
| 424 | 30 | Fx+ | 0.00 | 50.69 | 0.00 |
| | 30 | Fy+ | 0.00 | 52.99 | 0.00 |
| | 30 | Mz+ | 0.00 | 50.69 | 0.00 |
| | 30 | Fx- | 0.00 | 50.69 | 0.00 |
| | 30 | Fy- | 0.00 | 47.74 | 0.00 |
| | 30 | Mz- | 0.00 | 50.69 | 0.00 |
| 425 | 30 | Fx+ | 0.00 | 49.81 | 0.00 |
| | 30 | Fy+ | 0.00 | 51.27 | 0.00 |
| | 30 | Mz+ | 0.00 | 49.81 | 0.00 |
| | 30 | Fx- | 0.00 | 49.81 | 0.00 |
| | 30 | Fy- | 0.00 | 46.70 | 0.00 |
| | 30 | Mz- | 0.00 | 49.81 | 0.00 |
| 521 | 30 | Fx+ | 0.00 | 7.04 | 0.00 |
| | 30 | Fy+ | 0.00 | 7.87 | 0.00 |
| | 30 | Mz+ | 0.00 | 7.04 | 0.00 |
| | 30 | Fx- | 0.00 | 7.04 | 0.00 |
| | 30 | Fy- | 0.00 | 6.49 | 0.00 |
| | 30 | Mz- | 0.00 | 7.04 | 0.00 |
| 522 | 30 | Fx+ | 0.00 | 1.66 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.86 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.66 | 0.00 |
| | 30 | Fx- | 0.00 | 1.66 | 0.00 |
| | 30 | Fy- | 0.00 | 1.53 | 0.00 |
| | 30 | Mz- | 0.00 | 1.66 | 0.00 |
| 523 | 30 | Fx+ | 0.00 | 1.67 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.86 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.67 | 0.00 |
| | 30 | Fx- | 0.00 | 1.67 | 0.00 |
| | 30 | Fy- | 0.00 | 1.53 | 0.00 |
| | 30 | Mz- | 0.00 | 1.67 | 0.00 |
| 524 | 30 | Fx+ | 0.00 | 1.67 | 0.00 |
| | 30 | Fy+ | 0.00 | 1.87 | 0.00 |
| | 30 | Mz+ | 0.00 | 1.67 | 0.00 |
| | 30 | Fx- | 0.00 | 1.67 | 0.00 |
| | 30 | Fy- | 0.00 | 1.54 | 0.00 |
| | 30 | Mz- | 0.00 | 1.67 | 0.00 |
| 525 | 30 | Fx+ | 0.00 | 0.84 | 0.00 |
| | 30 | Fy+ | 0.00 | 0.94 | 0.00 |
| | 30 | Mz+ | 0.00 | 0.84 | 0.00 |
| | 30 | Fx- | 0.00 | 0.84 | 0.00 |
| | 30 | Fy- | 0.00 | 0.77 | 0.00 |
| | 30 | Mz- | 0.00 | 0.84 | 0.00 |

### 9.4. EMBOCADURAS

Tras el encaje geométrico previo se obtiene las siguientes dimensiones básicas:

| Elemento | H (m) | Hz (m) | Zsz | T (m) | Ef (m) | P (m) |
|---|---|---|---|---|---|---|
| E-1 | 6.20-3.50 | 1.00 | 59.484 | 5.40 | 0.80 | 1.60 |
| E-2 | 6.20-3.216 | 1.00 | 59.484 | 5.40 | 0.80 | 1.60 |
| S-1 | 6.20-2.516 | 1.00 | 59.484 | 5.40 | 0.80 | 1.60 |
| S-2 | 6.20-2.766 | 1.00 | 59.484 | 5.40 | 0.80 | 1.60 |

Se ha considerado como Tensión admisible del terreno 2.0 Kp/cm². Y su ángulo de rozamiento es de 30°






ACCIONES:

- Terreno: $\gamma$=2.00 T/m²; $\phi$= 30°; Sobre carga terraplen= 3.0 T/m²

CONTROL DE ESTABILIDAD Y ESFUERZOS DE ARMADO

Según la combinación de aciones que se muestra en las hojas siguientes se obtienen los resultados pésimos siguientes:

**Control de Estabilidad**

| $\gamma$ deslizamiento | $\gamma$ vuelco | $\sigma$ máxima (T/m²) | $\sigma$ media (T/m²) |
|---|---|---|---|
| 1.51 | 4.32 | 20.52 | 15.26 |

**Esfuerzos de Armado**

| Arranque Fuste | | | Talón | | Puntera |
|---|---|---|---|---|---|
| Vd(T) | Nd(T) | Md(mT) | Vd(T) | Md(mT) | $\sigma$(T/m²) |
| 52.35 | 23.18 | 123.99 | 34.54 | 119.81 | 25.87 |

## Calculo de Esfuerzos en Muros:

Proyecto: **LAV. MARTORELL.**
Elemento: **ODT300.9. Aletas**

### Geometría

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | 6.20 | 0.80 | Zapata | 5.40 | 1.60 | 1.00 |
| eso especif. | 2.50 | | | 2.50 | | |

### Terreno

| | Densidad [tm/m³] | ϕ [º] | δ [º] | β [º] | α [º] |
|---|---|---|---|---|---|
| Relleno | 2.00 | 30.00 | 5.00 | 29.00 | 0.00 |

| | σ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | 2.00 | 1.30 | 0.57 |

### Hipótesis de cálculo

| | | | Cargas Tablero | | | | Sismo | |
|---|---|---|---|---|---|---|---|---|
| Hip | γf | SC terraplén [tm/m²] | Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | ac horiz. [1/g] | ac vert. [1/g] |
| 1 | 1.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 1.50 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

### Control Estabilidad

| Hip | γdes | γvuelco | σmin | σmax | σmed | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 1.83 | 5.90 | 10.71 | 15.35 | 13.03 | 7.80 |
| 2 | 1.51 | 4.32 | 9.99 | 20.52 | 15.26 | 7.80 |

### Esfuerzos de Armado

| | Arranque Fuste | | | Talón | | Puntera | | |
|---|---|---|---|---|---|---|---|---|
| Hip | Vd | Nd | Md | Vd | Md | Vd | Md | |
| 1 | 35.28 | 21.69 | 71.67 | -20.92 | -68.17 | 21.34 | 27.75 | Tipo I |
| 2 | 52.35 | 23.18 | 123.99 | -34.54 | -119.81 | 29.22 | 38.26 | Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.9. Aletas: FUSTE**

### MATERIALES

| | fk | gamma | fd | |
|---|---|---|---|---|
| Hormigón | 250 | 1.500 | 166.67 | kp/cm2 |
| Acero | 5100 | 1.150 | 4434.78 | kp/cm2 |

### SECCION

| | | |
|---|---|---|
| Título | | |
| Ancho | 1.000 | m |
| Canto | 0.800 | m |
| C, util | 0.725 | m |

### ESFUERZOS

| | | |
|---|---|---|
| Título | | |
| Mserv | 82.66 | mtm |
| Md | 123.99 | mtm |
| Vd | 52.35 | tm |
| min geo | 0.90 | /mil |

### ARMADO

| | | |
|---|---|---|
| diam | 25.00 | mm |
| sep | 10.00 | cm |
| recub, c | 3.00 | cm |
| wk | 0.29 | mm |

### CONTROL FLEXION

| | Cálculo | | Dispuesto | |
|---|---|---|---|---|
| min geom | 7.2 | | | |
| As, calc | 42.45 | cm2 | 49.09 | cm2 |
| num. | 8.65 | | | |
| sep. | 11.56 | cm | | |

### CONTROL CORTANTE

| | | |
|---|---|---|
| Vcu | 46.80 | tm |
| Vu2a | 31.32 | tm |
| coef. | 0.60 | |

Cuantía de cercos necesaria 9.81 cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | | |
|---|---|---|
| Uc | 1027.08 | tm |
| 0.35*Uc*d | 260.62 | mtm |
| Us | 188.28 | tm |
| Usmin,0 | 53.33 | tm |
| alpha | -0.27 | |
| Us | 188.28 | tm |
| As | 42.45 | cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | | |
|---|---|---|
| bef | 10.00 | cm |
| hef,0 | 23.00 | cm |
| hef | 20.00 | cm |
| sm | 130.93 | mm |
| fctm | 26.15 | kp/cm2 |
| sig, sr | 979.59 | kp/cm2 |
| sig, s | 2903.34 | kp/cm2 |
| k red | 0.94 | |
| eps sm | 1303.85 | *10^6 |
| wk | 0.29 | mm |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.9. Aletas: TALON**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

### SECCION

| | |
|---|---|
| Título | |
| Ancho | **1.000** m |
| Canto | **1.000** m |
| C, util | **0.900** m |

### ESFUERZOS

| | |
|---|---|
| Título | |
| Mserv | **79.87** mtm |
| Md | **119.81** mtm |
| Vd | **34.54** tm |
| min geo | **0.90** /mil |

### ARMADO

| | |
|---|---|
| diam | **25.00** mm |
| sep | **10.00** cm |
| recub, c | **3.50** cm |
| wk | 0.23 mm |

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 9 | |
| As, calc | 31.77 cm2 | **49.09** cm2 |
| num. | 6.47 | |
| sep. | 15.45 cm | |

### CONTROL CORTANTE

| | |
|---|---|
| Vcu | 58.09 tm |
| Vu2a | 36.97 tm |
| coef. | **1.07** |

Cuantía de cercos necesaria cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1275.00 tm |
| 0.35*Uc*d | 401.63 mtm |
| Us | 140.91 tm |
| Usmin,0 | 66.67 tm |
| alpha | 0.44 |
| Us | 140.91 tm |
| As | 31.77 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 10.00 cm |
| hef,0 | 23.50 cm |
| hef | 23.50 cm |
| sm | 149.84 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 1232.99 kp/cm2 |
| sig, s | 2259.93 kp/cm2 |
| k red | 0.85 |
| eps sm | 915.99 *10^6 |
| wk | 0.23 mm |

PROYECTO **LAV. MARTORELL.**
ZAPATA **ODT300.9. Aletas: PUNTERA**

### CALCULO DE ZAPATAS RIGIDAS SEGÚN EHE-98

**DIMENSIONES**

| | LONG | TRANS | CANTO | UTIL | |
|---|---|---|---|---|---|
| Pilar | **0.80** | **1.00** | | | [m] |
| Zapata | **4.00** | **1.00** | **1.00** | **0.90** | [m] |

**HORMIGON**

| | | |
|---|---|---|
| fkc | **250** | [kp/cm2] |
| gamma,c | **1.5** | |

**ACERO**

| | | |
|---|---|---|
| fyk | **4080** | [kp/cm2] |
| gamma,s | **1** | |

**TENSIONES TERRENO**

(Descontado el peso de la Zapata)

| | LONG | TRANS | |
|---|---|---|---|
| Tensión | **25.87** | **25.87** | [tm/m2] |
| gamma,f | **1.00** | | |

**COMPROBACION A FLEXION**

| | LONG | TRANS | |
|---|---|---|---|
| vd | 1.80 | 0.25 | [m] |
| z max | 0.88 | 0.90 | [m] |
| z | **0.77** | **0.77** | [m] |
| Armadura | 13.26 | 0.00 | [cm2] |
| | 13.43 | 1.04 | |

| ontrol zapata alargada | LONG Zona Pilar | LONG Resto | TRANS Zona Pilar | TRANS Resto | |
|---|---|---|---|---|---|
| dimensión | 1.00 | 0.00 | 2.80 | 1.20 | [m] |
| Armadura | 13.26 | 0.00 | 0.00 | 0.00 | [cm2] |
| Mínima mecánica | 14.51 | 0.00 | 0.00 | 0.00 | [cm2] |
| Mínima geométrica | 18.00 | 0.00 | 50.40 | 21.60 | [cm2] |
| Armadura inferior | **14.51** | **0.00** | **9.00** | **9.00** | [cm2/m] |
| Armadura superior | **6.00** | **0.00** | **9.00** | **9.00** | [cm2/m] |

**COMPROBACION A CORTANTE**

| | LONG | | | TRANS | | | |
|---|---|---|---|---|---|---|---|
| Zona comprimida | | 0.27 | | | 0.27 | | [m] |
| Reacción total | 41.385898 | 41.385898 | | 0.00 | 0.00 | | [tm] |
| | α | β | θ | α | β | θ | |
| Ángulos | 34.02 | 18.56 | 37.42 | 28.37 | -10.27 | 71.90 | [°] |
| | Ancho | Canto | | Ancho | Canto | | |
| Biela, horizontal | 1.00 | 0.27 | | 1.07 | 0.27 | | [m] |
| Biela, superior | 1.00 | 0.46 | | 1.07 | 0.56 | | [m] |
| Bilea, Inferior | 1.00 | 0.97 | | 2.80 | 0.00 | | [m] |

| Control validez | Tensión | Admisible | | Tensión | Admisible | |
|---|---|---|---|---|---|---|
| Horizontal | 200.37 | 1666.67 | **CUMPLE** | 0.00 | 1666.67 | **CUMPLE** |
| Superior | 148.89 | 1666.67 | **CUMPLE** | 0.00 | 1666.67 | **CUMPLE** |
| Inferior | 70.06 | 1166.67 | **CUMPLE** | 0.00 | 1166.67 | **CUMPLE** |

## Calculo de Esfuerzos en Muros:

Proyecto: **LAV. MARTORELL.**
Elemento: **ODT300.9. Aletas**
Corte de armado

### Geometría

| | Altura [m] | Espesor medio [m] | | Talón [m] | Puntera [m] | Canto [m] |
|---|---|---|---|---|---|---|
| Fuste | **4.50** | **0.80** | Zapata | **5.40** | **1.60** | **1.00** |
| eso especif. | **2.50** | | | **2.50** | | |

### Terreno

| | Densidad [tm/m³] | ϕ [º] | δ [º] | β [º] | α [º] |
|---|---|---|---|---|---|
| Relleno | **2.00** | **30.00** | **5.00** | **29.00** | **0.00** |

| | σ adm [kp/cm²] | Punta | Rozamiento |
|---|---|---|---|
| Cimentacion | **2.00** | **1.30** | **0.57** |

### Hipótesis de cálculo

| | | | Cargas Tablero | | | | Sismo | |
|---|---|---|---|---|---|---|---|---|
| Hip | γf | SC terraplén [tm/m²] | Vertical [tm] | Dist borde [m] | Horizontal [tm] | Profundidad [m] | ac horiz. [1/g] | ac vert. [1/g] |
| 1 | **1.50** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |
| 2 | **1.50** | **3.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

### Control Estabilidad

| Hip | γdes | γvuelco | σmin | σmax | σmed | ona reacción |
|---|---|---|---|---|---|---|
| 1 | 2.42 | 10.19 | 10.57 | 9.61 | 10.09 | 7.80 |
| 2 | 1.91 | 6.98 | 11.81 | 12.75 | 12.28 | 7.80 |

### Esfuerzos de Armado

| | Arranque Fuste | | | Talón | | Puntera | | |
|---|---|---|---|---|---|---|---|---|
| Hip | Vd | Nd | Md | Vd | Md | Vd | Md | |
| 1 | 18.58 | 15.13 | 27.23 | -10.21 | -25.14 | 12.44 | 15.94 | Tipo I |
| 2 | 30.97 | 16.21 | 54.67 | -19.14 | -54.06 | 17.52 | 22.60 | Tipo I |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.9. Aletas: FUSTE**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

### SECCION

Título
Ancho **1.000** m
Canto **0.800** m
C, util **0.725** m

### ESFUERZOS

Título
Mserv **36.45** mtm
Md **54.67** mtm
Vd **30.97** tm
min geo **0.90** /mil

### ARMADO

diam **25.00** mm
sep **20.00** cm
recub, c **3.00** cm
wk 0.30 mm

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 7.2 | |
| As, calc | 17.68 cm2 | **24.54** cm2 |
| num. | 3.60 | |
| sep. | 27.77 cm | |

### CONTROL CORTANTE

| | |
|---|---|
| Vcu | 46.80 tm |
| Vu2a | 27.36 tm |
| coef. | **0.88** |

Cuantía de cercos necesaria 8.13 cm2/m

### CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1027.08 tm |
| 0.35*Uc*d | 260.62 mtm |
| Us | 78.40 tm |
| Usmin,0 | 53.33 tm |
| alpha | 0.77 |
| Us | 78.40 tm |
| As | 17.68 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 20.00 cm |
| hef,0 | 23.00 cm |
| hef | 20.00 cm |
| sm | 201.86 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 1959.17 kp/cm2 |
| sig, s | 2560.18 kp/cm2 |
| k red | 0.71 |
| eps sm | 862.17 *10^6 |
| wk | 0.30 mm |

## CALCULO FISURACION LOSAS

Ver 2.0 Junio 1999 (EHE-98)

Proyecto **LAV. MARTORELL.**
Elemento **ODT300.9. Aletas: FUSTE**

### MATERIALES

| | fk | gamma | fd |
|---|---|---|---|
| Hormigón | **250** | **1.500** | 166.67 kp/cm2 |
| Acero | **5100** | **1.150** | 4434.78 kp/cm2 |

### SECCION

| | |
|---|---|
| Título | |
| Ancho | **1.000** m |
| Canto | **0.800** m |
| C, util | **0.725** m |

### ESFUERZOS

| | |
|---|---|
| Título | |
| Mserv | **36.45** mtm |
| Md | **54.67** mtm |
| Vd | **30.97** tm |
| min geo | **0.90** /mil |

### ARMADO

| | |
|---|---|
| diam | **25.00** mm |
| sep | **10.00** cm |
| recub, c | **3.00** cm |
| wk | 0.10 mm |

### CONTROL FLEXION

| | Cálculo | Dispuesto |
|---|---|---|
| min geom | 7.2 | |
| As, calc | 17.68 cm2 | **49.09** cm2 |
| num. | 3.60 | |
| sep. | 27.77 cm | |

### CONTROL CORTANTE

| | |
|---|---|
| Vcu | 46.80 tm |
| Vu2a | 31.32 tm |
| coef. | **1.01** |

Cuantía de cercos necesaria cm2/m

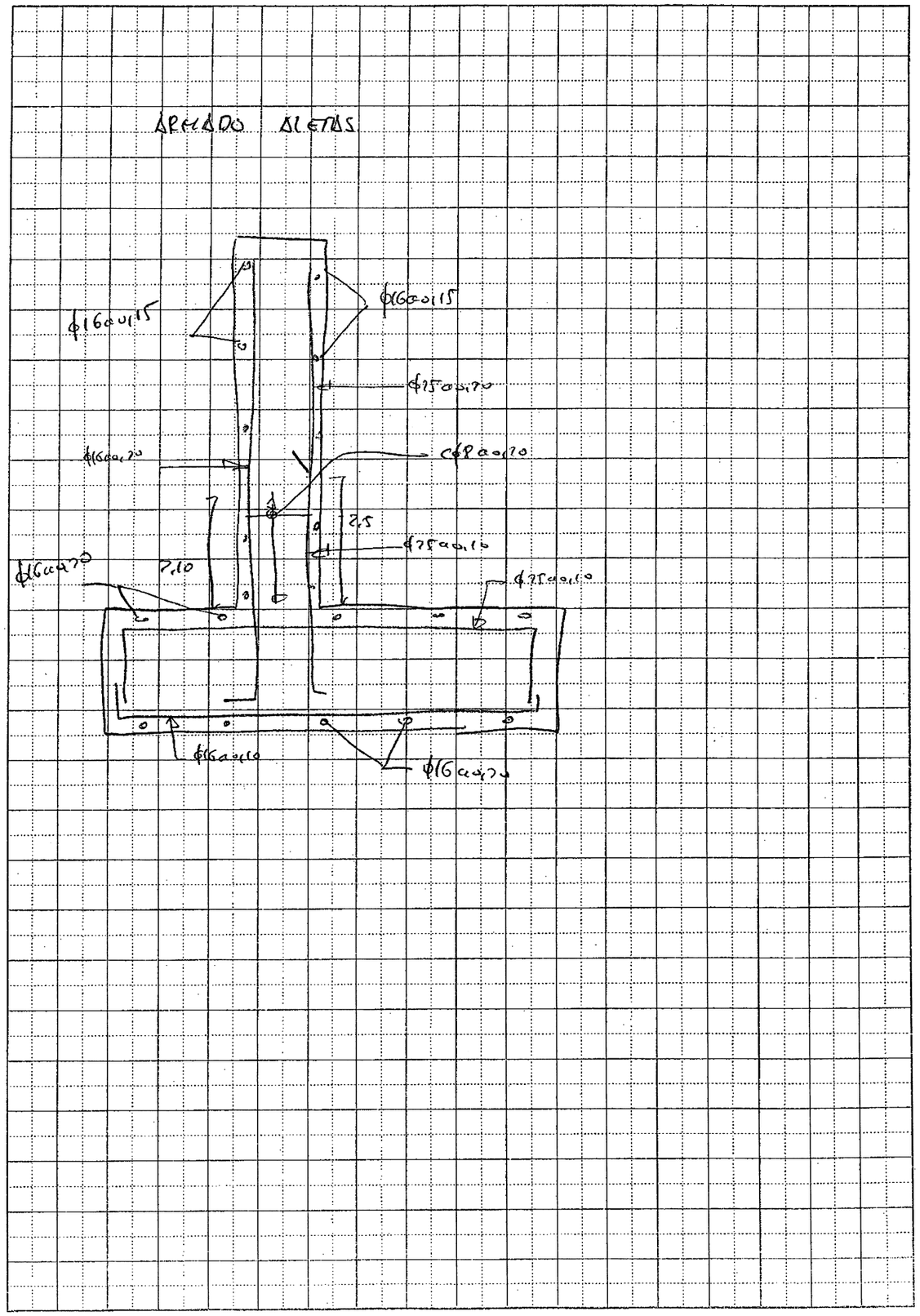
### CALCULO ARMARURA AGOTAMIENTO

| | |
|---|---|
| Uc | 1027.08 tm |
| 0.35*Uc*d | 260.62 mtm |
| Us | 78.40 tm |
| Usmin,0 | 53.33 tm |
| alpha | 0.77 |
| Us | 78.40 tm |
| As | 17.68 cm2 |

### CONTROL FISURACIÓN

(1 capa armadura)

| | |
|---|---|
| bef | 10.00 cm |
| hef,0 | 23.00 cm |
| hef | 20.00 cm |
| sm | 130.93 mm |
| fctm | 26.15 kp/cm2 |
| sig, sr | 979.59 kp/cm2 |
| sig, s | 1280.09 kp/cm2 |
| k red | 0.71 |
| eps sm | 431.08 *10^6 |
| wk | 0.10 mm |



# Listado de Datos de la Obra

Proyecto: ODT 300.90
CONSTRUCTORA HISPANICA

Fecha:03/09/03

## 1.DATOS GENERALES DE LA ESTRUCTURA

Proyecto: ODT 300.90
CONSTRUCTORA HISPANICA

Clave: JC968_C

## 2.DATOS GEOMÉTRICOS DE GRUPOS Y PLANTAS

| Grupo | NOMBRE DEL GRUPO | Planta | NOMBRE PLANTA | Altura | Cota |
|---|---|---|---|---|---|
| 1 | VIAL | 1 | VIAL | 5.00 | 5.00 |
| 0 | Cimentación | | | | 0.00 |

## 3.LOSAS Y ELEMENTOS DE CIMENTACIÓN

| Losas Cimentación | Canto (cm) | Módulo Balasto (Tn/m3) | Tensión Admisible (Tn/m2) |
|---|---|---|---|
| Todas | 100 | 1500.00 | 29.00 |

## 4.ACCIONES CONSIDERADAS

### 4.1 GRAVITATORIAS

| NOMBRE DEL GRUPO | S.C.U | CARGAS MUERTAS |
|---|---|---|
| VIAL | 0.00 | 0.00 |

### 4.2 VIENTO

Sin acción de viento

### 4.3 SISMO

Sin acción de sismo

### 4.4 CJTO.CARGAS ESPECIALES

| NºCCE | HIPOTESIS |
|---|---|
| 1 | Peso propio |
| 2 | Sobrecarga |
| 3 | Sobrecarga separada |
| 4 | Sobrecarga separada |
| 5 | Sobrecarga separada |

### 4.5 CARGAS HORIZONTALES Y EN CABEZA DE PILARES

#### 4.5.1 CARGAS HORIZONTALES EN PILARES

| Referencia Pilar | Dirección de la Carga | Tipo de Carga | CCE | VALOR | COTA (m) |
|---|---|---|---|---|---|
| P1 | X Local | Carga Uniforme | Peso propio | 0.85 Tn/m | Desde: 3.30 Hasta: 5.00 |
| | X Local | Carga Uniforme | Peso propio | 2.50 Tn/m | Desde: 1.70 Hasta: 3.30 |
| | X Local | Carga Uniforme | Peso propio | 4.15 Tn/m | Desde: 0.00 Hasta: 1.70 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 5.00 |
| P4 | X Local | Carga Uniforme | Peso propio | 0.85 Tn/m | Desde: 3.30 Hasta: 5.00 |
| | X Local | Carga Uniforme | Peso propio | 2.50 Tn/m | Desde: 1.70 Hasta: 3.30 |
| | X Local | Carga Uniforme | Peso propio | 4.15 Tn/m | Desde: 0.00 Hasta: 1.70 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 5.00 |
| P7 | X Local | Carga Uniforme | Peso propio | -0.85 Tn/m | Desde: 3.30 Hasta: 5.00 |
| | X Local | Carga Uniforme | Peso propio | 2.50 Tn/m | Desde: 1.70 Hasta: 3.30 |
| | X Local | Carga Uniforme | Peso propio | 4.15 Tn/m | Desde: 0.00 Hasta: 1.70 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 5.00 |
| P10 | X Local | Carga Uniforme | Peso propio | 0.85 Tn/m | Desde: 3.30 Hasta: 5.00 |
| | X Local | Carga Uniforme | Peso propio | 2.50 Tn/m | Desde: 1.70 Hasta: 3.30 |
| | X Local | Carga Uniforme | Peso propio | 4.15 Tn/m | Desde: 0.00 Hasta: 1.70 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 5.00 |
| P13 | X Local | Carga Uniforme | Peso propio | 0.85 Tn/m | Desde: 3.30 Hasta: 5.00 |
| | X Local | Carga Uniforme | Peso propio | 2.50 Tn/m | Desde: 1.70 Hasta: 3.30 |
| | X Local | Carga Uniforme | Peso propio | 4.15 Tn/m | Desde: 0.00 Hasta: 1.70 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 5.00 |
| P16 | X Local | Carga Uniforme | Peso propio | 0.85 Tn/m | Desde: 3.30 Hasta: 5.00 |
| | X Local | Carga Uniforme | Peso propio | 2.50 Tn/m | Desde: 1.70 Hasta: 3.30 |
| | X Local | Carga Uniforme | Peso propio | 4.15 Tn/m | Desde: 0.00 Hasta: 1.70 |
| | X Local | Carga Uniforme | Sobrecarga | 1.50 Tn/m | Desde: 0.00 Hasta: 5.00 |
| P19 | X Local | Carga Uniforme | Peso propio | -0.85 Tn/m | Desde: 3.30 Hasta: 5.00 |
| | X Local | Carga Uniforme | Peso propio | -2.50 Tn/m | Desde: 1.70 Hasta: 3.30 |
| | X Local | Carga Uniforme | Peso propio | -4.15 Tn/m | Desde: 0.00 Hasta: 1.70 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 5.00 |
| P20 | X Local | Carga Uniforme | Peso propio | -0.85 Tn/m | Desde: 3.30 Hasta: 5.00 |
| | X Local | Carga Uniforme | Peso propio | -2.50 Tn/m | Desde: 1.70 Hasta: 3.30 |
| | X Local | Carga Uniforme | Peso propio | -4.15 Tn/m | Desde: 0.00 Hasta: 1.70 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 5.00 |
| P21 | X Local | Carga Uniforme | Peso propio | -0.85 Tn/m | Desde: 3.30 Hasta: 5.00 |
| | X Local | Carga Uniforme | Peso propio | -2.50 Tn/m | Desde: 1.70 Hasta: 3.30 |
| | X Local | Carga Uniforme | Peso propio | -4.15 Tn/m | Desde: 0.00 Hasta: 1.70 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 5.00 |
| P22 | X Local | Carga Uniforme | Peso propio | -0.85 Tn/m | Desde: 3.30 Hasta: 5.00 |
| | X Local | Carga Uniforme | Peso propio | -2.50 Tn/m | Desde: 1.70 Hasta: 3.30 |
| | X Local | Carga Uniforme | Peso propio | -4.15 Tn/m | Desde: 0.00 Hasta: 1.70 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 5.00 |
| 23 | X Local | Carga Uniforme | Peso propio | -0.85 Tn/m | Desde: 3.30 Hasta: 5.00 |
| | X Local | Carga Uniforme | Peso propio | -2.50 Tn/m | Desde: 1.70 Hasta: 3.30 |
| | X Local | Carga Uniforme | Peso propio | -4.15 Tn/m | Desde: 0.00 Hasta: 1.70 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 5.00 |
| 24 | X Local | Carga Uniforme | Peso propio | -0.85 Tn/m | Desde: 3.30 Hasta: 5.00 |
| | X Local | Carga Uniforme | Peso propio | -2.50 Tn/m | Desde: 1.70 Hasta: 3.30 |
| | X Local | Carga Uniforme | Peso propio | -4.15 Tn/m | Desde: 0.00 Hasta: 1.70 |
| | X Local | Carga Uniforme | Sobrecarga | -1.50 Tn/m | Desde: 0.00 Hasta: 5.00 |

### 4.6 LISTADO DE CARGAS

CARGAS ESPECIALES INTRODUCIDAS (en Tm, Tm/m y Tm/m2)

| GRUPO | C.C.E. | TIPO | VALOR | COORDENADAS |
|---|---|---|---|---|
| 0 | 1 | Superficial | 2.00 | ( 8.59, 0.36) ( 8.69, -5.39) ( 17.34, -5.31) ( 17.47, 0.31) |

| | | | | |
|---|---|---|---|---|
| | 2 | Puntual | 10.00 | ( 11.83, -1.18) |
| | 2 | Puntual | 10.00 | ( 14.02, -3.82) |
| | 2 | Puntual | 10.00 | ( 11.86, -2.49) |
| | 2 | Puntual | 10.00 | ( 14.04, -1.16) |
| | 2 | Puntual | 10.00 | ( 11.81, -3.71) |
| | 2 | Puntual | 10.00 | ( 13.96, -2.46) |
| | 2 | Superficial | 0.40 | ( 0.27, 0.41) ( 8.85, 0.20) ( 8.70, -5.35) ( 0.22, -5.33) |
| 1 | 1 | Superficial | 2.00 | ( -0.32, 0.43) ( 17.46, 0.35) ( 17.49, -5.35) ( -0.36, -5.45) |
| | 2 | Puntual | 30.00 | ( 0.45, -2.50) |
| | 2 | Puntual | 30.00 | ( 2.95, -2.50) |
| | 2 | Puntual | 30.00 | ( 1.75, -2.50) |
| | 2 | Puntual | 30.00 | ( 11.77, -2.49) |
| | 2 | Puntual | 30.00 | ( 12.90, -2.49) |
| | 2 | Puntual | 30.00 | ( 14.21, -2.50) |
| | 2 | Lineal | 12.00 | ( 0.25, -2.50) ( 17.23, -2.51) |
| | 3 | Puntual | 30.00 | ( 3.16, -2.53) |
| | 3 | Puntual | 30.00 | ( 4.38, -2.53) |
| | 3 | Puntual | 30.00 | ( 5.53, -2.52) |
| | 3 | Puntual | 30.00 | ( 14.48, -2.49) |
| | 3 | Puntual | 30.00 | ( 15.77, -2.51) |
| | 3 | Puntual | 30.00 | ( 16.81, -2.49) |
| | 4 | Puntual | 30.00 | ( 8.17, -2.50) |
| | 4 | Puntual | 30.00 | ( 6.94, -2.55) |
| | 4 | Puntual | 30.00 | ( 5.71, -2.56) |
| | 5 | Puntual | 30.00 | ( 8.93, -2.48) |
| | 5 | Puntual | 30.00 | ( 10.20, -2.48) |
| | 5 | Puntual | 30.00 | ( 11.66, -2.49) |

## 5.COMBINACIONES CONSIDERADAS

HORMIGON.....: EHE, Control normal
ACEROS CONFORMADOS.....: EA-95
ACEROS LAMINADOS.....: EA-95
DESPLAZAMIENTOS.....: Acciones Caracteristicas
TENSION DEL TERRENO.....: Acciones Caracteristicas
DIMENS. DE VIGAS CENTRADORAS...: EHE, Control normal
EQUILIBRIO DE CIMENTACIONES....: EHE, Control normal

## 6.MATERIALES UTILIZADOS

### 6.1 HORMIGONES

| ELEMENTO | HORMIGON | PLANTAS | FCK Kp/cm2 | GAMMA C |
|---|---|---|---|---|
| Forjados | HA-25 , Control Estadístico | Todas | 255 | 1.50 |
| Cimentación | HA-25 , Control Estadístico | Todas | 255 | 1.50 |
| Pilares y Pantallas | HA-25 , Control Estadístico | Todas | 255 | 1.50 |
| Muros | HA-25 , Control Estadístico | Todas | 255 | 1.50 |

### 6.2 ACEROS POR ELEMENTO Y POSICION

#### 6.2.1.ACEROS EN BARRAS

| ELEMENTO | POSICION | ACERO | FYK Kp/cm2 | GAMMA S |
|---|---|---|---|---|
| Pilares y Pantallas | Barras(Verticales) | B 500 S , Control Normal | 5097 | 1.15 |
| | Estribos(Horizontales) | B 500 S , Control Normal | 5097 | 1.15 |
| Vigas | Negativos(Superior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Positivos(Inferior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Montaje(Superior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Piel(Lateral) | B 500 S , Control Normal | 5097 | 1.15 |
| | Estribos | B 500 S , Control Normal | 5097 | 1.15 |
| Vigas de cimentación | Refuerzo Inferior | B 500 S , Control Normal | 5097 | 1.15 |
| | Superior | B 500 S , Control Normal | 5097 | 1.15 |
| | Inferior | B 500 S , Control Normal | 5097 | 1.15 |
| | Piel | B 500 S , Control Normal | 5097 | 1.15 |
| | Estribos | B 500 S , Control Normal | 5097 | 1.15 |
| Forjados | Punzonamiento | B 500 S , Control Normal | 5097 | 1.15 |
| | Negativos(Superior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Positivos(Inferior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Nervios Negativos | B 500 S , Control Normal | 5097 | 1.15 |
| | Nervios Positivos | B 500 S , Control Normal | 5097 | 1.15 |
| Losas de cimentación | Punzonamiento | B 500 S , Control Normal | 5097 | 1.15 |
| | Negativos(Superior) | B 500 S , Control Normal | 5097 | 1.15 |
| | Positivos(Inferior) | B 500 S , Control Normal | 5097 | 1.15 |

#### 6.2.2.ACEROS EN PERFILES

| TIPO ACERO | ACERO | LIM. ELÁSTICO Kp/cm2 | MÓDULO DE ELASTICIDAD Kp/cm2 |
|---|---|---|---|
| Aceros Conformados | S275 | 2806 | 2100000 |
| Aceros Laminados | S275 | 2806 | 2100000 |

### 6.3 MUROS DE FÁBRICA

Módulo de cortadura (G): 4166.67 Kp/cm2
Módulo de Elasticidad (E): 10000 Kp/cm2
Peso Específico: 1.5 Tn/m3
Tensión de cálculo en compresión: 20 Kp/cm2
Tensión de cálculo en tracción: 2 Kp/cm2

### 6.4 MUROS DE MAMPOSTERÍA

Acero barras verticales fy = 4200
Acero varillas horizontales fy = 5000

Nombre Obra: ODT 300.90
CONSTRUCTORA HISPANICA

Fecha:03/09/03

## 1. ESFUERZOS DE PILARES, PANTALLAS Y MUROS POR HIPOTESIS

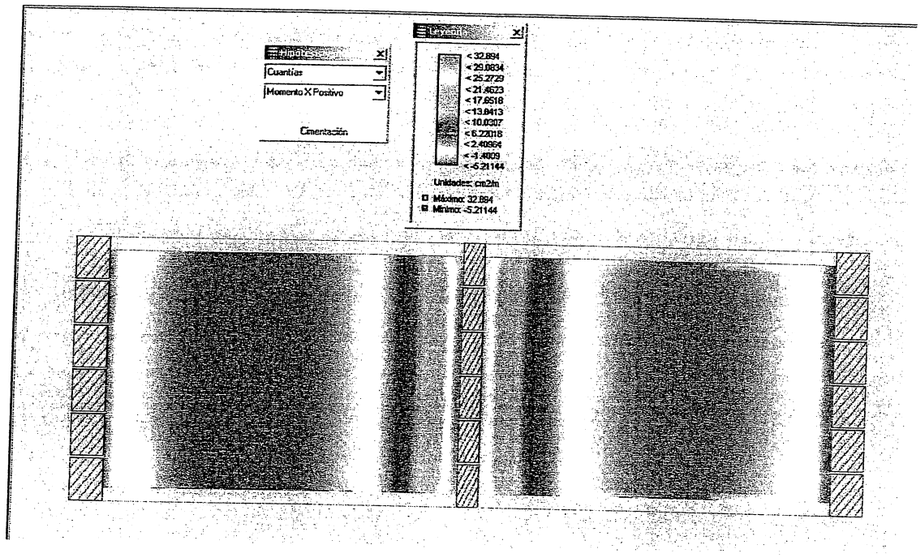
Pl: nº de planta
Tramo: nivel inicial / nivel final del tramo entre plantas.
Los esfuerzos de pilares son en ejes locales.
El sistema de unidades utilizado es
N,Qx,Qy: (Tn) Mx,My,T: (Tn·m)

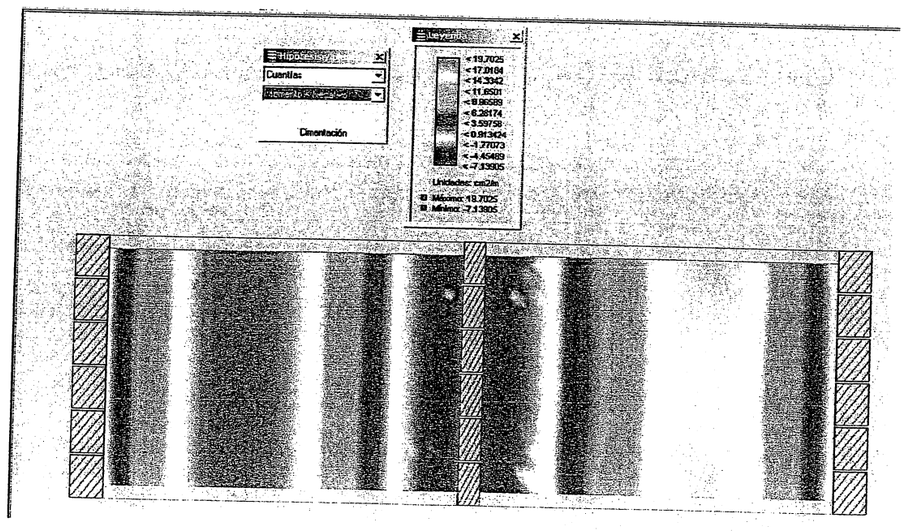
| Pilar | Pl | TRAMO | Hipótesis | Base | | | | | | Cabeza | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | N | Mx | My | Qx | Qy | T | N | Mx | My | Qx | Qy | T |
| P1 | 1 | 0.00/4.30 | Peso propio | 22.16 | -12.77 | 0.04 | -8.61 | 0.01 | -0.00 | 14.50 | -7.72 | -0.01 | 3.30 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 6.95 | -7.28 | -1.45 | -3.16 | -0.59 | -0.00 | 6.95 | -7.56 | 1.07 | 3.29 | -0.59 | -0.00 |
| | | | Sobrecarga uso 2 | 3.63 | -2.48 | -0.28 | 0.68 | -0.12 | -0.00 | 3.63 | -5.41 | 0.23 | 0.68 | -0.12 | -0.00 |
| | | | Sobrecarga uso 3 | 1.92 | 1.13 | -0.03 | 1.13 | -0.01 | -0.00 | 1.92 | -3.75 | 0.04 | 1.13 | -0.01 | -0.00 |
| | | | Sobrecarga uso 4 | -0.52 | 1.86 | -0.05 | 0.35 | -0.02 | -0.00 | -0.52 | 0.34 | 0.02 | 0.35 | -0.02 | -0.00 |
| P3 | 1 | 0.00/4.30 | Peso propio | 41.99 | 0.94 | 0.02 | 0.28 | 0.01 | -0.00 | 36.88 | -0.25 | -0.03 | 0.28 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 22.64 | 2.37 | -1.15 | 0.93 | -0.47 | -0.00 | 22.64 | -1.63 | 0.88 | 0.93 | -0.47 | -0.00 |
| | | | Sobrecarga uso 2 | 10.27 | -1.90 | -0.29 | -0.81 | -0.12 | -0.00 | 10.27 | 1.58 | 0.23 | -0.81 | -0.12 | -0.00 |
| | | | Sobrecarga uso 3 | 5.47 | -1.39 | -0.82 | -0.73 | -0.34 | -0.00 | 5.47 | 1.74 | 0.63 | -0.73 | -0.34 | -0.00 |
| | | | Sobrecarga uso 4 | 6.32 | 1.42 | -0.70 | 0.74 | -0.30 | -0.00 | 6.32 | -1.74 | 0.57 | 0.74 | -0.30 | -0.00 |
| P4 | 1 | 0.00/4.30 | Peso propio | 22.39 | -12.79 | 0.04 | -8.62 | 0.01 | -0.00 | 14.73 | -7.69 | -0.01 | 3.29 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 18.78 | -6.62 | -1.27 | -2.79 | -0.51 | -0.00 | 18.78 | -8.50 | 0.94 | 3.66 | -0.51 | -0.00 |
| | | | Sobrecarga uso 2 | 6.34 | -2.27 | -0.22 | 0.81 | -0.09 | -0.00 | 6.34 | -5.74 | 0.18 | 0.81 | -0.09 | -0.00 |
| | | | Sobrecarga uso 3 | 2.57 | 1.16 | -0.02 | 1.16 | -0.01 | -0.00 | 2.57 | -3.82 | 0.03 | 1.16 | -0.01 | -0.00 |
| | | | Sobrecarga uso 4 | -0.54 | 1.86 | -0.05 | 0.35 | -0.02 | -0.00 | -0.54 | 0.34 | 0.02 | 0.35 | -0.02 | -0.00 |
| P6 | 1 | 0.00/4.30 | Peso propio | 41.57 | 0.94 | 0.01 | 0.28 | 0.00 | -0.00 | 36.46 | -0.25 | -0.00 | 0.28 | 0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 33.17 | 2.45 | -0.99 | 0.96 | -0.41 | -0.00 | 33.17 | -1.70 | 0.77 | 0.96 | -0.41 | -0.00 |
| | | | Sobrecarga uso 2 | 13.13 | -1.98 | -0.25 | -0.85 | -0.10 | -0.00 | 13.13 | 1.68 | 0.20 | -0.85 | -0.10 | -0.00 |
| | | | Sobrecarga uso 3 | 13.12 | -1.54 | -0.74 | -0.81 | -0.31 | -0.00 | 13.12 | 1.92 | 0.58 | -0.81 | -0.31 | -0.00 |
| | | | Sobrecarga uso 4 | 13.84 | 1.54 | -0.62 | 0.80 | -0.26 | -0.00 | 13.84 | -1.90 | 0.52 | 0.80 | -0.26 | -0.00 |
| P7 | 1 | 0.00/4.30 | Peso propio | 22.52 | -12.44 | 0.03 | -8.37 | 0.01 | -0.00 | 14.86 | -7.56 | -0.01 | 1.83 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 27.94 | -5.80 | -0.61 | -2.34 | -0.25 | -0.00 | 27.94 | -9.62 | 0.49 | 4.11 | -0.25 | -0.00 |
| | | | Sobrecarga uso 2 | 7.86 | -2.11 | -0.08 | 0.91 | -0.03 | -0.00 | 7.86 | -6.01 | 0.07 | 0.91 | -0.03 | -0.00 |
| | | | Sobrecarga uso 3 | 2.94 | 1.20 | 0.01 | 1.18 | 0.00 | -0.00 | 2.94 | -3.89 | 0.00 | 1.18 | 0.00 | -0.00 |
| | | | Sobrecarga uso 4 | -0.55 | 1.86 | -0.05 | 0.35 | -0.02 | -0.00 | -0.55 | 0.34 | 0.02 | 0.35 | -0.02 | -0.00 |
| P9 | 1 | 0.00/4.30 | Peso propio | 41.63 | 0.94 | 0.00 | 0.28 | 0.00 | -0.00 | 36.52 | -0.25 | 0.00 | 0.28 | 0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 40.88 | 2.50 | -0.41 | 0.99 | -0.17 | -0.00 | 40.88 | -1.75 | 0.34 | 0.99 | -0.17 | -0.00 |
| | | | Sobrecarga uso 2 | 14.96 | -2.06 | -0.12 | -0.89 | -0.05 | -0.00 | 14.96 | 1.76 | 0.09 | -0.89 | -0.05 | -0.00 |
| | | | Sobrecarga uso 3 | 19.43 | -1.73 | -0.40 | -0.90 | -0.17 | -0.00 | 19.43 | 2.15 | 0.32 | -0.90 | -0.17 | -0.00 |
| | | | Sobrecarga uso 4 | 20.00 | 1.69 | -0.25 | 0.88 | -0.11 | -0.00 | 20.00 | -2.09 | 0.25 | 0.88 | -0.11 | -0.00 |
| P10 | 1 | 0.00/4.30 | Peso propio | 22.58 | -12.81 | 0.03 | -8.63 | 0.01 | -0.00 | 14.92 | -7.68 | -0.01 | 3.28 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 27.94 | -5.81 | 0.56 | -2.34 | 0.24 | -0.00 | 27.94 | -9.62 | -0.47 | 4.11 | 0.24 | -0.00 |
| | | | Sobrecarga uso 2 | 7.96 | -2.13 | 0.10 | 0.91 | 0.04 | -0.00 | 7.96 | -6.04 | -0.07 | 0.91 | 0.04 | -0.00 |
| | | | Sobrecarga uso 3 | 2.99 | 1.19 | 0.05 | 1.19 | 0.02 | -0.00 | 2.99 | -3.91 | -0.03 | 1.19 | 0.02 | -0.00 |
| | | | Sobrecarga uso 4 | -0.56 | 1.85 | -0.05 | 0.35 | -0.02 | -0.00 | -0.56 | 0.34 | 0.02 | 0.35 | -0.02 | -0.00 |
| P12 | 1 | 0.00/4.30 | Peso propio | 41.65 | 0.93 | 0.00 | 0.27 | 0.00 | -0.00 | 36.55 | -0.25 | -0.00 | 0.27 | 0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 40.88 | 2.49 | 0.49 | 0.98 | 0.20 | -0.00 | 40.88 | -1.74 | -0.38 | 0.98 | 0.20 | -0.00 |
| | | | Sobrecarga uso 2 | 15.08 | -2.09 | 0.05 | -0.90 | 0.02 | -0.00 | 15.08 | 1.79 | -0.05 | -0.90 | 0.02 | -0.00 |
| | | | Sobrecarga uso 3 | 19.73 | -1.75 | 0.26 | -0.91 | 0.12 | -0.00 | 19.73 | 2.18 | -0.24 | -0.91 | 0.12 | -0.00 |
| | | | Sobrecarga uso 4 | 19.42 | 1.66 | 0.44 | 0.86 | 0.19 | -0.00 | 19.42 | -2.05 | -0.36 | 0.86 | 0.19 | -0.00 |
| P13 | 1 | 0.00/4.30 | Peso propio | 22.51 | -12.86 | 0.02 | -8.64 | 0.01 | -0.00 | 14.85 | -7.66 | -0.01 | 3.26 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 18.78 | -6.62 | 1.22 | -2.79 | 0.50 | -0.00 | 18.78 | -8.49 | -0.92 | 3.66 | 0.50 | -0.00 |
| | | | Sobrecarga uso 2 | 6.67 | -2.33 | 0.24 | 0.81 | 0.10 | -0.00 | 6.67 | -5.82 | -0.18 | 0.81 | 0.10 | -0.00 |
| | | | Sobrecarga uso 3 | 2.75 | 1.14 | 0.08 | 1.17 | 0.03 | -0.00 | 2.75 | -3.87 | -0.05 | 1.17 | 0.03 | -0.00 |
| | | | Sobrecarga uso 4 | -0.57 | 1.85 | -0.04 | 0.35 | -0.01 | -0.00 | -0.57 | 0.34 | 0.02 | 0.35 | -0.01 | -0.00 |
| P15 | 1 | 0.00/4.30 | Peso propio | 41.64 | 0.92 | -0.00 | 0.27 | -0.00 | -0.00 | 36.54 | -0.24 | 0.00 | 0.27 | -0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 33.06 | 2.41 | 1.06 | 0.95 | 0.44 | -0.00 | 33.06 | -1.68 | -0.81 | 0.95 | 0.44 | -0.00 |
| | | | Sobrecarga uso 2 | 13.49 | -2.07 | 0.19 | -0.89 | 0.08 | -0.00 | 13.49 | 1.75 | -0.16 | -0.89 | 0.08 | -0.00 |
| | | | Sobrecarga uso 3 | 13.85 | -1.60 | 0.62 | -0.83 | 0.26 | -0.00 | 13.85 | 1.98 | -0.51 | -0.83 | 0.26 | -0.00 |
| | | | Sobrecarga uso 4 | 12.87 | 1.49 | 0.77 | 0.78 | 0.32 | -0.00 | 12.87 | -1.85 | -0.59 | 0.78 | 0.32 | -0.00 |
| P16 | 1 | 0.00/4.30 | Peso propio | 22.37 | -12.88 | 0.01 | -8.64 | 0.01 | -0.00 | 14.71 | -7.67 | -0.01 | 3.26 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 6.93 | -7.29 | 1.41 | -3.16 | 0.57 | -0.00 | 6.93 | -7.56 | -1.05 | 3.29 | 0.57 | -0.00 |
| | | | Sobrecarga uso 2 | 4.28 | -2.59 | 0.30 | 0.68 | 0.12 | -0.00 | 4.28 | -5.52 | -0.23 | 0.68 | 0.12 | -0.00 |
| | | | Sobrecarga uso 3 | 2.32 | 1.09 | 0.09 | 1.15 | 0.03 | -0.00 | 2.32 | -3.83 | -0.05 | 1.15 | 0.03 | -0.00 |
| | | | Sobrecarga uso 4 | -0.58 | 1.84 | -0.04 | 0.35 | -0.01 | -0.00 | -0.58 | 0.35 | 0.02 | 0.35 | -0.01 | -0.00 |
| P18 | 1 | 0.00/4.30 | Peso propio | 42.13 | 0.91 | -0.02 | 0.27 | -0.01 | -0.00 | 37.02 | -0.23 | 0.03 | 0.27 | -0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 22.42 | 2.32 | 1.23 | 0.91 | 0.50 | -0.00 | 22.42 | -1.59 | -0.92 | 0.91 | 0.50 | -0.00 |
| | | | Sobrecarga uso 2 | 10.87 | -2.03 | 0.23 | -0.86 | 0.10 | -0.00 | 10.87 | 1.69 | -0.20 | -0.86 | 0.10 | -0.00 |
| | | | Sobrecarga uso 3 | 6.46 | -1.47 | 0.71 | -0.76 | 0.30 | -0.00 | 6.46 | 1.82 | -0.57 | -0.76 | 0.30 | -0.00 |
| | | | Sobrecarga uso 4 | 5.33 | 1.35 | 0.85 | 0.71 | 0.34 | -0.00 | 5.33 | -1.68 | -0.63 | 0.71 | 0.34 | -0.00 |
| P19 | 1 | 0.00/4.30 | Peso propio | 21.67 | 12.91 | -0.09 | 8.82 | -0.03 | -0.00 | 14.01 | 6.95 | 0.05 | -3.09 | -0.03 | -0.00 |
| | | | Sobrecarga uso 1 | 7.88 | 4.86 | -0.95 | 2.10 | -0.38 | -0.00 | 7.88 | 9.69 | 0.67 | -4.35 | -0.38 | -0.00 |
| | | | Sobrecarga uso 2 | 3.39 | 4.27 | -0.96 | 0.35 | -0.39 | -0.00 | 3.39 | 2.78 | 0.72 | 0.35 | -0.39 | -0.00 |
| | | | Sobrecarga uso 3 | -0.60 | -1.83 | 0.04 | -0.33 | 0.01 | -0.00 | -0.60 | -0.41 | -0.02 | -0.33 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 2.27 | -1.06 | -0.10 | -1.13 | -0.04 | -0.00 | 2.27 | 3.78 | 0.06 | -1.13 | -0.04 | -0.00 |
| P20 | 1 | 0.00/4.30 | Peso propio | 21.89 | 12.85 | -0.08 | 8.81 | -0.03 | -0.00 | 14.23 | 6.95 | 0.04 | -3.10 | -0.03 | -0.00 |
| | | | Sobrecarga uso 1 | 14.59 | 4.28 | -0.80 | 1.80 | -0.31 | -0.00 | 14.59 | 10.38 | 0.56 | -4.65 | -0.31 | -0.00 |
| | | | Sobrecarga uso 2 | 11.59 | 3.82 | -0.85 | 0.10 | -0.35 | -0.00 | 11.59 | 3.39 | 0.64 | 0.10 | -0.35 | -0.00 |
| | | | Sobrecarga uso 3 | -0.60 | -1.84 | 0.04 | -0.33 | 0.01 | -0.00 | -0.60 | -0.40 | -0.02 | -0.33 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 2.75 | -1.11 | -0.09 | -1.15 | -0.03 | -0.00 | 2.75 | 3.83 | 0.05 | -1.15 | -0.03 | -0.00 |
| P21 | 1 | 0.00/4.30 | Peso propio | 22.03 | 12.79 | -0.05 | 8.79 | -0.02 | -0.00 | 14.37 | 6.97 | 0.02 | -3.12 | -0.02 | -0.00 |
| | | | Sobrecarga uso 1 | 19.11 | 3.73 | -0.35 | 1.52 | -0.14 | -0.00 | 19.11 | 11.05 | 0.25 | -4.93 | -0.14 | -0.00 |
| | | | Sobrecarga uso 2 | 18.16 | 3.21 | -0.38 | -0.23 | -0.17 | -0.00 | 18.16 | 4.19 | 0.33 | -0.23 | -0.17 | -0.00 |
| | | | Sobrecarga uso 3 | -0.60 | -1.85 | 0.04 | -0.34 | 0.01 | -0.00 | -0.60 | -0.40 | -0.02 | -0.34 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 3.00 | -1.16 | -0.06 | -1.17 | -0.02 | -0.00 | 3.00 | 3.87 | 0.03 | -1.17 | -0.02 | -0.00 |
| P22 | 1 | 0.00/4.30 | Peso propio | 22.04 | 12.77 | -0.01 | 8.78 | -0.00 | -0.00 | 14.38 | 6.98 | 0.00 | -3.13 | -0.00 | -0.00 |
| | | | Sobrecarga uso 1 | 19.21 | 3.73 | 0.31 | 1.52 | 0.13 | -0.00 | 19.21 | 11.06 | -0.23 | -4.93 | 0.13 | -0.00 |
| | | | Sobrecarga uso 2 | 17.90 | 3.23 | 0.45 | -0.21 | 0.19 | -0.00 | 17.90 | 4.12 | -0.36 | -0.21 | 0.19 | -0.00 |
| | | | Sobrecarga uso 3 | -0.59 | -1.86 | 0.04 | -0.34 | 0.01 | -0.00 | -0.59 | -0.40 | -0.02 | -0.34 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 2.96 | -1.16 | -0.02 | -1.17 | -0.01 | -0.00 | 2.96 | 3.85 | 0.00 | -1.17 | -0.01 | -0.00 |
| P23 | 1 | 0.00/4.30 | Peso propio | 21.93 | 12.78 | 0.02 | 8.78 | 0.01 | -0.00 | 14.27 | 6.97 | -0.02 | -3.12 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 14.71 | 4.28 | 0.76 | 1.80 | 0.30 | -0.00 | 14.71 | 10.40 | -0.54 | -4.65 | 0.30 | -0.00 |
| | | | Sobrecarga uso 2 | 11.30 | 3.74 | 0.89 | 0.08 | 0.36 | -0.00 | 11.30 | 3.37 | -0.66 | 0.08 | 0.36 | -0.00 |
| | | | Sobrecarga uso 3 | -0.58 | -1.86 | 0.04 | -0.34 | 0.01 | -0.00 | -0.58 | -0.40 | -0.02 | -0.34 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 2.60 | -1.13 | 0.01 | -1.14 | 0.01 | -0.00 | 2.60 | 3.79 | -0.02 | -1.14 | 0.01 | -0.00 |
| P24 | 1 | 0.00/4.30 | Peso propio | 21.73 | 12.80 | 0.03 | 8.78 | 0.01 | -0.00 | 14.07 | 6.99 | -0.02 | -3.12 | 0.01 | -0.00 |
| | | | Sobrecarga uso 1 | 7.96 | 4.87 | 0.92 | 2.10 | 0.37 | -0.00 | 7.96 | 9.71 | -0.66 | -4.35 | 0.37 | -0.00 |
| | | | Sobrecarga uso 2 | 3.12 | 4.12 | 1.01 | 0.31 | 0.41 | -0.00 | 3.12 | 2.78 | -0.74 | 0.31 | 0.41 | -0.00 |
| | | | Sobrecarga uso 3 | -0.57 | -1.87 | 0.04 | -0.34 | 0.01 | -0.00 | -0.57 | -0.39 | -0.02 | -0.34 | 0.01 | -0.00 |
| | | | Sobrecarga uso 4 | 1.95 | -1.09 | 0.02 | -1.12 | 0.01 | -0.00 | 1.95 | 3.72 | -0.03 | -1.12 | 0.01 | -0.00 |

ODT 300.9

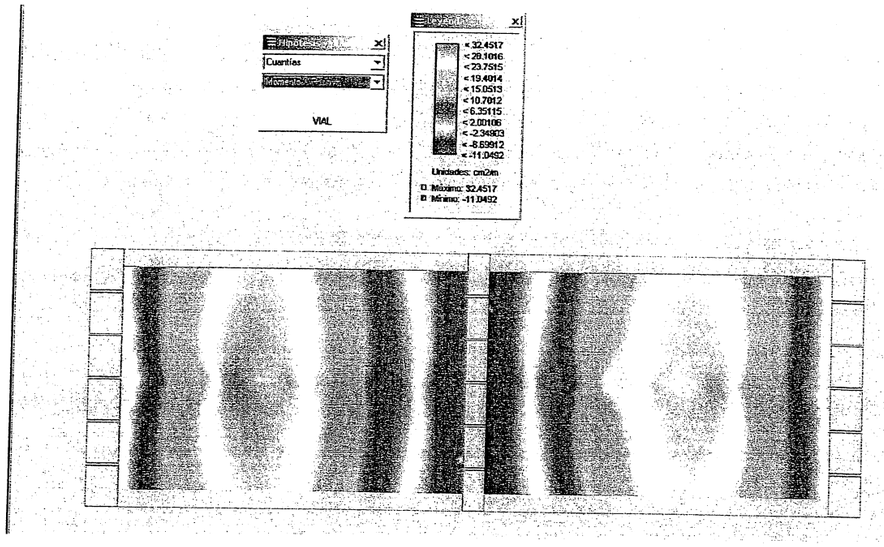
## CUANTIAS

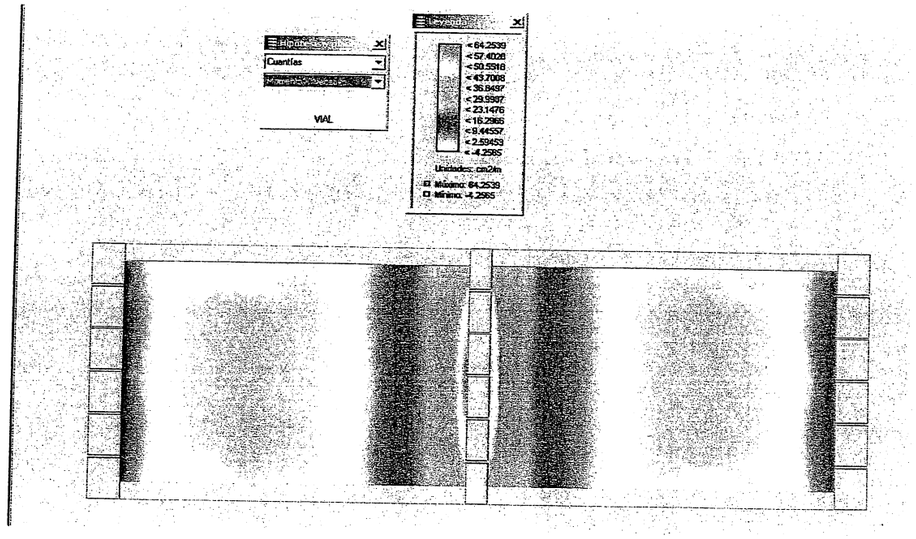
## LOSA CIMENTACIÓN




## LOSA SUPERIOR



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

Obra: AVE MARTORELL
Fecha: 04/12/2003
Hora: 13:49:16

ODT 300.4 y ODT 300.9

## Cálculo de secciones a cortante

### 1 Datos

- Materiales

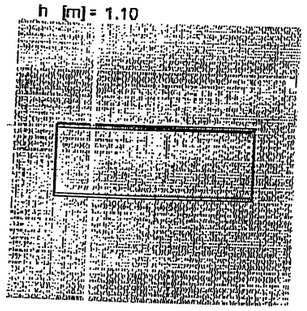
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : LOSA110
b0 [m] = 3.00
h [m] = 1.10



### 2 Dimensionamiento

Esfuerzo cortante de cálculo Vd [kN] = 1900
Inclinación de las bielas [°] = 45
Inclinación de los cercos [°] = 90.0
ρ [1.E-3] = 4
Nd [kN] = 0.0
σxd [MPa] = 0.0
σyd [MPa] = 0
θe [°] = 45.0



| ϕ [mm] | Separación [mm] | nº ramas | Area [cm²/m] | Tipo | Vsu [kN] | Vu2 [kN] |
|---|---|---|---|---|---|---|
| ø 6 | --- | --- | --- | --- | --- | --- |
| ø 8 | --- | --- | --- | --- | --- | --- |
| ø 10 | 0.10 | 4 | 31.4 | 2 | 1193.8 | --- |
| ø 12 | 0.15 | 4 | 30.2 | 2 | 1146.1 | --- |

Área estricta [cm²/m] = 25.0
(Cuantía mínima)
Vu1 [kN] = 15750.0
Vcu [kN] = 974.8

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

Obra: AVE MARTORELL
Fecha: 04/12/2003
Hora: 13:51:52

ODT 300.4 y ODT 300.9

## Cálculo de secciones a cortante

### 1 Datos

- Materiales

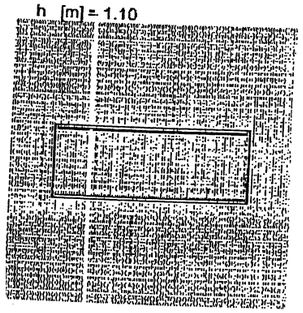
Tipo de hormigón : HA-25
Tipo de acero : B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00
γc = 1.50
γs = 1.15

- Tipo de elemento estructural

Tipo : elemento con armadura a cortante

- Sección

Sección : LOSA110
b0 [m] = 3.00
h [m] = 1.10



### 2 Dimensionamiento

Esfuerzo cortante de cálculo Vd [kN] = 1750

Inclinación de las bielas [°] = 45
Inclinación de los cercos [°] = 90.0
ρ [·1.E-3] = 4
Nd [kN] = 0.0
σxd [MPa] = 0.0
σyd [MPa] = 0
θe [°] = 45.0



| ϕ [mm] | Separación [mm] | nº ramas | Area [cm²/m] | Tipo | Vsu [kN] | Vu2 [kN] |
|---|---|---|---|---|---|---|
| ø 6 | --- | --- | --- | --- | --- | --- |
| ø 8 | --- | --- | --- | --- | --- | --- |
| ø 10 | 0.10 | 4 | 31.4 | 2 | 1193.8 | --- |
| ø 12 | 0.15 | 4 | 30.2 | 2 | 1146.1 | --- |

Área estricta [cm²/m] = 25.0
(Cuantía mínima)
Vu1 [kN] = 15750.0
Vcu [kN] = 974.8

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

Obra: AVE MARTORELL
Fecha: 04/12/2003
Hora: 14:10:32

ODT 300.4 y ODT 300.9

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

## 1 Datos

- Materiales

Tipo de hormigón: HA-25
Tipo de acero: B-500-S
fck [MPa] = 25.00
fyk [MPa] = 500.00

- Ambiente

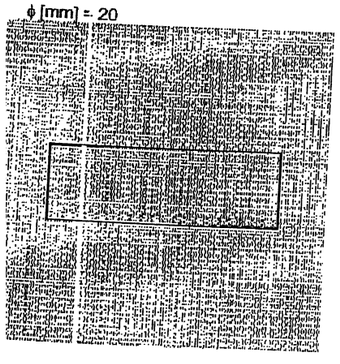
Clase general de exposición : I
Clases específicas de exposición : Qb

- Geometría de la sección

Sección : LOSA100
b [m] = 3.00
h [m] = 1.00

- Armado de la sección

ϕ [mm] = 20



| Capa | nº barras | Separación [mm] |
|---|---|---|
| 1 | 21 | 55.0 |
| 2 | 21 | 55 |

As [cm²] = 131.9
Ac,ef [cm²] = 6975.0



## 2 Resultados

Mk [kN·m] = 1900

Separación media entre fisuras sm [mm] = 172.0
Deformación media de las armaduras εsm [·1.E-3] = 0.64
Tensión en las armaduras en el instante de fisuración σsr [MPa] = 130.4
Tensión en las armaduras en servicio σs [MPa] = 176.5
Abertura característica de fisura wk [mm] = 0.19

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

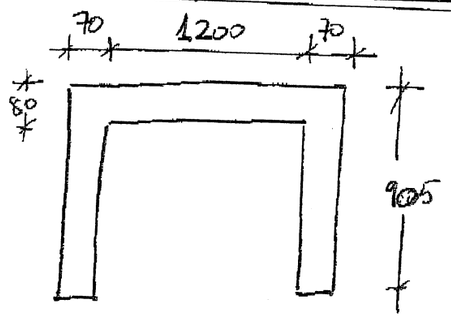
JC-968 | __/__/03 | Ingeniería y Arquitectura

OBRA: TUNELES L.A.V. -MARTORELL-
CLIENTE: CONSTRUCTORA HISPANICA

VALLADARES

Cálculo hastiales obra singular

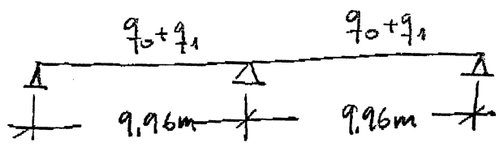
Hoja 1 de 2



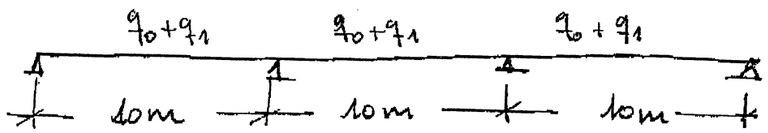

Cargas permanentes: $0,80 \times 2,50 + 2 = 4\ t/m^2$

Sobrecargas: $0,50\ t/m^2$

ODT 300.4 - ODT 300.9




ODT 300.2




$q_0 = 4 \times \frac{12}{2} + 0,70 \times 9,05 \times 2,50 = 39,84\ t/m$

$q_1 = 0,50 \times \frac{(12 + 2 \times 0,70)}{2} = 3,35\ t/m$

ERVACIONES



JC-968 | __/__/03 | Ingeniería y Arquitectura

OBRA: TUNELES L.A.V. -MARTORELL-
CLIENTE: CONSTRUCTORA HISPANICA

VALLADARES

Cálculo hastiales obra singular

Hoja 2 de 2

Calculamos los hastiales como vigas de gran canto (viga pared) continuas.

Según la Instrucción EHE las tracciones producidas bajo carga uniformemente distribuida de valor $p_d$

So.1:

$T_{1d} = 0,16\ p_d \cdot l$

$T_{2d} = 0,20 \times p_d \cdot l$

$P_d = 1,50 \times 39,84 + 1,6 \times 3,35 = 65,20\ t/m$

$l = 10\ m$

* $T_{1d} = 0,16 \times 65,2 \times 10 = 104,33\ t$

$T_{1d} = A_s \times f_{yd}$ con $f_{yd} \leq 400\ N/mm^2$

$A_s = \frac{T_{1d}}{f_{yd}} = \frac{104,33 \times 1000\ kg}{4000\ kg/cm^2} = 26,08\ cm^2 \Rightarrow 6\phi 25$

* $T_{2d} = 0,20 \times 65,20 \times 10 = 130,4\ t$

$T_{2d} = A_s \times f_{yd}$ con $f_{yd} \leq 400\ N/mm^2$

$A_s = \frac{130,40 \times 1000\ kg}{4000\ kg/cm^2} = 32,60\ cm^2 \rightarrow 7\phi 25$

Esta armadura ha de repartirse en una altura $0,6 \times l = 6\ m$

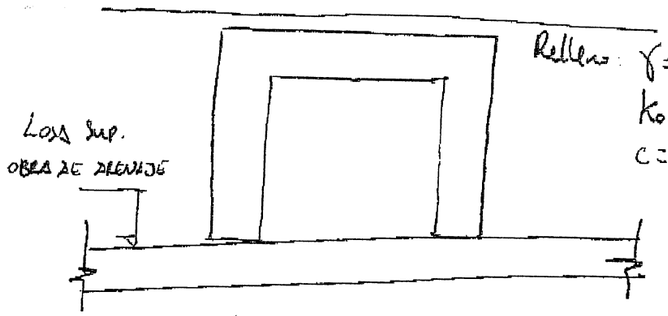
OBSERVACIONES

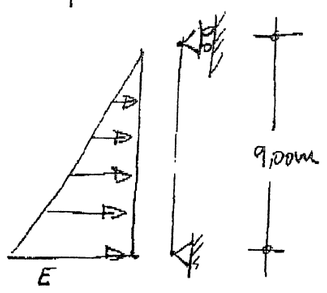
JC-968 | __/__/03 | Ingeniería y Arquitectura

VALLADARES

OBRA: TUNELES L.A.V. -MARTORELL -
CLIENTE: CONSTRUCTORA HISPANICA

Hoja 1 de 1




$E = \gamma \cdot k_0 \cdot h = 2 \times 0{,}50 \times 9{,}00 = 9{,}00$ t/m por metro lineal de túnel

Reacción en el apoyo inferior: $V_d = 1{,}6 \times \left(\frac{q^2}{2} \times \frac{2}{3}\right) = 43{,}20$ t/m

$$V_d = A_{s90} \times \frac{f_{yd}}{\sqrt{3}}$$

$$A_{s90} = \frac{43{,}20 \times 1000 \text{ kg}}{\frac{5100/1{,}15}{\sqrt{3}}} = 16{,}87 \text{ cm}^2 \text{ por metro lineal}$$

OBSERVACIONES