

**ASISTENCIA PARA LA REALIZACIÓN DE PRUEBAS DE CARGA E  
INSPECCIONES DE PUENTES DE LA LÍNEA DE ALTA VELOCIDAD  
MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA.  
TRAMO: LA ROCA DEL VALLÉS-RIUDELLOTS DE LA SELVA.**



**INFORME DE PRUEBA DE CARGA**

**SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS  
OBRA DRENAJE 1.2  
01750D04 (V.I. Obra 401 + 162, P.K. Tramo 1 + 162)**

**Marzo de 2010**

Cliente: A.D.I.F.

Nº O.T.:

Refª.: I/OC-10004/CE-1

**INFORME DE RESULTADOS Y CONCLUSIONES DE LAS  
ACTIVIDADES DE INSPECCIÓN TÉCNICA Y PRUEBA DE  
CARGA REALIZADAS EN LA OBRA DE DRENAJE ODT 1.2  
SITUADA EN EL P.K. 401+162 DE LA L.A.V. MADRID-  
ZARAGOZA-BARCELONA-FRONTIERA FRANCESA.  
TRAMO: BARCELONA SANTIS-FIGUERES  
SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS**

**MARZO DE 2010**

**Peticionario: A.D.I.F. C/ Titán nº 4. 28045.  
MADRID.**

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## **1. INTRODUCCIÓN**

### **1.1. INTRODUCCIÓN**

A instancias del Administrador de Infraestructuras Ferroviarias (A.D.I.F.), se redacta el presente documento, cuyo objeto es informar sobre la inspección técnica y los resultados de la Prueba de Carga de la “OBRA DE DRENAJE ODT 1.2 SITUADA EN EL P.K. 401+162 DE LA L.A.V. MADRID-ZARAGOZA-BARCELONA-FRONTIERA FRANCESA. TRAMO: BARCELONA SANTS-FIGUERES. SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS”, de acuerdo a las condiciones del Contrato de asistencia para la realización de pruebas de carga e inspecciones de puentes de la línea de alta velocidad Madrid-Zaragoza-Barcelona-Frontera Francesa. Tramo: la Roca del Vallés-Riudellots de la Selva. suscrito por la UTE PC LAV la Roca del Vallés-Riudellots de la Selva (GEOCISA – INTEMAC).

### **1.2. ANTECEDENTES**

La redacción del presente documento forma parte de las actividades relacionadas con la realización de las preceptivas pruebas de carga en los puentes y estructuras que el Administrador de Infraestructuras Ferroviarias (A.D.I.F.), proyecta y construye, previamente a su puesta en servicio, de acuerdo con la “Instrucción de acciones a considerar en puentes de ferrocarril”.

## **2. OBJETO**

El objeto del presente documento es explicar las actividades desarrolladas en la obra de referencia, exponiendo los resultados obtenidos en la misma y realizando el análisis de dichos resultados, a fin de emitir las conclusiones y recomendaciones oportunas.

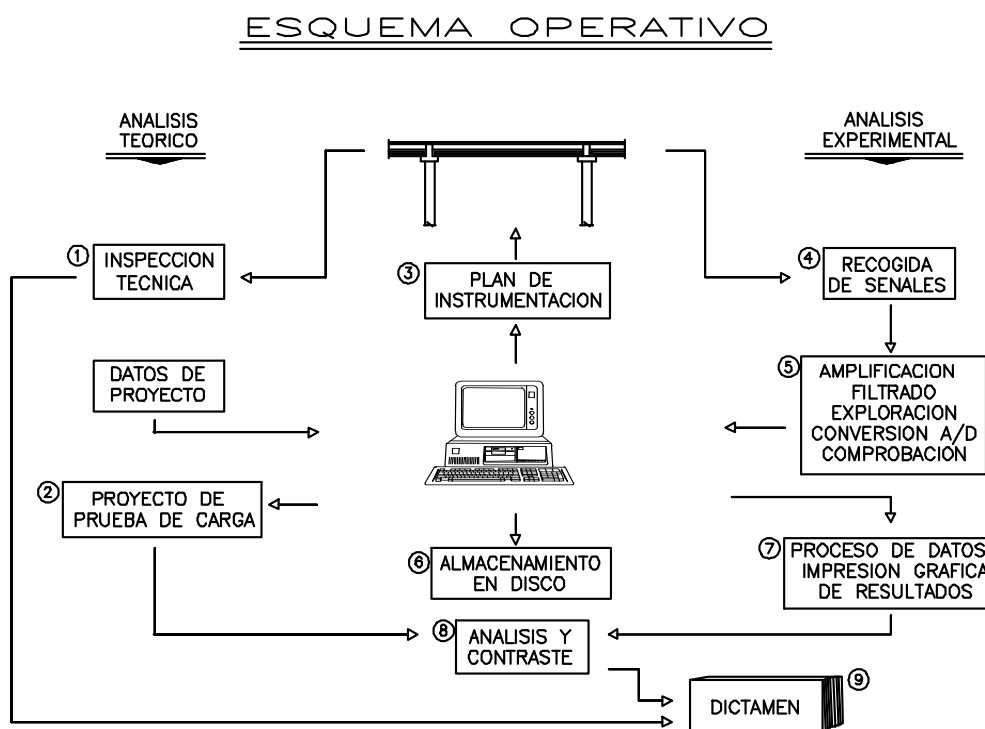
Las actividades se desarrollaron en dos fases:

- Inspección Preliminar y elaboración del Proyecto de Prueba de Carga

- Realización de la Prueba de Carga y análisis de sus resultados

Llevándose a cabo la Inspección Previa y la Prueba de Carga el día 4 de febrero de 2010, previa realización y entrega del correspondiente Proyecto de Prueba de Carga, con referencia: I/OC-10004/CE.

Las actividades desarrolladas se incorporan en el esquema operativo que se acompaña.



### 3. DESCRIPCIÓN DE LA OBRA

La estructura objeto de la Prueba de Carga es una obra de drenaje formada por un marco de hormigón armado de 12,00 m de luz libre.

El paso presenta un esviaje de 75 °.

En el plano siguiente se indica la localización aproximada de la obra.



#### **4. INSPECCIÓN PRELIMINAR**

La inspección previa a la realización de la Prueba de Carga fue realizada por el Ingeniero de Caminos, Canales y Puertos de INTEMAC D. Fco. Javier de la Cuerda del Olmo, en fecha 4 de febrero de 2010.

#### **5. ANÁLISIS DEL PROYECTO DE LA ESTRUCTURA**

La documentación facilitada por el Peticionario consiste en la memoria de cálculo y planos de la estructura, todo ello en soporte informático. En el Anejo 1 se incluye copia de los planos facilitados.

##### **5.1. DEFINICIÓN COMPLETA DE LOS ELEMENTOS**

Las losas superior e inferior del marco tienen un espesor de 1,20 m y la altura libre existente entre ambas es de 3,00 m. Los hastiales presentan un espesor de 0,75 cm.

El ancho total de la estructura, en dirección perpendicular al trazado de la vía, es de 17,35 m.

La infraestructura viaria dispuesta corresponde a dos vías de ferrocarril de ancho internacional con una separación aproximada entre ejes de vías de 4,70 m, de acuerdo con los planos de secciones tipo facilitados.

## 5.2. ACCIONES CONSIDERADAS

Según la documentación facilitada se han considerado en el proyecto las siguientes normas de acciones:

- Instrucciones y recomendaciones para la redacción de proyectos de plataforma, (G.I.F).
- Instrucción sobre las acciones a considerar en el proyecto de puentes de ferrocarril (I.A.P.F.-1975).
- Eurocódigo 1: Bases de proyecto y acciones en estructuras. Parte 3: cargas de tráfico en puentes, UNE-ENV 1991-3 octubre 1997 (EC1.3).
- Instrucción relativa a las acciones a considerar en el proyecto de puentes de carretera, IAP, 1998.

No se habrían considerado por lo tanto las prescripciones de la Instrucción de Acciones a considerar en Puentes de Ferrocarril, IAPF, tales como la mayoración de cargas mediante el coeficiente de clasificación  $\alpha$ .

Las cargas consideradas en el cálculo del marco, de acuerdo con la memoria de cálculo facilitada, serían:

- Peso propio.
- Balasto y cargas muertas (tierras, vías y traviesas, conductos de cableado y paseos, soportes de catenarias e impostas y barandillas).
- Empujes (activo y al reposo) de tierras.
- Sobrecargas de uso. Componentes verticales: trenes de carga de IPF-75 y EC1-3, sobrecarga tráfico losa inferior, sobrecarga en paseos y sobrecarga de tráfico en trasdós hastiales.



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- Sobrecargas de uso. Componentes horizontales: efectos de frenado y arranque.

### 5.3. MODELIZACIÓN EMPLEADA

El anejo de cálculo incluido en la documentación facilitada no se corresponde con la estructura definida en planos por lo que no podemos valorar el modelo de cálculo empleado.

### 5.4. MATERIALES Y COEFICIENTES DE CÁLCULO

Además de las normas de acciones consideradas en proyecto se ha considerado también la Instrucción EHE.

Los materiales y coeficientes de cálculo definidos en planos son los siguientes:

- Hormigón Alzados: HA-25/B/20/Ila.
- Hormigón Cimentaciones: HA-25/B/20/Ila.
- Acero Pasivo B-500-S.
- Coeficientes de minoración de resistencias  $\gamma_c=1,50$  y  $\gamma_s=1,15$ .
- Se define nivel de control de ejecución intenso, por lo que los coeficientes de ponderación de acciones correspondientes son,  $\gamma_g=1,35$  y  $\gamma_q=1,50$ .

No se ha encontrado la definición explícita del hormigón de la losa superior, sin embargo entendemos que será el mismo que el definido para los hastiales, HA-25/B/20/Ila, y así se ha considerado en el Proyecto de Prueba de Carga.

### 5.5. EVALUACIÓN DE LA SITUACIÓN ESTRUCTURAL

En la memoria facilitada no se han encontrado los esfuerzos de cálculo considerados en el proyecto de la estructura, por lo que no ha sido posible realizar comprobaciones.

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## **6. PLAN DE PRUEBAS**

Como ya se ha indicado, con anterioridad a la prueba de carga se elaboró un Proyecto de Prueba de Carga con referencia: I/OC-10004/CE. En dicho documento se evaluaba el desplazamiento vertical de la losa superior del marco bajo las solicitaciones de un tren de cargas tipo formado por 2 locomotoras de seis ejes y un peso unitario de 120 t. El peso total máximo sobre la estructura durante la realización de la prueba estática era de 120 t.

En el Anejo 3 del presente documento se incluyen los esquemas del tren de cargas dispuesto para la prueba.

En el Anejo 2 se acompaña una copia del proyecto de prueba de carga. En dicho documento hemos detectado un error en el valor del módulo de deformación del hormigón considerado en el modelo de cálculo realizado. En el anejo 2 se han incluido los listados del modelo corregido, exponiéndose en los apartados siguientes el resumen de su contenido.

### **6.1. ACCIONES REPRODUCIDAS**

Se preveía la realización de pruebas estáticas y dinámicas.

La materialización de la sobrecarga se realizaría mediante el tren de cargas descrito en el apartado anterior, que se situaría con objeto de producir los momentos flectores máximos en las secciones instrumentadas.

El desarrollo de las pruebas estáticas se programó según el siguiente esquema:

ESCALÓN 0: Puesta a cero de los aparatos.

ESCALÓN 1: Situación de la carga.

ESCALÓN 2: Estabilización de las medidas. Se realizarían medidas continuas hasta

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comprobar la estabilización de las mismas.

ESCALÓN 3: Descarga total y medida de la recuperación. Las lecturas se realizarían de forma continua hasta alcanzar una recuperación del 80% en un intervalo no superior al de mantenimiento de la carga.

En lo que a las pruebas dinámicas se refiere se planteaba la posibilidad de realizar los siguientes ensayos:

Ensayo Cuasiestático: Paso de una locomotora por la estructura circulando a la velocidad de 5 km/h (paso de hombre).

Ensayo Dinámico lento: Paso de la locomotora del ensayo anterior circulando en el mismo sentido y a la velocidad de 30 km/h.

Ensayo Dinámico rápido: Paso de la locomotora del ensayo cuasiestático circulando en el mismo sentido y a la máxima velocidad posible.

Ensayo de Frenado: Paso de una locomotora cualquiera circulando a la máxima velocidad posible y frenando justo sobre el tablero.

## 6.2. PUNTOS DE MEDIDA

Las mediciones a realizar durante la Prueba de Carga serían de dos tipos:

- Desplazamientos verticales
- Aceleraciones

En el Anejo 3 del presente documento se incluyen los esquemas de la instrumentación dispuesta.

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### 6.3. EQUIPOS UTILIZADOS

Para la obtención de estas medidas se planteó un equipo que consta de:

- Anillos resistivos para la medida de flechas, con un rango máximo de medida de 25 mm, fijados a la cara inferior del tablero.
- Para la medida de las vibraciones en las pruebas dinámicas se ha instalado un acelerómetro modelo 8340 de la firma Brüel & Kjaer, con rango de medida 1 g.

El equipo de control y adquisición de datos está constituido por amplificadores de la marca SANEI y tarjeta de Adquisición de Datos de la casa NATIONAL INSTRUMENTS, con una capacidad de lectura de hasta 32 canales de extensometría.

La excitación de los transductores resistivos se realiza por medio de una corriente continua de 4 V de tensión.

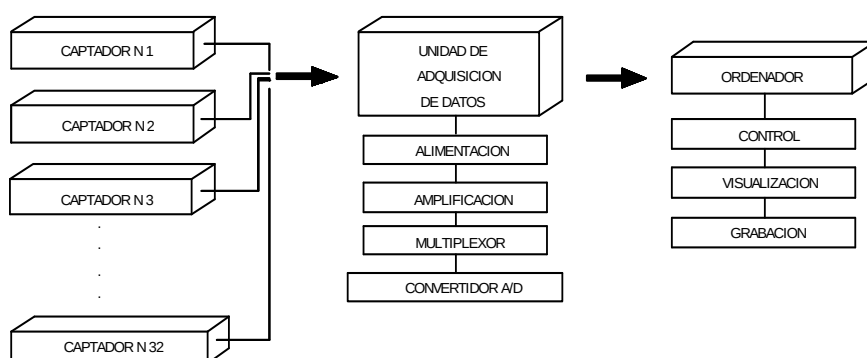
La señal de entrada puede amplificarse en una gama comprendida entre 1 y 128000 veces. La velocidad de muestreo está comprendida entre 1 lectura cada 850 segundos y 200000 lecturas cada segundo (por canal).

Como equipo controlador de la cadena de medida se emplea un ordenador PC.

Los programas de toma de datos, visualización y análisis gráfico de los registros, tanto en tiempo real como con posterioridad a la prueba, han sido desarrollados para auscultación estática y dinámica de estructuras. Las lecturas vienen expresadas en las unidades propias del fenómeno físico que se está midiendo, ya que las constantes de transformación de los captadores se introducen en el proceso de toma de datos. La presentación de los datos en la pantalla del ordenador permite la comparación directa y rápida de los resultados obtenidos en cada ensayo. Los registros pueden ampliarse horizontal y verticalmente para su mejor análisis y comprensión. La resolución del sistema completo de instrumentación es función de los fondos de escala utilizados, pero para rangos de medida medios o habituales pueden establecerse en 0,01 mm (para rangos de hasta 25 mm).

La totalidad de la información recogida se registra en unidades de disquete magnético para su posterior proceso y análisis en gabinete.

La cadena de instrumentación completa se representa gráficamente en la figura adjunta.



#### 6.4. RESULTADOS PREVISTOS

A continuación se presentan los desplazamientos verticales y la frecuencia fundamental de flexión de la estructura que cabría esperar durante la prueba conforme al modelo de cálculo corregido.

##### PRUEBA ESTÁTICA

| CANALES | FLECHA (mm) |
|---------|-------------|
| C1      | 0,30        |
| C2      | 0,41        |
| C3      | 0,42        |
| C4      | 0,41        |
| C5      | 0,30        |

El valor estimado para la frecuencia fundamental de flexión del tablero era de 11,78 Hz.

En la memoria facilitada no se han encontrado los esfuerzos de cálculo considerados en el proyecto de la estructura, por lo que no ha sido posible obtener el porcentaje de

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solicitud que la prueba de carga representa frente a la sobrecarga de Proyecto.

## **7. PRUEBA DE CARGA**

### **7.1. DESCRIPCIÓN**

La Prueba de Carga fue realizada el día 4 de febrero de 2010 por un equipo especializado bajo la dirección del Ingeniero de Caminos, Canales y Puertos de INTEMAC D. Fco. Javier de la Cuerda del Olmo.

Se dispuso la instrumentación prevista en el proyecto de prueba de carga.

El orden de realización de los ensayos fue el siguiente:

- Ensayo Estático. Comenzó a las 21:11 horas
- Ensayo Cuasiestático. Comenzó a las 21:28 horas
- Ensayo Dinámico Lento. Comenzó a las 21:31 horas
- Ensayo Dinámico Rápido. Comenzó a las 21:36 horas
- Ensayo de Frenado. Comenzó a las 21:43 horas

La duración de la prueba estática fue superior a 10 minutos con la carga total estabilizada y el período de descarga el suficiente para obtener una recuperación mínima del 80%.

La temperatura y la humedad registradas durante la realización de las pruebas fluctuaron entre los valores que se indican a continuación.

TEMPERATURA: 12º C a 13º C

HUMEDAD: 74% a 79%

En el Anejo 4 se encuentra una copia de las mediciones realizadas durante las pruebas

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con el termohigrógrafo.

## 7.2. RESULTADOS OBTENIDOS

En el Anejo 4 del presente documento se adjuntan los registros obtenidos durante los diferentes ensayos de que constó la prueba de carga, resumiéndose en los cuadros que a continuación se acompañan los valores obtenidos.

Se ha corregido la deriva de los registros que la presentan y los valores representativos incluidos en los cuadros son ya el resultado de dicha corrección.

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OBRA DE DRENAJE ODT 1.2 SITUADA EN EL P.K. 401+163 DE LA L.A.V. MADRID-ZARAGOZA-BARCELONA-F. FRANCESA.  
 TRAMO: BARCELONA SANTS-FIGUERES. SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS.  
 PRUEBA ESTÁTICA.

| Punto | Canal | Descripción | Uds | Valor<br>previsto | Medida<br>en carga | % obtenido | Medida<br>descarga | Recuperación | % recuperación |
|-------|-------|-------------|-----|-------------------|--------------------|------------|--------------------|--------------|----------------|
| A     | 1     | Flecha      | mm  | 0.30              | 0.25               | 83.33      | 0.00               | 0.25         | 100.00         |
| B     | 2     | Flecha      | mm  | 0.41              | 0.30               | 73.17      | 0.00               | 0.30         | 100.00         |
| C     | 3     | Flecha      | mm  | 0.42              | 0.32               | 76.19      | 0.00               | 0.32         | 100.00         |
| D     | 4     | Flecha      | mm  | 0.41              | 0.29               | 70.73      | 0.00               | 0.29         | 100.00         |
| E     | 5     | Flecha      | mm  | 0.30              | 0.22               | 73.33      | 0.00               | 0.22         | 100.00         |

|                                                      |         |
|------------------------------------------------------|---------|
| PARÁMETROS ESTADÍSTICOS                              | FLECHAS |
| VALOR MEDIO DE LA RELACIÓN V.MEDIDO/V.PREVISTO       | 75.4%   |
| DESVIACIÓN TÍPICA DE LA RELACIÓN V.MEDIDO/V.PREVISTO | 4.9%    |
| RELACIÓN ENTRE LOS VALORES MEDIOS MEDIDO Y PREVISTO  | 75.0%   |
| VALOR MEDIO DE LA RECUPERACIÓN                       | 100.0%  |



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OBRA DE DRENAJE ODT 1.2 SITUADA EN EL P.K. 401+163 DE LA L.A.V. MADRID-ZARAGOZA-BARCELONA-F. FRANCESA.  
 TRAMO: BARCELONA SANTS-FIGUERES. SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS.  
 ENSAYOS DINÁMICOS.

- Prueba dinámica a 30 km/h

| Punto | Canal | Descripción | Uds | Valor cuasiestático | Medida en carga | Medida en descarga | Coefficiente de impacto real |
|-------|-------|-------------|-----|---------------------|-----------------|--------------------|------------------------------|
| A     | 1     | Flecha      | mm  | 0.16                | 0.17            | 0.00               | 1.06                         |
| B     | 2     | Flecha      | mm  | 0.18                | 0.17            | 0.00               | 1.00                         |
| C     | 3     | Flecha      | mm  | 0.14                | 0.14            | 0.00               | 1.00                         |
| D     | 4     | Flecha      | mm  | 0.10                | 0.10            | 0.00               | 1.00                         |
| E     | 5     | Flecha      | mm  | 0.05                | 0.05            | 0.00               | 1.00                         |

EL CÁLCULO DEL VALOR MEDIO SE REALIZA PONDERANDO EL COEFICIENTE DE IMPACTO POR EL VALOR DE LA MAGNITUD REGISTRADA EN CADA PUNTO EN LA PRUEBA CUASIESTÁTICA

PARÁMETROS ESTADÍSTICOS

| VALOR MEDIO DEL COEFICIENTE DE IMPACTO       | FLECHAS |
|----------------------------------------------|---------|
| DESVIACIÓN TÍPICA DEL COEFICIENTE DE IMPACTO | 1.00    |
|                                              | 0.03    |

- Prueba dinámica a 70 km/h

| Punto | Canal | Descripción | Uds | Valor cuasiestático | Medida en carga | Medida en descarga | Coefficiente de impacto real |
|-------|-------|-------------|-----|---------------------|-----------------|--------------------|------------------------------|
| A     | 1     | Flecha      | mm  | 0.16                | 0.16            | 0.00               | 1.00                         |
| B     | 2     | Flecha      | mm  | 0.18                | 0.18            | 0.00               | 1.00                         |
| C     | 3     | Flecha      | mm  | 0.14                | 0.14            | 0.00               | 1.00                         |
| D     | 4     | Flecha      | mm  | 0.10                | 0.10            | 0.00               | 1.00                         |
| E     | 5     | Flecha      | mm  | 0.05                | 0.05            | 0.00               | 1.00                         |

EL CÁLCULO DEL VALOR MEDIO SE REALIZA PONDERANDO EL COEFICIENTE DE IMPACTO POR EL VALOR DE LA MAGNITUD REGISTRADA EN CADA PUNTO EN LA PRUEBA CUASIESTÁTICA

PARÁMETROS ESTADÍSTICOS

| VALOR MEDIO DEL COEFICIENTE DE IMPACTO       | FLECHAS |
|----------------------------------------------|---------|
| DESVIACIÓN TÍPICA DEL COEFICIENTE DE IMPACTO | 1.00    |
|                                              | 0.00    |

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## ANÁLISIS DE VIBRACIONES LIBRES

### VALORES DE LA FRECUENCIA FUNDAMENTAL

| CANAL                  | NÚMERO DE CICLOS | INCREMENTO DE TIEMPO (s) | PERIODO (s) | FRECUENCIA (Hz) |
|------------------------|------------------|--------------------------|-------------|-----------------|
| 1<br>(Dinámica rápida) | 8                | 0,63                     | 0,079       | 12,69 (12,66)   |
| 2<br>(Dinámica rápida) | 9                | 0,71                     | 0,079       | 12,68 (12,66)   |
| 4<br>(Dinámica rápida) | 9                | 0,70                     | 0,078       | 12,86 (12,73)   |
| 5<br>(Dinámica rápida) | 6                | 0,48                     | 0,080       | 12,50 (12,66)   |

**VALOR MEDIO: 12,68 Hz (12,68 Hz)**

Entre paréntesis se indican los resultados obtenidos a través del tratamiento numérico (F.F.T.) de la señal.

La forma de las señales obtenidas en las pruebas dinámicas no se corresponde con la de la señal típica de un solo grado de libertad lo cual hace imposible la medición exacta del índice de amortiguamiento.

## **8. ANÁLISIS DE LOS RESULTADOS**

### **8.1. PRUEBA ESTÁTICA**

Conforme a los resultados mostrados en anteriores apartados es posible establecer las siguientes consideraciones:

- Las flechas obtenidas en la prueba estática de la estructura alcanzan, respecto a las previstas en el Proyecto de Prueba de Carga valores puntuales comprendidos entre el 70% y el 83%.

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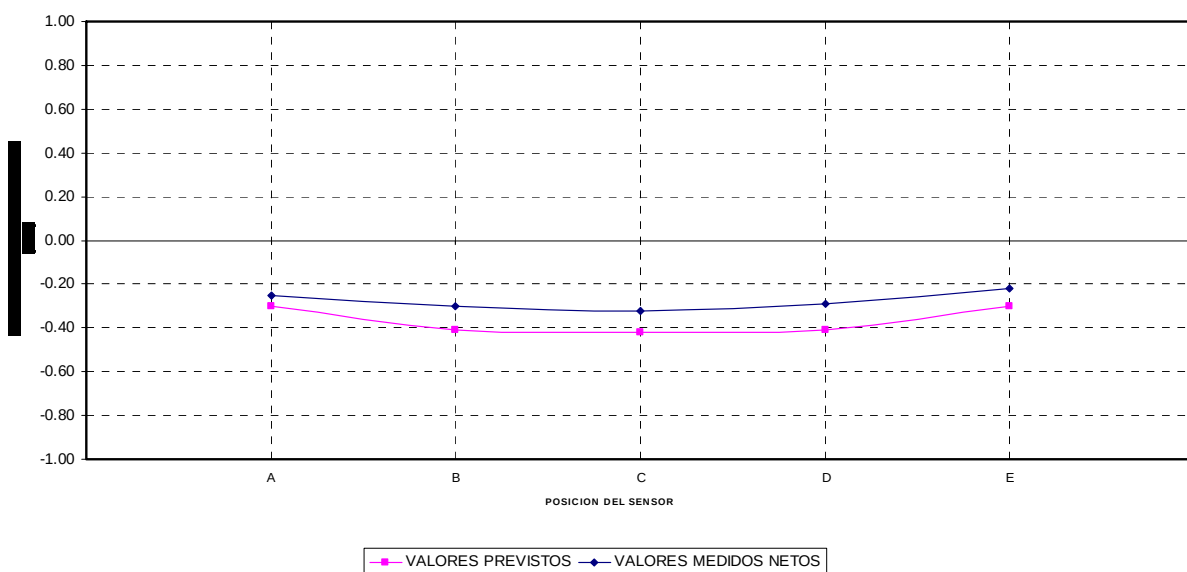
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- El valor estadístico medio de la distribución de medida de flechas arriba señalada es del 75,0%. Dicho valor medio se ha obtenido ponderando las relaciones valor medido frente a valor previsto por la amplitud de las medidas previstas en cada canal. Este resultado coincide con la relación entre los valores medios medido y previsto.

Se observa un comportamiento del tablero más rígido que el previsto debido a la contribución de la armadura a la rigidez del tablero no considerada en el modelo de cálculo, a posibles sobreespesores de la losa superior y a posibles resistencias del hormigón superiores a la nominal del proyecto.

- En el gráfico que se muestra a continuación se observa la comparación entre los valores máximos previstos y medidos.

OBRA DE DRENAJE ODT 1.2 SITUADA EN EL P.K. 401+163 DE LA L.A.V. MADRID-ZARAGOZA-BARCELONA-F. FRANCESA.  
TRAMO: BARCELONA SANTS-FIGUERES. SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS.  
PRUEBA ESTÁTICA. RESULTADOS EN LA SECCIÓN DE CENTRO DE VANO (FLECHAS)



- La mayor relación entre el desplazamiento neto y la luz registrada es 1/24490 para el canal 3 durante la prueba estática.
- Se han alcanzado porcentajes de recuperación del 100% en todos los puntos instrumentados.

Las recuperaciones señaladas como completas (100%) lo son únicamente de acuerdo a la sensibilidad del aparato que las registra. Así, un aparato con sensibilidad del 2% de la medida registrada no podrá dar lugar a una recuperación superior al 98%. Con el uso del 100% se quiere dar a entender únicamente que el valor residual no alcanza los márgenes de sensibilidad de la instrumentación.

## 8.2. PRUEBA DINÁMICA

- Los parámetros estadísticos básicos de las distribuciones de coeficientes de impacto son los que se recogen en el siguiente cuadro.

### COEFICIENTE DE IMPACTO

| PRUEBAS             | FLECHAS |            |
|---------------------|---------|------------|
|                     | MEDIA   | DESVIACIÓN |
| D. LENTA (30 km/h)  | 1,00    | 0,03       |
| D. RÁPIDA (70 km/h) | 1,00    | 0,00       |

Para la determinación de los coeficientes de impacto se dividen los resultados máximos obtenidos en las pruebas dinámicas, por los valores máximos obtenidos en la pasada cuasiestática.

- Mediante el tratamiento numérico de la señal de varios registros se ha estimado un valor para la frecuencia fundamental de flexión de 12,68 Hz frente al valor previsto en el proyecto de prueba de carga, 11,78 Hz.

Las diferencias existentes con los resultados en desplazamientos para la estructura pueden verse a partir de la estimación de la relación entre rigideces previstas y medidas según la doble comparación en términos de desplazamientos y de frecuencia de vibración.

$$\sqrt{\frac{flecha_{medida}}{flecha_{prevista}}} = 0,87$$

$$\frac{frecuencia_{prevista}}{frecuencia_{medida}} = 0,93$$

En la comparación establecida se aprecian resultados similares para las mediciones de frecuencia y desplazamientos, con un aumento de rigidez respecto a la prevista coherente y admisible.

## **9. CONCLUSIONES Y RECOMENDACIONES**

De acuerdo con lo expuesto en los apartados precedentes, se pueden extraer las siguientes conclusiones:

- Las flechas máximas medidas en los ensayos pueden considerarse aceptables desde cualquier punto de vista.
- El modelo estructural adoptado identifica adecuadamente el comportamiento de la estructura.
- Las recuperaciones obtenidas se pueden considerar completas e instantáneas, de lo que se deduce que la estructura ha trabajado en régimen elástico durante la prueba.
- No se ha observado la existencia de fisuras u otro tipo de daños, en el transcurso de la prueba.

De acuerdo con todo lo anterior, puede establecerse que el comportamiento de la estructura durante la prueba ha sido satisfactorio.

**Cliente:** A.D.I.F.

**Nº O.T.:**

**Refª:** I/OC-10004/CE-1

El presente documento consta de 21 páginas numeradas y selladas y de 9 anejos.

Madrid, 02 de marzo de 2010

POR EL DEPARTAMENTO DE  
CONTROLES ESPECIALES



Fdo. Suyapa Dávila Sánchez-Toscano  
Ingeniero de Caminos, Canales y Puertos

EL JEFE DE LA SECCIÓN DE  
ESTRUCTURAS



Fdo. José Ramón Arroyo Arroyo  
Ingeniero Industrial

EL JEFE DEL DEPARTAMENTO DE  
CONTROLES ESPECIALES



Fdo. Ramón Álvarez Cabal  
Dr. Ingeniero Industrial

EL DIRECTOR DE LA DIVISIÓN DE  
CONTROL DE PROYECTO



Fdo. Justo Díaz Lozano  
Dr. Ingeniero de Caminos, Canales y Puertos



**Cliente:** A.D.I.F.

**Nº O.T.:**

**Refª:** I/OC-10004/CE-1

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## **ANEJO 1: DOCUMENTACIÓN FACILITADA POR EL ADIF**

Diagrama de un muro de gravedad con un hormigón de nivelación. El muro tiene una altura de 1.75 m y una longitud de 12.00 m. El hormigón de nivelación tiene una longitud de 13.00 m.

|                     |                |
|---------------------|----------------|
| PK 401+152.825      |                |
| Marco 12,00x3,00 m  |                |
| COORDENADAS         | EJE:           |
|                     | X = 447151.415 |
|                     | Y = 4607805.71 |
|                     | Z = 155.905    |
|                     | ENTRADA :      |
|                     | X = 447149.017 |
| Y = 4607813.32      |                |
| Z = 151.341         |                |
| SAIDA :             |                |
| X = 447153.863      |                |
| Y = 4607796.61      |                |
| Z = 151.226         |                |
| LONG ENTRADA = 8.63 |                |
| LONG SAIDA = 8.72   |                |

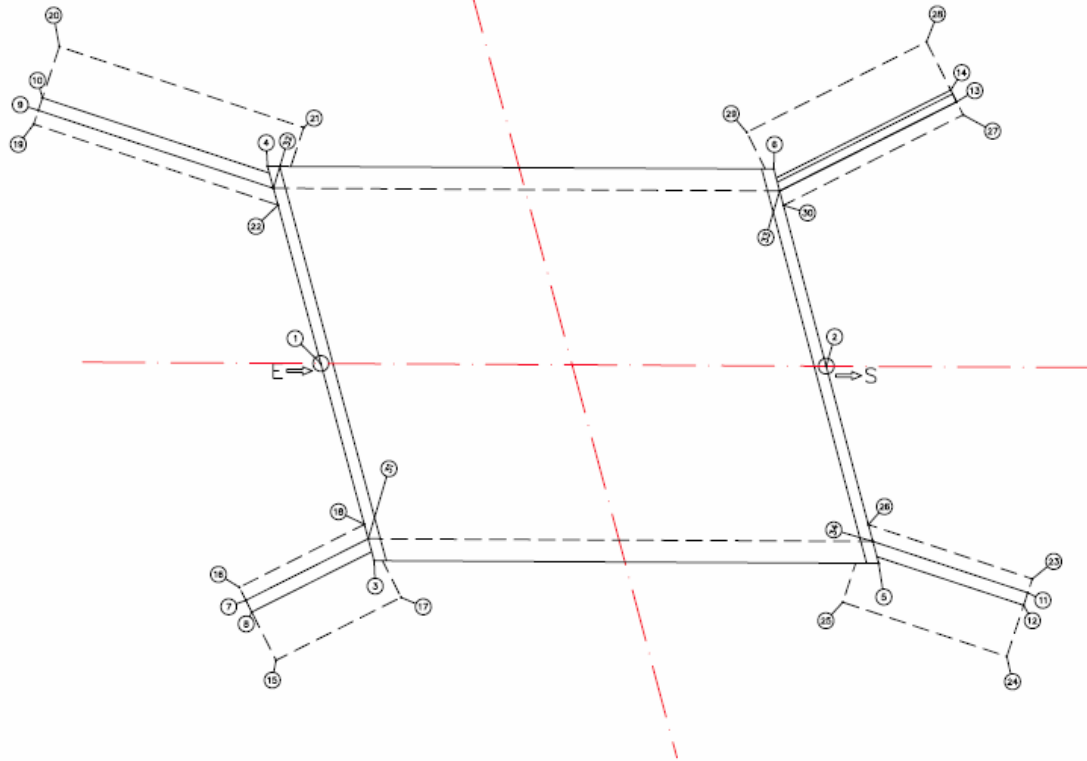
| HORMIGONES           |                            |         |     |
|----------------------|----------------------------|---------|-----|
| ELEMENTO ESTRUCTURAL | TIPO                       | CONTROL | 7   |
| ALZADOS              | HA-25/B/20/1/a             | NORMAL  | 1.5 |
| CEMENTACIONES        | HA-25/B/20/1/a             | NORMAL  | 1.5 |
| NIVELACIÓN           | $f_{ck}=15 \text{ N/mm}^2$ | NORMAL  | 1.5 |

|                            |         |         |     |
|----------------------------|---------|---------|-----|
| ACEROS                     | TIPO    | CONTROL | 7   |
| ACERO PARA ARMAR CORRUGADO | B 500 5 | NORMAL  | 1.1 |

|       |                                                                                                                                                                                                                                                                |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NOTAS | -LA RELACIÓN AGUA/CEMENTO MÁXIMA UTILIZADA SERÁ $A/C=0.55$                                                                                                                                                                                                     |
|       | -EL CONTENIDO DE CEMENTO SERÁ DE 300 $\text{kg}/\text{m}^3$ (EHE)                                                                                                                                                                                              |
|       | -SE IMPERMEABILIZARÁN TODOS LOS PARAMENTOS EN CONTACTO CON LAS TIERRAS, EXCEPTO LAS ZAPATAS.                                                                                                                                                                   |
|       | -UNIONES Y SOLAPOS DE LAS ARMADURAS SEGÚN INSTRUCCIONES EHE                                                                                                                                                                                                    |
|       | -PARA LA CIMENTACIÓN DE LOS MUROS, SE COMPROVARÁ EN OBRA QUE LA TENSIÓN ADMISIBLE E TIENRO SO SEA COMO MÍNIMO 2 $\text{kg}/\text{cm}^2$ ; SI ESTO PASA, EN COTA SEÑALADA EN PLANOS, SE HARÁ UN RELLENO CON HORMIGÓN $F_{ck}=15 \text{ N/mm}^2$ HASTA LA MISMA. |
|       | -REQUERIMIENTO DE LAS ARMADURAS = 4cm.                                                                                                                                                                                                                         |
|       | -ANTES DE PROCEDER A LA ELEVACIÓN DEL MURO, SE COMPROBARÁ SOBRE TIENRO LA VALIDEZ DEL REPLANTEO INDICADO.                                                                                                                                                      |



PLANTA  
ESCALA 1:100



| N  | X          | Y           |
|----|------------|-------------|
| 1  | 447149.017 | 4607813.316 |
| 2  | 447153.863 | 4607796.661 |
| 3  | 447143.057 | 4607809.639 |
| 4  | 447154.978 | 4607816.993 |
| 5  | 447147.894 | 4607793.012 |
| 6  | 447159.831 | 4607800.310 |
| 7  | 447140.501 | 4607813.472 |
| 8  | 447140.173 | 4607813.164 |
| 9  | 447154.579 | 4607825.080 |
| 10 | 447155.029 | 4607825.066 |
| 11 | 447148.384 | 4607787.820 |
| 12 | 447147.934 | 4607787.834 |
| 13 | 447163.824 | 4607794.949 |
| 14 | 447164.152 | 4607795.257 |
| 15 | 447138.825 | 4607811.897 |
| 16 | 447140.865 | 4607813.815 |
| 17 | 447142.113 | 4607808.398 |
| 18 | 447144.154 | 4607810.315 |
| 19 | 447154.080 | 4607825.096 |
| 20 | 447156.878 | 4607825.009 |
| 21 | 447156.604 | 4607816.183 |
| 22 | 447153.805 | 4607816.270 |
| 23 | 447148.883 | 4607787.805 |
| 24 | 447146.085 | 4607787.891 |
| 25 | 447146.266 | 4607793.815 |
| 26 | 447149.067 | 4607793.729 |
| 27 | 447163.460 | 4607794.607 |
| 28 | 447165.500 | 4607796.524 |
| 29 | 447160.772 | 4607801.555 |
| 30 | 447158.732 | 4607799.638 |
| 31 | 447143.720 | 4607810.047 |
| 32 | 447154.315 | 4607816.584 |
| 33 | 447159.168 | 4607799.904 |
| 34 | 447148.557 | 4607793.417 |



PROYECTO DE CONSTRUCCIÓN DE PLATAFORMA  
TÍTULO LA VÍA ANCHOA ZARAGOZA-MANDELLA-MONTAÑA HERRERA  
TRAMO BARCELONA-SANTO-VILLORES  
SUTRAMO LA ROCA DEL VALLES + LUNAR DEL VALLES

EL DIRECTOR DEL PROYECTO  
CONSTRUIDO:  
Féj. JUAN LUIS MONCADA TORRES

EL AUTOR DEL PROYECTO  
CONSTRUIDO:  
Féj. JOSE LUIS HERRERA GAZ

CONSEJERO  
ASISTENTE AL CONTROL DE OBRAS  
SERCAL

ESCALA NORMAL  
1:100

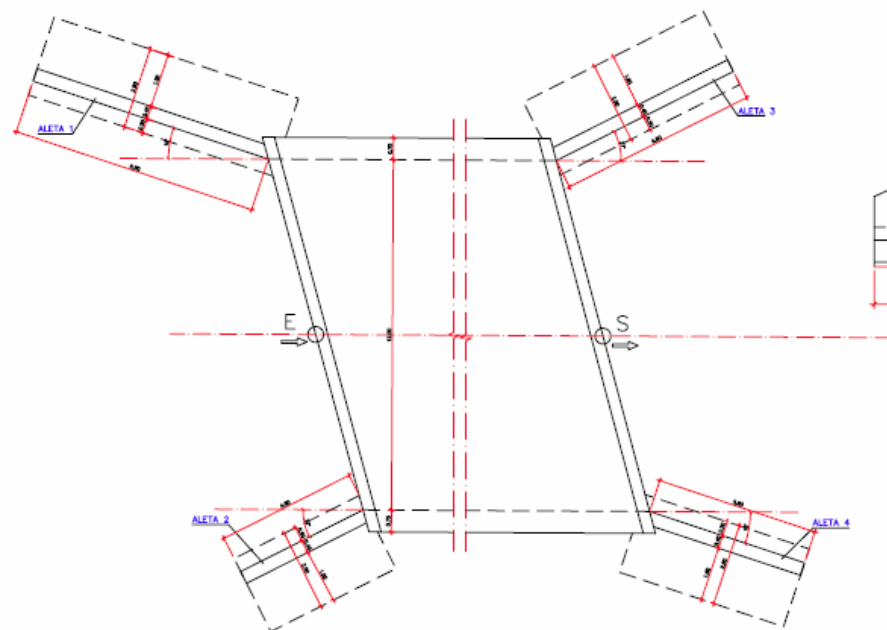


FECHA  
DICIEMBRE 2007

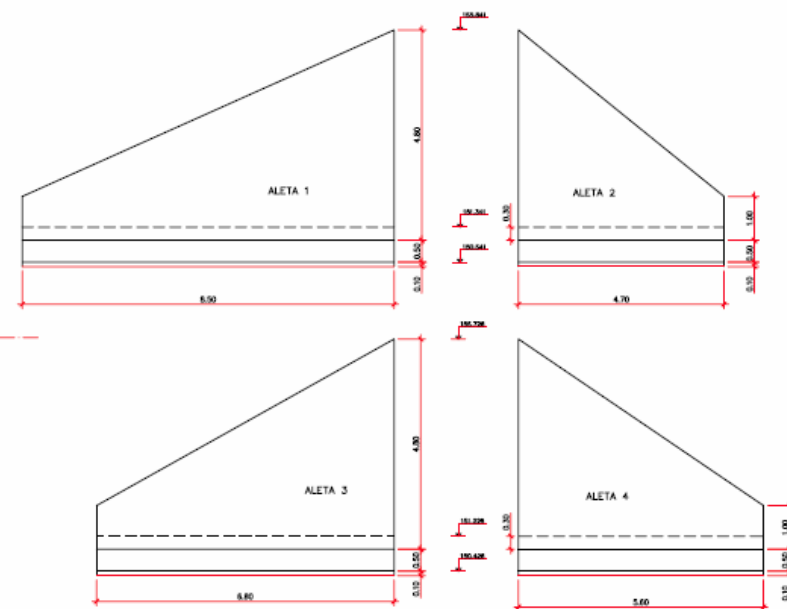
TÍTULO DEL PLANO  
DETALLES DE DRENAJE ODT 1:2  
PLANO DE REPLANTEO

Nº DE PLANO  
42/1/2  
Hoja 2 de 10

PLANTA  
ESCALA 1:150



ALZADO ALETAS  
ESCALA 1:100



CARACTERÍSTICAS DE LOS MATERIALES  
NIVELES DE CONTROL Y COEFICIENTES DE SEGURIDAD ADOPTADOS

| HORMIGONES    |                          |         |          |
|---------------|--------------------------|---------|----------|
| ELEMENTO      | TIPO                     | CONTROL | $\gamma$ |
| ACEROS        | HA-25/B/20/8c            | NORMAL  | 1,50     |
| ORIENTACIONES | HA-25/B/20/8c            | NORMAL  | 1,50     |
| REVELACIÓN    | Fck=15 N/mm <sup>2</sup> | NORMAL  | 1,50     |

| ACEROS                    |         |         |          |
|---------------------------|---------|---------|----------|
| ACEROS                    | TIPO    | CONTROL | $\gamma$ |
| ACERO PARA ARMAR CORBUADO | B 500 S | NORMAL  | 1,15     |

COEFICIENTES DE MAYORACIÓN DE LAS ADOSIONES SEGÚN EHE.  
EJECUCIÓN DE LA OBRA.  
ELEMENTOS IN SITU CONTROL INTENSO.



PROYECTO DE CONSTRUCCIÓN DE PLATAFORMA  
TÍTULO LA-1, VÍA DE ENLACE DE LA LÍNEA DE ALTA VELOCIDAD  
TRAMO: BARCELONA - SANTIS - FIGUERAS  
SITUACIÓN: LA ROCA DEL VALLES - LÍNEA DEL VALLES

EL DIRECTOR DEL PROYECTO  
CONSTRUIDO:  
Fdo: JUAN LUIS MONTEAÑOS TORRES

EL AUTOR DEL PROYECTO  
CONSTRUIDO:  
Fdo: JOSE LUIS HERVINO SÁEZ

CONSEJERO  
(ASISTENTE AL CONTROL DE OBRAS)  
SERCAL

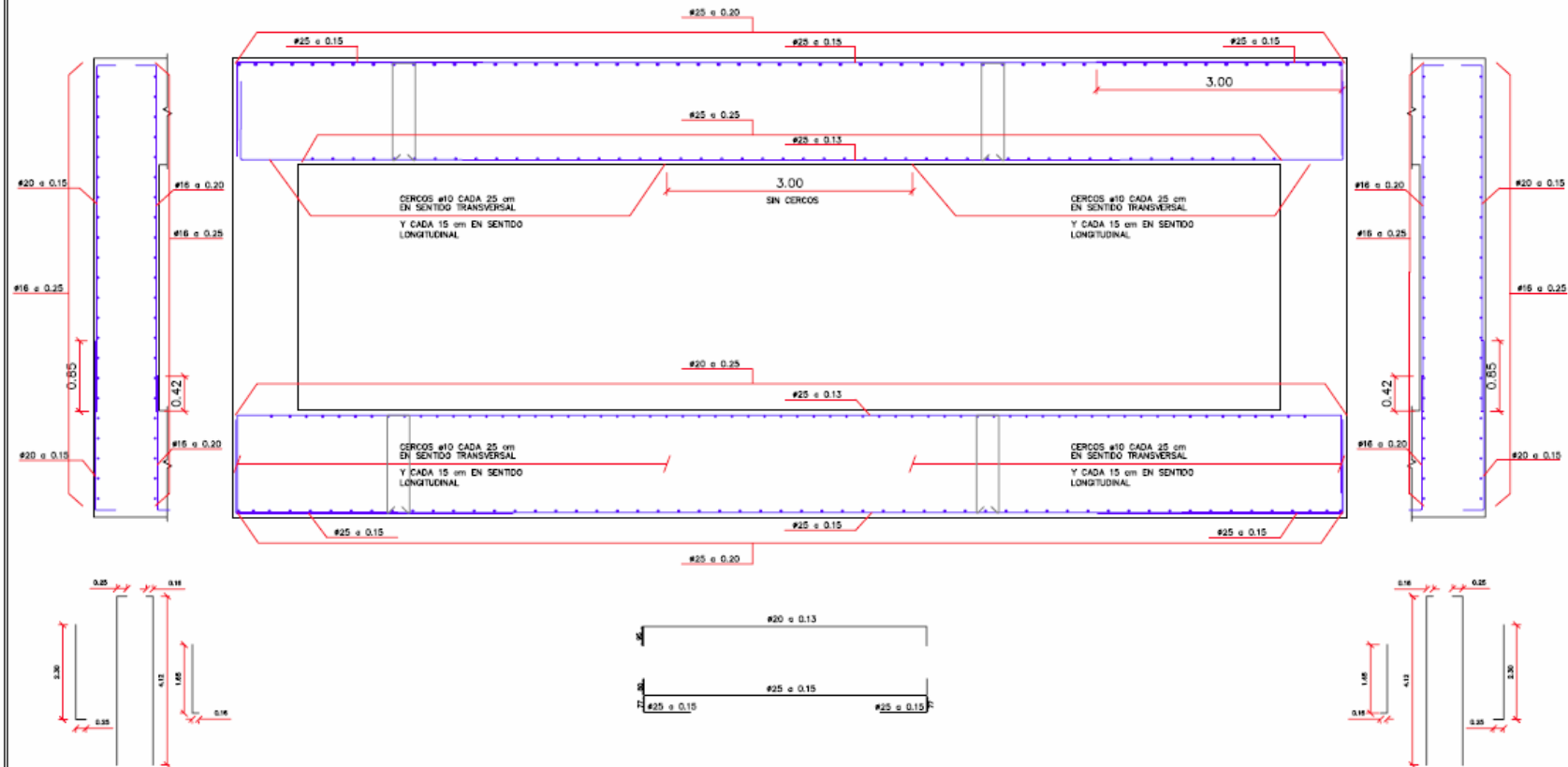
ESCALA NORMAL  
1:150  
1:100

0 3,75 m  
0 2,50 m

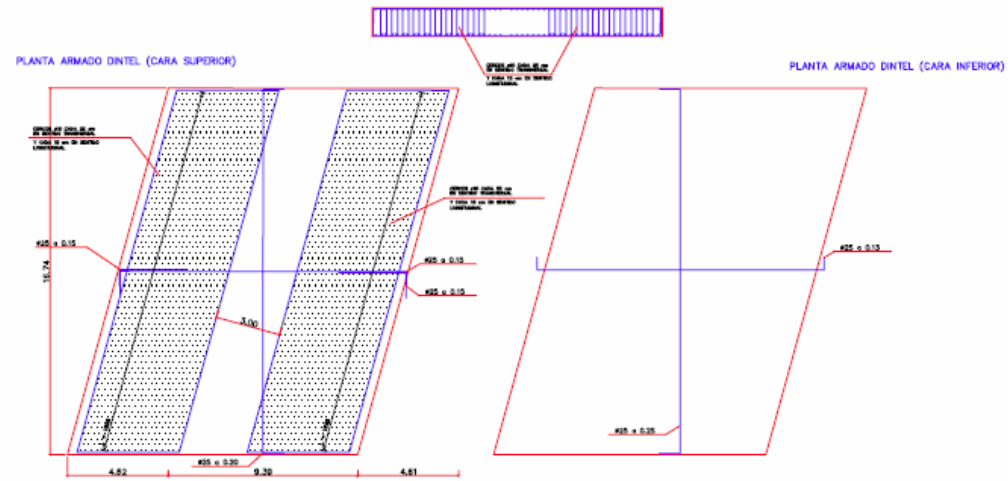
FECHA  
OCTUBRE 2007

TÍTULO DEL PLANO  
DETALLES DE DRENAJE OOT 1,2  
DEFINICIÓN GEOMÉTRICA

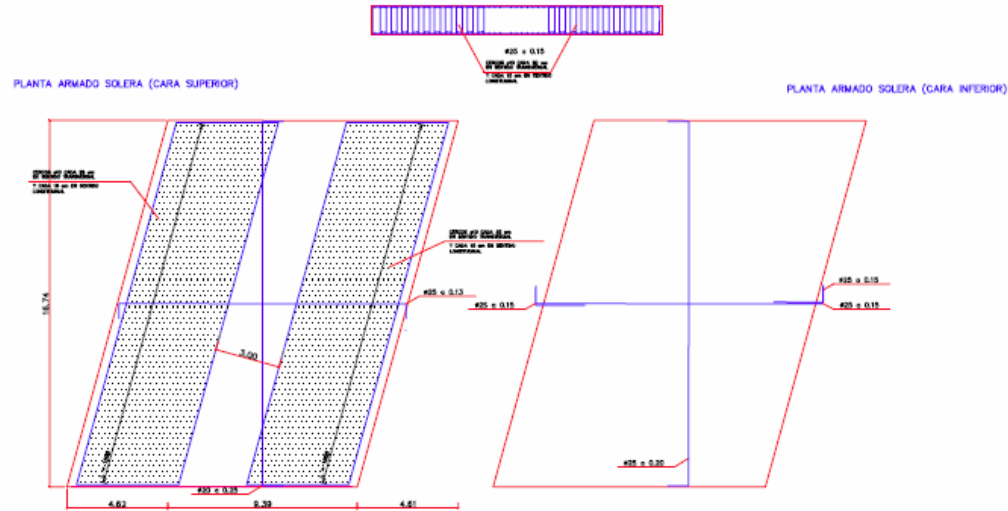
Nº DE PLANO  
42/15  
Hoja 3 de 10



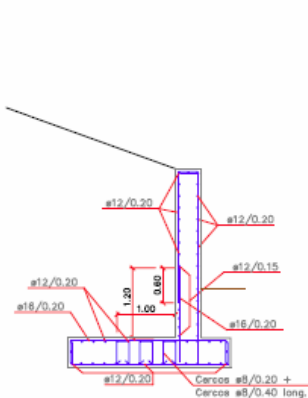
# ALZADO ARMADO DINTEL



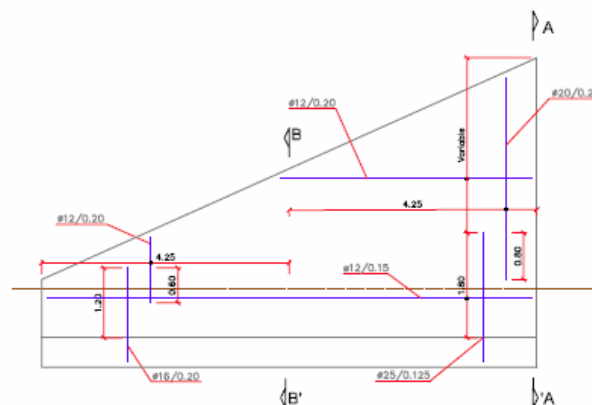
# ALZADO ARMADO SOLERA



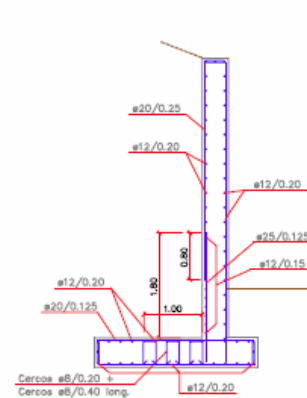
SECCION B-B' ARMADURA ALETA 1  
ESCALA 1:75



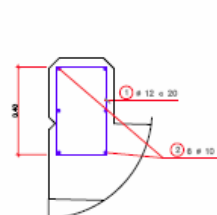
ALZADO ARMADURA ALETA 1  
ESCALA 1:75



SECCION A-A' ARMADURA ALETA 1  
ESCALA 1:75



ARMADURA IMPOSTA  
ESCALA 1:20



DETALLE IMPOSTA  
ESCALA 1:20



DESPIECE DE LA IMPOSTA

| PROFUNDIDAD | Nº DE BARRAS | ESPESOR DE LA IMPOSTA (cm) | FORMA L = cm | LONGITUD DE LA IMPOSTA (cm) | ANCHO DE LA IMPOSTA (cm) | ESPESOR DE LA IMPOSTA (cm) | ESPESOR DE LA IMPOSTA (cm) | ESPESOR DE LA IMPOSTA (cm) |
|-------------|--------------|----------------------------|--------------|-----------------------------|--------------------------|----------------------------|----------------------------|----------------------------|
| 1           | 12           | 5                          | 2.82         | 40                          | 40                       | 20                         | 14.8                       | 0.88                       |
| 2           | 12           | 10                         | 1.06         | 70                          | 70                       | 100                        | 10.0                       | 0.88                       |

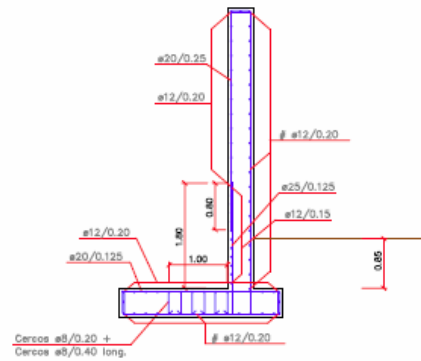
CARACTERÍSTICAS DE LOS MATERIALES  
NIVELES DE CONTROL Y COEFICIENTES DE SEGURIDAD ADOPTADOS

| HORMIGONES           |                          |         |          |
|----------------------|--------------------------|---------|----------|
| ELEMENTO ESTRUCTURAL | TIPO                     | CONTROL | $\gamma$ |
| ALZADOS              | HA-25/S/20/1e            | NORMAL  | 1.50     |
| IMENTACIONES         | HA-25/S/20/1e            | NORMAL  | 1.50     |
| NAVELACIÓN           | Fck=15 N/mm <sup>2</sup> | NORMAL  | 1.50     |

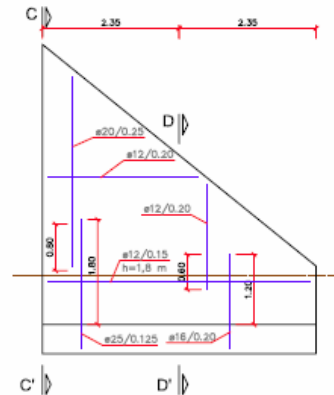
| ACEROS                     |         |         |          |
|----------------------------|---------|---------|----------|
| ACEROS                     | TIPO    | CONTROL | $\gamma$ |
| ACERO PARA ARMAR CORRUGADO | B 500 S | NORMAL  | 1.15     |

COEFICIENTES DE MAYORACIÓN DE LAS ADICIONES SEGÚN EHE.  
EJECUCIÓN DE LA OBRA.  
ELEMENTOS IN SITU CONTROL INTENSO.

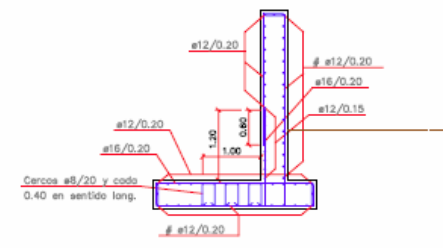
SECCION C-C' ARMADURA ALETA 2  
ESCALA 1:75



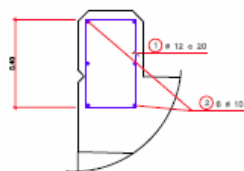
ALZADO ARMADURA ALETA 2  
ESCALA 1:75



SECCION D-D' ARMADURA ALETA 2  
ESCALA 1:75



ARMADURA IMPOSTA  
ESCALA 1:20



DETALLE IMPOSTA  
ESCALA 1:20



DESPIEGE DE LA IMPOSTA

| PARTE | Nº | ESPESOR | FORMA | LONGITUD | ANCHO | ESPESOR |
|-------|----|---------|-------|----------|-------|---------|
| 1     | 12 | 5       | 2.00  | 14.6     | 0.80  | 12.00   |
| 2     | 12 | 10      | 1.00  | 10.0     | 0.80  | 8.00    |

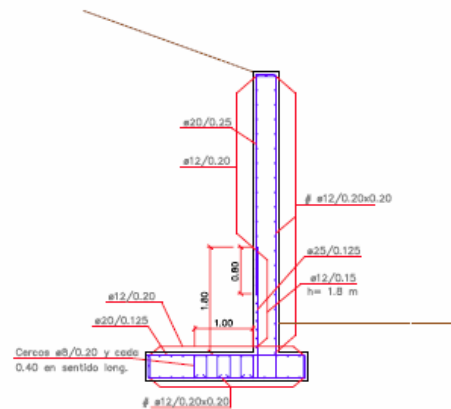
CARACTERÍSTICAS DE LOS MATERIALES  
NIVELES DE CONTROL Y COEFICIENTES DE SEGURIDAD ADOPTADOS

| HORMIGONES           |               |         |      |
|----------------------|---------------|---------|------|
| ELEMENTO ESTRUCTURAL | TIPO          | CONTROL | γ    |
| ALZADOS              | HA-25/B/20/10 | NORMAL  | 1.50 |
| CEMENTACIONES        | HA-25/B/20/10 | NORMAL  | 1.50 |
| NIVELACIÓN           | Fck=15 N/mm²  | NORMAL  | 1.50 |

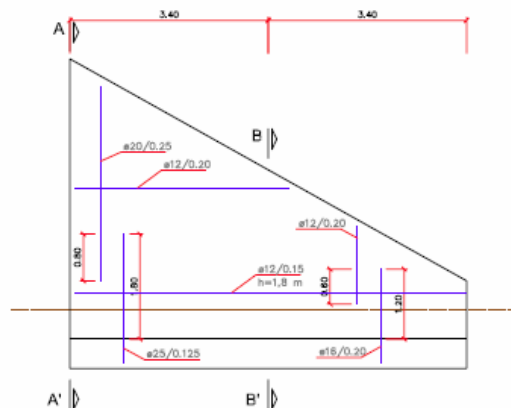
| ACEROS                     |         |         |      |
|----------------------------|---------|---------|------|
| ACEROS                     | TIPO    | CONTROL | γ    |
| ACERO PARA ARMAR CORRUGADO | B 500 S | NORMAL  | 1.15 |

COEFICIENTES DE MAYORACIÓN DE LAS ACCIONES SEGUN EHE.  
EJECUCIÓN DE LA OBRA.  
ELEMENTOS IN SITU CONTROL INTENSO.

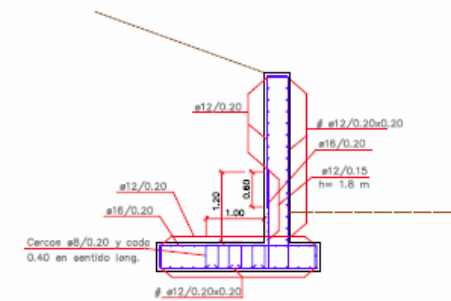
SECCIÓN A-A' ARMADURA ALETA 3  
ESCALA 1:75



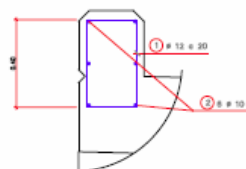
ALZADO ARMADURA ALETA 3  
ESCALA 1:75



SECCIÓN B-B' ARMADURA ALETA 3  
ESCALA 1:75



ARMADURA IMPOSTA  
ESCALA 1:20



DETALLE IMPOSTA  
ESCALA 1:20



DESPIECE DE LA IMPOSTA

| ORDEN | #  | VAR. | LONGITUD | FORMA | LONGITUD | ORDEN | #  | VAR. | LONGITUD | FORMA | LONGITUD |
|-------|----|------|----------|-------|----------|-------|----|------|----------|-------|----------|
| 1     | 12 | 5    | 2.82     | 20    | 40       | 2     | 12 | 10   | 1.00     | 70    | 100      |
| 2     | 12 | 10   | 1.00     | 70    | 100      |       |    |      |          |       |          |

CARACTERÍSTICAS DE LOS MATERIALES  
NIVELES DE CONTROL Y COEFICIENTES DE SEGURIDAD ADOPTADOS

| HORMIGONES           |                          |         |          |
|----------------------|--------------------------|---------|----------|
| ELEMENTO ESTRUCTURAL | TIPO                     | CONTROL | $\gamma$ |
| ALZADOS              | HA-25/B/20/16            | NORMAL  | 1.50     |
| CIMENTACIONES        | HA-25/B/20/16            | NORMAL  | 1.50     |
| NIVELACIÓN           | Fck=15 N/mm <sup>2</sup> | NORMAL  | 1.50     |

| ACEROS                     |         |         |          |
|----------------------------|---------|---------|----------|
| ACEROS                     | TIPO    | CONTROL | $\gamma$ |
| ACERO PARA ARMAR CORRUGADO | B 500 S | NORMAL  | 1.15     |

COEFICIENTES DE MAYORACIÓN DE LAS ACCIONES SEGÚN EHE.  
EJECUCIÓN DE LA OBRA.  
ELEMENTOS IN SITU CONTROL INTENSO.



PROYECTO CONSTRUIDO DE PLATAFORMA  
TÍTULO LA LÍNEA BILBAO-BARCELONA-MADRID-VALENCIA-SEVILLA  
TRAMO: BARCELONA-SANTS-FIGUERES  
SANTIRAMÓ Y LA ROCA DEL VALLES + L'ENFORS DEL VALLES

EL DIRECTOR DEL PROYECTO  
CONSTRUIDO:  
Fco. J. JUAN LUIS MONTEAGÜES TORRES

EL AUTOR DEL PROYECTO  
CONSTRUIDO:  
Fco. J. JOSE LUIS HERNÁNDEZ SÁIZ

CONSEJERO  
ASISTENTE AL CONTROL DE OBRA:  
SERCAL

ESCALA NORMAL  
1:100  
1:200  
1:500

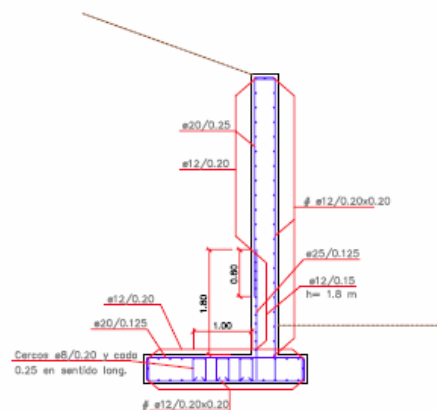


FECHA  
DICIEMBRE 2007

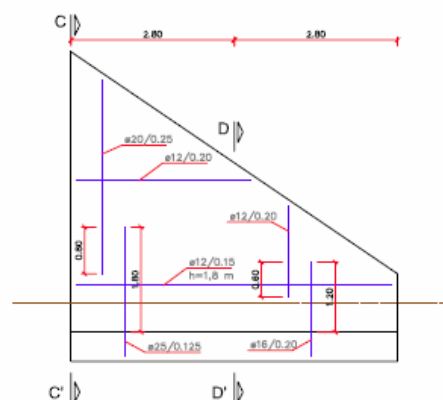
TÍTULO DEL PLANO  
DETALLES DE DRENAJE ODT 1-2  
ARMADO ALETA 3

Nº DE PLANO  
A2.1.1.6  
Hoja 6 de 10

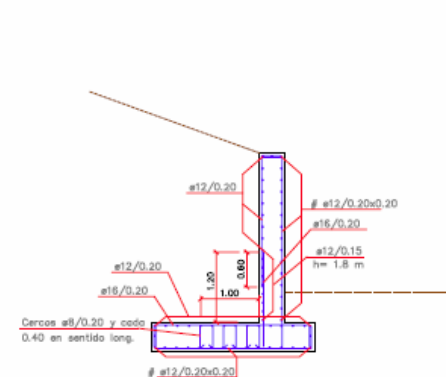
SECCIÓN C-C' ARMADURA ALETA 4  
ESCALA 1:75



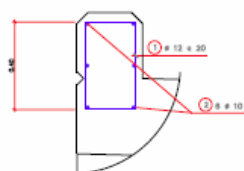
ALZADO ARMADURA ALETA 4  
ESCALA 1:75



SECCIÓN D-D' ARMADURA ALETA 4  
ESCALA 1:75



ARMADURA IMPOSTA  
ESCALA 1:20



DETALLE IMPOSTA  
ESCALA 1:20



DESPIECE DE LA IMPOSTA

| ALZADO | Nº | h. barra | longitud | FORMA<br>L = cm | longitud<br>total | peso<br>total | peso<br>unitario |
|--------|----|----------|----------|-----------------|-------------------|---------------|------------------|
| 1      | 12 | 5        | 2.82     | 49              | 14.6              | 0.89          | 12.98            |
| 2      | 12 | 10       | 1.00     | 70              | 10.0              | 0.89          | 8.90             |
|        |    |          |          |                 | 24.6              | 0.89          | 27.88            |

CARACTERÍSTICAS DE LOS MATERIALES  
NIVELES DE CONTROL Y COEFICIENTES DE SEGURIDAD ADOPTADOS

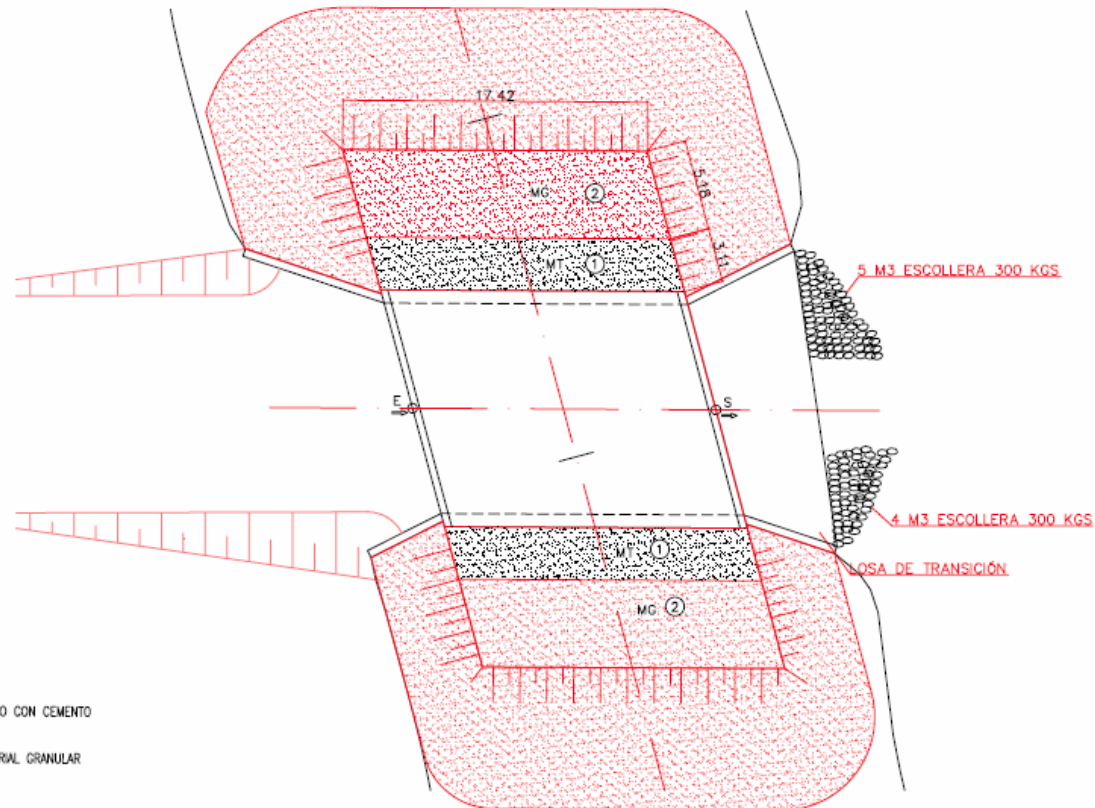
| HORMIGONES           |               |         |      |
|----------------------|---------------|---------|------|
| ELEMENTO ESTRUCTURAL | TIPO          | CONTROL | γ    |
| ALZADOS              | HA-25/B/20/10 | NORMAL  | 1.50 |
| CEMENTACIONES        | HA-25/B/20/10 | NORMAL  | 1.50 |
| NEVELACIÓN           | Fck=15 N/mm²  | NORMAL  | 1.50 |

| ACEROS                     |         |         |      |
|----------------------------|---------|---------|------|
| ACEROS                     | TIPO    | CONTROL | γ    |
| ACERO PARA ARMAR CORRUGADO | B 500 S | NORMAL  | 1.15 |

COEFICIENTES DE MAYORACIÓN DE LAS ACCIONES SEGÚN EHE.  
EJECUCIÓN DE LA OBRA.  
ELEMENTOS IN SITU CONTROL INTENSO.

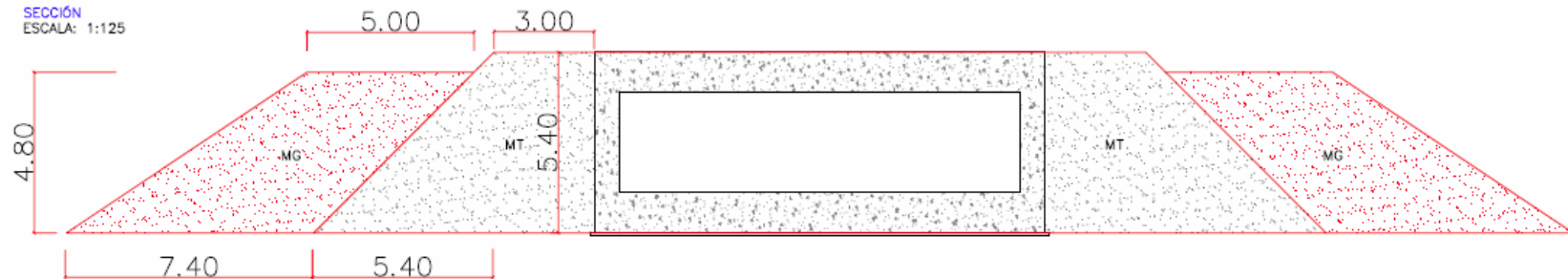


PLANTA  
ESCALA: 1:250



 MT = MATERIAL TRATADO CON CEMENTO  
 MG = CUÑA CON MATERIAL GRANULAR

SECCIÓN  
ESCALA: 1:125



PROYECTO CONSTRUCCIÓN DE PLATAFORMA  
TRÁMITE DE LA VÍA DE ALTA VELOCIDAD EN LA LÍNEA DE ALTA VELOCIDAD  
SUBTRÁMITE DE LA VÍA DE ALTA VELOCIDAD EN LA LÍNEA DE ALTA VELOCIDAD

EL DIRECTOR DEL PROYECTO  
CONSTRUCCIÓN:  
Fdo: JUAN LUIS MONTERO TORRES

EL AUTOR DEL PROYECTO  
CONSTRUCCIÓN:  
Fdo: JOSE LUIS HERRERA SÁEZ

COORDINADOR  
ASISTENTE AL CONTROL DE OBRAS:  
SERCAL

ESCALA NORMAL  
1:250  
1:125  
Número  
Gráfica

0 6,25 m  
0 3,125 m

FECHA  
DICIEMBRE 2007

TÍTULO DEL PLANO  
DETALLES DE CUÑAS  
CDT 1.2 (PAJ 401+162,825)

Nº DE PLANO  
42/15  
Hoja 10 de 10

## **ANEJO 2: PROYECTO DE PRUEBA DE CARGA**

**PROYECTO DE PRUEBA DE CARGA DE LA OBRA DE  
DRENAJE ODT 1.2 SITUADA EN EL P.K. 401+162  
PERTENECIENTE A LA L.A.V. MADRID-ZARAGOZA-  
BARCELONA-FRONTERA FRANCESA.  
TRAMO: BARCELONA SANTS-FIGUERES  
SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS**

**FEBRERO DE 2010**

**Peticionario: A.D.I.F. C/ Titán nº 4, 28045 MADRID.**

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MEDIDA

ANEJO 2-D- ANÁLISIS DE PROYECTO

## **1.- INTRODUCCIÓN**

A instancias del Administrador de Infraestructuras Ferroviarias (A.D.I.F.), se redacta el presente documento cuyo objeto es la especificación de la Prueba de Carga de recepción de la estructura de la “OBRA DE DRENAJE ODT 1.2 SITUADA EN EL P.K. 401+162 PERTENECIENTE A LA L.A.V. MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA. TRAMO: BARCELONA SANTS-FIGUERES. SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS”, de acuerdo a las condiciones del Contrato de asistencia para la realización de pruebas de carga e inspecciones de puentes de la línea de alta velocidad Madrid-Zaragoza-Barcelona-Frontera Francesa. Tramo: la Roca del Vallés-Riudellots de la Selva. suscrito por la UTE PC LAV la Roca del Vallés-Riudellots de la Selva (GEOCISA – INTEMAC).

El alcance del citado contrato es la realización de las preceptivas pruebas de carga en las estructuras, con anterioridad a su puesta en servicio, de acuerdo con la “Instrucción de acciones a considerar en puentes de ferrocarril”.

## **2.- DATOS DE LA ESTRUCTURA**

La estructura objeto de la Prueba de Carga es una obra de drenaje formada por un marco de hormigón armado de 12,00 m de luz libre.

Las losas superior e inferior del marco tienen un espesor de 1,20 m y la altura libre existente entre ambas es de 3,00 m. Los hastiales presentan un espesor de 0,75 m.

El ancho total de la estructura, en dirección perpendicular al trazado de la vía, es de 17,35 m.

El paso presenta un esviaje de 75 °.

La infraestructura viaria dispuesta corresponde a dos vías de ferrocarril de ancho internacional

con una separación aproximada entre ejes de vías de 4,70 m, de acuerdo con los planos de secciones tipo facilitados.

La documentación facilitada por el Peticionario consiste en la memoria de cálculo y planos de la estructura. En el Anejo 2-A se incluye copia de los planos facilitados.

### **3.- JUSTIFICACIÓN DE LA CARGA DE PRUEBA**

Para la realización de la Prueba de Carga el Peticionario nos ha confirmado la disponibilidad del tren de cargas formado por 2 locomotoras de seis ejes y con un peso unitario de 120 t.

Las características del tren de cargas en lo que a geometría y peso por eje se refiere vienen expresadas en el Anejo 2-C, donde se acompañan, además, los croquis con la disposición de cargas sobre el tablero durante la prueba estática.

El peso total máximo de las cargas situadas sobre la estructura durante la realización de la prueba estática será de 120 t.

En la memoria de cálculo facilitada no se han encontrado los esfuerzos de cálculo considerados en el proyecto de la estructura, por lo que no ha sido posible obtener el porcentaje de solicitación que la prueba de carga representa frente a la sobrecarga de Proyecto.

### **4.- MEDIDAS A REALIZAR**

A continuación se exponen las medidas que se realizarán durante los ensayos de Prueba de Carga, mediante la instrumentación que se detalla en los croquis del Anejo 2-C.

#### **4.1. SOBRE FLECHAS**

Los desplazamientos medidos serán los verticales, en las posiciones definidas en el Anejo 2-C.

La medida de las flechas será realizada mediante anillos extensométricos, registrándose dichas medidas, tanto durante las pruebas estáticas como durante las dinámicas.

#### **4.2. SOBRE ACELERACIONES**

Durante las pruebas dinámicas se procederá a un registro de las aceleraciones verticales con el objeto de evaluar la frecuencia fundamental de oscilación de la estructura.

La medida de las aceleraciones verticales se realizará mediante un acelerómetro piezoeléctrico integrado en la cadena de medida.

#### **4.3. OTRAS MEDIDAS**

Se procederá a un registro continuo de temperatura y humedad relativa ambiente, durante toda la realización del ensayo.

### **5.- PLAN DE CARGA Y PROGRAMACIÓN DEL ENSAYO**

#### **5.1. PRUEBAS ESTÁTICAS**

Para la realización de las pruebas estáticas se posicionará el tren de carga según la disposición indicada en los croquis del Anejo 2-C.

Las medidas serán realizadas de acuerdo con los escalones siguientes:

ESCALÓN 0: Puesta a cero de los aparatos.

ESCALÓN 1: Situación de la carga.

ESCALÓN 2: Estabilización de las medidas. Se realizarán medidas continuas hasta comprobar la estabilización de las mismas.

ESCALÓN 3: Descarga total y medida de la recuperación. Las lecturas se realizarán de una forma continua hasta alcanzar una recuperación del 80% en un intervalo de tiempo no superior al de mantenimiento de la carga.

## 5.2. PRUEBAS DINÁMICAS

Para las pruebas dinámicas se hará uso del tren de cargas formado por una de las locomotoras utilizadas en la prueba estática.

Se realizarán las siguientes pruebas de carácter dinámico:

- |                         |                                                                                                                |
|-------------------------|----------------------------------------------------------------------------------------------------------------|
| Ensayo Cuasiestático:   | Paso de la locomotora por la estructura circulando a la velocidad de 5 km/h, (paso de hombre).                 |
| Ensayo Dinámico Lento:  | Paso de la locomotora del ensayo anterior circulando en el mismo sentido y a la velocidad de 30 km/h.          |
| Ensayo Dinámico Rápido: | Paso de la locomotora del ensayo cuasiestático circulando en el mismo sentido y a la máxima velocidad posible. |
| Ensayo de Frenado:      | Paso de una locomotora cualquiera circulando a la máxima velocidad posible y frenando sobre el tablero.        |

Las pruebas se realizarán en el siguiente orden:

ESTÁTICA  
CUASIESTÁTICA  
DINÁMICA LENTA



DINÁMICA RÁPIDA

FRENADO

**6.- PREVISIÓN DE RESULTADOS**

En el Anejo 2-B figura la relación de las flechas que cabe esperar durante el ensayo estático, así como la estimación de la frecuencia fundamental de flexión de la estructura.

A continuación se expone el resumen de los valores calculados para las características de los materiales definidos en proyecto. La situación de los puntos de medida se indica en los croquis de instrumentación del Anejo 2-C.

**PRUEBA ESTÁTICA**

| CANALES | FLECHA (mm) |
|---------|-------------|
| C1      | 0,33        |
| C2      | 0,47        |
| C3      | 0,49        |
| C4      | 0,47        |
| C5      | 0,32        |

El valor calculado para la frecuencia fundamental de flexión del marco es de 11,27 Hz.

El presente documento consta de 8 páginas numeradas y selladas y de 4 anejos.

Madrid, 3 de febrero de 2010

POR EL DEPARTAMENTO DE  
CONTROLES ESPECIALES



Fdo. Suyapa Dávila Sánchez-Toscano  
Ingeniero de Caminos, Canales y Puertos

EL JEFE DE LA SECCIÓN DE  
ESTRUCTURAS



Fdo. José Ramón Arroyo Arroyo  
Ingeniero Industrial

EL JEFE DEL DEPARTAMENTO DE  
CONTROLES ESPECIALES



Fdo. Ramón Álvarez Cabal  
Dr. Ingeniero Industrial



**Cliente:** A.D.I.F.

**Nº O.T.:**

**Ref<sup>a</sup>.:** I/OC-10004/CE

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## **ANEJO 2-A- DOCUMENTACIÓN GRÁFICA UTILIZADA**



**Cliente:** A.D.I.F.

**Nº O.T.:**

**Refª:** I/OC-10004/CE

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## ANEJO 2-B- EVALUACIÓN DE FLECHAS

# CARACTERÍSTICAS MECÁNICAS DE LAS SECCIONES Y TREN DE CARGAS PARA LA PRUEBA DE CARGA DE LA OBRA DE DRENAJE ODT 1.2 (P.K. 401+162) DE LA L.A.V. DE MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA. TRAMO: BARCELONA SANTS-FIGUERES. SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS.

## 0.-UNIDADES

$$\text{kN} := 1000 \cdot \text{newton} \quad \text{N} := 1 \cdot \text{newton}$$

$$\text{tm} := 10^3 \cdot \text{kg} \quad \text{Toneladas masa}$$

$$\text{t} := 10^3 \cdot \text{kgf} \quad \text{Toneladas fuerza}$$

## 1.- CARACTERÍSTICAS DE LAS DISTINTAS ZONAS DE LOSAS

$$\text{Luz} := 12 \cdot \text{m} \quad \text{Luz de cálculo}$$

$$f_{ck} := 25 \cdot \frac{\text{N}}{\text{mm}^2} \quad \text{Resistencia característica del hormigón}$$

$$f_{cm} := f_{ck} + 8 \cdot \frac{\text{N}}{\text{mm}^2} \quad f_{cm} = 33 \cdot \frac{\text{N}}{\text{mm}^2} \quad \text{Resistencia media del hormigón}$$

$$E := 10000 \cdot \sqrt[3]{f_{cm}} \cdot \left( \frac{\text{N}}{\text{mm}^2} \right)^{\frac{2}{3}} \quad E = 3.208 \times 10^4 \cdot \frac{\text{N}}{\text{mm}^2} \quad \text{Módulo de deformación del hormigón}$$

$$\text{DH} := 2.5 \cdot \frac{\text{tm}}{\text{m}^3} \quad \text{Densidad del hormigón armado}$$

$$\text{DR} := 0 \cdot \frac{\text{tm}}{\text{m}^3} \quad \text{Densidad de los rellenos}$$

$$\text{DB} := 1.8 \cdot \frac{\text{tm}}{\text{m}^3} \quad \text{Densidad del balasto}$$

$$\text{DTV} := 0.64 \cdot \frac{\text{tm}}{\text{m}} \quad \text{Densidad de las traviesas y de la vía}$$

$$\text{DBA} := 0 \cdot \frac{\text{tm}}{\text{m}^3} \quad \text{Densidad de la barandilla}$$

$$\text{DC} := 0.3 \cdot \frac{\text{tm}}{\text{m}} \quad \text{Conductos para cableado}$$

## LOSA INFERIOR

$$EL := 1.2 \cdot m$$

Espesor de la losa

$$ER := 0 \cdot m$$

Espesor aglomerado

$$DE := \frac{EL \cdot DH + ER \cdot DBA}{EL}$$

$$DE = 2.50 \frac{tm}{m^3}$$

Masa equivalente del material

## LOSA SUPERIOR BAJO BALASTO

$$ELSC := 1.2 \cdot m$$

Espesor de la losa

$$ET := 0 \cdot m$$

Espesor del relleno hasta el balasto

$$EB := 0.991 \cdot m$$

Espesor del balasto (plano secciones tipo)

$$ATV := 10.5 \cdot m$$

Ancho para el reparto de la vía

$$DE := \frac{ELSC \cdot DH + ET \cdot DR + EB \cdot DB + \frac{2DTV}{ATV} + \frac{DC}{ATV}}{ELSC}$$

$$DE = 4.11 \frac{tm}{m^3}$$

Masa equivalente del material

## LOSA SUPERIOR EN ZONA SIN BALASTO

$$DE := \frac{ELSC \cdot DH + ET \cdot DR}{ELSC}$$

$$DE = 2.50 \frac{tm}{m^3}$$

Masa equivalente del material

## 2.- POSICIÓN DEL TREN DE CARGAS

### 2.1. TREN DE CARGAS

Se han previsto para la prueba de carga un tren de carga compuesto por dos locomotoras de seis ejes y 120 t de peso unitario. Seguidamente se estima la situación del tren de cargas que produce mayor momento flector en la sección de centro de vano considerado isostático.

### 2.2.- POSICION DEL TREN DE CARGAS

Se dibuja la línea de influencia de momentos al objeto de mostrar la posición de máximo momento:

$nc := 6$

nc es el número de cargas

$l := 1 .. nc$

| $F_l :=$ | $L_l :=$                             |
|----------|--------------------------------------|
| 2·20·t   | 0·m                                  |
| 2·20·t   | 2.05·m                               |
| 2·20·t   | (2.05 + 2.06)·m                      |
| 2·20·t   | (2.05 + 2.06 + 7.22)·m               |
| 2·20·t   | (2.05 + 2.06 + 7.22 + 2.06)·m        |
| 2·20·t   | (2.05 + 2.06 + 7.22 + 2.06 + 2.05)·m |

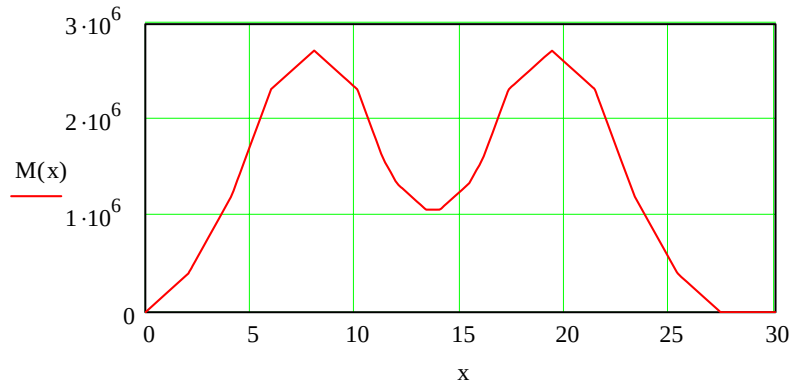
$LTC := 18.075 \cdot m$

Longitud del tren de cargas

$$R_i(x) := \frac{\sum_{i=1}^{nc} F_i \cdot \text{if} \left[ (x - L_i) > 0 \cdot m, \left[ \text{if} \left[ (x - L_i) < Luz, \left[ Luz - (x - L_i) \right], 0 \cdot m \right] \right], 0 \cdot m \right]}{Luz}$$

$$M(x) := R_i(x) \cdot \frac{Luz}{2} - \sum_{i=1}^{nc} F_i \cdot \text{if} \left[ (x - L_i) > 0 \cdot m, \left[ \text{if} \left[ (x - L_i) < \frac{Luz}{2}, \left[ \frac{Luz}{2} - (x - L_i) \right], 0 \cdot m \right] \right], 0 \cdot m \right]$$

$$x := 0 \cdot \text{m}, 0.05 \cdot \text{m} \dots \text{Luz} + \text{LTC}$$



$$\text{posición} := \frac{\text{Luz}}{2} + 2.05 \cdot \text{m}$$

$$\text{posición} = 8.05 \text{ m}$$

La posición más desfavorable del tren se produce cuando en la sección de centro de vano se encuentra el segundo eje. El momento alcanzado en la sección transversal central toma un valor de:

$$M(\text{posición}) = 2724.29 \text{ m} \cdot \text{kN}$$

### MOMENTO FLECTOR OBTENIDO DEBIDO A UN TREN TIPO UIC-71

La sobrecarga de diseño se obtiene para el tren UIC71 de la Instrucción IAPF (se introduce la carga de los dos trenes):

$$\text{ancho\_acera} := 0 \text{ m}$$

$$Q := 2 \cdot 8 \cdot \frac{t}{\text{m}}$$

Carga uniforme

$$P := 2 \cdot 25 \cdot t$$

Cargas puntuales

$$\alpha := 1.21$$

Coefficiente de clasificación para vías de ancho RENFE

$$S_d := \text{ancho\_acera} \cdot 0.5 \cdot \frac{t}{\text{m}^2} \cdot \text{Luz} + 4 \cdot P + Q \cdot (\text{Luz} - 6.4 \cdot \text{m})$$

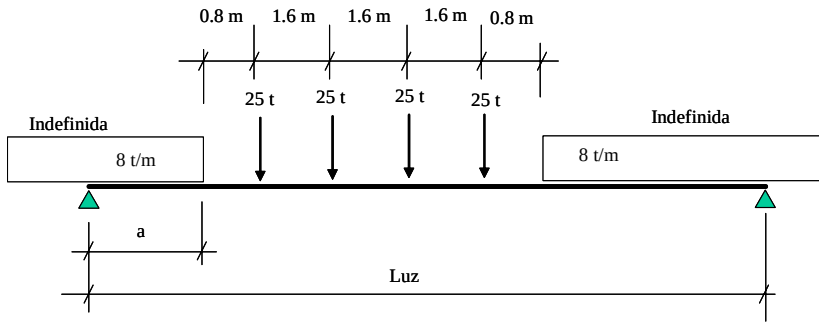
$$S_d = 289.6 \text{ t}$$

Seguidamente se calcula el porcentaje de carga en lo que a momentos se refiere:

Posiciones de los distintos puntos del tren de cargas:

a = tramo de carga uniforme del tren UIC71 que está en el vano



**TREN UIC-71**

$$D1(a) := a + 0.8 \cdot m$$

$$D2(a) := a + 2.4 \cdot m$$

$$D3(a) := a + 4.0 \cdot m$$

$$D4(a) := a + 5.6 \cdot m$$

$$D5(a) := a + 6.4 \cdot m$$

Para el cálculo de la reacción:

$$AR(a) := \text{if}(a < 0 \cdot m, 0 \cdot m, \text{if}(a < Luz, a, Luz))$$

$$DR1(a) := \text{if}(D1(a) < 0 \cdot m, 0 \cdot m, \text{if}(D1(a) < Luz, D1(a), Luz))$$

$$DR2(a) := \text{if}(D2(a) < 0 \cdot m, 0 \cdot m, \text{if}(D2(a) < Luz, D2(a), Luz))$$

$$DR3(a) := \text{if}(D3(a) < 0 \cdot m, 0 \cdot m, \text{if}(D3(a) < Luz, D3(a), Luz))$$

$$DR4(a) := \text{if}(D4(a) < 0 \cdot m, 0 \cdot m, \text{if}(D4(a) < Luz, D4(a), Luz))$$

$$DR5(a) := \text{if}(D5(a) < 0 \cdot m, 0 \cdot m, \text{if}(D5(a) < Luz, D5(a), Luz))$$

$$R(a) := \frac{Q \cdot AR(a) \left( Luz - \frac{AR(a)}{2} \right)}{Luz} + \frac{Q \cdot (Luz - DR5(a))^2}{Luz \cdot 2} + \frac{P}{Luz} \cdot (4 \cdot Luz - DR1(a) - DR2(a) - DR3(a) - DR4(a))$$

Para el cálculo del momento en centro de vano:

$$AM(a) := \text{if} \left( a < 0 \cdot m, 0 \cdot m, \text{if} \left( a < \frac{Luz}{2}, a, \frac{Luz}{2} \right) \right)$$

$$DM1(a) := \text{if} \left( D1(a) < 0 \cdot m, 0 \cdot m, \text{if} \left( D1(a) < \frac{Luz}{2}, D1(a), \frac{Luz}{2} \right) \right)$$

$$DM2(a) := \text{if} \left( D2(a) < 0 \cdot m, 0 \cdot m, \text{if} \left( D2(a) < \frac{Luz}{2}, D2(a), \frac{Luz}{2} \right) \right)$$

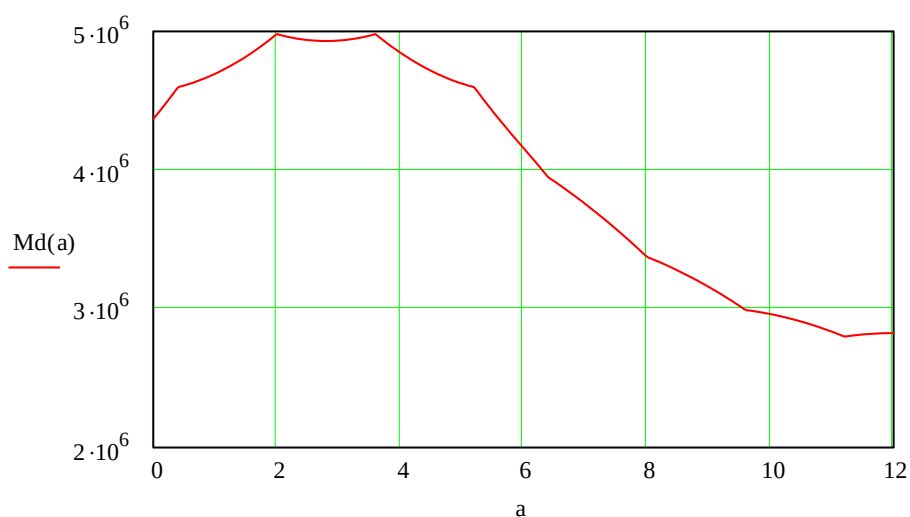
$$DM3(a) := \text{if} \left( D3(a) < 0 \cdot m, 0 \cdot m, \text{if} \left( D3(a) < \frac{Luz}{2}, D3(a), \frac{Luz}{2} \right) \right)$$

$$DM4(a) := \text{if} \left( D4(a) < 0 \cdot m, 0 \cdot m, \text{if} \left( D4(a) < \frac{Luz}{2}, D4(a), \frac{Luz}{2} \right) \right)$$

$$DM5(a) := \text{if} \left( D5(a) < 0 \cdot m, 0 \cdot m, \text{if} \left( D5(a) < \frac{Luz}{2}, D5(a), \frac{Luz}{2} \right) \right)$$

$$Md(a) := R(a) \cdot \frac{Luz}{2} - Q \cdot AM(a) \cdot \left( \frac{Luz}{2} - \frac{AM(a)}{2} \right) - \frac{Q \cdot \left( \frac{Luz}{2} - DM5(a) \right)^2}{2} \dots$$

$$+ -P \cdot (2 \cdot Luz - DM1(a) - DM2(a) - DM3(a) - DM4(a)) + ancho\_acera \cdot 0.5 \cdot \frac{t}{m^2} \cdot \frac{Luz^2}{8}$$



A la vista de la curva, el máximo momento flector en centro de vano se produce cuando alguna de las dos cargas centrales se encuentra en el centro de vano

$$a := \frac{Luz}{2} - 0.8 \cdot m - 1.6m$$

$$a = 3.6m$$

$$Md(a) = 507.84 \text{ m} \cdot t$$

### 3.- PORCENTAJES DE CARGA

Se han estimado los porcentajes referidos a los momentos flectores correspondientes al proyecto mediante la introducción en el modelo de las acciones definidas en el documentación facilitada.

Momento flector producido en la prueba de carga estática:

$$ME_{cv} := 14.5t \cdot \frac{m}{m} \quad \text{Centro de vano}$$

Momento flector producido por la sobrecarga de la IAPF-07:

$$MI_{cv} := 43.88 \cdot t \cdot \frac{m}{m} \quad \text{Centro de vano}$$

El porcentaje frente a momentos flectores es:

$$\frac{ME_{cv}}{MI_{cv}} = 33.0 \%$$

$$S_{locom} := 193.6t$$

El porcentaje frente a cargas es:

$$\frac{S_{locom}}{S_d} = 66.9 \%$$



**Cliente:** A.D.I.F.

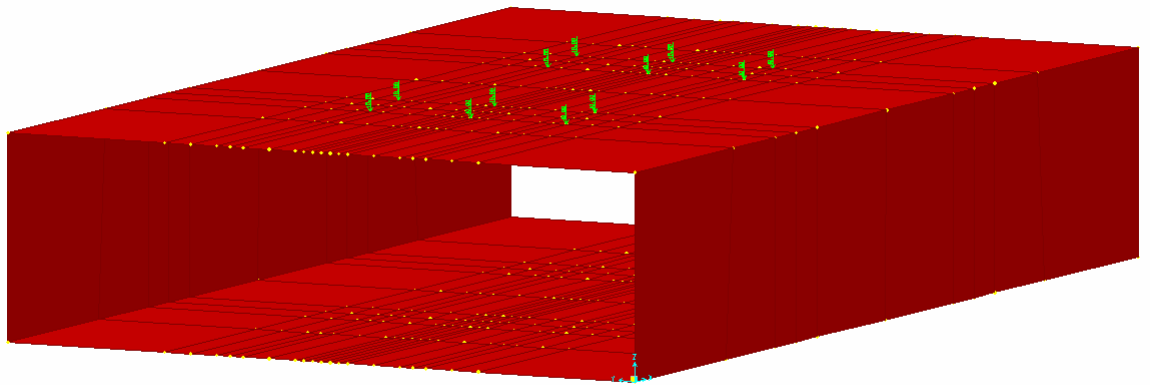
**Nº O.T.:**

**Ref<sup>a</sup>.:** I/OC-10004/CE

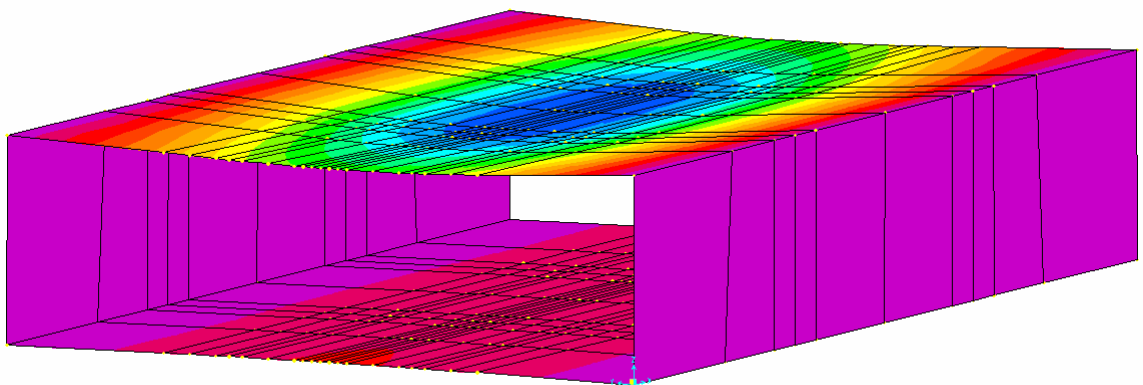
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## LISTADOS DEL MODELO INFORMÁTICO

**Modelo con las cargas correspondientes a la prueba estática**



**Deformada de la prueba estática**





**Cliente:** A.D.I.F.

**Nº O.T.:**

**Ref<sup>a</sup>.:** I/OC-10004/CE

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## ANÁLISIS ESTÁTICO

Table: Analysis Case Definitions

| Case<br>Text | Type<br>Text | InitialCond<br>Text | ModalCase<br>Text |
|--------------|--------------|---------------------|-------------------|
| DEAD         | LinStatic    | Zero                |                   |
| MODAL        | LinModal     | Zero                |                   |
| locomotoras  | LinStatic    | Zero                |                   |

Table: Area Section Properties, Part 1 of 4

| Section<br>Text | Material<br>Text | MatAngle<br>Degrees | AreaType<br>Text | Type<br>Text | Thickness<br>m | BendThick<br>m | Arc<br>Degrees |
|-----------------|------------------|---------------------|------------------|--------------|----------------|----------------|----------------|
| ASEC1           | CONC             | 0,000               | Shell            | Shell-Thin   | 1,000000       | 1,000000       |                |
| hastial         | CONC             | 0,000               | Shell            | Shell-Thin   | 0,750000       | 0,750000       |                |
| losalnf         | CONC             | 0,000               | Shell            | Shell-Thin   | 1,200000       | 1,200000       |                |
| losaSup         | CONC             | 0,000               | Shell            | Shell-Thin   | 1,200000       | 1,200000       |                |
| losaSupVia      | losaSupVia       | 0,000               | Shell            | Shell-Thin   | 1,200000       | 1,200000       |                |

Table: Area Section Properties, Part 2 of 4

| Section<br>Text | InComp<br>Yes/No | CoordSys<br>Text | Color<br>Text | TotalWt<br>Ton | TotalMass<br>Ton-s2/m | F11Mod<br>Unitless | F22Mod<br>Unitless |
|-----------------|------------------|------------------|---------------|----------------|-----------------------|--------------------|--------------------|
| ASEC1           |                  |                  | Magenta       | 0,0000         | 0,00                  | 1,000000           | 1,000000           |
| hastial         |                  |                  | Magenta       | 273,2625       | 27,33                 | 1,000000           | 1,000000           |
| losalnf         |                  |                  | Magenta       | 663,6375       | 66,36                 | 1,000000           | 1,000000           |
| losaSup         |                  |                  | Magenta       | 262,0603       | 26,21                 | 1,000000           | 1,000000           |
| losaSupVia      |                  |                  | Magenta       | 660,1929       | 66,02                 | 1,000000           | 1,000000           |

Table: Area Section Properties, Part 3 of 4

| Section<br>Text | F12Mod<br>Unitless | M11Mod<br>Unitless | M22Mod<br>Unitless | M12Mod<br>Unitless | V13Mod<br>Unitless | V23Mod<br>Unitless | MMod<br>Unitless |
|-----------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|------------------|
| ASEC1           | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000         |
| hastial         | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000         |
| losalnf         | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000         |
| losaSup         | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000         |
| losaSupVia      | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000           | 1,000000         |

Table: Area Section Properties, Part 4 of 4

| Section<br>Text | WMod<br>Unitless |
|-----------------|------------------|
| ASEC1           | 1,000000         |
| hastial         | 1,000000         |
| losalnf         | 1,000000         |
| losaSup         | 1,000000         |
| losaSupVia      | 1,000000         |

Table: Assembled Joint Masses

| Joint<br>Text | U1<br>Ton-s2/m | U2<br>Ton-s2/m | U3<br>Ton-s2/m | R1<br>Ton-m-s2 | R2<br>Ton-m-s2 | R3<br>Ton-m-s2 |
|---------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 6             | 0,21           | 0,21           | 0,21           | 0,00000        | 0,00000        | 0,00000        |
| 7             | 8,981E-02      | 8,981E-02      | 8,981E-02      | 0,00000        | 0,00000        | 0,00000        |
| 9             | 9,217E-02      | 9,217E-02      | 9,217E-02      | 0,00000        | 0,00000        | 0,00000        |
| 11            | 0,14           | 0,14           | 0,14           | 0,00000        | 0,00000        | 0,00000        |

| Joint | U1        | U2        | U3        | R1       | R2       | R3       |
|-------|-----------|-----------|-----------|----------|----------|----------|
| Text  | Ton-s2/m  | Ton-s2/m  | Ton-s2/m  | Ton-m-s2 | Ton-m-s2 | Ton-m-s2 |
| 14    | 9,509E-02 | 9,509E-02 | 9,509E-02 | 0,00000  | 0,00000  | 0,00000  |
| 17    | 0,13      | 0,13      | 0,13      | 0,00000  | 0,00000  | 0,00000  |
| 20    | 9,542E-02 | 9,542E-02 | 9,542E-02 | 0,00000  | 0,00000  | 0,00000  |
| 23    | 6,256E-02 | 6,256E-02 | 6,256E-02 | 0,00000  | 0,00000  | 0,00000  |
| 26    | 6,245E-02 | 6,245E-02 | 6,245E-02 | 0,00000  | 0,00000  | 0,00000  |
| 267   | 0,15      | 0,15      | 0,15      | 0,00000  | 0,00000  | 0,00000  |
| 288   | 0,16      | 0,16      | 0,16      | 0,00000  | 0,00000  | 0,00000  |

Table: Base Reactions, Part 1 of 4

| OutputCase  | CaseType  | StepType | StepNum   | GlobalFX    | GlobalFY    | GlobalFZ    | GlobalMX    | GlobalMY    |
|-------------|-----------|----------|-----------|-------------|-------------|-------------|-------------|-------------|
| Text        | Text      | Text     | Unitless  | Ton         | Ton         | Ton         | Ton-m       | Ton-m       |
| DEAD        | LinStatic |          |           | -4,343E-13  | 6,395E-13   | 1859,1532   | 11852,10171 | -12941,2443 |
| MODAL       | LinModal  | Mode     | 1,000000  | -3101,5871  | -23603,9457 | -2,3236     | 79521,14761 | -15130,1841 |
| MODAL       | LinModal  | Mode     | 2,000000  | 11,0151     | 22,5181     | -25102,0836 | -160094,116 | 173982,9706 |
| MODAL       | LinModal  | Mode     | 3,000000  | -89,9153    | -78,9565    | 78901,1517  | 503179,484  | -547479,42  |
| MODAL       | LinModal  | Mode     | 4,000000  | -13085,4572 | -7317,1860  | -1134,8319  | 6538,92225  | 172921,5675 |
| MODAL       | LinModal  | Mode     | 5,000000  | 105049,4329 | 25341,5132  | -66,8628    | 51900,54119 | 183568,3737 |
| MODAL       | LinModal  | Mode     | 6,000000  | -31227,3762 | 4248,7613   | 40,9222     | -68403,815  | -667849,37  |
| MODAL       | LinModal  | Mode     | 7,000000  | -1307,8413  | 429,8048    | -7829,0988  | -49265,502  | 51595,11171 |
| MODAL       | LinModal  | Mode     | 8,000000  | 4015,0878   | -2924,7289  | 8840,3313   | 55513,49315 | -50363,178  |
| MODAL       | LinModal  | Mode     | 9,000000  | -161979,572 | 126162,2448 | 304,0446    | 36789,72559 | -525329,74  |
| MODAL       | LinModal  | Mode     | 10,000000 | 164,2177    | -233,1568   | 7836,6134   | 50073,78333 | -55022,388  |
| MODAL       | LinModal  | Mode     | 11,000000 | -16832,7748 | 1579,8241   | 200,4427    | 120149,7628 | 124124,4871 |
| MODAL       | LinModal  | Mode     | 12,000000 | 10389,8295  | 7225,3718   | 159,2164    | 1214963,278 | 11196,83598 |
| locomotoras | LinStatic |          |           | 5,640E-14   | 1,079E-13   | 120,0000    | 765,00000   | -830,26500  |

Table: Base Reactions, Part 2 of 4

| OutputCase  | StepType | StepNum   | GlobalMZ    | GlobalX | GlobalY | GlobalZ | XCcentroidF<br>X | YCentroidF<br>X |
|-------------|----------|-----------|-------------|---------|---------|---------|------------------|-----------------|
| Text        | Text     | Unitless  | Ton-m       | m       | m       | m       | m                | m               |
| DEAD        |          |           | -2,367E-12  | 0,00000 | 0,00000 | 0,00000 | 1,685E+15        | -1,035E+15      |
| MODAL       | Mode     | 1,000000  | -144292,066 | 0,00000 | 0,00000 | 0,00000 | 6,56301          | 6,62304         |
| MODAL       | Mode     | 2,000000  | 1545,20920  | 0,00000 | 0,00000 | 0,00000 | 1674,29669       | -1017,38785     |
| MODAL       | Mode     | 3,000000  | -28975,9337 | 0,00000 | 0,00000 | 0,00000 | 733,64968        | -439,76902      |
| MODAL       | Mode     | 4,000000  | 33392,45611 | 0,00000 | 0,00000 | 0,00000 | 6,84053          | 6,45270         |
| MODAL       | Mode     | 5,000000  | -495253,85  | 0,00000 | 0,00000 | 0,00000 | 6,94001          | 6,39157         |
| MODAL       | Mode     | 6,000000  | 227956,8695 | 0,00000 | 0,00000 | 0,00000 | 6,99507          | 6,35782         |
| MODAL       | Mode     | 7,000000  | -1394225,99 | 0,00000 | 0,00000 | 0,00000 | 840,70790        | -505,52626      |
| MODAL       | Mode     | 8,000000  | 278618,7618 | 0,00000 | 0,00000 | 0,00000 | 64,34944         | -28,85632       |
| MODAL       | Mode     | 9,000000  | 1931347,710 | 0,00000 | 0,00000 | 0,00000 | 6,89852          | 6,41704         |
| MODAL       | Mode     | 10,000000 | -194668,002 | 0,00000 | 0,00000 | 0,00000 | -481,66015       | 306,34866       |
| MODAL       | Mode     | 11,000000 | 122028,1729 | 0,00000 | 0,00000 | 0,00000 | 6,90893          | 6,41123         |
| MODAL       | Mode     | 12,000000 | -13318,4459 | 0,00000 | 0,00000 | 0,00000 | 6,95052          | 6,38481         |
| locomotoras |          |           | 8,272E-13   | 0,00000 | 0,00000 | 0,00000 | -1,258E+15       | 7,724E+14       |

Table: Base Reactions, Part 3 of 4

| OutputCase | StepType | StepNum  | ZCentroidF<br>X | XCcentroidF<br>Y | YCentroidF<br>Y | ZCentroidF<br>Y | XCcentroidF<br>Z | YCentroidF<br>Z |
|------------|----------|----------|-----------------|------------------|-----------------|-----------------|------------------|-----------------|
| Text       | Text     | Unitless | m               | m                | m               | m               | m                | m               |
| DEAD       |          |          | -1,757E-16      | 7,027E+14        | -4,315E+14      | -1,542E-16      | 6,96083          | 6,37500         |
| MODAL      | Mode     | 1,000000 | -1,665E-16      | 6,98332          | 6,36498         | -1,665E-16      | -6511,64302      | -34223,862      |
| MODAL      | Mode     | 2,000000 | -1,665E-16      | -429,05204       | 274,07894       | -1,665E-16      | 6,93102          | 6,37772         |



| OutputCase  | StepType | StepNum   | ZCentroidF<br>X | XCentroidF<br>Y | YCentroidF<br>Y | ZCentroidF<br>Y | XCentroidF<br>Z | YCentroidF<br>Z |
|-------------|----------|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Text        | Text     | Unitless  | m               | m               | m               | m               | m               | m               |
| MODAL       | Mode     | 3,000000  | -1,665E-16      | -133,82084      | 92,80892        | -1,665E-16      | 6,93880         | 6,37734         |
| MODAL       | Mode     | 4,000000  | -1,665E-16      | 6,97591         | 6,36959         | -1,665E-16      | 152,37637       | -5,76202        |
| MODAL       | Mode     | 5,000000  | -1,665E-16      | 6,95211         | 6,38414         | -1,665E-16      | 2745,44694      | -776,22402      |
| MODAL       | Mode     | 6,000000  | -1,665E-16      | 6,92409         | 6,40113         | -1,665E-16      | 16319,99383     | -1671,55931     |
| MODAL       | Mode     | 7,000000  | -1,665E-16      | -1705,60644     | 1057,87053      | -1,665E-16      | 6,59017         | 6,29261         |
| MODAL       | Mode     | 8,000000  | -1,665E-16      | -55,64895       | 44,82013        | -1,665E-16      | 5,69698         | 6,27957         |
| MODAL       | Mode     | 9,000000  | -1,665E-16      | 7,06961         | 6,31204         | -1,665E-16      | 1727,80499      | 121,00109       |
| MODAL       | Mode     | 10,000000 | -1,665E-16      | 619,15488       | -369,60302      | -1,665E-16      | 7,02119         | 6,38972         |
| MODAL       | Mode     | 11,000000 | -1,665E-16      | 8,93099         | 5,16657         | -1,665E-16      | -619,25163      | 599,42191       |
| MODAL       | Mode     | 12,000000 | -1,665E-16      | 7,33784         | 6,14591         | -1,665E-16      | -70,32465       | 7630,89341      |
| locomotoras |          |           | -1,683E-16      | 4,037E+14       | -2,478E+14      | -1,444E-16      | 6,91887         | 6,37500         |

Table: Base Reactions, Part 4 of 4

| OutputCase  | StepType | StepNum   | ZCentroidFZ |
|-------------|----------|-----------|-------------|
| Text        | Text     | Unitless  | m           |
| DEAD        |          |           | -1,665E-16  |
| MODAL       | Mode     | 1,000000  | -1,665E-16  |
| MODAL       | Mode     | 2,000000  | -1,665E-16  |
| MODAL       | Mode     | 3,000000  | -1,665E-16  |
| MODAL       | Mode     | 4,000000  | -1,665E-16  |
| MODAL       | Mode     | 5,000000  | -1,665E-16  |
| MODAL       | Mode     | 6,000000  | -1,665E-16  |
| MODAL       | Mode     | 7,000000  | -1,665E-16  |
| MODAL       | Mode     | 8,000000  | -1,665E-16  |
| MODAL       | Mode     | 9,000000  | -1,665E-16  |
| MODAL       | Mode     | 10,000000 | -1,665E-16  |
| MODAL       | Mode     | 11,000000 | -1,665E-16  |
| MODAL       | Mode     | 12,000000 | -1,665E-16  |
| locomotoras |          |           | -1,665E-16  |

Table: Case - Modal 1 - General

| Case  | ModeType | MaxNumModes | MinNumModes | EigenShift | EigenCutoff | EigenTol   | AutoShift |
|-------|----------|-------------|-------------|------------|-------------|------------|-----------|
| Text  | Text     | Unitless    | Unitless    | Cyc/sec    | Cyc/sec     | Unitless   | Text      |
| MODAL | Eigen    | 12          | 1           | 0,0000E+00 | 0,0000E+00  | 1,0000E-07 | No        |

Table: Case - Static 1 - Load Assignments

| Case        | LoadType  | LoadName    | LoadSF   |
|-------------|-----------|-------------|----------|
| Text        | Text      | Text        | Unitless |
| DEAD        | Load case | DEAD        | 1,000000 |
| locomotoras | Load case | locomotoras | 1,000000 |

Table: Groups 1 - Definitions, Part 1 of 2

| GroupName | Selection | SectionCut | Steel  | Concrete | Aluminum | ColdFormed | Stage  |
|-----------|-----------|------------|--------|----------|----------|------------|--------|
| Text      | Yes/No    | Yes/No     | Yes/No | Yes/No   | Yes/No   | Yes/No     | Yes/No |
| ALL       | Yes       | Yes        | Yes    | Yes      | Yes      | Yes        | Yes    |
| FLECHAS   | Yes       | Yes        | Yes    | Yes      | Yes      | Yes        | Yes    |

Table: Groups 1 - Definitions, Part 2 of 2

| GroupName | Bridge | AutoSeismic | AutoWind | MassWeight |
|-----------|--------|-------------|----------|------------|
| Text      | Yes/No | Yes/No      | Yes/No   | Yes/No     |
| ALL       | Yes    | No          | No       | Yes        |
| FLECHAS   | Yes    | No          | No       | Yes        |

Table: Groups 2 - Assignments

| GroupName | ObjectType | ObjectLabel |
|-----------|------------|-------------|
| Text      | Text       | Text        |
| FLECHAS   | Joint      | 6           |
| FLECHAS   | Joint      | 7           |
| FLECHAS   | Joint      | 9           |
| FLECHAS   | Joint      | 11          |
| FLECHAS   | Joint      | 14          |
| FLECHAS   | Joint      | 17          |
| FLECHAS   | Joint      | 20          |
| FLECHAS   | Joint      | 23          |
| FLECHAS   | Joint      | 26          |
| FLECHAS   | Joint      | 267         |
| FLECHAS   | Joint      | 288         |

Table: Joint Coordinates, Part 1 of 2

| Joint | CoordSys | CoordType | XorR     | Y       | Z       | SpecialJt | GlobalX  |
|-------|----------|-----------|----------|---------|---------|-----------|----------|
| Text  | Text     | Text      | m        | m       | m       | Yes/No    | m        |
| 6     | GLOBAL   | Cartesian | 6,97200  | 6,37500 | 4,20000 | No        | 6,97200  |
| 7     | GLOBAL   | Cartesian | -1,70800 | 6,37500 | 4,20000 | No        | -1,70800 |
| 9     | GLOBAL   | Cartesian | 15,64200 | 6,37500 | 4,20000 | No        | 15,64200 |
| 11    | GLOBAL   | Cartesian | 4,56700  | 6,37500 | 4,20000 | No        | 4,56700  |
| 14    | GLOBAL   | Cartesian | 3,13450  | 6,37500 | 4,20000 | No        | 3,13450  |
| 17    | GLOBAL   | Cartesian | 9,27200  | 6,37500 | 4,20000 | No        | 9,27200  |
| 20    | GLOBAL   | Cartesian | 10,70200 | 6,37500 | 4,20000 | No        | 10,70200 |
| 23    | GLOBAL   | Cartesian | 3,85075  | 6,37500 | 4,20000 | No        | 3,85075  |
| 26    | GLOBAL   | Cartesian | 9,98700  | 6,37500 | 4,20000 | No        | 9,98700  |
| 267   | GLOBAL   | Cartesian | 1,67325  | 6,37500 | 4,20000 | No        | 1,67325  |
| 288   | GLOBAL   | Cartesian | 12,17200 | 6,37500 | 4,20000 | No        | 12,17200 |

Table: Joint Coordinates, Part 2 of 2

| Joint | GlobalY | GlobalZ |
|-------|---------|---------|
| Text  | m       | m       |
| 6     | 6,37500 | 4,20000 |
| 7     | 6,37500 | 4,20000 |
| 9     | 6,37500 | 4,20000 |
| 11    | 6,37500 | 4,20000 |
| 14    | 6,37500 | 4,20000 |
| 17    | 6,37500 | 4,20000 |
| 20    | 6,37500 | 4,20000 |
| 23    | 6,37500 | 4,20000 |
| 26    | 6,37500 | 4,20000 |
| 267   | 6,37500 | 4,20000 |
| 288   | 6,37500 | 4,20000 |

Table: Joint Displacements, Part 1 of 2

| Joint<br>Text | OutputCase<br>Text | CaseType<br>Text | StepType<br>Text | StepNum<br>Unitless | U1<br>m           | U2<br>m           | U3<br>m          | R1<br>Radians     |
|---------------|--------------------|------------------|------------------|---------------------|-------------------|-------------------|------------------|-------------------|
| 6             | DEAD               | LinStatic        |                  |                     | 2,107E-08         | -1,945E-07        | -0,002036        | 2,041E-07         |
| 6             | MODAL              | LinModal         | Mode             | 1,000000            | 0,007860          | 0,094351          | 0,000012         | 0,003298          |
| 6             | MODAL              | LinModal         | Mode             | 2,000000            | -0,000011         | -0,000027         | 0,136240         | -0,000013         |
| 6             | MODAL              | LinModal         | Mode             | 3,000000            | 0,000056          | 0,000032          | -0,060419        | 4,821E-06         |
| 6             | MODAL              | LinModal         | Mode             | 4,000000            | 0,007888          | 0,000421          | 0,001684         | -0,000733         |
| 6             | MODAL              | LinModal         | Mode             | 5,000000            | -0,063098         | 0,016468          | 0,000082         | 0,005332          |
| 6             | MODAL              | LinModal         | Mode             | 6,000000            | 0,014725          | -0,011008         | -0,000445        | -0,001612         |
| 6             | MODAL              | LinModal         | Mode             | 7,000000            | 0,000541          | 0,000385          | 0,027419         | 0,000048          |
| 6             | MODAL              | LinModal         | Mode             | 8,000000            | -0,001487         | -0,000382         | 0,140131         | -0,000175         |
| 6             | MODAL              | LinModal         | Mode             | 9,000000            | 0,060384          | 0,012746          | 0,003182         | 0,008205          |
| 6             | MODAL              | LinModal         | Mode             | 10,000000           | -0,000065         | 9,260E-06         | -0,026173        | -0,000019         |
| 6             | MODAL              | LinModal         | Mode             | 11,000000           | 0,001654          | 0,002811          | 0,001977         | -0,004490         |
| 6             | MODAL              | LinModal         | Mode             | 12,000000           | 0,002796          | 0,006942          | -0,000685        | -0,083216         |
| <b>6</b>      | <b>locomotoras</b> | <b>LinStatic</b> |                  |                     | <b>4,182E-09</b>  | <b>-2,887E-07</b> | <b>-0,000486</b> | <b>2,798E-08</b>  |
| 7             | DEAD               | LinStatic        |                  |                     | -7,022E-06        | -0,000043         | -0,001939        | 0,000065          |
| 7             | MODAL              | LinModal         | Mode             | 1,000000            | 0,008004          | 0,093035          | 0,015913         | 0,003367          |
| 7             | MODAL              | LinModal         | Mode             | 2,000000            | 0,000204          | 0,000587          | 0,132896         | -0,004420         |
| 7             | MODAL              | LinModal         | Mode             | 3,000000            | -0,000368         | -0,006135         | -0,053177        | 0,002271          |
| 7             | MODAL              | LinModal         | Mode             | 4,000000            | 0,007836          | -0,000471         | -0,229848        | 0,008748          |
| 7             | MODAL              | LinModal         | Mode             | 5,000000            | -0,063189         | 0,022848          | -0,011211        | 0,004118          |
| 7             | MODAL              | LinModal         | Mode             | 6,000000            | 0,015105          | -0,010704         | 0,105431         | -0,006830         |
| 7             | MODAL              | LinModal         | Mode             | 7,000000            | 0,001503          | -0,116426         | -0,053084        | -0,002555         |
| 7             | MODAL              | LinModal         | Mode             | 8,000000            | -0,001248         | 0,020696          | -0,293948        | 0,013066          |
| 7             | MODAL              | LinModal         | Mode             | 9,000000            | 0,060089          | 0,008641          | -0,008117        | 0,005851          |
| 7             | MODAL              | LinModal         | Mode             | 10,000000           | -0,001224         | -0,007610         | 0,052460         | -0,004651         |
| 7             | MODAL              | LinModal         | Mode             | 11,000000           | 0,002776          | -0,000093         | -0,260319        | 0,001543          |
| 7             | MODAL              | LinModal         | Mode             | 12,000000           | 0,002559          | 0,005860          | 0,031698         | -0,052636         |
| <b>7</b>      | <b>locomotoras</b> | <b>LinStatic</b> |                  |                     | <b>-1,072E-06</b> | <b>-2,431E-06</b> | <b>-0,000326</b> | <b>9,367E-06</b>  |
| 9             | DEAD               | LinStatic        |                  |                     | 7,059E-06         | 0,000042          | -0,001927        | -0,000064         |
| 9             | MODAL              | LinModal         | Mode             | 1,000000            | 0,008003          | 0,092847          | -0,015882        | 0,003365          |
| 9             | MODAL              | LinModal         | Mode             | 2,000000            | -0,000226         | -0,000637         | 0,131509         | 0,004352          |
| 9             | MODAL              | LinModal         | Mode             | 3,000000            | 0,000479          | 0,006172          | -0,047674        | -0,002050         |
| 9             | MODAL              | LinModal         | Mode             | 4,000000            | 0,007820          | -0,000778         | 0,232655         | 0,008851          |
| 9             | MODAL              | LinModal         | Mode             | 5,000000            | -0,063165         | 0,023364          | 0,011292         | 0,004122          |
| 9             | MODAL              | LinModal         | Mode             | 6,000000            | 0,015094          | -0,010562         | -0,105903        | -0,006840         |
| 9             | MODAL              | LinModal         | Mode             | 7,000000            | -0,000426         | 0,116868          | -0,053118        | 0,002628          |
| 9             | MODAL              | LinModal         | Mode             | 8,000000            | -0,001720         | -0,021125         | -0,298092        | -0,013596         |
| 9             | MODAL              | LinModal         | Mode             | 9,000000            | 0,060041          | 0,005842          | -0,005026        | 0,005111          |
| 9             | MODAL              | LinModal         | Mode             | 10,000000           | 0,001108          | 0,007622          | 0,053357         | 0,004698          |
| 9             | MODAL              | LinModal         | Mode             | 11,000000           | 0,002745          | -0,000112         | 0,249334         | 0,001837          |
| 9             | MODAL              | LinModal         | Mode             | 12,000000           | 0,002537          | 0,006011          | -0,030601        | -0,050984         |
| <b>9</b>      | <b>locomotoras</b> | <b>LinStatic</b> |                  |                     | <b>1,072E-06</b>  | <b>1,836E-06</b>  | <b>-0,000317</b> | <b>-8,996E-06</b> |
| 11            | DEAD               | LinStatic        |                  |                     | -2,160E-06        | -0,000012         | -0,002016        | 1,123E-06         |
| 11            | MODAL              | LinModal         | Mode             | 1,000000            | 0,007884          | 0,094240          | 0,003139         | 0,003272          |
| 11            | MODAL              | LinModal         | Mode             | 2,000000            | 0,000064          | 0,000148          | 0,135180         | -0,000172         |
| 11            | MODAL              | LinModal         | Mode             | 3,000000            | -0,000063         | -0,001707         | -0,059925        | 0,000035          |
| 11            | MODAL              | LinModal         | Mode             | 4,000000            | 0,007905          | 0,000389          | -0,073522        | -0,000546         |
| 11            | MODAL              | LinModal         | Mode             | 5,000000            | -0,063173         | 0,016973          | -0,002494        | 0,005265          |
| 11            | MODAL              | LinModal         | Mode             | 6,000000            | 0,014771          | -0,011012         | 0,035172         | -0,001726         |
| 11            | MODAL              | LinModal         | Mode             | 7,000000            | 0,001065          | -0,034732         | 0,019574         | -0,000520         |
| 11            | MODAL              | LinModal         | Mode             | 8,000000            | -0,001335         | 0,006147          | 0,091960         | -0,000389         |
| 11            | MODAL              | LinModal         | Mode             | 9,000000            | 0,060468          | 0,012853          | -0,003667        | 0,007736          |
| 11            | MODAL              | LinModal         | Mode             | 10,000000           | -0,000654         | -0,002476         | -0,017045        | -0,000309         |
| 11            | MODAL              | LinModal         | Mode             | 11,000000           | 0,001903          | 0,002618          | 0,133120         | -0,004610         |

| Joint<br>Text | OutputCase<br>Text | CaseType<br>Text | StepType<br>Text | StepNum<br>Unitless | U1<br>m    | U2<br>m    | U3<br>m   | R1<br>Radians |
|---------------|--------------------|------------------|------------------|---------------------|------------|------------|-----------|---------------|
| 11            | MODAL              | LinModal         | Mode             | 12,000000           | 0,002755   | 0,006860   | -0,005886 | -0,079144     |
| 11            | locomotoras        | LinStatic        |                  |                     | -3,854E-07 | -8,769E-07 | -0,000480 | 2,025E-07     |
| 14            | DEAD               | LinStatic        |                  |                     | -3,424E-06 | -0,000018  | -0,001986 | 6,631E-06     |
| 14            | MODAL              | LinModal         | Mode             | 1,000000            | 0,007922   | 0,094048   | 0,005381  | 0,003231      |
| 14            | MODAL              | LinModal         | Mode             | 2,000000            | 0,000106   | 0,000249   | 0,133588  | -0,000571     |
| 14            | MODAL              | LinModal         | Mode             | 3,000000            | -0,000137  | -0,002733  | -0,058459 | 0,000250      |
| 14            | MODAL              | LinModal         | Mode             | 4,000000            | 0,007913   | 0,000301   | -0,114061 | -6,447E-06    |
| 14            | MODAL              | LinModal         | Mode             | 5,000000            | -0,063262  | 0,017795   | -0,003943 | 0,005125      |
| 14            | MODAL              | LinModal         | Mode             | 6,000000            | 0,014842   | -0,010991  | 0,053937  | -0,002050     |
| 14            | MODAL              | LinModal         | Mode             | 7,000000            | 0,001282   | -0,054828  | 0,008401  | -0,000948     |
| 14            | MODAL              | LinModal         | Mode             | 8,000000            | -0,001249  | 0,009888   | 0,025540  | -0,000129     |
| 14            | MODAL              | LinModal         | Mode             | 9,000000            | 0,060555   | 0,012639   | -0,006650 | 0,007057      |
| 14            | MODAL              | LinModal         | Mode             | 10,000000           | -0,000941  | -0,003860  | -0,004747 | -0,000600     |
| 14            | MODAL              | LinModal         | Mode             | 11,000000           | 0,002212   | 0,002334   | 0,139909  | -0,003931     |
| 14            | MODAL              | LinModal         | Mode             | 12,000000           | 0,002709   | 0,006757   | -0,005922 | -0,073039     |
| 14            | locomotoras        | LinStatic        |                  |                     | -6,040E-07 | -1,240E-06 | -0,000456 | 1,593E-06     |
| 17            | DEAD               | LinStatic        |                  |                     | 2,111E-06  | 0,000011   | -0,002013 | -8,497E-07    |
| 17            | MODAL              | LinModal         | Mode             | 1,000000            | 0,007883   | 0,094196   | -0,002985 | 0,003276      |
| 17            | MODAL              | LinModal         | Mode             | 2,000000            | -0,000084  | -0,000195  | 0,134816  | 0,000149      |
| 17            | MODAL              | LinModal         | Mode             | 3,000000            | 0,000170   | 0,001693   | -0,058278 | -0,000029     |
| 17            | MODAL              | LinModal         | Mode             | 4,000000            | 0,007900   | 0,000309   | 0,073525  | -0,000575     |
| 17            | MODAL              | LinModal         | Mode             | 5,000000            | -0,063160  | 0,017073   | 0,002509  | 0,005269      |
| 17            | MODAL              | LinModal         | Mode             | 6,000000            | 0,014763   | -0,010970  | -0,034433 | -0,001707     |
| 17            | MODAL              | LinModal         | Mode             | 7,000000            | 0,000043   | 0,033955   | 0,020603  | 0,000585      |
| 17            | MODAL              | LinModal         | Mode             | 8,000000            | -0,001640  | -0,006609  | 0,097077  | 0,000047      |
| 17            | MODAL              | LinModal         | Mode             | 9,000000            | 0,060448   | 0,012033   | 0,007701  | 0,007751      |
| 17            | MODAL              | LinModal         | Mode             | 10,000000           | 0,000504   | 0,002389   | -0,018256 | 0,000257      |
| 17            | MODAL              | LinModal         | Mode             | 11,000000           | 0,001868   | 0,002642   | -0,126924 | -0,004063     |
| 17            | MODAL              | LinModal         | Mode             | 12,000000           | 0,002750   | 0,006916   | 0,005374  | -0,078932     |
| 17            | locomotoras        | LinStatic        |                  |                     | 3,773E-07  | 2,740E-07  | -0,000479 | -1,708E-07    |
| 20            | DEAD               | LinStatic        |                  |                     | 3,380E-06  | 0,000018   | -0,001982 | -6,142E-06    |
| 20            | MODAL              | LinModal         | Mode             | 1,000000            | 0,007920   | 0,093977   | -0,005207 | 0,003235      |
| 20            | MODAL              | LinModal         | Mode             | 2,000000            | -0,000126  | -0,000295  | 0,132990  | 0,000531      |
| 20            | MODAL              | LinModal         | Mode             | 3,000000            | 0,000244   | 0,002717   | -0,055884 | -0,000226     |
| 20            | MODAL              | LinModal         | Mode             | 4,000000            | 0,007905   | 0,000172   | 0,114068  | -0,000054     |
| 20            | MODAL              | LinModal         | Mode             | 5,000000            | -0,063244  | 0,017957   | 0,003931  | 0,005134      |
| 20            | MODAL              | LinModal         | Mode             | 6,000000            | 0,014830   | -0,010925  | -0,053187 | -0,002018     |
| 20            | MODAL              | LinModal         | Mode             | 7,000000            | -0,000177  | 0,054037   | 0,009866  | 0,000999      |
| 20            | MODAL              | LinModal         | Mode             | 8,000000            | -0,001734  | -0,010329  | 0,032413  | -0,000166     |
| 20            | MODAL              | LinModal         | Mode             | 9,000000            | 0,060524   | 0,011344   | 0,007819  | 0,007056      |
| 20            | MODAL              | LinModal         | Mode             | 10,000000           | 0,000798   | 0,003777   | -0,006327 | 0,000543      |
| 20            | MODAL              | LinModal         | Mode             | 11,000000           | 0,002165   | 0,002366   | -0,140754 | -0,003266     |
| 20            | MODAL              | LinModal         | Mode             | 12,000000           | 0,002700   | 0,006846   | 0,006327  | -0,072633     |
| 20            | locomotoras        | LinStatic        |                  |                     | 5,963E-07  | 6,364E-07  | -0,000454 | -1,501E-06    |
| 23            | DEAD               | LinStatic        |                  |                     | -2,822E-06 | -0,000015  | -0,002002 | 3,392E-06     |
| 23            | MODAL              | LinModal         | Mode             | 1,000000            | 0,007904   | 0,094156   | 0,004220  | 0,003254      |
| 23            | MODAL              | LinModal         | Mode             | 2,000000            | 0,000087   | 0,000200   | 0,134450  | -0,000342     |
| 23            | MODAL              | LinModal         | Mode             | 3,000000            | -0,000101  | -0,002221  | -0,059287 | 0,000125      |
| 23            | MODAL              | LinModal         | Mode             | 4,000000            | 0,007902   | 0,000349   | -0,094334 | -0,000341     |
| 23            | MODAL              | LinModal         | Mode             | 5,000000            | -0,063216  | 0,017339   | -0,003207 | 0,005208      |
| 23            | MODAL              | LinModal         | Mode             | 6,000000            | 0,014809   | -0,011002  | 0,044860  | -0,001852     |
| 23            | MODAL              | LinModal         | Mode             | 7,000000            | 0,001184   | -0,044885  | 0,014530  | -0,000728     |
| 23            | MODAL              | LinModal         | Mode             | 8,000000            | -0,001292  | 0,008037   | 0,061621  | -0,000355     |
| 23            | MODAL              | LinModal         | Mode             | 9,000000            | 0,060520   | 0,012774   | -0,005310 | 0,007424      |
| 23            | MODAL              | LinModal         | Mode             | 10,000000           | -0,000806  | -0,003181  | -0,011406 | -0,000428     |
| 23            | MODAL              | LinModal         | Mode             | 11,000000           | 0,002045   | 0,002497   | 0,145341  | -0,004258     |

| Joint<br>Text | OutputCase<br>Text | CaseType<br>Text | StepType<br>Text | StepNum<br>Unitless | U1<br>m           | U2<br>m           | U3<br>m          | R1<br>Radians     |
|---------------|--------------------|------------------|------------------|---------------------|-------------------|-------------------|------------------|-------------------|
| 23            | MODAL              | LinModal         | Mode             | 12,000000           | 0,002743          | 0,006817          | -0,006666        | -0,076437         |
| <b>23</b>     | <b>locomotoras</b> | <b>LinStatic</b> |                  |                     | <b>-5,009E-07</b> | <b>-1,059E-06</b> | <b>-0,000470</b> | <b>8,207E-07</b>  |
| 26            | DEAD               | LinStatic        |                  |                     | 2,774E-06         | 0,000014          | -0,001999        | -3,027E-06        |
| 26            | MODAL              | LinModal         | Mode             | 1,000000            | 0,007902          | 0,094098          | -0,004057        | 0,003257          |
| 26            | MODAL              | LinModal         | Mode             | 2,000000            | -0,000106         | -0,000246         | 0,133969         | 0,000312          |
| 26            | MODAL              | LinModal         | Mode             | 3,000000            | 0,000208          | 0,002206          | -0,057166        | -0,000112         |
| 26            | MODAL              | LinModal         | Mode             | 4,000000            | 0,007895          | 0,000244          | 0,094328         | -0,000378         |
| 26            | MODAL              | LinModal         | Mode             | 5,000000            | -0,063200         | 0,017470          | 0,003210         | 0,005214          |
| 26            | MODAL              | LinModal         | Mode             | 6,000000            | 0,014799          | -0,010948         | -0,044109        | -0,001827         |
| 26            | MODAL              | LinModal         | Mode             | 7,000000            | -0,000077         | 0,044099          | 0,015801         | 0,000786          |
| 26            | MODAL              | LinModal         | Mode             | 8,000000            | -0,001687         | -0,008489         | 0,067783         | 0,000030          |
| 26            | MODAL              | LinModal         | Mode             | 9,000000            | 0,060494          | 0,011713          | 0,008038         | 0,007436          |
| 26            | MODAL              | LinModal         | Mode             | 10,000000           | 0,000659          | 0,003096          | -0,012846        | 0,000374          |
| 26            | MODAL              | LinModal         | Mode             | 11,000000           | 0,002003          | 0,002526          | -0,142387        | -0,003642         |
| 26            | MODAL              | LinModal         | Mode             | 12,000000           | 0,002736          | 0,006890          | 0,006582         | -0,076126         |
| <b>26</b>     | <b>locomotoras</b> | <b>LinStatic</b> |                  |                     | <b>4,926E-07</b>  | <b>4,552E-07</b>  | <b>-0,000468</b> | <b>-7,638E-07</b> |
| 267           | DEAD               | LinStatic        |                  |                     | -4,650E-06        | -0,000026         | -0,001951        | 0,000017          |
| 267           | MODAL              | LinModal         | Mode             | 1,000000            | 0,007967          | 0,093775          | 0,008030         | 0,003191          |
| 267           | MODAL              | LinModal         | Mode             | 2,000000            | 0,000144          | 0,000343          | 0,131806         | -0,001265         |
| 267           | MODAL              | LinModal         | Mode             | 3,000000            | -0,000213         | -0,003770         | -0,056423        | 0,000629          |
| 267           | MODAL              | LinModal         | Mode             | 4,000000            | 0,007905          | 0,000162          | -0,151030        | 0,001220          |
| 267           | MODAL              | LinModal         | Mode             | 5,000000            | -0,063330         | 0,018945          | -0,005628        | 0,004873          |
| 267           | MODAL              | LinModal         | Mode             | 6,000000            | 0,014930          | -0,010936         | 0,070637         | -0,002742         |
| 267           | MODAL              | LinModal         | Mode             | 7,000000            | 0,001401          | -0,074388         | -0,006954        | -0,001440         |
| 267           | MODAL              | LinModal         | Mode             | 8,000000            | -0,001191         | 0,013491          | -0,060947        | 0,001183          |
| 267           | MODAL              | LinModal         | Mode             | 9,000000            | 0,060565          | 0,012152          | -0,008330        | 0,006270          |
| 267           | MODAL              | LinModal         | Mode             | 10,000000           | -0,001141         | -0,005143         | 0,011034         | -0,001171         |
| 267           | MODAL              | LinModal         | Mode             | 11,000000           | 0,002517          | 0,001837          | 0,075267         | -0,003297         |
| 267           | MODAL              | LinModal         | Mode             | 12,000000           | 0,002666          | 0,006589          | 0,000376         | -0,064820         |
| 267           | locomotoras        | LinStatic        |                  |                     | -7,961E-07        | -1,602E-06        | -0,000415        | 2,565E-06         |
| 288           | DEAD               | LinStatic        |                  |                     | 4,619E-06         | 0,000025          | -0,001944        | -0,000016         |
| 288           | MODAL              | LinModal         | Mode             | 1,000000            | 0,007965          | 0,093674          | -0,007847        | 0,003192          |
| 288           | MODAL              | LinModal         | Mode             | 2,000000            | -0,000164         | -0,000390         | 0,130944         | 0,001204          |
| 288           | MODAL              | LinModal         | Mode             | 3,000000            | 0,000321          | 0,003757          | -0,052956        | -0,000571         |
| 288           | MODAL              | LinModal         | Mode             | 4,000000            | 0,007894          | -0,000016         | 0,151388         | 0,001150          |
| 288           | MODAL              | LinModal         | Mode             | 5,000000            | -0,063309         | 0,019180          | 0,005593         | 0,004886          |
| 288           | MODAL              | LinModal         | Mode             | 6,000000            | 0,014916          | -0,010847         | -0,070041        | -0,002691         |
| 288           | MODAL              | LinModal         | Mode             | 7,000000            | -0,000303         | 0,073741          | -0,005381        | 0,001480          |
| 288           | MODAL              | LinModal         | Mode             | 8,000000            | -0,001797         | -0,013927         | -0,054438        | -0,001406         |
| 288           | MODAL              | LinModal         | Mode             | 9,000000            | 0,060527          | 0,010402          | 0,005721         | 0,006183          |
| 288           | MODAL              | LinModal         | Mode             | 10,000000           | 0,001009          | 0,005077          | 0,009583         | 0,001109          |
| 288           | MODAL              | LinModal         | Mode             | 11,000000           | 0,002468          | 0,001872          | -0,083632        | -0,002590         |
| 288           | MODAL              | LinModal         | Mode             | 12,000000           | 0,002653          | 0,006709          | 0,000949         | -0,064137         |
| 288           | locomotoras        | LinStatic        |                  |                     | 7,903E-07         | 9,999E-07         | -0,000411        | -2,406E-06        |

Table: Joint Displacements, Part 2 of 2

| Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | R2<br>Radians | R3<br>Radians |
|---------------|--------------------|------------------|---------------------|---------------|---------------|
| 6             | DEAD               |                  |                     | -8,922E-07    | 2,010E-06     |
| 6             | MODAL              | Mode             | 1,000000            | 0,001318      | -0,000011     |
| 6             | MODAL              | Mode             | 2,000000            | 0,000098      | 0,000039      |
| 6             | MODAL              | Mode             | 3,000000            | -0,000380     | 0,000553      |
| 6             | MODAL              | Mode             | 4,000000            | -0,032007     | -0,000014     |
| 6             | MODAL              | Mode             | 5,000000            | -0,000949     | 0,000027      |

| Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | R2<br>Radians | R3<br>Radians |
|---------------|--------------------|------------------|---------------------|---------------|---------------|
| 6             | MODAL              | Mode             | 6,000000            | 0,015179      | 8,536E-06     |
| 6             | MODAL              | Mode             | 7,000000            | -0,000097     | 0,013291      |
| 6             | MODAL              | Mode             | 8,000000            | -0,000354     | -0,002679     |
| 6             | MODAL              | Mode             | 9,000000            | -0,002461     | -0,000168     |
| 6             | MODAL              | Mode             | 10,000000           | 0,000129      | 0,001104      |
| 6             | MODAL              | Mode             | 11,000000           | 0,067200      | -3,070E-06    |
| 6             | MODAL              | Mode             | 12,000000           | -0,006475     | 5,104E-06     |
| 6             | locomotoras        |                  |                     | -4,600E-07    | -8,209E-08    |
| 7             | DEAD               |                  |                     | -0,000026     | 4,708E-06     |
| 7             | MODAL              | Mode             | 1,000000            | 0,002935      | 0,000181      |
| 7             | MODAL              | Mode             | 2,000000            | 0,002317      | -0,000106     |
| 7             | MODAL              | Mode             | 3,000000            | 0,000153      | 0,000611      |
| 7             | MODAL              | Mode             | 4,000000            | -0,024874     | 0,000258      |
| 7             | MODAL              | Mode             | 5,000000            | -0,001741     | -0,001306     |
| 7             | MODAL              | Mode             | 6,000000            | 0,010852      | 0,000021      |
| 7             | MODAL              | Mode             | 7,000000            | -0,015530     | 0,011903      |
| 7             | MODAL              | Mode             | 8,000000            | -0,073555     | -0,001884     |
| 7             | MODAL              | Mode             | 9,000000            | 0,000699      | 0,001406      |
| 7             | MODAL              | Mode             | 10,000000           | 0,012797      | 0,000660      |
| 7             | MODAL              | Mode             | 11,000000           | -0,118314     | 0,000578      |
| 7             | MODAL              | Mode             | 12,000000           | 0,006905      | 0,000088      |
| 7             | locomotoras        |                  |                     | 0,000021      | 2,505E-07     |
| 9             | DEAD               |                  |                     | 0,000025      | 4,673E-06     |
| 9             | MODAL              | Mode             | 1,000000            | 0,002934      | -0,000200     |
| 9             | MODAL              | Mode             | 2,000000            | -0,002190     | -0,000104     |
| 9             | MODAL              | Mode             | 3,000000            | -0,000740     | 0,000605      |
| 9             | MODAL              | Mode             | 4,000000            | -0,025076     | -0,000289     |
| 9             | MODAL              | Mode             | 5,000000            | -0,001731     | 0,001364      |
| 9             | MODAL              | Mode             | 6,000000            | 0,010924      | -7,714E-06    |
| 9             | MODAL              | Mode             | 7,000000            | 0,015759      | 0,011878      |
| 9             | MODAL              | Mode             | 8,000000            | 0,075356      | -0,001802     |
| 9             | MODAL              | Mode             | 9,000000            | 0,003951      | -0,001673     |
| 9             | MODAL              | Mode             | 10,000000           | -0,013268     | 0,000659      |
| 9             | MODAL              | Mode             | 11,000000           | -0,115776     | -0,000580     |
| 9             | MODAL              | Mode             | 12,000000           | 0,006894      | -0,000085     |
| 9             | locomotoras        |                  |                     | -0,000022     | 2,401E-07     |
| 11            | DEAD               |                  |                     | 0,000017      | 5,172E-06     |
| 11            | MODAL              | Mode             | 1,000000            | 0,001467      | 0,000026      |
| 11            | MODAL              | Mode             | 2,000000            | -0,000898     | -0,000131     |
| 11            | MODAL              | Mode             | 3,000000            | 0,000739      | 0,000673      |
| 11            | MODAL              | Mode             | 4,000000            | -0,029782     | 0,000092      |
| 11            | MODAL              | Mode             | 5,000000            | -0,000975     | -0,000334     |
| 11            | MODAL              | Mode             | 6,000000            | 0,013932      | -0,000046     |
| 11            | MODAL              | Mode             | 7,000000            | -0,006234     | 0,013279      |
| 11            | MODAL              | Mode             | 8,000000            | -0,037833     | -0,002342     |
| 11            | MODAL              | Mode             | 9,000000            | -0,002449     | 0,000083      |
| 11            | MODAL              | Mode             | 10,000000           | 0,007057      | 0,000941      |
| 11            | MODAL              | Mode             | 11,000000           | 0,028771      | 0,000058      |
| 11            | MODAL              | Mode             | 12,000000           | -0,002438     | -7,102E-06    |
| 11            | locomotoras        |                  |                     | 9,947E-06     | 3,878E-07     |
| 14            | DEAD               |                  |                     | 0,000024      | 5,006E-06     |
| 14            | MODAL              | Mode             | 1,000000            | 0,001690      | 0,000094      |
| 14            | MODAL              | Mode             | 2,000000            | -0,001258     | -0,000119     |
| 14            | MODAL              | Mode             | 3,000000            | 0,001266      | 0,000660      |
| 14            | MODAL              | Mode             | 4,000000            | -0,026771     | 0,000086      |
| 14            | MODAL              | Mode             | 5,000000            | -0,001041     | -0,000524     |

| Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | R2<br>Radians | R3<br>Radians |
|---------------|--------------------|------------------|---------------------|---------------|---------------|
| 14            | MODAL              | Mode             | 6,000000            | 0,012237      | 5,312E-06     |
| 14            | MODAL              | Mode             | 7,000000            | -0,009263     | 0,012835      |
| 14            | MODAL              | Mode             | 8,000000            | -0,053851     | -0,002306     |
| 14            | MODAL              | Mode             | 9,000000            | -0,001613     | 0,000180      |
| 14            | MODAL              | Mode             | 10,000000           | 0,009903      | 0,000948      |
| 14            | MODAL              | Mode             | 11,000000           | -0,020199     | 0,000181      |
| 14            | MODAL              | Mode             | 12,000000           | 0,001810      | 0,000041      |
| 14            | locomotoras        |                  |                     | 0,000024      | 3,717E-07     |
| 17            | DEAD               |                  |                     | -0,000018     | 5,173E-06     |
| 17            | MODAL              | Mode             | 1,000000            | 0,001458      | -0,000045     |
| 17            | MODAL              | Mode             | 2,000000            | 0,001062      | -0,000131     |
| 17            | MODAL              | Mode             | 3,000000            | -0,001418     | 0,000672      |
| 17            | MODAL              | Mode             | 4,000000            | -0,029804     | -0,000125     |
| 17            | MODAL              | Mode             | 5,000000            | -0,000962     | 0,000381      |
| 17            | MODAL              | Mode             | 6,000000            | 0,013930      | 0,000061      |
| 17            | MODAL              | Mode             | 7,000000            | 0,005877      | 0,013273      |
| 17            | MODAL              | Mode             | 8,000000            | 0,036223      | -0,002332     |
| 17            | MODAL              | Mode             | 9,000000            | -0,000826     | -0,000384     |
| 17            | MODAL              | Mode             | 10,000000           | -0,006691     | 0,000946      |
| 17            | MODAL              | Mode             | 11,000000           | 0,032832      | -0,000062     |
| 17            | MODAL              | Mode             | 12,000000           | -0,002977     | 0,000018      |
| 17            | locomotoras        |                  |                     | -0,000011     | 3,858E-07     |
| 20            | DEAD               |                  |                     | -0,000025     | 4,997E-06     |
| 20            | MODAL              | Mode             | 1,000000            | 0,001675      | -0,000113     |
| 20            | MODAL              | Mode             | 2,000000            | 0,001426      | -0,000118     |
| 20            | MODAL              | Mode             | 3,000000            | -0,001889     | 0,000659      |
| 20            | MODAL              | Mode             | 4,000000            | -0,026851     | -0,000117     |
| 20            | MODAL              | Mode             | 5,000000            | -0,001020     | 0,000572      |
| 20            | MODAL              | Mode             | 6,000000            | 0,012268      | 9,420E-06     |
| 20            | MODAL              | Mode             | 7,000000            | 0,009043      | 0,012838      |
| 20            | MODAL              | Mode             | 8,000000            | 0,053194      | -0,002294     |
| 20            | MODAL              | Mode             | 9,000000            | 0,000719      | -0,000472     |
| 20            | MODAL              | Mode             | 10,000000           | -0,009789     | 0,000952      |
| 20            | MODAL              | Mode             | 11,000000           | -0,014671     | -0,000187     |
| 20            | MODAL              | Mode             | 12,000000           | 0,001114      | -0,000033     |
| 20            | locomotoras        |                  |                     | -0,000024     | 3,693E-07     |
| 23            | DEAD               |                  |                     | 0,000021      | 2,053E-06     |
| 23            | MODAL              | Mode             | 1,000000            | 0,001567      | 0,000121      |
| 23            | MODAL              | Mode             | 2,000000            | -0,001127     | 0,000041      |
| 23            | MODAL              | Mode             | 3,000000            | 0,001033      | 0,000550      |
| 23            | MODAL              | Mode             | 4,000000            | -0,028317     | -0,000026     |
| 23            | MODAL              | Mode             | 5,000000            | -0,000998     | -0,000399     |
| 23            | MODAL              | Mode             | 6,000000            | 0,013105      | 0,000052      |
| 23            | MODAL              | Mode             | 7,000000            | -0,007828     | 0,013010      |
| 23            | MODAL              | Mode             | 8,000000            | -0,046639     | -0,002595     |
| 23            | MODAL              | Mode             | 9,000000            | -0,002081     | 0,000159      |
| 23            | MODAL              | Mode             | 10,000000           | 0,008639      | 0,001037      |
| 23            | MODAL              | Mode             | 11,000000           | 0,004948      | 0,000125      |
| 23            | MODAL              | Mode             | 12,000000           | -0,000242     | 0,000187      |
| 23            | locomotoras        |                  |                     | 0,000017      | -9,021E-08    |
| 26            | DEAD               |                  |                     | -0,000022     | 2,057E-06     |
| 26            | MODAL              | Mode             | 1,000000            | 0,001556      | -0,000139     |
| 26            | MODAL              | Mode             | 2,000000            | 0,001291      | 0,000040      |
| 26            | MODAL              | Mode             | 3,000000            | -0,001684     | 0,000551      |
| 26            | MODAL              | Mode             | 4,000000            | -0,028371     | -3,256E-06    |
| 26            | MODAL              | Mode             | 5,000000            | -0,000981     | 0,000444      |

| Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | R2<br>Radians | R3<br>Radians |
|---------------|--------------------|------------------|---------------------|---------------|---------------|
| 26            | MODAL              | Mode             | 6,000000            | 0,013121      | -0,000036     |
| 26            | MODAL              | Mode             | 7,000000            | 0,007535      | 0,013014      |
| 26            | MODAL              | Mode             | 8,000000            | 0,045483      | -0,002581     |
| 26            | MODAL              | Mode             | 9,000000            | -0,000069     | -0,000469     |
| 26            | MODAL              | Mode             | 10,000000           | -0,008394     | 0,001038      |
| 26            | MODAL              | Mode             | 11,000000           | 0,009953      | -0,000134     |
| 26            | MODAL              | Mode             | 12,000000           | -0,000893     | -0,000164     |
| 26            | locomotoras        |                  |                     | -0,000017     | -8,680E-08    |
| 267           | DEAD               |                  |                     | 0,000023      | 2,529E-06     |
| 267           | MODAL              | Mode             | 1,000000            | 0,001994      | 0,000145      |
| 267           | MODAL              | Mode             | 2,000000            | -0,001060     | 0,000025      |
| 267           | MODAL              | Mode             | 3,000000            | 0,001445      | 0,000565      |
| 267           | MODAL              | Mode             | 4,000000            | -0,024005     | -9,845E-06    |
| 267           | MODAL              | Mode             | 5,000000            | -0,001204     | -0,000506     |
| 267           | MODAL              | Mode             | 6,000000            | 0,010684      | 0,000032      |
| 267           | MODAL              | Mode             | 7,000000            | -0,011652     | 0,012516      |
| 267           | MODAL              | Mode             | 8,000000            | -0,063473     | -0,002494     |
| 267           | MODAL              | Mode             | 9,000000            | -0,000548     | 0,000281      |
| 267           | MODAL              | Mode             | 10,000000           | 0,011477      | 0,001037      |
| 267           | MODAL              | Mode             | 11,000000           | -0,066649     | 0,000139      |
| 267           | MODAL              | Mode             | 12,000000           | 0,004700      | 0,000254      |
| 267           | locomotoras        |                  |                     | 0,000030      | -1,645E-08    |
| 288           | DEAD               |                  |                     | -0,000024     | 2,542E-06     |
| 288           | MODAL              | Mode             | 1,000000            | 0,001977      | -0,000163     |
| 288           | MODAL              | Mode             | 2,000000            | 0,001238      | 0,000024      |
| 288           | MODAL              | Mode             | 3,000000            | -0,002022     | 0,000566      |
| 288           | MODAL              | Mode             | 4,000000            | -0,024096     | -0,000019     |
| 288           | MODAL              | Mode             | 5,000000            | -0,001179     | 0,000552      |
| 288           | MODAL              | Mode             | 6,000000            | 0,010723      | -0,000018     |
| 288           | MODAL              | Mode             | 7,000000            | 0,011599      | 0,012519      |
| 288           | MODAL              | Mode             | 8,000000            | 0,063883      | -0,002479     |
| 288           | MODAL              | Mode             | 9,000000            | 0,002230      | -0,000571     |
| 288           | MODAL              | Mode             | 10,000000           | -0,011633     | 0,001043      |
| 288           | MODAL              | Mode             | 11,000000           | -0,061650     | -0,000150     |
| 288           | MODAL              | Mode             | 12,000000           | 0,004113      | -0,000235     |
| 288           | locomotoras        |                  |                     | -0,000031     | -1,077E-08    |

Table: Load Case Definitions

| LoadCase<br>Text | DesignType<br>Text | SelfWtMult<br>Unitless | AutoLoad<br>Text |
|------------------|--------------------|------------------------|------------------|
| DEAD             | DEAD               | 1,000000               |                  |
| locomotoras      | LIVE               | 0,000000               |                  |

Table: Material List 1 - By Object Type

| ObjectType<br>Text | Material<br>Text | TotalWeight<br>Ton | NumPieces<br>Unitless |
|--------------------|------------------|--------------------|-----------------------|
| Area               | CONC             | 1198,9603          |                       |
| Area               | losaSupVia       | 660,1929           |                       |



Table: Material List 2 - By Section Property

| Section<br>Text | ObjectType<br>Text | NumPieces<br>Unitless | TotalLength<br>m | TotalWeight<br>Ton |
|-----------------|--------------------|-----------------------|------------------|--------------------|
| losaSupVia      | Area               |                       |                  | 660,1929           |
| losaSup         | Area               |                       |                  | 262,0603           |
| losaInf         | Area               |                       |                  | 663,6375           |
| hastial         | Area               |                       |                  | 273,2625           |

Table: Material Properties 01 - General, Part 1 of 2

| Material<br>Text | Type<br>Text | DesignType<br>Text | UnitMass<br>Ton-s2/m4 | UnitWeight<br>Ton/m3 | E<br>Ton/m2 | U<br>Unitless | A<br>1/C   |
|------------------|--------------|--------------------|-----------------------|----------------------|-------------|---------------|------------|
| ALUM             | Isotropic    | Aluminum           | 2,7680E-01            | 2,7126E+00           | 7101003,22  | 0,330000      | 2,3580E-05 |
| CLDFRM           | Isotropic    | ColdFormed         | 8,0038E-01            | 7,8490E+00           | 20740553,97 | 0,300000      | 1,1700E-05 |
| CONC             | Isotropic    | Concrete           | 2,5000E-01            | 2,5000E+00           | 2531050,70  | 0,200000      | 9,9000E-06 |
| losaSupVia       | Isotropic    | Steel              | 4,1100E-01            | 4,1100E+00           | 2531050,70  | 0,200000      | 0,0000E+00 |
| OTHER            | Isotropic    | None               | 2,4480E-01            | 2,4026E+00           | 2531050,65  | 0,200000      | 9,9000E-06 |
| STEEL            | Isotropic    | Steel              | 8,0038E-01            | 7,8490E+00           | 20389019,16 | 0,300000      | 1,1700E-05 |

Table: Material Properties 01 - General, Part 2 of 2

| Material<br>Text | MDampRatio<br>Unitless | VDampMass<br>1/Sec | VDampStiff<br>Sec | HDampMass<br>1/Sec2 | HDampStiff<br>Unitless | NumAdvanc<br>e<br>Unitless | Color<br>Text |
|------------------|------------------------|--------------------|-------------------|---------------------|------------------------|----------------------------|---------------|
| ALUM             | 0,0000                 | 0,0000             | 0,0000            | 0,0000              | 0,000000               | 0                          | Magenta       |
| CLDFRM           | 0,0000                 | 0,0000             | 0,0000            | 0,0000              | 0,000000               | 0                          | Yellow        |
| CONC             | 0,0000                 | 0,0000             | 0,0000            | 0,0000              | 0,000000               | 0                          | Red           |
| losaSupVia       | 0,0000                 | 0,0000             | 0,0000            | 0,0000              | 0,000000               | 0                          | Green         |
| OTHER            | 0,0000                 | 0,0000             | 0,0000            | 0,0000              | 0,000000               | 0                          | White         |
| STEEL            | 0,0000                 | 0,0000             | 0,0000            | 0,0000              | 0,000000               | 0                          | Cyan          |

Table: Material Properties 03 - Design Steel

| Material<br>Text | Fy<br>Ton/m2 | Fu<br>Ton/m2 |
|------------------|--------------|--------------|
| losaSupVia       | 25310,51     | 40778,04     |
| STEEL            | 25310,51     | 40778,04     |

Table: Material Properties 04 - Design Concrete

| Material<br>Text | Fc<br>Ton/m2 | RebarFy<br>Ton/m2 | RebarFys<br>Ton/m2 | LtWtConc<br>Yes/No | LtWtFact<br>Unitless |
|------------------|--------------|-------------------|--------------------|--------------------|----------------------|
| CONC             | 2812,28      | 42184,18          | 28122,79           | No                 | 1,000000             |

Table: Material Properties 05 - Design Aluminum

| Material<br>Text | AlumType<br>Text | Alloy<br>Text | Ftu<br>Ton/m2 | Fty<br>Ton/m2 | Fcy<br>Ton/m2 | Fsu<br>Ton/m2 | Fsy<br>Ton/m2 |
|------------------|------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| ALUM             | Wrought          | 6061-T6       | 26716,65      | 24607,44      | 24607,44      | 16873,67      | 14061,39      |

**Table: Material Properties 06 - Design ColdFormed**

| Material | Fy       | Fu       |
|----------|----------|----------|
| Text     | Ton/m2   | Ton/m2   |
| CLDFRM   | 25310,51 | 40778,04 |

**Table: Material Properties 07 - Time Dependence For Steel**

| Material   | Relaxation | Class    |
|------------|------------|----------|
| Text       | Yes/No     | Unitless |
| IosaSupVia | No         | 1        |
| STEEL      | No         | 1        |

**Table: Material Properties 08 - Time Dependence For Concrete, Part 1 of 2**

| Material | E      | Creep  | Shrinkage | S        | RelHumid | NotionSize | BetaSC   | ShrinkStart |
|----------|--------|--------|-----------|----------|----------|------------|----------|-------------|
| Text     | Yes/No | Yes/No | Yes/No    | Unitless | Percent  | m          | Unitless | Unitless    |
| CONC     | No     | No     | No        | 0,250000 | 50,0000  | 0,100000   | 5,000000 | 0,000000    |

**Table: Material Properties 08 - Time Dependence For Concrete, Part 2 of 2**

| Material | BetaSC   | CreepType        |
|----------|----------|------------------|
| Text     | Unitless | Text             |
| CONC     | 5,000000 | Full Integration |

**Table: Material Properties 09 - Stress-Strain Curves 1 - General**

| Material   | SSCurve            | HysType   | Color     |
|------------|--------------------|-----------|-----------|
| Text       | Text               | Text      | Text      |
| ALUM       | Default-Steel      | Kinematic | Gray8Dark |
| CLDFRM     | Default-Steel      | Kinematic | Gray8Dark |
| CONC       | Default-Rebar      | Kinematic | Gray8Dark |
| CONC       | Default-Unconfined | Takeda    | Red       |
| CONC       | Default-Confined   | Takeda    | Blue      |
| IosaSupVia | Default-Steel      | Kinematic | Gray8Dark |
| STEEL      | Default-Steel      | Kinematic | Gray8Dark |

**Table: Material Properties 10 - Stress-Strain Curves 2 - Data**

| Material | SSCurve       | Point | Strain    | Stress    | PointID |
|----------|---------------|-------|-----------|-----------|---------|
| Text     | Text          | Text  | Unitless  | Ton/m2    | Text    |
| ALUM     | Default-Steel | 1     | -0,050000 | 0,00      | -E      |
| ALUM     | Default-Steel | 2     | -0,035000 | -12303,72 | -D      |
| ALUM     | Default-Steel | 3     | -0,020000 | -24607,44 | -C      |
| ALUM     | Default-Steel | 4     | -0,003465 | -24607,44 | -B      |
| ALUM     | Default-Steel | 5     | 0,000000  | 0,00      | A       |
| ALUM     | Default-Steel | 6     | 0,003465  | 24607,44  | B       |
| ALUM     | Default-Steel | 7     | 0,020000  | 24607,44  |         |
| ALUM     | Default-Steel | 8     | 0,050000  | 26716,65  | C       |
| ALUM     | Default-Steel | 9     | 0,080000  | 26716,65  | D       |
| ALUM     | Default-Steel | 10    | 0,100000  | 24607,44  | E       |
| CLDFRM   | Default-Steel | 1     | -0,050000 | 0,00      | -E      |
| CLDFRM   | Default-Steel | 2     | -0,035000 | -12655,25 | -D      |
| CLDFRM   | Default-Steel | 3     | -0,020000 | -25310,51 | -C      |
| CLDFRM   | Default-Steel | 4     | -0,001220 | -25310,51 | -B      |
| CLDFRM   | Default-Steel | 5     | 0,000000  | 0,00      | A       |

| Material<br>Text | SSCurve<br>Text    | Point<br>Text | Strain<br>Unitless | Stress<br>Ton/m2 | PointID<br>Text |
|------------------|--------------------|---------------|--------------------|------------------|-----------------|
| CLDFRM           | Default-Steel      | 6             | 0,001220           | 25310,51         | B               |
| CLDFRM           | Default-Steel      | 7             | 0,020000           | 25310,51         |                 |
| CLDFRM           | Default-Steel      | 8             | 0,050000           | 40778,04         | C               |
| CLDFRM           | Default-Steel      | 9             | 0,080000           | 40778,04         | D               |
| CLDFRM           | Default-Steel      | 10            | 0,100000           | 25310,51         | E               |
| CONC             | Default-Rebar      | 1             | -0,050000          | 0,00             | -E              |
| CONC             | Default-Rebar      | 2             | -0,035000          | -21092,09        | -D              |
| CONC             | Default-Rebar      | 3             | -0,020000          | -42184,18        | -C              |
| CONC             | Default-Rebar      | 4             | -0,002069          | -42184,18        | -B              |
| CONC             | Default-Rebar      | 5             | 0,000000           | 0,00             | A               |
| CONC             | Default-Rebar      | 6             | 0,002069           | 42184,18         | B               |
| CONC             | Default-Rebar      | 7             | 0,020000           | 42184,18         |                 |
| CONC             | Default-Rebar      | 8             | 0,050000           | 52730,22         | C               |
| CONC             | Default-Rebar      | 9             | 0,080000           | 52730,22         | D               |
| CONC             | Default-Rebar      | 10            | 0,100000           | 42184,18         | E               |
| CONC             | Default-Unconfined | 1             | -0,011111          | 0,00             |                 |
| CONC             | Default-Unconfined | 2             | -0,002222          | -2812,28         | -C              |
| CONC             | Default-Unconfined | 3             | -0,002000          | -2784,16         |                 |
| CONC             | Default-Unconfined | 4             | -0,001778          | -2699,79         | -B              |
| CONC             | Default-Unconfined | 5             | -0,001333          | -2362,31         |                 |
| CONC             | Default-Unconfined | 6             | -0,000889          | -1799,86         |                 |
| CONC             | Default-Unconfined | 7             | -0,000444          | -1012,42         |                 |
| CONC             | Default-Unconfined | 8             | 0,000000           | 0,00             | A               |
| CONC             | Default-Unconfined | 9             | 0,000105           | 266,80           |                 |
| CONC             | Default-Unconfined | 10            | 0,000106           | 0,00             |                 |
| CONC             | Default-Confined   | 1             | -0,024444          | 0,00             |                 |
| CONC             | Default-Confined   | 2             | -0,022222          | -562,46          | -E              |
| CONC             | Default-Confined   | 3             | -0,017778          | -562,46          | -D              |
| CONC             | Default-Confined   | 4             | -0,002222          | -2812,28         | -C              |
| CONC             | Default-Confined   | 5             | -0,002000          | -2784,16         |                 |
| CONC             | Default-Confined   | 6             | -0,001778          | -2699,79         | -B              |
| CONC             | Default-Confined   | 7             | -0,001333          | -2362,31         |                 |
| CONC             | Default-Confined   | 8             | -0,000889          | -1799,86         |                 |
| CONC             | Default-Confined   | 9             | -0,000444          | -1012,42         |                 |
| CONC             | Default-Confined   | 10            | 0,000000           | 0,00             | A               |
| CONC             | Default-Confined   | 11            | 0,000105           | 266,80           |                 |
| CONC             | Default-Confined   | 12            | 0,000106           | 0,00             |                 |
| losaSupVia       | Default-Steel      | 1             | -0,050000          | 0,00             | -E              |
| losaSupVia       | Default-Steel      | 2             | -0,035000          | -12655,25        | -D              |
| losaSupVia       | Default-Steel      | 3             | -0,020000          | -25310,51        | -C              |
| losaSupVia       | Default-Steel      | 4             | -0,001241          | -25310,51        | -B              |
| losaSupVia       | Default-Steel      | 5             | 0,000000           | 0,00             | A               |
| losaSupVia       | Default-Steel      | 6             | 0,001241           | 25310,51         | B               |
| losaSupVia       | Default-Steel      | 7             | 0,020000           | 25310,51         |                 |
| losaSupVia       | Default-Steel      | 8             | 0,050000           | 40778,04         | C               |
| losaSupVia       | Default-Steel      | 9             | 0,080000           | 40778,04         | D               |
| losaSupVia       | Default-Steel      | 10            | 0,100000           | 25310,51         | E               |
| STEEL            | Default-Steel      | 1             | -0,050000          | 0,00             | -E              |
| STEEL            | Default-Steel      | 2             | -0,035000          | -12655,25        | -D              |
| STEEL            | Default-Steel      | 3             | -0,020000          | -25310,51        | -C              |
| STEEL            | Default-Steel      | 4             | -0,001241          | -25310,51        | -B              |
| STEEL            | Default-Steel      | 5             | 0,000000           | 0,00             | A               |
| STEEL            | Default-Steel      | 6             | 0,001241           | 25310,51         | B               |
| STEEL            | Default-Steel      | 7             | 0,020000           | 25310,51         |                 |
| STEEL            | Default-Steel      | 8             | 0,050000           | 40778,04         | C               |
| STEEL            | Default-Steel      | 9             | 0,080000           | 40778,04         | D               |

| Material | SSCurve       | Point | Strain   | Stress   | PointID |
|----------|---------------|-------|----------|----------|---------|
| Text     | Text          | Text  | Unitless | Ton/m2   | Text    |
| STEEL    | Default-Steel | 10    | 0,100000 | 25310,51 | E       |

Table: Modal Load Participation Ratios

| OutputCase | ItemType     | Item | Static  | Dynamic |
|------------|--------------|------|---------|---------|
| Text       | Text         | Text | Percent | Percent |
| MODAL      | Acceleration | UX   | 99,5972 | 96,1142 |
| MODAL      | Acceleration | UY   | 99,9594 | 98,2273 |
| MODAL      | Acceleration | UZ   | 99,4121 | 75,5244 |

Table: Modal Participating Mass Ratios, Part 1 of 3

| OutputCase | StepType | StepNum   | Period   | UX        | UY        | UZ        | SumUX    | SumUY    |
|------------|----------|-----------|----------|-----------|-----------|-----------|----------|----------|
| Text       | Text     | Unitless  | Sec      | Unitless  | Unitless  | Unitless  | Unitless | Unitless |
| MODAL      | Mode     | 1,000000  | 0,140601 | 0,013173  | 0,762923  | 8,688E-09 | 0,013173 | 0,762923 |
| MODAL      | Mode     | 2,000000  | 0,088728 | 2,664E-08 | 1,103E-07 | 0,160976  | 0,013173 | 0,762923 |
| MODAL      | Mode     | 3,000000  | 0,069283 | 6,482E-07 | 5,016E-07 | 0,591242  | 0,013174 | 0,762924 |
| MODAL      | Mode     | 4,000000  | 0,066242 | 0,011552  | 0,003612  | 0,000102  | 0,024725 | 0,766536 |
| MODAL      | Mode     | 5,000000  | 0,062874 | 0,604282  | 0,035166  | 2,885E-07 | 0,629008 | 0,801701 |
| MODAL      | Mode     | 6,000000  | 0,056498 | 0,034815  | 0,000645  | 6,961E-08 | 0,663823 | 0,802346 |
| MODAL      | Mode     | 7,000000  | 0,048363 | 0,000033  | 3,540E-06 | 0,001382  | 0,663856 | 0,802349 |
| MODAL      | Mode     | 8,000000  | 0,042567 | 0,000185  | 0,000098  | 0,001058  | 0,664041 | 0,802448 |
| MODAL      | Mode     | 9,000000  | 0,042369 | 0,296268  | 0,179731  | 1,232E-06 | 0,960310 | 0,982179 |
| MODAL      | Mode     | 10,000000 | 0,037127 | 1,808E-07 | 3,635E-07 | 0,000481  | 0,960310 | 0,982179 |
| MODAL      | Mode     | 11,000000 | 0,028450 | 0,000650  | 5,729E-06 | 1,056E-07 | 0,960960 | 0,982185 |
| MODAL      | Mode     | 12,000000 | 0,026354 | 0,000182  | 0,000088  | 4,717E-08 | 0,961142 | 0,982273 |

Table: Modal Participating Mass Ratios, Part 2 of 3

| OutputCase | StepType | StepNum   | SumUZ     | RX       | RY        | RZ        | SumRX    | SumRY    |
|------------|----------|-----------|-----------|----------|-----------|-----------|----------|----------|
| Text       | Text     | Unitless  | Unitless  | Unitless | Unitless  | Unitless  | Unitless | Unitless |
| MODAL      | Mode     | 1,000000  | 8,688E-09 | 0,153045 | 0,004347  | 0,217815  | 0,153045 | 0,004347 |
| MODAL      | Mode     | 2,000000  | 0,160976  | 0,098378 | 0,091169  | 3,960E-06 | 0,251423 | 0,095517 |
| MODAL      | Mode     | 3,000000  | 0,752219  | 0,361287 | 0,335601  | 0,000518  | 0,612711 | 0,431117 |
| MODAL      | Mode     | 4,000000  | 0,752321  | 0,000051 | 0,027978  | 0,000575  | 0,612761 | 0,459096 |
| MODAL      | Mode     | 5,000000  | 0,752321  | 0,002607 | 0,025591  | 0,102612  | 0,615368 | 0,484687 |
| MODAL      | Mode     | 6,000000  | 0,752321  | 0,002953 | 0,220847  | 0,014174  | 0,618321 | 0,705533 |
| MODAL      | Mode     | 7,000000  | 0,753704  | 0,000822 | 0,000708  | 0,284685  | 0,619143 | 0,706241 |
| MODAL      | Mode     | 8,000000  | 0,754761  | 0,000627 | 0,000405  | 0,006823  | 0,619770 | 0,706646 |
| MODAL      | Mode     | 9,000000  | 0,754762  | 0,000270 | 0,043218  | 0,321792  | 0,620040 | 0,749864 |
| MODAL      | Mode     | 10,000000 | 0,755244  | 0,000295 | 0,000280  | 0,001928  | 0,620335 | 0,750144 |
| MODAL      | Mode     | 11,000000 | 0,755244  | 0,000586 | 0,000491  | 0,000261  | 0,620921 | 0,750634 |
| MODAL      | Mode     | 12,000000 | 0,755244  | 0,044097 | 2,957E-06 | 2,288E-06 | 0,665018 | 0,750637 |

Table: Modal Participating Mass Ratios, Part 3 of 3

| OutputCase | StepType | StepNum  | SumRZ    |
|------------|----------|----------|----------|
| Text       | Text     | Unitless | Unitless |
| MODAL      | Mode     | 1,000000 | 0,217815 |
| MODAL      | Mode     | 2,000000 | 0,217819 |
| MODAL      | Mode     | 3,000000 | 0,218337 |
| MODAL      | Mode     | 4,000000 | 0,218911 |
| MODAL      | Mode     | 5,000000 | 0,321524 |
| MODAL      | Mode     | 6,000000 | 0,335698 |

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| OutputCase | StepType | StepNum   | SumRZ    |
|------------|----------|-----------|----------|
| Text       | Text     | Unitless  | Unitless |
| MODAL      | Mode     | 7,000000  | 0,620382 |
| MODAL      | Mode     | 8,000000  | 0,627205 |
| MODAL      | Mode     | 9,000000  | 0,948998 |
| MODAL      | Mode     | 10,000000 | 0,950926 |
| MODAL      | Mode     | 11,000000 | 0,951187 |
| MODAL      | Mode     | 12,000000 | 0,951189 |

Table: Modal Participation Factors, Part 1 of 2

| OutputCase | StepType | StepNum   | Period   | UX        | UY         | UZ        | RX         | RY         |
|------------|----------|-----------|----------|-----------|------------|-----------|------------|------------|
| Text       | Text     | Unitless  | Sec      | Ton-s2    | Ton-s2     | Ton-s2    | Ton-m-s2   | Ton-m-s2   |
| MODAL      | Mode     | 1,000000  | 0,140601 | -1,553103 | -11,819547 | -0,001163 | 39,819785  | -7,576359  |
| MODAL      | Mode     | 2,000000  | 0,088728 | 0,002209  | 0,004494   | -5,005774 | -31,925507 | 34,695079  |
| MODAL      | Mode     | 3,000000  | 0,069283 | -0,010894 | -0,009584  | 9,593410  | 61,180788  | -66,566397 |
| MODAL      | Mode     | 4,000000  | 0,066242 | -1,454413 | -0,813286  | -0,126150 | 0,726746   | 19,220029  |
| MODAL      | Mode     | 5,000000  | 0,062874 | 10,519145 | 2,537578   | -0,006702 | 5,197039   | 18,381703  |
| MODAL      | Mode     | 6,000000  | 0,056498 | -2,524905 | 0,343540   | 0,003292  | -5,530894  | -53,999404 |
| MODAL      | Mode     | 7,000000  | 0,048363 | -0,077466 | 0,025462   | -0,463867 | -2,918760  | 3,057089   |
| MODAL      | Mode     | 8,000000  | 0,042567 | 0,184280  | -0,134238  | 0,405759  | 2,547903   | -2,311630  |
| MODAL      | Mode     | 9,000000  | 0,042369 | -7,365515 | 5,736827   | 0,013850  | 1,672860   | -23,887873 |
| MODAL      | Mode     | 10,000000 | 0,037127 | 0,005753  | -0,008158  | 0,273670  | 1,748144   | -1,921539  |
| MODAL      | Mode     | 11,000000 | 0,028450 | -0,345081 | 0,032390   | 0,004054  | 2,463338   | 2,545294   |
| MODAL      | Mode     | 12,000000 | 0,026354 | 0,182772  | 0,127113   | 0,002710  | 21,374378  | 0,197591   |

Table: Modal Participation Factors, Part 2 of 2

| OutputCase | StepType | StepNum   | RZ         | ModalMass | ModalStiff  |
|------------|----------|-----------|------------|-----------|-------------|
| Text       | Text     | Unitless  | Ton-m-s2   | Ton-m-s2  | Ton-m       |
| MODAL      | Mode     | 1,000000  | -72,253465 | 1,0000    | 1997,026282 |
| MODAL      | Mode     | 2,000000  | 0,308072   | 1,0000    | 5014,623834 |
| MODAL      | Mode     | 3,000000  | -3,523229  | 1,0000    | 8224,531025 |
| MODAL      | Mode     | 4,000000  | 3,711460   | 1,0000    | 8997,020068 |
| MODAL      | Mode     | 5,000000  | -49,592339 | 1,0000    | 9986,502595 |
| MODAL      | Mode     | 6,000000  | 18,431574  | 1,0000    | 12367,67782 |
| MODAL      | Mode     | 7,000000  | -82,603214 | 1,0000    | 16878,62443 |
| MODAL      | Mode     | 8,000000  | 12,788081  | 1,0000    | 21787,50109 |
| MODAL      | Mode     | 9,000000  | 87,821921  | 1,0000    | 21991,62488 |
| MODAL      | Mode     | 10,000000 | -6,797460  | 1,0000    | 28640,23312 |
| MODAL      | Mode     | 11,000000 | 2,501533   | 1,0000    | 48775,8450  |
| MODAL      | Mode     | 12,000000 | -0,234183  | 1,0000    | 56841,7695  |

Table: Modal Periods And Frequencies

| OutputCase   | StepType    | StepNum         | Period          | Frequency         | CircFreq          | Eigenvalue        |
|--------------|-------------|-----------------|-----------------|-------------------|-------------------|-------------------|
| Text         | Text        | Unitless        | Sec             | Cyc/sec           | rad/sec           | rad2/sec2         |
| MODAL        | Mode        | 1,000000        | 0,140601        | 7,1123E+00        | 4,4688E+01        | 1,9970E+03        |
| <b>MODAL</b> | <b>Mode</b> | <b>2,000000</b> | <b>0,088728</b> | <b>1,1270E+01</b> | <b>7,0814E+01</b> | <b>5,0146E+03</b> |
| MODAL        | Mode        | 3,000000        | 0,069283        | 1,4434E+01        | 9,0689E+01        | 8,2245E+03        |
| MODAL        | Mode        | 4,000000        | 0,066242        | 1,5096E+01        | 9,4853E+01        | 8,9970E+03        |
| MODAL        | Mode        | 5,000000        | 0,062874        | 1,5905E+01        | 9,9932E+01        | 9,9865E+03        |
| MODAL        | Mode        | 6,000000        | 0,056498        | 1,7700E+01        | 1,1121E+02        | 1,2368E+04        |
| MODAL        | Mode        | 7,000000        | 0,048363        | 2,0677E+01        | 1,2992E+02        | 1,6879E+04        |
| MODAL        | Mode        | 8,000000        | 0,042567        | 2,3492E+01        | 1,4761E+02        | 2,1788E+04        |
| MODAL        | Mode        | 9,000000        | 0,042369        | 2,3602E+01        | 1,4830E+02        | 2,1992E+04        |

| OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | Period<br>Sec | Frequency<br>Cyc/sec | CircFreq<br>rad/sec | Eigenvalue<br>rad2/sec2 |
|--------------------|------------------|---------------------|---------------|----------------------|---------------------|-------------------------|
| MODAL              | Mode             | 10,000000           | 0,037127      | 2,6934E+01           | 1,6923E+02          | 2,8640E+04              |
| MODAL              | Mode             | 11,000000           | 0,028450      | 3,5150E+01           | 2,2085E+02          | 4,8776E+04              |
| MODAL              | Mode             | 12,000000           | 0,026354      | 3,7945E+01           | 2,3842E+02          | 5,6842E+04              |

Table: Objects And Elements - Areas

| AreaElem<br>Text | AreaObject<br>Text | ElemJt1<br>Text | ElemJt2<br>Text | ElemJt3<br>Text | ElemJt4<br>Text |
|------------------|--------------------|-----------------|-----------------|-----------------|-----------------|
| 1                | 31                 | 29              | 28              | 8               | 12              |
| 2                | 35                 | 28              | 32              | 18              | 8               |
| 3                | 39                 | 30              | 35              | 24              | 15              |
| 4                | 41                 | 35              | 29              | 12              | 24              |
| 5                | 43                 | 32              | 36              | 27              | 18              |
| 6                | 45                 | 36              | 34              | 21              | 27              |
| 7                | 102                | 10              | 5               | 37              | 38              |
| 8                | 106                | 5               | 16              | 41              | 37              |
| 9                | 110                | 13              | 22              | 44              | 39              |
| 10               | 112                | 22              | 10              | 38              | 44              |
| 11               | 114                | 16              | 25              | 45              | 41              |
| 12               | 116                | 25              | 19              | 43              | 45              |
| 13               | 119                | 47              | 46              | 48              | 49              |
| 14               | 120                | 49              | 48              | 50              | 51              |
| 15               | 122                | 53              | 52              | 54              | 55              |
| 16               | 123                | 55              | 54              | 28              | 29              |
| 17               | 131                | 46              | 66              | 67              | 48              |
| 18               | 132                | 48              | 67              | 68              | 50              |
| 19               | 134                | 52              | 69              | 70              | 54              |
| 20               | 135                | 54              | 70              | 32              | 28              |
| 21               | 143                | 56              | 81              | 82              | 58              |
| 22               | 144                | 58              | 82              | 83              | 60              |
| 23               | 146                | 62              | 84              | 85              | 64              |
| 24               | 147                | 64              | 85              | 35              | 30              |
| 25               | 149                | 81              | 47              | 49              | 82              |
| 26               | 150                | 82              | 49              | 51              | 83              |
| 27               | 152                | 84              | 53              | 55              | 85              |
| 28               | 153                | 85              | 55              | 29              | 35              |
| 29               | 155                | 66              | 86              | 87              | 67              |
| 30               | 156                | 67              | 87              | 88              | 68              |
| 31               | 158                | 69              | 89              | 90              | 70              |
| 32               | 159                | 70              | 90              | 36              | 32              |
| 33               | 161                | 86              | 72              | 74              | 87              |
| 34               | 162                | 87              | 74              | 76              | 88              |
| 35               | 164                | 89              | 78              | 80              | 90              |
| 36               | 165                | 90              | 80              | 34              | 36              |
| 37               | 166                | 38              | 37              | 91              | 92              |
| 38               | 167                | 92              | 91              | 93              | 94              |
| 39               | 169                | 96              | 95              | 97              | 98              |
| 40               | 170                | 98              | 97              | 99              | 100             |
| 41               | 178                | 37              | 41              | 111             | 91              |
| 42               | 179                | 91              | 111             | 112             | 93              |
| 43               | 181                | 95              | 113             | 114             | 97              |
| 44               | 182                | 97              | 114             | 115             | 99              |
| 45               | 190                | 39              | 44              | 126             | 101             |
| 46               | 191                | 101             | 126             | 127             | 103             |
| 47               | 193                | 105             | 128             | 129             | 107             |

| AreaElem | AreaObject | ElemJt1 | ElemJt2 | ElemJt3 | ElemJt4 |
|----------|------------|---------|---------|---------|---------|
| Text     | Text       | Text    | Text    | Text    | Text    |
| 48       | 194        | 107     | 129     | 130     | 109     |
| 49       | 196        | 44      | 38      | 92      | 126     |
| 50       | 197        | 126     | 92      | 94      | 127     |
| 51       | 199        | 128     | 96      | 98      | 129     |
| 52       | 200        | 129     | 98      | 100     | 130     |
| 53       | 202        | 41      | 45      | 131     | 111     |
| 54       | 203        | 111     | 131     | 132     | 112     |
| 55       | 205        | 113     | 133     | 134     | 114     |
| 56       | 206        | 114     | 134     | 135     | 115     |
| 57       | 208        | 45      | 43      | 117     | 131     |
| 58       | 209        | 131     | 117     | 119     | 132     |
| 59       | 211        | 133     | 121     | 123     | 134     |
| 60       | 212        | 134     | 123     | 125     | 135     |
| 61       | 246        | 11      | 6       | 136     | 137     |
| 62       | 247        | 137     | 136     | 138     | 139     |
| 63       | 248        | 139     | 138     | 46      | 47      |
| 64       | 252        | 6       | 17      | 144     | 136     |
| 65       | 253        | 136     | 144     | 145     | 138     |
| 66       | 254        | 138     | 145     | 66      | 46      |
| 67       | 258        | 14      | 23      | 150     | 140     |
| 68       | 259        | 140     | 150     | 151     | 142     |
| 69       | 260        | 142     | 151     | 81      | 56      |
| 70       | 261        | 23      | 11      | 137     | 150     |
| 71       | 262        | 150     | 137     | 139     | 151     |
| 72       | 263        | 151     | 139     | 47      | 81      |
| 73       | 264        | 17      | 26      | 152     | 144     |
| 74       | 265        | 144     | 152     | 153     | 145     |
| 75       | 266        | 145     | 153     | 86      | 66      |
| 76       | 267        | 26      | 20      | 147     | 152     |
| 77       | 268        | 152     | 147     | 149     | 153     |
| 78       | 269        | 153     | 149     | 72      | 86      |
| 79       | 270        | 100     | 99      | 154     | 155     |
| 80       | 271        | 155     | 154     | 156     | 157     |
| 81       | 272        | 157     | 156     | 6       | 11      |
| 82       | 276        | 99      | 115     | 162     | 154     |
| 83       | 277        | 154     | 162     | 163     | 156     |
| 84       | 278        | 156     | 163     | 17      | 6       |
| 85       | 282        | 109     | 130     | 168     | 158     |
| 86       | 283        | 158     | 168     | 169     | 160     |
| 87       | 284        | 160     | 169     | 23      | 14      |
| 88       | 285        | 130     | 100     | 155     | 168     |
| 89       | 286        | 168     | 155     | 157     | 169     |
| 90       | 287        | 169     | 157     | 11      | 23      |
| 91       | 288        | 115     | 135     | 170     | 162     |
| 92       | 289        | 162     | 170     | 171     | 163     |
| 93       | 290        | 163     | 171     | 26      | 17      |
| 94       | 291        | 135     | 125     | 165     | 170     |
| 95       | 292        | 170     | 165     | 167     | 171     |
| 96       | 293        | 171     | 167     | 20      | 26      |
| 97       | 294        | 51      | 50      | 172     | 173     |
| 98       | 295        | 173     | 172     | 52      | 53      |
| 99       | 298        | 50      | 68      | 176     | 172     |
| 100      | 299        | 172     | 176     | 69      | 52      |
| 101      | 302        | 60      | 83      | 179     | 174     |
| 102      | 303        | 174     | 179     | 84      | 62      |
| 103      | 304        | 83      | 51      | 173     | 179     |



| AreaElem | AreaObject | ElemJt1 | ElemJt2 | ElemJt3 | ElemJt4 |
|----------|------------|---------|---------|---------|---------|
| Text     | Text       | Text    | Text    | Text    | Text    |
| 104      | 305        | 179     | 173     | 53      | 84      |
| 105      | 306        | 68      | 88      | 180     | 176     |
| 106      | 307        | 176     | 180     | 89      | 69      |
| 107      | 308        | 88      | 76      | 178     | 180     |
| 108      | 309        | 180     | 178     | 78      | 89      |
| 109      | 310        | 94      | 93      | 181     | 182     |
| 110      | 311        | 182     | 181     | 95      | 96      |
| 111      | 314        | 93      | 112     | 185     | 181     |
| 112      | 315        | 181     | 185     | 113     | 95      |
| 113      | 318        | 103     | 127     | 188     | 183     |
| 114      | 319        | 183     | 188     | 128     | 105     |
| 115      | 320        | 127     | 94      | 182     | 188     |
| 116      | 321        | 188     | 182     | 96      | 128     |
| 117      | 322        | 112     | 132     | 189     | 185     |
| 118      | 323        | 185     | 189     | 133     | 113     |
| 119      | 324        | 132     | 119     | 187     | 189     |
| 120      | 325        | 189     | 187     | 121     | 133     |
| 121      | 326        | 31      | 190     | 191     | 4       |
| 122      | 327        | 190     | 30      | 15      | 191     |
| 123      | 328        | 1       | 192     | 193     | 40      |
| 124      | 329        | 192     | 13      | 39      | 193     |
| 125      | 330        | 57      | 194     | 195     | 59      |
| 126      | 331        | 194     | 56      | 58      | 195     |
| 127      | 332        | 59      | 195     | 196     | 61      |
| 128      | 333        | 195     | 58      | 60      | 196     |
| 129      | 334        | 63      | 197     | 198     | 65      |
| 130      | 335        | 197     | 62      | 64      | 198     |
| 131      | 336        | 65      | 198     | 190     | 31      |
| 132      | 337        | 198     | 64      | 30      | 190     |
| 133      | 338        | 40      | 193     | 199     | 102     |
| 134      | 339        | 193     | 39      | 101     | 199     |
| 135      | 340        | 102     | 199     | 200     | 104     |
| 136      | 341        | 199     | 101     | 103     | 200     |
| 137      | 342        | 106     | 201     | 202     | 108     |
| 138      | 343        | 201     | 105     | 107     | 202     |
| 139      | 344        | 108     | 202     | 203     | 110     |
| 140      | 345        | 202     | 107     | 109     | 203     |
| 141      | 346        | 7       | 204     | 205     | 141     |
| 142      | 347        | 204     | 14      | 140     | 205     |
| 143      | 348        | 141     | 205     | 206     | 143     |
| 144      | 349        | 205     | 140     | 142     | 206     |
| 145      | 350        | 143     | 206     | 194     | 57      |
| 146      | 351        | 206     | 142     | 56      | 194     |
| 147      | 352        | 110     | 203     | 207     | 159     |
| 148      | 353        | 203     | 109     | 158     | 207     |
| 149      | 354        | 159     | 207     | 208     | 161     |
| 150      | 355        | 207     | 158     | 160     | 208     |
| 151      | 356        | 161     | 208     | 204     | 7       |
| 152      | 357        | 208     | 160     | 14      | 204     |
| 153      | 358        | 61      | 196     | 209     | 175     |
| 154      | 359        | 196     | 60      | 174     | 209     |
| 155      | 360        | 175     | 209     | 197     | 63      |
| 156      | 361        | 209     | 174     | 62      | 197     |
| 157      | 362        | 104     | 200     | 210     | 184     |
| 158      | 363        | 200     | 103     | 183     | 210     |
| 159      | 364        | 184     | 210     | 201     | 106     |

| AreaElem | AreaObject | ElemJt1 | ElemJt2 | ElemJt3 | ElemJt4 |
|----------|------------|---------|---------|---------|---------|
| Text     | Text       | Text    | Text    | Text    | Text    |
| 160      | 365        | 210     | 183     | 105     | 201     |
| 161      | 366        | 34      | 211     | 212     | 21      |
| 162      | 367        | 211     | 33      | 3       | 212     |
| 163      | 368        | 19      | 213     | 214     | 43      |
| 164      | 369        | 213     | 2       | 42      | 214     |
| 165      | 370        | 72      | 215     | 216     | 74      |
| 166      | 371        | 215     | 71      | 73      | 216     |
| 167      | 372        | 74      | 216     | 217     | 76      |
| 168      | 373        | 216     | 73      | 75      | 217     |
| 169      | 374        | 78      | 218     | 219     | 80      |
| 170      | 375        | 218     | 77      | 79      | 219     |
| 171      | 376        | 80      | 219     | 211     | 34      |
| 172      | 377        | 219     | 79      | 33      | 211     |
| 173      | 378        | 43      | 214     | 220     | 117     |
| 174      | 379        | 214     | 42      | 116     | 220     |
| 175      | 380        | 117     | 220     | 221     | 119     |
| 176      | 381        | 220     | 116     | 118     | 221     |
| 177      | 382        | 121     | 222     | 223     | 123     |
| 178      | 383        | 222     | 120     | 122     | 223     |
| 179      | 384        | 123     | 223     | 224     | 125     |
| 180      | 385        | 223     | 122     | 124     | 224     |
| 181      | 386        | 20      | 225     | 226     | 147     |
| 182      | 387        | 225     | 9       | 146     | 226     |
| 183      | 388        | 147     | 226     | 227     | 149     |
| 184      | 389        | 226     | 146     | 148     | 227     |
| 185      | 390        | 149     | 227     | 215     | 72      |
| 186      | 391        | 227     | 148     | 71      | 215     |
| 187      | 392        | 125     | 224     | 228     | 165     |
| 188      | 393        | 224     | 124     | 164     | 228     |
| 189      | 394        | 165     | 228     | 229     | 167     |
| 190      | 395        | 228     | 164     | 166     | 229     |
| 191      | 396        | 167     | 229     | 225     | 20      |
| 192      | 397        | 229     | 166     | 9       | 225     |
| 193      | 398        | 76      | 217     | 230     | 178     |
| 194      | 399        | 217     | 75      | 177     | 230     |
| 195      | 400        | 178     | 230     | 218     | 78      |
| 196      | 401        | 230     | 177     | 77      | 218     |
| 197      | 402        | 119     | 221     | 231     | 187     |
| 198      | 403        | 221     | 118     | 186     | 231     |
| 199      | 404        | 187     | 231     | 222     | 121     |
| 200      | 405        | 231     | 186     | 120     | 222     |
| 201      | 406        | 260     | 259     | 239     | 243     |
| 202      | 407        | 259     | 263     | 249     | 239     |
| 203      | 408        | 261     | 266     | 255     | 246     |
| 204      | 409        | 266     | 260     | 243     | 255     |
| 205      | 410        | 263     | 267     | 258     | 249     |
| 206      | 411        | 267     | 265     | 252     | 258     |
| 207      | 412        | 241     | 236     | 268     | 269     |
| 208      | 413        | 236     | 247     | 272     | 268     |
| 209      | 414        | 244     | 253     | 275     | 270     |
| 210      | 415        | 253     | 241     | 269     | 275     |
| 211      | 416        | 247     | 256     | 276     | 272     |
| 212      | 417        | 256     | 250     | 274     | 276     |
| 213      | 418        | 278     | 277     | 279     | 280     |
| 214      | 419        | 280     | 279     | 281     | 282     |
| 215      | 420        | 284     | 283     | 285     | 286     |

| AreaElem | AreaObject | ElemJt1 | ElemJt2 | ElemJt3 | ElemJt4 |
|----------|------------|---------|---------|---------|---------|
| Text     | Text       | Text    | Text    | Text    | Text    |
| 216      | 421        | 286     | 285     | 259     | 260     |
| 217      | 422        | 277     | 297     | 298     | 279     |
| 218      | 423        | 279     | 298     | 299     | 281     |
| 219      | 424        | 283     | 300     | 301     | 285     |
| 220      | 425        | 285     | 301     | 263     | 259     |
| 221      | 426        | 287     | 312     | 313     | 289     |
| 222      | 427        | 289     | 313     | 314     | 291     |
| 223      | 428        | 293     | 315     | 316     | 295     |
| 224      | 429        | 295     | 316     | 266     | 261     |
| 225      | 430        | 312     | 278     | 280     | 313     |
| 226      | 431        | 313     | 280     | 282     | 314     |
| 227      | 432        | 315     | 284     | 286     | 316     |
| 228      | 433        | 316     | 286     | 260     | 266     |
| 229      | 434        | 297     | 317     | 318     | 298     |
| 230      | 435        | 298     | 318     | 319     | 299     |
| 231      | 436        | 300     | 320     | 321     | 301     |
| 232      | 437        | 301     | 321     | 267     | 263     |
| 233      | 438        | 317     | 303     | 305     | 318     |
| 234      | 439        | 318     | 305     | 307     | 319     |
| 235      | 440        | 320     | 309     | 311     | 321     |
| 236      | 441        | 321     | 311     | 265     | 267     |
| 237      | 442        | 269     | 268     | 322     | 323     |
| 238      | 443        | 323     | 322     | 324     | 325     |
| 239      | 444        | 327     | 326     | 328     | 329     |
| 240      | 445        | 329     | 328     | 330     | 331     |
| 241      | 446        | 268     | 272     | 342     | 322     |
| 242      | 447        | 322     | 342     | 343     | 324     |
| 243      | 448        | 326     | 344     | 345     | 328     |
| 244      | 449        | 328     | 345     | 346     | 330     |
| 245      | 450        | 270     | 275     | 357     | 332     |
| 246      | 451        | 332     | 357     | 358     | 334     |
| 247      | 452        | 336     | 359     | 360     | 338     |
| 248      | 453        | 338     | 360     | 361     | 340     |
| 249      | 454        | 275     | 269     | 323     | 357     |
| 250      | 455        | 357     | 323     | 325     | 358     |
| 251      | 456        | 359     | 327     | 329     | 360     |
| 252      | 457        | 360     | 329     | 331     | 361     |
| 253      | 458        | 272     | 276     | 362     | 342     |
| 254      | 459        | 342     | 362     | 363     | 343     |
| 255      | 460        | 344     | 364     | 365     | 345     |
| 256      | 461        | 345     | 365     | 366     | 346     |
| 257      | 462        | 276     | 274     | 348     | 362     |
| 258      | 463        | 362     | 348     | 350     | 363     |
| 259      | 464        | 364     | 352     | 354     | 365     |
| 260      | 465        | 365     | 354     | 356     | 366     |
| 261      | 466        | 242     | 237     | 367     | 368     |
| 262      | 467        | 368     | 367     | 369     | 370     |
| 263      | 468        | 370     | 369     | 277     | 278     |
| 264      | 469        | 237     | 248     | 375     | 367     |
| 265      | 470        | 367     | 375     | 376     | 369     |
| 266      | 471        | 369     | 376     | 297     | 277     |
| 267      | 472        | 245     | 254     | 381     | 371     |
| 268      | 473        | 371     | 381     | 382     | 373     |
| 269      | 474        | 373     | 382     | 312     | 287     |
| 270      | 475        | 254     | 242     | 368     | 381     |
| 271      | 476        | 381     | 368     | 370     | 382     |

| AreaElem | AreaObject | ElemJt1 | ElemJt2 | ElemJt3 | ElemJt4 |
|----------|------------|---------|---------|---------|---------|
| Text     | Text       | Text    | Text    | Text    | Text    |
| 272      | 477        | 382     | 370     | 278     | 312     |
| 273      | 478        | 248     | 257     | 383     | 375     |
| 274      | 479        | 375     | 383     | 384     | 376     |
| 275      | 480        | 376     | 384     | 317     | 297     |
| 276      | 481        | 257     | 251     | 378     | 383     |
| 277      | 482        | 383     | 378     | 380     | 384     |
| 278      | 483        | 384     | 380     | 303     | 317     |
| 279      | 484        | 331     | 330     | 385     | 386     |
| 280      | 485        | 386     | 385     | 387     | 388     |
| 281      | 486        | 388     | 387     | 237     | 242     |
| 282      | 487        | 330     | 346     | 393     | 385     |
| 283      | 488        | 385     | 393     | 394     | 387     |
| 284      | 489        | 387     | 394     | 248     | 237     |
| 285      | 490        | 340     | 361     | 399     | 389     |
| 286      | 491        | 389     | 399     | 400     | 391     |
| 287      | 492        | 391     | 400     | 254     | 245     |
| 288      | 493        | 361     | 331     | 386     | 399     |
| 289      | 494        | 399     | 386     | 388     | 400     |
| 290      | 495        | 400     | 388     | 242     | 254     |
| 291      | 496        | 346     | 366     | 401     | 393     |
| 292      | 497        | 393     | 401     | 402     | 394     |
| 293      | 498        | 394     | 402     | 257     | 248     |
| 294      | 499        | 366     | 356     | 396     | 401     |
| 295      | 500        | 401     | 396     | 398     | 402     |
| 296      | 501        | 402     | 398     | 251     | 257     |
| 297      | 502        | 282     | 281     | 403     | 404     |
| 298      | 503        | 404     | 403     | 283     | 284     |
| 299      | 504        | 281     | 299     | 407     | 403     |
| 300      | 505        | 403     | 407     | 300     | 283     |
| 301      | 506        | 291     | 314     | 410     | 405     |
| 302      | 507        | 405     | 410     | 315     | 293     |
| 303      | 508        | 314     | 282     | 404     | 410     |
| 304      | 509        | 410     | 404     | 284     | 315     |
| 305      | 510        | 299     | 319     | 411     | 407     |
| 306      | 511        | 407     | 411     | 320     | 300     |
| 307      | 512        | 319     | 307     | 409     | 411     |
| 308      | 513        | 411     | 409     | 309     | 320     |
| 309      | 514        | 325     | 324     | 412     | 413     |
| 310      | 515        | 413     | 412     | 326     | 327     |
| 311      | 516        | 324     | 343     | 416     | 412     |
| 312      | 517        | 412     | 416     | 344     | 326     |
| 313      | 518        | 334     | 358     | 419     | 414     |
| 314      | 519        | 414     | 419     | 359     | 336     |
| 315      | 520        | 358     | 325     | 413     | 419     |
| 316      | 521        | 419     | 413     | 327     | 359     |
| 317      | 522        | 343     | 363     | 420     | 416     |
| 318      | 523        | 416     | 420     | 364     | 344     |
| 319      | 524        | 363     | 350     | 418     | 420     |
| 320      | 525        | 420     | 418     | 352     | 364     |
| 321      | 526        | 262     | 421     | 422     | 235     |
| 322      | 527        | 421     | 261     | 246     | 422     |
| 323      | 528        | 232     | 423     | 424     | 271     |
| 324      | 529        | 423     | 244     | 270     | 424     |
| 325      | 530        | 288     | 425     | 426     | 290     |
| 326      | 531        | 425     | 287     | 289     | 426     |
| 327      | 532        | 290     | 426     | 427     | 292     |

| AreaElem | AreaObject | ElemJt1 | ElemJt2 | ElemJt3 | ElemJt4 |
|----------|------------|---------|---------|---------|---------|
| Text     | Text       | Text    | Text    | Text    | Text    |
| 328      | 533        | 426     | 289     | 291     | 427     |
| 329      | 534        | 294     | 428     | 429     | 296     |
| 330      | 535        | 428     | 293     | 295     | 429     |
| 331      | 536        | 296     | 429     | 421     | 262     |
| 332      | 537        | 429     | 295     | 261     | 421     |
| 333      | 538        | 271     | 424     | 430     | 333     |
| 334      | 539        | 424     | 270     | 332     | 430     |
| 335      | 540        | 333     | 430     | 431     | 335     |
| 336      | 541        | 430     | 332     | 334     | 431     |
| 337      | 542        | 337     | 432     | 433     | 339     |
| 338      | 543        | 432     | 336     | 338     | 433     |
| 339      | 544        | 339     | 433     | 434     | 341     |
| 340      | 545        | 433     | 338     | 340     | 434     |
| 341      | 546        | 238     | 435     | 436     | 372     |
| 342      | 547        | 435     | 245     | 371     | 436     |
| 343      | 548        | 372     | 436     | 437     | 374     |
| 344      | 549        | 436     | 371     | 373     | 437     |
| 345      | 550        | 374     | 437     | 425     | 288     |
| 346      | 551        | 437     | 373     | 287     | 425     |
| 347      | 552        | 341     | 434     | 438     | 390     |
| 348      | 553        | 434     | 340     | 389     | 438     |
| 349      | 554        | 390     | 438     | 439     | 392     |
| 350      | 555        | 438     | 389     | 391     | 439     |
| 351      | 556        | 392     | 439     | 435     | 238     |
| 352      | 557        | 439     | 391     | 245     | 435     |
| 353      | 558        | 292     | 427     | 440     | 406     |
| 354      | 559        | 427     | 291     | 405     | 440     |
| 355      | 560        | 406     | 440     | 428     | 294     |
| 356      | 561        | 440     | 405     | 293     | 428     |
| 357      | 562        | 335     | 431     | 441     | 415     |
| 358      | 563        | 431     | 334     | 414     | 441     |
| 359      | 564        | 415     | 441     | 432     | 337     |
| 360      | 565        | 441     | 414     | 336     | 432     |
| 361      | 566        | 265     | 442     | 443     | 252     |
| 362      | 567        | 442     | 264     | 234     | 443     |
| 363      | 568        | 250     | 444     | 445     | 274     |
| 364      | 569        | 444     | 233     | 273     | 445     |
| 365      | 570        | 303     | 446     | 447     | 305     |
| 366      | 571        | 446     | 302     | 304     | 447     |
| 367      | 572        | 305     | 447     | 448     | 307     |
| 368      | 573        | 447     | 304     | 306     | 448     |
| 369      | 574        | 309     | 449     | 450     | 311     |
| 370      | 575        | 449     | 308     | 310     | 450     |
| 371      | 576        | 311     | 450     | 442     | 265     |
| 372      | 577        | 450     | 310     | 264     | 442     |
| 373      | 578        | 274     | 445     | 451     | 348     |
| 374      | 579        | 445     | 273     | 347     | 451     |
| 375      | 580        | 348     | 451     | 452     | 350     |
| 376      | 581        | 451     | 347     | 349     | 452     |
| 377      | 582        | 352     | 453     | 454     | 354     |
| 378      | 583        | 453     | 351     | 353     | 454     |
| 379      | 584        | 354     | 454     | 455     | 356     |
| 380      | 585        | 454     | 353     | 355     | 455     |
| 381      | 586        | 251     | 456     | 457     | 378     |
| 382      | 587        | 456     | 240     | 377     | 457     |
| 383      | 588        | 378     | 457     | 458     | 380     |

| AreaElem | AreaObject | ElemJt1 | ElemJt2 | ElemJt3 | ElemJt4 |
|----------|------------|---------|---------|---------|---------|
| Text     | Text       | Text    | Text    | Text    | Text    |
| 384      | 589        | 457     | 377     | 379     | 458     |
| 385      | 590        | 380     | 458     | 446     | 303     |
| 386      | 591        | 458     | 379     | 302     | 446     |
| 387      | 592        | 356     | 455     | 459     | 396     |
| 388      | 593        | 455     | 355     | 395     | 459     |
| 389      | 594        | 396     | 459     | 460     | 398     |
| 390      | 595        | 459     | 395     | 397     | 460     |
| 391      | 596        | 398     | 460     | 456     | 251     |
| 392      | 597        | 460     | 397     | 240     | 456     |
| 393      | 598        | 307     | 448     | 461     | 409     |
| 394      | 599        | 448     | 306     | 408     | 461     |
| 395      | 600        | 409     | 461     | 449     | 309     |
| 396      | 601        | 461     | 408     | 308     | 449     |
| 397      | 602        | 350     | 452     | 462     | 418     |
| 398      | 603        | 452     | 349     | 417     | 462     |
| 399      | 604        | 418     | 462     | 453     | 352     |
| 400      | 605        | 462     | 417     | 351     | 453     |
| 401      | 607        | 232     | 423     | 192     | 1       |
| 402      | 608        | 423     | 244     | 13      | 192     |
| 403      | 609        | 244     | 253     | 22      | 13      |
| 404      | 610        | 253     | 241     | 10      | 22      |
| 405      | 611        | 241     | 236     | 5       | 10      |
| 406      | 612        | 236     | 247     | 16      | 5       |
| 407      | 613        | 247     | 256     | 25      | 16      |
| 408      | 614        | 256     | 250     | 19      | 25      |
| 409      | 615        | 250     | 444     | 213     | 19      |
| 410      | 616        | 444     | 233     | 2       | 213     |
| 411      | 618        | 235     | 422     | 191     | 4       |
| 412      | 619        | 422     | 246     | 15      | 191     |
| 413      | 620        | 246     | 255     | 24      | 15      |
| 414      | 621        | 255     | 243     | 12      | 24      |
| 415      | 622        | 243     | 239     | 8       | 12      |
| 416      | 623        | 239     | 249     | 18      | 8       |
| 417      | 624        | 249     | 258     | 27      | 18      |
| 418      | 625        | 258     | 252     | 21      | 27      |
| 419      | 626        | 252     | 443     | 212     | 21      |
| 420      | 627        | 443     | 234     | 3       | 212     |

Table: Objects And Elements - Joints

| JointElem | JointObject | GlobalX  | GlobalY  | GlobalZ |
|-----------|-------------|----------|----------|---------|
| Text      | Text        | m        | m        | m       |
| 1         | 1           | 0,00000  | 0,00000  | 4,20000 |
| 2         | 2           | 17,35000 | 0,00000  | 4,20000 |
| 3         | 3           | 13,93400 | 12,75000 | 4,20000 |
| 4         | 4           | -3,41600 | 12,75000 | 4,20000 |
| 5         | 5           | 8,68000  | 0,00000  | 4,20000 |
| 6         | 6           | 6,97200  | 6,37500  | 4,20000 |
| 7         | 7           | -1,70800 | 6,37500  | 4,20000 |
| 8         | 8           | 5,26400  | 12,75000 | 4,20000 |
| 9         | 9           | 15,64200 | 6,37500  | 4,20000 |
| 10        | 10          | 6,27500  | 0,00000  | 4,20000 |
| 11        | 11          | 4,56700  | 6,37500  | 4,20000 |
| 12        | 12          | 2,85900  | 12,75000 | 4,20000 |
| 13        | 13          | 4,84250  | 0,00000  | 4,20000 |

| JointElem | JointObject | GlobalX  | GlobalY  | GlobalZ |
|-----------|-------------|----------|----------|---------|
| Text      | Text        | m        | m        | m       |
| 14        | 14          | 3,13450  | 6,37500  | 4,20000 |
| 15        | 15          | 1,42650  | 12,75000 | 4,20000 |
| 16        | 16          | 10,98000 | 0,00000  | 4,20000 |
| 17        | 17          | 9,27200  | 6,37500  | 4,20000 |
| 18        | 18          | 7,56400  | 12,75000 | 4,20000 |
| 19        | 19          | 12,41000 | 0,00000  | 4,20000 |
| 20        | 20          | 10,70200 | 6,37500  | 4,20000 |
| 21        | 21          | 8,99400  | 12,75000 | 4,20000 |
| 22        | 22          | 5,55875  | 0,00000  | 4,20000 |
| 23        | 23          | 3,85075  | 6,37500  | 4,20000 |
| 24        | 24          | 2,14275  | 12,75000 | 4,20000 |
| 25        | 25          | 11,69500 | 0,00000  | 4,20000 |
| 26        | 26          | 9,98700  | 6,37500  | 4,20000 |
| 27        | 27          | 8,27900  | 12,75000 | 4,20000 |
| 28        | 28          | 6,11800  | 9,56250  | 4,20000 |
| 29        | 29          | 3,71300  | 9,56250  | 4,20000 |
| 30        | 30          | 2,28050  | 9,56250  | 4,20000 |
| 31        | 31          | -2,56200 | 9,56250  | 4,20000 |
| 32        | 32          | 8,41800  | 9,56250  | 4,20000 |
| 33        | 33          | 14,78800 | 9,56250  | 4,20000 |
| 34        | 34          | 9,84800  | 9,56250  | 4,20000 |
| 35        | 35          | 2,99675  | 9,56250  | 4,20000 |
| 36        | 36          | 9,13300  | 9,56250  | 4,20000 |
| 37        | 82          | 7,82600  | 3,18750  | 4,20000 |
| 38        | 83          | 5,42100  | 3,18750  | 4,20000 |
| 39        | 84          | 3,98850  | 3,18750  | 4,20000 |
| 40        | 85          | -0,85400 | 3,18750  | 4,20000 |
| 41        | 86          | 10,12600 | 3,18750  | 4,20000 |
| 42        | 87          | 16,49600 | 3,18750  | 4,20000 |
| 43        | 88          | 11,55600 | 3,18750  | 4,20000 |
| 44        | 89          | 4,70475  | 3,18750  | 4,20000 |
| 45        | 90          | 10,84100 | 3,18750  | 4,20000 |
| 46        | 91          | 6,82967  | 6,90625  | 4,20000 |
| 47        | 92          | 4,42467  | 6,90625  | 4,20000 |
| 48        | 93          | 6,68733  | 7,43750  | 4,20000 |
| 49        | 94          | 4,28233  | 7,43750  | 4,20000 |
| 50        | 95          | 6,54500  | 7,96875  | 4,20000 |
| 51        | 96          | 4,14000  | 7,96875  | 4,20000 |
| 52        | 97          | 6,40267  | 8,50000  | 4,20000 |
| 53        | 98          | 3,99767  | 8,50000  | 4,20000 |
| 54        | 99          | 6,26033  | 9,03125  | 4,20000 |
| 55        | 100         | 3,85533  | 9,03125  | 4,20000 |
| 56        | 101         | 2,99217  | 6,90625  | 4,20000 |
| 57        | 102         | -1,85033 | 6,90625  | 4,20000 |
| 58        | 103         | 2,84983  | 7,43750  | 4,20000 |
| 59        | 104         | -1,99267 | 7,43750  | 4,20000 |
| 60        | 105         | 2,70750  | 7,96875  | 4,20000 |
| 61        | 106         | -2,13500 | 7,96875  | 4,20000 |
| 62        | 107         | 2,56517  | 8,50000  | 4,20000 |
| 63        | 108         | -2,27733 | 8,50000  | 4,20000 |
| 64        | 109         | 2,42283  | 9,03125  | 4,20000 |
| 65        | 110         | -2,41967 | 9,03125  | 4,20000 |
| 66        | 111         | 9,12967  | 6,90625  | 4,20000 |
| 67        | 112         | 8,98733  | 7,43750  | 4,20000 |
| 68        | 113         | 8,84500  | 7,96875  | 4,20000 |
| 69        | 114         | 8,70267  | 8,50000  | 4,20000 |

| JointElem | JointObject | GlobalX  | GlobalY | GlobalZ |
|-----------|-------------|----------|---------|---------|
| Text      | Text        | m        | m       | m       |
| 70        | 115         | 8,56033  | 9,03125 | 4,20000 |
| 71        | 116         | 15,49967 | 6,90625 | 4,20000 |
| 72        | 117         | 10,55967 | 6,90625 | 4,20000 |
| 73        | 118         | 15,35733 | 7,43750 | 4,20000 |
| 74        | 119         | 10,41733 | 7,43750 | 4,20000 |
| 75        | 120         | 15,21500 | 7,96875 | 4,20000 |
| 76        | 121         | 10,27500 | 7,96875 | 4,20000 |
| 77        | 122         | 15,07267 | 8,50000 | 4,20000 |
| 78        | 123         | 10,13267 | 8,50000 | 4,20000 |
| 79        | 124         | 14,93033 | 9,03125 | 4,20000 |
| 80        | 125         | 9,99033  | 9,03125 | 4,20000 |
| 81        | 126         | 3,70842  | 6,90625 | 4,20000 |
| 82        | 127         | 3,56608  | 7,43750 | 4,20000 |
| 83        | 128         | 3,42375  | 7,96875 | 4,20000 |
| 84        | 129         | 3,28142  | 8,50000 | 4,20000 |
| 85        | 130         | 3,13908  | 9,03125 | 4,20000 |
| 86        | 131         | 9,84467  | 6,90625 | 4,20000 |
| 87        | 132         | 9,70233  | 7,43750 | 4,20000 |
| 88        | 133         | 9,56000  | 7,96875 | 4,20000 |
| 89        | 134         | 9,41767  | 8,50000 | 4,20000 |
| 90        | 135         | 9,27533  | 9,03125 | 4,20000 |
| 91        | 136         | 7,68367  | 3,71875 | 4,20000 |
| 92        | 137         | 5,27867  | 3,71875 | 4,20000 |
| 93        | 138         | 7,54133  | 4,25000 | 4,20000 |
| 94        | 139         | 5,13633  | 4,25000 | 4,20000 |
| 95        | 140         | 7,39900  | 4,78125 | 4,20000 |
| 96        | 141         | 4,99400  | 4,78125 | 4,20000 |
| 97        | 142         | 7,25667  | 5,31250 | 4,20000 |
| 98        | 143         | 4,85167  | 5,31250 | 4,20000 |
| 99        | 144         | 7,11433  | 5,84375 | 4,20000 |
| 100       | 145         | 4,70933  | 5,84375 | 4,20000 |
| 101       | 146         | 3,84617  | 3,71875 | 4,20000 |
| 102       | 147         | -0,99633 | 3,71875 | 4,20000 |
| 103       | 148         | 3,70383  | 4,25000 | 4,20000 |
| 104       | 149         | -1,13867 | 4,25000 | 4,20000 |
| 105       | 150         | 3,56150  | 4,78125 | 4,20000 |
| 106       | 151         | -1,28100 | 4,78125 | 4,20000 |
| 107       | 152         | 3,41917  | 5,31250 | 4,20000 |
| 108       | 153         | -1,42333 | 5,31250 | 4,20000 |
| 109       | 154         | 3,27683  | 5,84375 | 4,20000 |
| 110       | 155         | -1,56567 | 5,84375 | 4,20000 |
| 111       | 156         | 9,98367  | 3,71875 | 4,20000 |
| 112       | 157         | 9,84133  | 4,25000 | 4,20000 |
| 113       | 158         | 9,69900  | 4,78125 | 4,20000 |
| 114       | 159         | 9,55667  | 5,31250 | 4,20000 |
| 115       | 160         | 9,41433  | 5,84375 | 4,20000 |
| 116       | 161         | 16,35367 | 3,71875 | 4,20000 |
| 117       | 162         | 11,41367 | 3,71875 | 4,20000 |
| 118       | 163         | 16,21133 | 4,25000 | 4,20000 |
| 119       | 164         | 11,27133 | 4,25000 | 4,20000 |
| 120       | 165         | 16,06900 | 4,78125 | 4,20000 |
| 121       | 166         | 11,12900 | 4,78125 | 4,20000 |
| 122       | 167         | 15,92667 | 5,31250 | 4,20000 |
| 123       | 168         | 10,98667 | 5,31250 | 4,20000 |
| 124       | 169         | 15,78433 | 5,84375 | 4,20000 |
| 125       | 170         | 10,84433 | 5,84375 | 4,20000 |



| JointElem | JointObject | GlobalX  | GlobalY | GlobalZ |
|-----------|-------------|----------|---------|---------|
| Text      | Text        | m        | m       | m       |
| 126       | 171         | 4,56242  | 3,71875 | 4,20000 |
| 127       | 172         | 4,42008  | 4,25000 | 4,20000 |
| 128       | 173         | 4,27775  | 4,78125 | 4,20000 |
| 129       | 174         | 4,13542  | 5,31250 | 4,20000 |
| 130       | 175         | 3,99308  | 5,84375 | 4,20000 |
| 131       | 176         | 10,69867 | 3,71875 | 4,20000 |
| 132       | 177         | 10,55633 | 4,25000 | 4,20000 |
| 133       | 178         | 10,41400 | 4,78125 | 4,20000 |
| 134       | 179         | 10,27167 | 5,31250 | 4,20000 |
| 135       | 180         | 10,12933 | 5,84375 | 4,20000 |
| 136       | 199         | 6,92456  | 6,55208 | 4,20000 |
| 137       | 200         | 4,51956  | 6,55208 | 4,20000 |
| 138       | 201         | 6,87711  | 6,72917 | 4,20000 |
| 139       | 202         | 4,47211  | 6,72917 | 4,20000 |
| 140       | 203         | 3,08706  | 6,55208 | 4,20000 |
| 141       | 204         | -1,75544 | 6,55208 | 4,20000 |
| 142       | 205         | 3,03961  | 6,72917 | 4,20000 |
| 143       | 206         | -1,80289 | 6,72917 | 4,20000 |
| 144       | 207         | 9,22456  | 6,55208 | 4,20000 |
| 145       | 208         | 9,17711  | 6,72917 | 4,20000 |
| 146       | 209         | 15,59456 | 6,55208 | 4,20000 |
| 147       | 210         | 10,65456 | 6,55208 | 4,20000 |
| 148       | 211         | 15,54711 | 6,72917 | 4,20000 |
| 149       | 212         | 10,60711 | 6,72917 | 4,20000 |
| 150       | 213         | 3,80331  | 6,55208 | 4,20000 |
| 151       | 214         | 3,75586  | 6,72917 | 4,20000 |
| 152       | 215         | 9,93956  | 6,55208 | 4,20000 |
| 153       | 216         | 9,89211  | 6,72917 | 4,20000 |
| 154       | 217         | 7,06689  | 6,02083 | 4,20000 |
| 155       | 218         | 4,66189  | 6,02083 | 4,20000 |
| 156       | 219         | 7,01944  | 6,19792 | 4,20000 |
| 157       | 220         | 4,61444  | 6,19792 | 4,20000 |
| 158       | 221         | 3,22939  | 6,02083 | 4,20000 |
| 159       | 222         | -1,61311 | 6,02083 | 4,20000 |
| 160       | 223         | 3,18194  | 6,19792 | 4,20000 |
| 161       | 224         | -1,66056 | 6,19792 | 4,20000 |
| 162       | 225         | 9,36689  | 6,02083 | 4,20000 |
| 163       | 226         | 9,31944  | 6,19792 | 4,20000 |
| 164       | 227         | 15,73689 | 6,02083 | 4,20000 |
| 165       | 228         | 10,79689 | 6,02083 | 4,20000 |
| 166       | 229         | 15,68944 | 6,19792 | 4,20000 |
| 167       | 230         | 10,74944 | 6,19792 | 4,20000 |
| 168       | 231         | 3,94564  | 6,02083 | 4,20000 |
| 169       | 232         | 3,89819  | 6,19792 | 4,20000 |
| 170       | 233         | 10,08189 | 6,02083 | 4,20000 |
| 171       | 234         | 10,03444 | 6,19792 | 4,20000 |
| 172       | 235         | 6,47383  | 8,23438 | 4,20000 |
| 173       | 236         | 4,06883  | 8,23438 | 4,20000 |
| 174       | 237         | 2,63633  | 8,23438 | 4,20000 |
| 175       | 238         | -2,20617 | 8,23438 | 4,20000 |
| 176       | 239         | 8,77383  | 8,23438 | 4,20000 |
| 177       | 240         | 15,14383 | 8,23438 | 4,20000 |
| 178       | 241         | 10,20383 | 8,23438 | 4,20000 |
| 179       | 242         | 3,35258  | 8,23438 | 4,20000 |
| 180       | 243         | 9,48883  | 8,23438 | 4,20000 |
| 181       | 244         | 7,47017  | 4,51563 | 4,20000 |

| JointElem | JointObject | GlobalX  | GlobalY  | GlobalZ    |
|-----------|-------------|----------|----------|------------|
| Text      | Text        | m        | m        | m          |
| 182       | 245         | 5,06517  | 4,51563  | 4,20000    |
| 183       | 246         | 3,63267  | 4,51563  | 4,20000    |
| 184       | 247         | -1,20983 | 4,51563  | 4,20000    |
| 185       | 248         | 9,77017  | 4,51563  | 4,20000    |
| 186       | 249         | 16,14017 | 4,51563  | 4,20000    |
| 187       | 250         | 11,20017 | 4,51563  | 4,20000    |
| 188       | 251         | 4,34892  | 4,51563  | 4,20000    |
| 189       | 252         | 10,48517 | 4,51563  | 4,20000    |
| 190       | 253         | 0,81925  | 9,56250  | 4,20000    |
| 191       | 254         | -0,03475 | 12,75000 | 4,20000    |
| 192       | 255         | 3,38125  | 0,00000  | 4,20000    |
| 193       | 256         | 2,52725  | 3,18750  | 4,20000    |
| 194       | 257         | 1,53092  | 6,90625  | 4,20000    |
| 195       | 258         | 1,38858  | 7,43750  | 4,20000    |
| 196       | 259         | 1,24625  | 7,96875  | 4,20000    |
| 197       | 260         | 1,10392  | 8,50000  | 4,20000    |
| 198       | 261         | 0,96158  | 9,03125  | 4,20000    |
| 199       | 262         | 2,38492  | 3,71875  | 4,20000    |
| 200       | 263         | 2,24258  | 4,25000  | 4,20000    |
| 201       | 264         | 2,10025  | 4,78125  | 4,20000    |
| 202       | 265         | 1,95792  | 5,31250  | 4,20000    |
| 203       | 266         | 1,81558  | 5,84375  | 4,20000    |
| 204       | 267         | 1,67325  | 6,37500  | 4,20000    |
| 205       | 268         | 1,62581  | 6,55208  | 4,20000    |
| 206       | 269         | 1,57836  | 6,72917  | 4,20000    |
| 207       | 270         | 1,76814  | 6,02083  | 4,20000    |
| 208       | 271         | 1,72069  | 6,19792  | 4,20000    |
| 209       | 272         | 1,17508  | 8,23438  | 4,20000    |
| 210       | 273         | 2,17142  | 4,51563  | 4,20000    |
| 211       | 274         | 11,31800 | 9,56250  | 4,20000    |
| 212       | 275         | 10,46400 | 12,75000 | 4,20000    |
| 213       | 276         | 13,88000 | 0,00000  | 4,20000    |
| 214       | 277         | 13,02600 | 3,18750  | 4,20000    |
| 215       | 278         | 12,02967 | 6,90625  | 4,20000    |
| 216       | 279         | 11,88733 | 7,43750  | 4,20000    |
| 217       | 280         | 11,74500 | 7,96875  | 4,20000    |
| 218       | 281         | 11,60267 | 8,50000  | 4,20000    |
| 219       | 282         | 11,46033 | 9,03125  | 4,20000    |
| 220       | 283         | 12,88367 | 3,71875  | 4,20000    |
| 221       | 284         | 12,74133 | 4,25000  | 4,20000    |
| 222       | 285         | 12,59900 | 4,78125  | 4,20000    |
| 223       | 286         | 12,45667 | 5,31250  | 4,20000    |
| 224       | 287         | 12,31433 | 5,84375  | 4,20000    |
| 225       | 288         | 12,17200 | 6,37500  | 4,20000    |
| 226       | 289         | 12,12456 | 6,55208  | 4,20000    |
| 227       | 290         | 12,07711 | 6,72917  | 4,20000    |
| 228       | 291         | 12,26689 | 6,02083  | 4,20000    |
| 229       | 292         | 12,21944 | 6,19792  | 4,20000    |
| 230       | 293         | 11,67383 | 8,23438  | 4,20000    |
| 231       | 294         | 12,67017 | 4,51563  | 4,20000    |
| 232       | 295         | 0,00000  | 0,00000  | -1,665E-16 |
| 233       | 296         | 17,35000 | 0,00000  | -1,665E-16 |
| 234       | 297         | 13,93400 | 12,75000 | -1,665E-16 |
| 235       | 298         | -3,41600 | 12,75000 | -1,665E-16 |
| 236       | 299         | 8,63000  | 0,00000  | -1,665E-16 |
| 237       | 300         | 6,92200  | 6,37500  | -1,665E-16 |

| JointElem | JointObject | GlobalX  | GlobalY  | GlobalZ    |
|-----------|-------------|----------|----------|------------|
| Text      | Text        | m        | m        | m          |
| 238       | 301         | -1,70800 | 6,37500  | -1,665E-16 |
| 239       | 302         | 5,21400  | 12,75000 | -1,665E-16 |
| 240       | 303         | 15,64200 | 6,37500  | -1,665E-16 |
| 241       | 304         | 6,27500  | 0,00000  | -1,665E-16 |
| 242       | 305         | 4,56700  | 6,37500  | -1,665E-16 |
| 243       | 306         | 2,85900  | 12,75000 | -1,665E-16 |
| 244       | 307         | 4,84250  | 0,00000  | -1,665E-16 |
| 245       | 308         | 3,13450  | 6,37500  | -1,665E-16 |
| 246       | 309         | 1,42650  | 12,75000 | -1,665E-16 |
| 247       | 310         | 10,98000 | 0,00000  | -1,665E-16 |
| 248       | 311         | 9,27200  | 6,37500  | -1,665E-16 |
| 249       | 312         | 7,56400  | 12,75000 | -1,665E-16 |
| 250       | 313         | 12,41000 | 0,00000  | -1,665E-16 |
| 251       | 314         | 10,70200 | 6,37500  | -1,665E-16 |
| 252       | 315         | 8,99400  | 12,75000 | -1,665E-16 |
| 253       | 316         | 5,55875  | 0,00000  | -1,665E-16 |
| 254       | 317         | 3,85075  | 6,37500  | -1,665E-16 |
| 255       | 318         | 2,14275  | 12,75000 | -1,665E-16 |
| 256       | 319         | 11,69500 | 0,00000  | -1,665E-16 |
| 257       | 320         | 9,98700  | 6,37500  | -1,665E-16 |
| 258       | 321         | 8,27900  | 12,75000 | -1,665E-16 |
| 259       | 322         | 6,06800  | 9,56250  | -1,665E-16 |
| 260       | 323         | 3,71300  | 9,56250  | -1,665E-16 |
| 261       | 324         | 2,28050  | 9,56250  | -1,665E-16 |
| 262       | 325         | -2,56200 | 9,56250  | -1,665E-16 |
| 263       | 326         | 8,41800  | 9,56250  | -1,665E-16 |
| 264       | 327         | 14,78800 | 9,56250  | -1,665E-16 |
| 265       | 328         | 9,84800  | 9,56250  | -1,665E-16 |
| 266       | 329         | 2,99675  | 9,56250  | -1,665E-16 |
| 267       | 330         | 9,13300  | 9,56250  | -1,665E-16 |
| 268       | 331         | 7,77600  | 3,18750  | -1,665E-16 |
| 269       | 332         | 5,42100  | 3,18750  | -1,665E-16 |
| 270       | 333         | 3,98850  | 3,18750  | -1,665E-16 |
| 271       | 334         | -0,85400 | 3,18750  | -1,665E-16 |
| 272       | 335         | 10,12600 | 3,18750  | -1,665E-16 |
| 273       | 336         | 16,49600 | 3,18750  | -1,665E-16 |
| 274       | 337         | 11,55600 | 3,18750  | -1,665E-16 |
| 275       | 338         | 4,70475  | 3,18750  | -1,665E-16 |
| 276       | 339         | 10,84100 | 3,18750  | -1,665E-16 |
| 277       | 340         | 6,77967  | 6,90625  | -1,665E-16 |
| 278       | 341         | 4,42467  | 6,90625  | -1,665E-16 |
| 279       | 342         | 6,63733  | 7,43750  | -1,665E-16 |
| 280       | 343         | 4,28233  | 7,43750  | -1,665E-16 |
| 281       | 344         | 6,49500  | 7,96875  | -1,665E-16 |
| 282       | 345         | 4,14000  | 7,96875  | -1,665E-16 |
| 283       | 346         | 6,35267  | 8,50000  | -1,665E-16 |
| 284       | 347         | 3,99767  | 8,50000  | -1,665E-16 |
| 285       | 348         | 6,21033  | 9,03125  | -1,665E-16 |
| 286       | 349         | 3,85533  | 9,03125  | -1,665E-16 |
| 287       | 350         | 2,99217  | 6,90625  | -1,665E-16 |
| 288       | 351         | -1,85033 | 6,90625  | -1,665E-16 |
| 289       | 352         | 2,84983  | 7,43750  | -1,665E-16 |
| 290       | 353         | -1,99267 | 7,43750  | -1,665E-16 |
| 291       | 354         | 2,70750  | 7,96875  | -1,665E-16 |
| 292       | 355         | -2,13500 | 7,96875  | -1,665E-16 |
| 293       | 356         | 2,56517  | 8,50000  | -1,665E-16 |

| JointElem | JointObject | GlobalX  | GlobalY | GlobalZ    |
|-----------|-------------|----------|---------|------------|
| Text      | Text        | m        | m       | m          |
| 294       | 357         | -2,27733 | 8,50000 | -1,665E-16 |
| 295       | 358         | 2,42283  | 9,03125 | -1,665E-16 |
| 296       | 359         | -2,41967 | 9,03125 | -1,665E-16 |
| 297       | 360         | 9,12967  | 6,90625 | -1,665E-16 |
| 298       | 361         | 8,98733  | 7,43750 | -1,665E-16 |
| 299       | 362         | 8,84500  | 7,96875 | -1,665E-16 |
| 300       | 363         | 8,70267  | 8,50000 | -1,665E-16 |
| 301       | 364         | 8,56033  | 9,03125 | -1,665E-16 |
| 302       | 365         | 15,49967 | 6,90625 | -1,665E-16 |
| 303       | 366         | 10,55967 | 6,90625 | -1,665E-16 |
| 304       | 367         | 15,35733 | 7,43750 | -1,665E-16 |
| 305       | 368         | 10,41733 | 7,43750 | -1,665E-16 |
| 306       | 369         | 15,21500 | 7,96875 | -1,665E-16 |
| 307       | 370         | 10,27500 | 7,96875 | -1,665E-16 |
| 308       | 371         | 15,07267 | 8,50000 | -1,665E-16 |
| 309       | 372         | 10,13267 | 8,50000 | -1,665E-16 |
| 310       | 373         | 14,93033 | 9,03125 | -1,665E-16 |
| 311       | 374         | 9,99033  | 9,03125 | -1,665E-16 |
| 312       | 375         | 3,70842  | 6,90625 | -1,665E-16 |
| 313       | 376         | 3,56608  | 7,43750 | -1,665E-16 |
| 314       | 377         | 3,42375  | 7,96875 | -1,665E-16 |
| 315       | 378         | 3,28142  | 8,50000 | -1,665E-16 |
| 316       | 379         | 3,13908  | 9,03125 | -1,665E-16 |
| 317       | 380         | 9,84467  | 6,90625 | -1,665E-16 |
| 318       | 381         | 9,70233  | 7,43750 | -1,665E-16 |
| 319       | 382         | 9,56000  | 7,96875 | -1,665E-16 |
| 320       | 383         | 9,41767  | 8,50000 | -1,665E-16 |
| 321       | 384         | 9,27533  | 9,03125 | -1,665E-16 |
| 322       | 385         | 7,63367  | 3,71875 | -1,665E-16 |
| 323       | 386         | 5,27867  | 3,71875 | -1,665E-16 |
| 324       | 387         | 7,49133  | 4,25000 | -1,665E-16 |
| 325       | 388         | 5,13633  | 4,25000 | -1,665E-16 |
| 326       | 389         | 7,34900  | 4,78125 | -1,665E-16 |
| 327       | 390         | 4,99400  | 4,78125 | -1,665E-16 |
| 328       | 391         | 7,20667  | 5,31250 | -1,665E-16 |
| 329       | 392         | 4,85167  | 5,31250 | -1,665E-16 |
| 330       | 393         | 7,06433  | 5,84375 | -1,665E-16 |
| 331       | 394         | 4,70933  | 5,84375 | -1,665E-16 |
| 332       | 395         | 3,84617  | 3,71875 | -1,665E-16 |
| 333       | 396         | -0,99633 | 3,71875 | -1,665E-16 |
| 334       | 397         | 3,70383  | 4,25000 | -1,665E-16 |
| 335       | 398         | -1,13867 | 4,25000 | -1,665E-16 |
| 336       | 399         | 3,56150  | 4,78125 | -1,665E-16 |
| 337       | 400         | -1,28100 | 4,78125 | -1,665E-16 |
| 338       | 401         | 3,41917  | 5,31250 | -1,665E-16 |
| 339       | 402         | -1,42333 | 5,31250 | -1,665E-16 |
| 340       | 403         | 3,27683  | 5,84375 | -1,665E-16 |
| 341       | 404         | -1,56567 | 5,84375 | -1,665E-16 |
| 342       | 405         | 9,98367  | 3,71875 | -1,665E-16 |
| 343       | 406         | 9,84133  | 4,25000 | -1,665E-16 |
| 344       | 407         | 9,69900  | 4,78125 | -1,665E-16 |
| 345       | 408         | 9,55667  | 5,31250 | -1,665E-16 |
| 346       | 409         | 9,41433  | 5,84375 | -1,665E-16 |
| 347       | 410         | 16,35367 | 3,71875 | -1,665E-16 |
| 348       | 411         | 11,41367 | 3,71875 | -1,665E-16 |
| 349       | 412         | 16,21133 | 4,25000 | -1,665E-16 |

| JointElem | JointObject | GlobalX  | GlobalY | GlobalZ    |
|-----------|-------------|----------|---------|------------|
| Text      | Text        | m        | m       | m          |
| 350       | 413         | 11,27133 | 4,25000 | -1,665E-16 |
| 351       | 414         | 16,06900 | 4,78125 | -1,665E-16 |
| 352       | 415         | 11,12900 | 4,78125 | -1,665E-16 |
| 353       | 416         | 15,92667 | 5,31250 | -1,665E-16 |
| 354       | 417         | 10,98667 | 5,31250 | -1,665E-16 |
| 355       | 418         | 15,78433 | 5,84375 | -1,665E-16 |
| 356       | 419         | 10,84433 | 5,84375 | -1,665E-16 |
| 357       | 420         | 4,56242  | 3,71875 | -1,665E-16 |
| 358       | 421         | 4,42008  | 4,25000 | -1,665E-16 |
| 359       | 422         | 4,27775  | 4,78125 | -1,665E-16 |
| 360       | 423         | 4,13542  | 5,31250 | -1,665E-16 |
| 361       | 424         | 3,99308  | 5,84375 | -1,665E-16 |
| 362       | 425         | 10,69867 | 3,71875 | -1,665E-16 |
| 363       | 426         | 10,55633 | 4,25000 | -1,665E-16 |
| 364       | 427         | 10,41400 | 4,78125 | -1,665E-16 |
| 365       | 428         | 10,27167 | 5,31250 | -1,665E-16 |
| 366       | 429         | 10,12933 | 5,84375 | -1,665E-16 |
| 367       | 430         | 6,87456  | 6,55208 | -1,665E-16 |
| 368       | 431         | 4,51956  | 6,55208 | -1,665E-16 |
| 369       | 432         | 6,82711  | 6,72917 | -1,665E-16 |
| 370       | 433         | 4,47211  | 6,72917 | -1,665E-16 |
| 371       | 434         | 3,08706  | 6,55208 | -1,665E-16 |
| 372       | 435         | -1,75544 | 6,55208 | -1,665E-16 |
| 373       | 436         | 3,03961  | 6,72917 | -1,665E-16 |
| 374       | 437         | -1,80289 | 6,72917 | -1,665E-16 |
| 375       | 438         | 9,22456  | 6,55208 | -1,665E-16 |
| 376       | 439         | 9,17711  | 6,72917 | -1,665E-16 |
| 377       | 440         | 15,59456 | 6,55208 | -1,665E-16 |
| 378       | 441         | 10,65456 | 6,55208 | -1,665E-16 |
| 379       | 442         | 15,54711 | 6,72917 | -1,665E-16 |
| 380       | 443         | 10,60711 | 6,72917 | -1,665E-16 |
| 381       | 444         | 3,80331  | 6,55208 | -1,665E-16 |
| 382       | 445         | 3,75586  | 6,72917 | -1,665E-16 |
| 383       | 446         | 9,93956  | 6,55208 | -1,665E-16 |
| 384       | 447         | 9,89211  | 6,72917 | -1,665E-16 |
| 385       | 448         | 7,01689  | 6,02083 | -1,665E-16 |
| 386       | 449         | 4,66189  | 6,02083 | -1,665E-16 |
| 387       | 450         | 6,96944  | 6,19792 | -1,665E-16 |
| 388       | 451         | 4,61444  | 6,19792 | -1,665E-16 |
| 389       | 452         | 3,22939  | 6,02083 | -1,665E-16 |
| 390       | 453         | -1,61311 | 6,02083 | -1,665E-16 |
| 391       | 454         | 3,18194  | 6,19792 | -1,665E-16 |
| 392       | 455         | -1,66056 | 6,19792 | -1,665E-16 |
| 393       | 456         | 9,36689  | 6,02083 | -1,665E-16 |
| 394       | 457         | 9,31944  | 6,19792 | -1,665E-16 |
| 395       | 458         | 15,73689 | 6,02083 | -1,665E-16 |
| 396       | 459         | 10,79689 | 6,02083 | -1,665E-16 |
| 397       | 460         | 15,68944 | 6,19792 | -1,665E-16 |
| 398       | 461         | 10,74944 | 6,19792 | -1,665E-16 |
| 399       | 462         | 3,94564  | 6,02083 | -1,665E-16 |
| 400       | 463         | 3,89819  | 6,19792 | -1,665E-16 |
| 401       | 464         | 10,08189 | 6,02083 | -1,665E-16 |
| 402       | 465         | 10,03444 | 6,19792 | -1,665E-16 |
| 403       | 466         | 6,42383  | 8,23438 | -1,665E-16 |
| 404       | 467         | 4,06883  | 8,23438 | -1,665E-16 |
| 405       | 468         | 2,63633  | 8,23438 | -1,665E-16 |

| JointElem | JointObject | GlobalX  | GlobalY  | GlobalZ    |
|-----------|-------------|----------|----------|------------|
| Text      | Text        | m        | m        | m          |
| 406       | 469         | -2,20617 | 8,23438  | -1,665E-16 |
| 407       | 470         | 8,77383  | 8,23438  | -1,665E-16 |
| 408       | 471         | 15,14383 | 8,23438  | -1,665E-16 |
| 409       | 472         | 10,20383 | 8,23438  | -1,665E-16 |
| 410       | 473         | 3,35258  | 8,23438  | -1,665E-16 |
| 411       | 474         | 9,48883  | 8,23438  | -1,665E-16 |
| 412       | 475         | 7,42017  | 4,51563  | -1,665E-16 |
| 413       | 476         | 5,06517  | 4,51563  | -1,665E-16 |
| 414       | 477         | 3,63267  | 4,51563  | -1,665E-16 |
| 415       | 478         | -1,20983 | 4,51563  | -1,665E-16 |
| 416       | 479         | 9,77017  | 4,51563  | -1,665E-16 |
| 417       | 480         | 16,14017 | 4,51563  | -1,665E-16 |
| 418       | 481         | 11,20017 | 4,51563  | -1,665E-16 |
| 419       | 482         | 4,34892  | 4,51563  | -1,665E-16 |
| 420       | 483         | 10,48517 | 4,51563  | -1,665E-16 |
| 421       | 484         | 0,56925  | 9,56250  | -1,665E-16 |
| 422       | 485         | -0,28475 | 12,75000 | -1,665E-16 |
| 423       | 486         | 3,13125  | 0,00000  | -1,665E-16 |
| 424       | 487         | 2,27725  | 3,18750  | -1,665E-16 |
| 425       | 488         | 1,28092  | 6,90625  | -1,665E-16 |
| 426       | 489         | 1,13858  | 7,43750  | -1,665E-16 |
| 427       | 490         | 0,99625  | 7,96875  | -1,665E-16 |
| 428       | 491         | 0,85392  | 8,50000  | -1,665E-16 |
| 429       | 492         | 0,71158  | 9,03125  | -1,665E-16 |
| 430       | 493         | 2,13492  | 3,71875  | -1,665E-16 |
| 431       | 494         | 1,99258  | 4,25000  | -1,665E-16 |
| 432       | 495         | 1,85025  | 4,78125  | -1,665E-16 |
| 433       | 496         | 1,70792  | 5,31250  | -1,665E-16 |
| 434       | 497         | 1,56558  | 5,84375  | -1,665E-16 |
| 435       | 498         | 1,42325  | 6,37500  | -1,665E-16 |
| 436       | 499         | 1,37581  | 6,55208  | -1,665E-16 |
| 437       | 500         | 1,32836  | 6,72917  | -1,665E-16 |
| 438       | 501         | 1,51814  | 6,02083  | -1,665E-16 |
| 439       | 502         | 1,47069  | 6,19792  | -1,665E-16 |
| 440       | 503         | 0,92508  | 8,23438  | -1,665E-16 |
| 441       | 504         | 1,92142  | 4,51563  | -1,665E-16 |
| 442       | 505         | 11,56800 | 9,56250  | -1,665E-16 |
| 443       | 506         | 10,71400 | 12,75000 | -1,665E-16 |
| 444       | 507         | 14,13000 | 0,00000  | -1,665E-16 |
| 445       | 508         | 13,27600 | 3,18750  | -1,665E-16 |
| 446       | 509         | 12,27967 | 6,90625  | -1,665E-16 |
| 447       | 510         | 12,13733 | 7,43750  | -1,665E-16 |
| 448       | 511         | 11,99500 | 7,96875  | -1,665E-16 |
| 449       | 512         | 11,85267 | 8,50000  | -1,665E-16 |
| 450       | 513         | 11,71033 | 9,03125  | -1,665E-16 |
| 451       | 514         | 13,13367 | 3,71875  | -1,665E-16 |
| 452       | 515         | 12,99133 | 4,25000  | -1,665E-16 |
| 453       | 516         | 12,84900 | 4,78125  | -1,665E-16 |
| 454       | 517         | 12,70667 | 5,31250  | -1,665E-16 |
| 455       | 518         | 12,56433 | 5,84375  | -1,665E-16 |
| 456       | 519         | 12,42200 | 6,37500  | -1,665E-16 |
| 457       | 520         | 12,37456 | 6,55208  | -1,665E-16 |
| 458       | 521         | 12,32711 | 6,72917  | -1,665E-16 |
| 459       | 522         | 12,51689 | 6,02083  | -1,665E-16 |
| 460       | 523         | 12,46944 | 6,19792  | -1,665E-16 |
| 461       | 524         | 11,92383 | 8,23438  | -1,665E-16 |

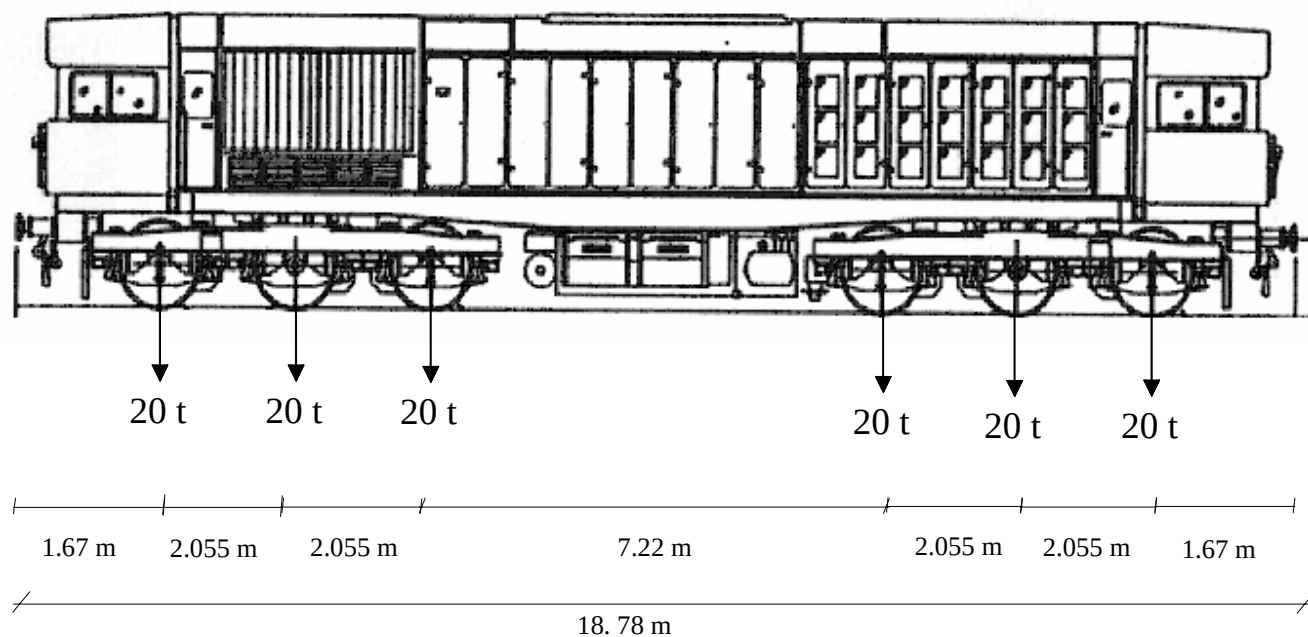
| JointElem | JointObject | GlobalX  | GlobalY | GlobalZ    |
|-----------|-------------|----------|---------|------------|
| Text      | Text        | m        | m       | m          |
| 462       | 525         | 12,92017 | 4,51563 | -1,665E-16 |

**ANEJO 2-C- TREN DE CARGAS Y SITUACIÓN DE LOS APARATOS DE MEDIDA**

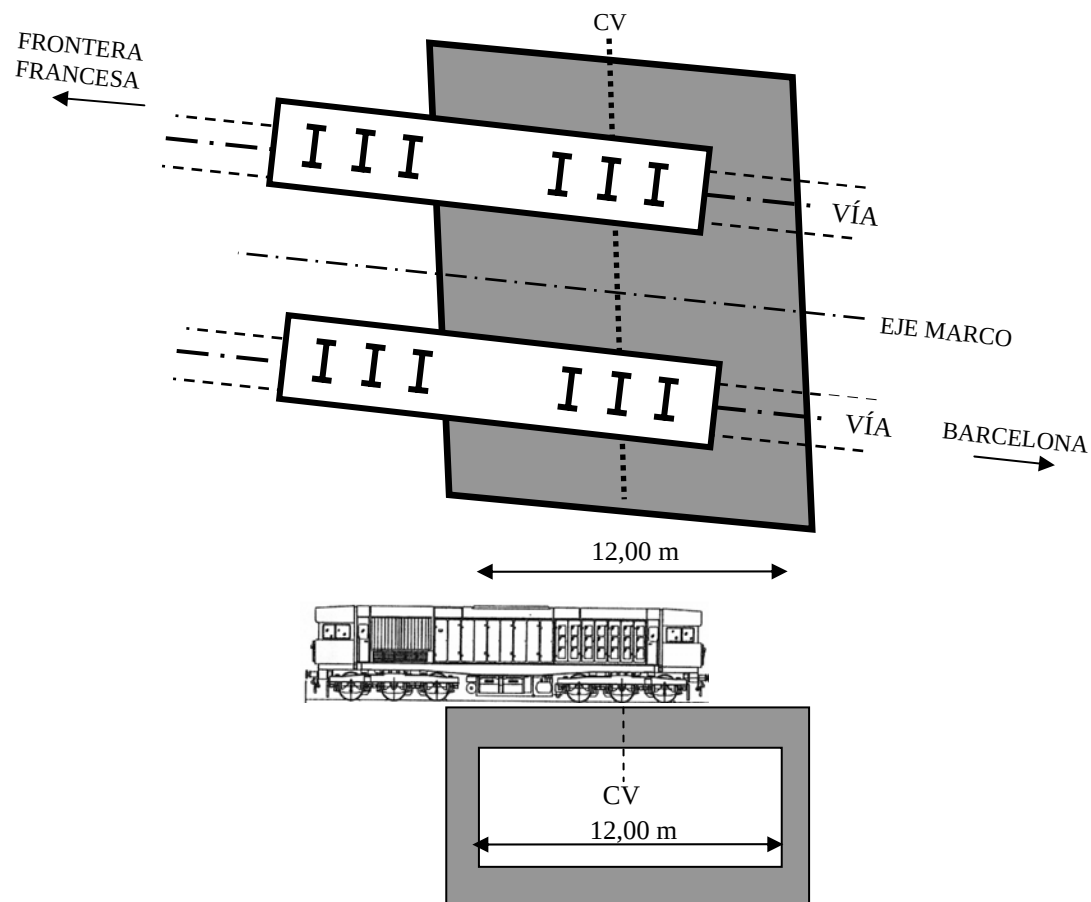


OBRA DE DRENAJE ODT 1.2 SITUADA EN EL P.K. 401+163 DE LA L.A.V DE  
MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA.  
TRAMO: BARCELONA SANTS-FIGUERES. SUBTRAMO: LA ROCA DEL  
VALLÉS-LLINARS DEL VALLÉS.

### TREN DE CARGA



OBRA DE DRENAJE ODT 1.2 SITUADA EN EL P.K. 401+163 DE LA L.A.V DE MADRID-  
ZARAGOZA-BARCELONA-FRONTERA FRANCESA.  
TRAMO BARCELONA SANTS-FIGUERES.  
SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS.  
**ENSAYO ESTÁTICO. POSICIÓN DEL TREN DE CARGAS**

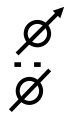
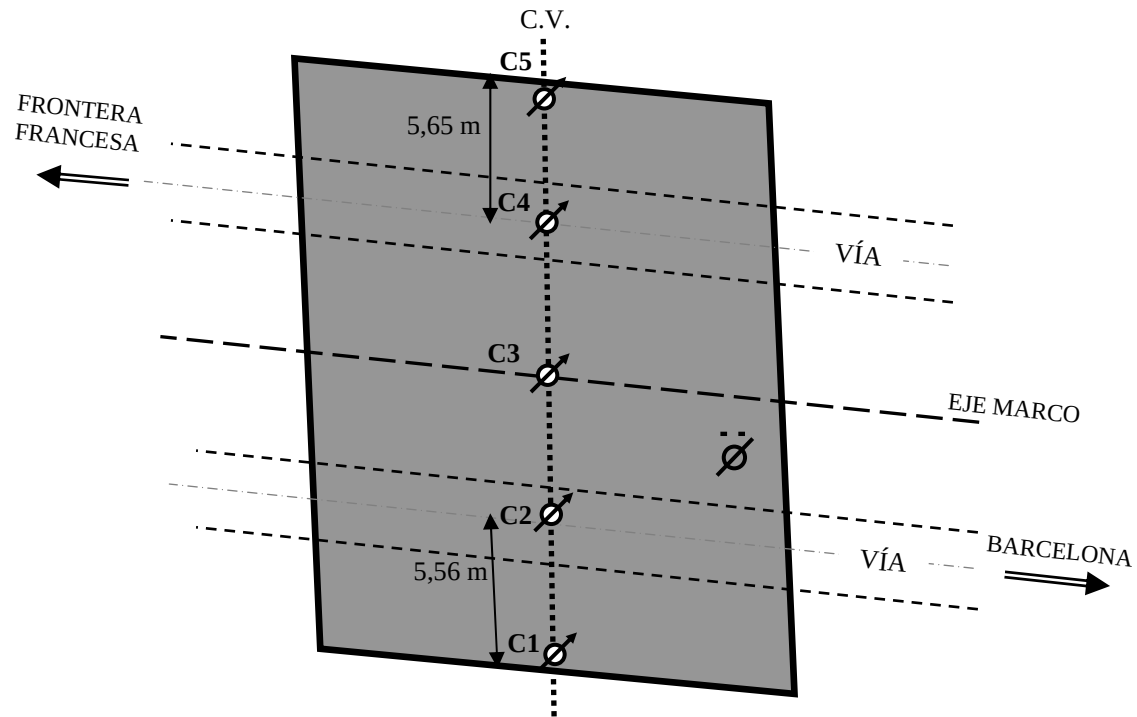


OBRA DE DRENAJE ODT 1.2 SITUADA EN EL P.K. 401+163 DE LA L.A.V DE  
MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA.

TRAMO: BARCELONA SANTS-FIGUERES.

SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS.

### INSTRUMENTACIÓN



Transductor de desplazamiento (0,01 mm de apreciación)

Acelerómetro



**Cliente:** A.D.I.F.

**Nº O.T.:**

**Refª:** I/OC-10004/CE

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## ANEJO 2-D- ANÁLISIS DE PROYECTO

No se han facilitado los esfuerzos de cálculo considerados en el Proyecto de esta estructura por lo que no ha sido posible realizar el control de proyecto de la misma.

**LISTADOS (PROGRAMA INFORMÁTICO DE ELEMENTOS FINITOS SAP2000) DEL MODELO  
DE CÁLCULO CORREGIDO**

Table: Analysis Case Definitions

| Case<br>Text | Type<br>Text | InitialCond<br>Text | ModalCase<br>Text |
|--------------|--------------|---------------------|-------------------|
| DEAD         | LinStatic    | Zero                |                   |
| MODAL        | LinModal     | Zero                |                   |
| locomotoras  | LinStatic    | Zero                |                   |

Table: Area Section Properties, Part 1 of 4

| Section<br>Text | Material<br>Text | MatAngle<br>Degrees | AreaType<br>Text | Type<br>Text | Thickness<br>m | BendThick<br>m | Arc<br>Degrees |
|-----------------|------------------|---------------------|------------------|--------------|----------------|----------------|----------------|
| ASEC1           | CONC             | 0.000               | Shell            | Shell-Thin   | 1.000000       | 1.000000       |                |
| hastial         | CONC             | 0.000               | Shell            | Shell-Thin   | 0.750000       | 0.750000       |                |
| losalnf         | CONC             | 0.000               | Shell            | Shell-Thin   | 1.200000       | 1.200000       |                |
| losaSup         | CONC             | 0.000               | Shell            | Shell-Thin   | 1.200000       | 1.200000       |                |
| losaSupVia      | losaSupVia       | 0.000               | Shell            | Shell-Thin   | 1.200000       | 1.200000       |                |

Table: Area Section Properties, Part 2 of 4

| Section<br>Text | InComp<br>Yes/No | CoordSys<br>Text | Color<br>Text | TotalWt<br>KN | TotalMass<br>KN-s2/m | F11Mod<br>Unitless | F22Mod<br>Unitless |
|-----------------|------------------|------------------|---------------|---------------|----------------------|--------------------|--------------------|
| ASEC1           |                  |                  | Magenta       | 0.000         | 0.00                 | 1.000000           | 1.000000           |
| hastial         |                  |                  | Magenta       | 2679.790      | 267.98               | 1.000000           | 1.000000           |
| losalnf         |                  |                  | Magenta       | 6508.061      | 650.81               | 1.000000           | 1.000000           |
| losaSup         |                  |                  | Magenta       | 2569.934      | 256.99               | 1.000000           | 1.000000           |
| losaSupVia      |                  |                  | Magenta       | 6475.031      | 647.50               | 1.000000           | 1.000000           |

Table: Area Section Properties, Part 3 of 4

| Section<br>Text | F12Mod<br>Unitless | M11Mod<br>Unitless | M22Mod<br>Unitless | M12Mod<br>Unitless | V13Mod<br>Unitless | V23Mod<br>Unitless | MMod<br>Unitless |
|-----------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|------------------|
| ASEC1           | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000         |
| hastial         | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000         |
| losalnf         | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000         |
| losaSup         | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000         |
| losaSupVia      | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000           | 1.000000         |

Table: Area Section Properties, Part 4 of 4

| Section<br>Text | WMod<br>Unitless |
|-----------------|------------------|
| ASEC1           | 1.000000         |
| hastial         | 1.000000         |
| losalnf         | 1.000000         |
| losaSup         | 1.000000         |
| losaSupVia      | 1.000000         |

Table: Coordinate Systems

| Name<br>Text | Type<br>Text | X<br>m  | Y<br>m  | Z<br>m  | AboutZ<br>Degrees | AboutY<br>Degrees | AboutX<br>Degrees |
|--------------|--------------|---------|---------|---------|-------------------|-------------------|-------------------|
| GLOBAL       | Cartesian    | 0.00000 | 0.00000 | 0.00000 | 0.000             | 0.000             | 0.000             |

Table: Element Forces - Area Shells, Part 2 of 7

Table: Element Forces - Area Shells, Part 5 of 7

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 246          | 61               | 11            | MODAL              | Mode             | 1.000000            | 1035.0726      | -823.7771      | 0.902             |
| 246          | 61               | 6             | MODAL              | Mode             | 1.000000            | -117.9627      | -677.2507      | -80.544           |
| 246          | 61               | 199           | MODAL              | Mode             | 1.000000            | -542.3426      | -726.7245      | -86.740           |
| 246          | 61               | 200           | MODAL              | Mode             | 1.000000            | 970.0226       | -1238.6001     | 2.823             |
| 246          | 61               | 11            | MODAL              | Mode             | 2.000000            | -7578.0412     | -39535.0992    | 1.029             |
| 246          | 61               | 6             | MODAL              | Mode             | 2.000000            | -8250.5311     | -39526.4944    | 0.664             |
| 246          | 61               | 199           | MODAL              | Mode             | 2.000000            | -8062.2553     | -39436.5933    | 0.692             |
| 246          | 61               | 200           | MODAL              | Mode             | 2.000000            | -7782.8795     | -39467.2330    | 0.979             |
| 246          | 61               | 11            | MODAL              | Mode             | 3.000000            | 23850.1876     | 5369.1537      | -89.094           |
| 246          | 61               | 6             | MODAL              | Mode             | 3.000000            | 23852.3373     | 5859.7592      | -89.551           |
| 246          | 61               | 199           | MODAL              | Mode             | 3.000000            | 23782.0687     | 5705.5937      | -89.510           |
| 246          | 61               | 200           | MODAL              | Mode             | 3.000000            | 23803.5368     | 5534.0854      | -89.164           |
| 246          | 61               | 11            | MODAL              | Mode             | 4.000000            | -9138.5669     | -21435.0130    | 4.196             |
| 246          | 61               | 6             | MODAL              | Mode             | 4.000000            | 460.5744       | -381.5791      | 58.373            |
| 246          | 61               | 199           | MODAL              | Mode             | 4.000000            | 897.9148       | -1192.2238     | 49.473            |
| 246          | 61               | 200           | MODAL              | Mode             | 4.000000            | -9294.3339     | -21704.1275    | 7.128             |
| 246          | 61               | 11            | MODAL              | Mode             | 5.000000            | 1625.5307      | 1336.4045      | 78.016            |
| 246          | 61               | 6             | MODAL              | Mode             | 5.000000            | -181.9787      | -1080.8619     | -78.795           |
| 246          | 61               | 199           | MODAL              | Mode             | 5.000000            | -765.4976      | -1217.0784     | -69.197           |
| 246          | 61               | 200           | MODAL              | Mode             | 5.000000            | 1247.2072      | 995.2470       | 18.640            |
| 246          | 61               | 11            | MODAL              | Mode             | 6.000000            | -7048.6996     | -15302.2898    | 4.914             |
| 246          | 61               | 6             | MODAL              | Mode             | 6.000000            | 628.4490       | -115.1758      | 36.703            |
| 246          | 61               | 199           | MODAL              | Mode             | 6.000000            | 1078.5522      | -491.9745      | 44.765            |
| 246          | 61               | 200           | MODAL              | Mode             | 6.000000            | -7118.1043     | -15199.1825    | 7.983             |
| 246          | 61               | 11            | MODAL              | Mode             | 7.000000            | 7768.6719      | 4511.9995      | -12.168           |
| 246          | 61               | 6             | MODAL              | Mode             | 7.000000            | 8952.1654      | 6329.5398      | -13.456           |
| 246          | 61               | 199           | MODAL              | Mode             | 7.000000            | 8872.3263      | 6364.5630      | -13.013           |
| 246          | 61               | 200           | MODAL              | Mode             | 7.000000            | 7765.9206      | 4412.4808      | -10.368           |
| 246          | 61               | 11            | MODAL              | Mode             | 8.000000            | 5070.6846      | 1859.1958      | 14.840            |
| 246          | 61               | 6             | MODAL              | Mode             | 8.000000            | -36.7670       | -1711.3010     | -87.807           |
| 246          | 61               | 199           | MODAL              | Mode             | 8.000000            | -1113.2608     | -1957.6903     | 88.630            |
| 246          | 61               | 200           | MODAL              | Mode             | 8.000000            | 4824.3438      | 813.5861       | 12.981            |
| 246          | 61               | 11            | MODAL              | Mode             | 9.000000            | -36636.6820    | -64996.9934    | 89.606            |
| 246          | 61               | 6             | MODAL              | Mode             | 9.000000            | -53453.8473    | -85238.6466    | 88.726            |
| 246          | 61               | 199           | MODAL              | Mode             | 9.000000            | -53611.2260    | -84712.9352    | 89.321            |
| 246          | 61               | 200           | MODAL              | Mode             | 9.000000            | -36460.8020    | -64652.5998    | -89.576           |
| 246          | 61               | 11            | MODAL              | Mode             | 10.000000           | -12036.1856    | -19242.1010    | -86.396           |
| 246          | 61               | 6             | MODAL              | Mode             | 10.000000           | -17686.9265    | -25744.5773    | -88.417           |
| 246          | 61               | 199           | MODAL              | Mode             | 10.000000           | -17719.3572    | -25558.7117    | -87.553           |
| 246          | 61               | 200           | MODAL              | Mode             | 10.000000           | -12005.0321    | -19165.8166    | -85.305           |
| 246          | 61               | 11            | MODAL              | Mode             | 11.000000           | -61970.3102    | -146756.290    | 89.555            |
| 246          | 61               | 6             | MODAL              | Mode             | 11.000000           | 2753.7557      | -2959.3476     | 28.002            |
| 246          | 61               | 199           | MODAL              | Mode             | 11.000000           | 3269.9116      | -2469.3768     | 56.580            |
| 246          | 61               | 200           | MODAL              | Mode             | 11.000000           | -58112.3250    | -147884.328    | 89.366            |
| 246          | 61               | 11            | MODAL              | Mode             | 12.000000           | 8681.4175      | -2121.3635     | -54.300           |
| 246          | 61               | 6             | MODAL              | Mode             | 12.000000           | 26024.9900     | 4528.0800      | 5.611             |
| 246          | 61               | 199           | MODAL              | Mode             | 12.000000           | 29621.8956     | 18946.9247     | 2.826             |
| 246          | 61               | 200           | MODAL              | Mode             | 12.000000           | 21631.8778     | 2309.9276      | -68.088           |
| 246          | 61               | 11            | locomotoras        |                  |                     | 151.3804       | 62.8818        | -89.464           |
| 246          | 61               | 6             | locomotoras        |                  |                     | 136.4936       | 21.6339        | -89.451           |
| 246          | 61               | 199           | locomotoras        |                  |                     | 134.6279       | 19.3427        | -89.254           |
| 246          | 61               | 200           | locomotoras        |                  |                     | 158.7131       | 67.8014        | -89.060           |
| 247          | 62               | 200           | MODAL              | Mode             | 1.000000            | 971.0655       | -1224.9309     | 2.431             |
| 247          | 62               | 199           | MODAL              | Mode             | 1.000000            | -526.1270      | -727.5219      | -81.940           |
| 247          | 62               | 201           | MODAL              | Mode             | 1.000000            | -770.9920      | -955.6589      | 17.192            |
| 247          | 62               | 202           | MODAL              | Mode             | 1.000000            | 908.6049       | -1639.1264     | 3.878             |
| 247          | 62               | 200           | MODAL              | Mode             | 2.000000            | -7777.8542     | -39447.4724    | 1.025             |
| 247          | 62               | 199           | MODAL              | Mode             | 2.000000            | -8062.7502     | -39440.9910    | 0.716             |
| 247          | 62               | 201           | MODAL              | Mode             | 2.000000            | -7864.9657     | -39248.0504    | 0.719             |
| 247          | 62               | 202           | MODAL              | Mode             | 2.000000            | -7953.3868     | -39272.9930    | 0.953             |
| 247          | 62               | 200           | MODAL              | Mode             | 3.000000            | 23788.8772     | 5530.6086      | -89.117           |
| 247          | 62               | 199           | MODAL              | Mode             | 3.000000            | 23787.4454     | 5706.3836      | -89.468           |
| 247          | 62               | 201           | MODAL              | Mode             | 3.000000            | 23634.3305     | 5543.4080      | -89.463           |
| 247          | 62               | 202           | MODAL              | Mode             | 3.000000            | 23656.2724     | 5670.1704      | -89.217           |



| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 247          | 62               | 200           | MODAL              | Mode             | 4.000000            | -9206.1540     | -22181.4459    | 9.374             |
| 247          | 62               | 199           | MODAL              | Mode             | 4.000000            | 1247.0283      | -1971.6641     | 45.341            |
| 247          | 62               | 201           | MODAL              | Mode             | 4.000000            | 1717.0846      | -2805.9228     | 44.853            |
| 247          | 62               | 202           | MODAL              | Mode             | 4.000000            | -9239.2730     | -22500.3070    | 12.039            |
| 247          | 62               | 200           | MODAL              | Mode             | 5.000000            | 1233.1785      | 1058.9615      | -8.066            |
| 247          | 62               | 199           | MODAL              | Mode             | 5.000000            | -649.1428      | -1281.2989     | -63.048           |
| 247          | 62               | 201           | MODAL              | Mode             | 5.000000            | -1081.1226     | -1565.4403     | -37.696           |
| 247          | 62               | 202           | MODAL              | Mode             | 5.000000            | 1099.2734      | 470.6448       | -0.694            |
| 247          | 62               | 200           | MODAL              | Mode             | 6.000000            | -7036.4651     | -15568.5983    | 10.541            |
| 247          | 62               | 199           | MODAL              | Mode             | 6.000000            | 1365.0680      | -1096.3717     | 42.382            |
| 247          | 62               | 201           | MODAL              | Mode             | 6.000000            | 1824.9584      | -1476.9506     | 44.736            |
| 247          | 62               | 202           | MODAL              | Mode             | 6.000000            | -7006.4784     | -15498.5197    | 13.535            |
| 247          | 62               | 200           | MODAL              | Mode             | 7.000000            | 7727.5265      | 4386.1085      | -8.958            |
| 247          | 62               | 199           | MODAL              | Mode             | 7.000000            | 8866.6296      | 6365.4839      | -12.773           |
| 247          | 62               | 201           | MODAL              | Mode             | 7.000000            | 8766.0054      | 6387.3303      | -12.141           |
| 247          | 62               | 202           | MODAL              | Mode             | 7.000000            | 7716.2679      | 4265.1016      | -7.216            |
| 247          | 62               | 200           | MODAL              | Mode             | 8.000000            | 4796.2695      | 968.1926       | 11.540            |
| 247          | 62               | 199           | MODAL              | Mode             | 8.000000            | -983.9806      | -1948.7771     | -82.934           |
| 247          | 62               | 201           | MODAL              | Mode             | 8.000000            | -2059.8422     | -2187.4968     | -74.040           |
| 247          | 62               | 202           | MODAL              | Mode             | 8.000000            | 4552.9457      | -84.0211       | 10.510            |
| 247          | 62               | 200           | MODAL              | Mode             | 9.000000            | -35728.7529    | -64548.6178    | -87.948           |
| 247          | 62               | 199           | MODAL              | Mode             | 9.000000            | -53571.8448    | -84703.3010    | 89.441            |
| 247          | 62               | 201           | MODAL              | Mode             | 9.000000            | -53621.2964    | -84026.8010    | -89.891           |
| 247          | 62               | 202           | MODAL              | Mode             | 9.000000            | -35457.9608    | -64087.8992    | -87.085           |
| 247          | 62               | 200           | MODAL              | Mode             | 10.000000           | -11729.2997    | -19175.1784    | -83.287           |
| 247          | 62               | 199           | MODAL              | Mode             | 10.000000           | -17704.1867    | -25557.8185    | -87.405           |
| 247          | 62               | 201           | MODAL              | Mode             | 10.000000           | -17686.3458    | -25321.2503    | -86.431           |
| 247          | 62               | 202           | MODAL              | Mode             | 10.000000           | -11654.0538    | -19063.0445    | -82.155           |
| 247          | 62               | 200           | MODAL              | Mode             | 11.000000           | -60671.7445    | -148444.839    | 88.613            |
| 247          | 62               | 199           | MODAL              | Mode             | 11.000000           | 3095.5379      | -6090.8342     | 44.148            |
| 247          | 62               | 201           | MODAL              | Mode             | 11.000000           | 4479.3658      | -6466.4637     | 58.945            |
| 247          | 62               | 202           | MODAL              | Mode             | 11.000000           | -56733.6939    | -149294.979    | 88.480            |
| 247          | 62               | 200           | MODAL              | Mode             | 12.000000           | 20576.4859     | 3126.8458      | -71.082           |
| 247          | 62               | 199           | MODAL              | Mode             | 12.000000           | 29853.0165     | 18650.3030     | 8.897             |
| 247          | 62               | 201           | MODAL              | Mode             | 12.000000           | 33243.7104     | 32919.0823     | 33.117            |
| 247          | 62               | 202           | MODAL              | Mode             | 12.000000           | 34396.3312     | 6676.3103      | -75.117           |
| 247          | 62               | 200           | locomotoras        |                  |                     | 159.5423       | 67.9825        | -88.829           |
| 247          | 62               | 199           | locomotoras        |                  |                     | 134.7169       | 19.3648        | -88.901           |
| 247          | 62               | 201           | locomotoras        |                  |                     | 136.3479       | 18.0543        | -88.592           |
| 247          | 62               | 202           | locomotoras        |                  |                     | 150.0323       | 69.0932        | -89.460           |
| 252          | 64               | 6             | MODAL              | Mode             | 1.000000            | 641.0970       | 129.3985       | 8.886             |
| 252          | 64               | 17            | MODAL              | Mode             | 1.000000            | 801.4238       | -999.2832      | -88.813           |
| 252          | 64               | 207           | MODAL              | Mode             | 1.000000            | 388.4964       | -1070.0229     | 88.330            |
| 252          | 64               | 199           | MODAL              | Mode             | 1.000000            | 593.5042       | -297.4110      | 10.401            |
| 252          | 64               | 6             | MODAL              | Mode             | 2.000000            | -8268.1703     | -39526.5719    | 0.699             |
| 252          | 64               | 17            | MODAL              | Mode             | 2.000000            | -7595.7224     | -39488.2071    | 1.010             |
| 252          | 64               | 207           | MODAL              | Mode             | 2.000000            | -7380.3937     | -39447.6667    | 1.039             |
| 252          | 64               | 199           | MODAL              | Mode             | 2.000000            | -8431.4444     | -39510.2723    | 0.652             |
| 252          | 64               | 6             | MODAL              | Mode             | 3.000000            | 23852.3006     | 5873.9646      | -89.501           |
| 252          | 64               | 17            | MODAL              | Mode             | 3.000000            | 23621.7718     | 5295.5795      | -89.093           |
| 252          | 64               | 207           | MODAL              | Mode             | 3.000000            | 23582.4867     | 5122.6071      | -89.034           |
| 252          | 64               | 199           | MODAL              | Mode             | 3.000000            | 23838.3524     | 6007.5731      | -89.549           |
| 252          | 64               | 6             | MODAL              | Mode             | 4.000000            | 541.9979       | 2.0609         | 28.483            |
| 252          | 64               | 17            | MODAL              | Mode             | 4.000000            | 20810.8793     | 8832.7990      | -88.524           |
| 252          | 64               | 207           | MODAL              | Mode             | 4.000000            | 20599.6360     | 8535.4120      | 88.413            |
| 252          | 64               | 199           | MODAL              | Mode             | 4.000000            | 986.9046       | -818.4137      | 39.533            |
| 252          | 64               | 6             | MODAL              | Mode             | 5.000000            | 984.1602       | 188.7675       | 4.822             |
| 252          | 64               | 17            | MODAL              | Mode             | 5.000000            | -1234.4561     | -1621.0872     | -24.624           |
| 252          | 64               | 207           | MODAL              | Mode             | 5.000000            | -1403.0743     | -2167.9873     | -9.763            |
| 252          | 64               | 199           | MODAL              | Mode             | 5.000000            | 868.9269       | -418.4152      | 3.940             |
| 252          | 64               | 6             | MODAL              | Mode             | 6.000000            | -50.2333       | -258.7305      | 46.368            |
| 252          | 64               | 17            | MODAL              | Mode             | 6.000000            | 14592.8407     | 6777.2846      | -88.098           |
| 252          | 64               | 207           | MODAL              | Mode             | 6.000000            | 14725.1411     | 6605.4445      | 88.887            |
| 252          | 64               | 199           | MODAL              | Mode             | 6.000000            | 427.3149       | -665.7911      | 50.669            |
| 252          | 64               | 6             | MODAL              | Mode             | 7.000000            | 8940.5820      | 6325.8179      | -13.602           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 252          | 64               | 17            | MODAL              | Mode             | 7.000000            | 8112.8859      | 4828.0072      | -13.121           |
| 252          | 64               | 207           | MODAL              | Mode             | 7.000000            | 8105.0318      | 4917.6484      | -14.908           |
| 252          | 64               | 199           | MODAL              | Mode             | 7.000000            | 8997.4753      | 6297.6932      | -13.947           |
| 252          | 64               | 6             | MODAL              | Mode             | 8.000000            | 2076.8679      | 429.4321       | -3.468            |
| 252          | 64               | 17            | MODAL              | Mode             | 8.000000            | -1373.2349     | -4576.0039     | -72.455           |
| 252          | 64               | 207           | MODAL              | Mode             | 8.000000            | -2384.4662     | -4847.4732     | -68.525           |
| 252          | 64               | 199           | MODAL              | Mode             | 8.000000            | 1819.0373      | -640.8896      | -0.400            |
| 252          | 64               | 6             | MODAL              | Mode             | 9.000000            | -53452.3704    | -85255.1265    | 88.690            |
| 252          | 64               | 17            | MODAL              | Mode             | 9.000000            | -39377.4307    | -68352.8604    | 88.081            |
| 252          | 64               | 207           | MODAL              | Mode             | 9.000000            | -39474.4613    | -68544.4821    | 87.382            |
| 252          | 64               | 199           | MODAL              | Mode             | 9.000000            | -53275.6730    | -85585.9988    | 88.182            |
| 252          | 64               | 6             | MODAL              | Mode             | 10.000000           | -17684.9735    | -25744.7919    | -88.501           |
| 252          | 64               | 17            | MODAL              | Mode             | 10.000000           | -13031.8452    | -20377.0492    | -88.590           |
| 252          | 64               | 207           | MODAL              | Mode             | 10.000000           | -13028.2425    | -20408.5492    | -89.499           |
| 252          | 64               | 199           | MODAL              | Mode             | 10.000000           | -17633.6548    | -25863.4296    | -89.216           |
| 252          | 64               | 6             | MODAL              | Mode             | 11.000000           | -2993.2470     | -5211.2250     | 72.556            |
| 252          | 64               | 17            | MODAL              | Mode             | 11.000000           | 138191.5899    | 56190.4234     | 0.890             |
| 252          | 64               | 207           | MODAL              | Mode             | 11.000000           | 136651.1181    | 59789.3833     | 1.224             |
| 252          | 64               | 199           | MODAL              | Mode             | 11.000000           | 189.4269       | -7389.7781     | 82.685            |
| 252          | 64               | 6             | MODAL              | Mode             | 12.000000           | -3736.4634     | -23886.7420    | -88.241           |
| 252          | 64               | 17            | MODAL              | Mode             | 12.000000           | 3984.1394      | -9681.2310     | 36.991            |
| 252          | 64               | 207           | MODAL              | Mode             | 12.000000           | 11799.8574     | -225.8724      | 62.254            |
| 252          | 64               | 199           | MODAL              | Mode             | 12.000000           | 10667.5575     | -20022.8322    | -85.901           |
| 252          | 64               | 6             | locomotoras        |                  |                     | 136.5112       | 21.6573        | -88.930           |
| 252          | 64               | 17            | locomotoras        |                  |                     | 150.4475       | 63.1069        | 89.922            |
| 252          | 64               | 207           | locomotoras        |                  |                     | 146.5809       | 60.2873        | 89.722            |
| 252          | 64               | 199           | locomotoras        |                  |                     | 135.6124       | 22.8269        | -89.130           |
| 253          | 65               | 199           | MODAL              | Mode             | 1.000000            | 590.4323       | -278.9209      | 9.443             |
| 253          | 65               | 207           | MODAL              | Mode             | 1.000000            | 400.2821       | -1066.7395     | 88.984            |
| 253          | 65               | 208           | MODAL              | Mode             | 1.000000            | -6.6367        | -1146.1970     | 84.634            |
| 253          | 65               | 201           | MODAL              | Mode             | 1.000000            | 542.5636       | -705.5417      | 10.349            |
| 253          | 65               | 199           | MODAL              | Mode             | 2.000000            | -8431.9919     | -39514.6175    | 0.673             |
| 253          | 65               | 207           | MODAL              | Mode             | 2.000000            | -7386.6976     | -39477.3862    | 1.024             |
| 253          | 65               | 208           | MODAL              | Mode             | 2.000000            | -7161.7780     | -39331.2155    | 1.028             |
| 253          | 65               | 201           | MODAL              | Mode             | 2.000000            | -8568.6306     | -39391.9371    | 0.602             |
| 253          | 65               | 199           | MODAL              | Mode             | 3.000000            | 23843.6862     | 6008.4059      | -89.512           |
| 253          | 65               | 207           | MODAL              | Mode             | 3.000000            | 23608.7684     | 5127.7136      | -89.023           |
| 253          | 65               | 208           | MODAL              | Mode             | 3.000000            | 23484.7580     | 4945.6327      | -88.998           |
| 253          | 65               | 201           | MODAL              | Mode             | 3.000000            | 23744.1067     | 6119.1905      | -89.592           |
| 253          | 65               | 199           | MODAL              | Mode             | 4.000000            | 1365.6632      | -1627.4991     | 38.933            |
| 253          | 65               | 207           | MODAL              | Mode             | 4.000000            | 20342.6874     | 8414.3119      | 85.693            |
| 253          | 65               | 208           | MODAL              | Mode             | 4.000000            | 20206.9313     | 7976.1125      | 82.695            |
| 253          | 65               | 201           | MODAL              | Mode             | 4.000000            | 1829.5287      | -2470.0464     | 40.517            |
| 253          | 65               | 199           | MODAL              | Mode             | 5.000000            | 871.7662       | -369.1202      | -0.779            |
| 253          | 65               | 207           | MODAL              | Mode             | 5.000000            | -1348.5161     | -2173.0350     | -16.727           |
| 253          | 65               | 208           | MODAL              | Mode             | 5.000000            | -1500.6329     | -2731.3401     | -9.875            |
| 253          | 65               | 201           | MODAL              | Mode             | 5.000000            | 754.3324       | -974.6323      | 0.162             |
| 253          | 65               | 199           | MODAL              | Mode             | 6.000000            | 698.0041       | -1254.3617     | 45.046            |
| 253          | 65               | 207           | MODAL              | Mode             | 6.000000            | 14532.5299     | 6519.5569      | 85.825            |
| 253          | 65               | 208           | MODAL              | Mode             | 6.000000            | 14700.8335     | 6251.2946      | 83.122            |
| 253          | 65               | 201           | MODAL              | Mode             | 6.000000            | 1168.7982      | -1655.8380     | 47.162            |
| 253          | 65               | 199           | MODAL              | Mode             | 7.000000            | 8992.4144      | 6297.9783      | -13.766           |
| 253          | 65               | 207           | MODAL              | Mode             | 7.000000            | 8147.6791      | 4934.4498      | -15.985           |
| 253          | 65               | 208           | MODAL              | Mode             | 7.000000            | 8130.2756      | 5003.9524      | -17.794           |
| 253          | 65               | 201           | MODAL              | Mode             | 7.000000            | 9025.1720      | 6256.8296      | -13.999           |
| 253          | 65               | 199           | MODAL              | Mode             | 8.000000            | 1852.0379      | -535.6969      | -3.727            |
| 253          | 65               | 207           | MODAL              | Mode             | 8.000000            | -2198.2606     | -4904.9882     | -67.123           |
| 253          | 65               | 208           | MODAL              | Mode             | 8.000000            | -3153.3508     | -5223.1825     | -60.505           |
| 253          | 65               | 201           | MODAL              | Mode             | 8.000000            | 1587.6682      | -1601.1655     | -1.312            |
| 253          | 65               | 199           | MODAL              | Mode             | 9.000000            | -53237.8467    | -85574.8097    | 88.270            |
| 253          | 65               | 207           | MODAL              | Mode             | 9.000000            | -40047.4306    | -68759.5420    | 85.934            |
| 253          | 65               | 208           | MODAL              | Mode             | 9.000000            | -40057.0482    | -68833.9421    | 85.274            |
| 253          | 65               | 201           | MODAL              | Mode             | 9.000000            | -52955.6863    | -85722.6390    | 87.812            |
| 253          | 65               | 199           | MODAL              | Mode             | 10.000000           | -17619.8557    | -25861.1651    | -89.122           |
| 253          | 65               | 207           | MODAL              | Mode             | 10.000000           | -13233.6413    | -20454.3162    | 88.577            |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 253          | 65               | 208           | MODAL              | Mode             | 10.000000           | -13189.4369    | -20449.5850    | 87.725            |
| 253          | 65               | 201           | MODAL              | Mode             | 10.000000           | -17520.0785    | -25915.8251    | -89.759           |
| 253          | 65               | 199           | MODAL              | Mode             | 11.000000           | -1720.2027     | -9275.9796     | 64.735            |
| 253          | 65               | 207           | MODAL              | Mode             | 11.000000           | 136185.8737    | 56998.5109     | 2.161             |
| 253          | 65               | 208           | MODAL              | Mode             | 11.000000           | 134405.2514    | 60494.8499     | 2.600             |
| 253          | 65               | 201           | MODAL              | Mode             | 11.000000           | 1109.0510      | -11088.5527    | 73.829            |
| 253          | 65               | 199           | MODAL              | Mode             | 12.000000           | 10490.1661     | -19910.9416    | -88.083           |
| 253          | 65               | 207           | MODAL              | Mode             | 12.000000           | 12759.7423     | -1361.9668     | 59.151            |
| 253          | 65               | 208           | MODAL              | Mode             | 12.000000           | 24001.7030     | 4405.5373      | 76.033            |
| 253          | 65               | 201           | MODAL              | Mode             | 12.000000           | 24802.5862     | -15887.4641    | -86.379           |
| 253          | 65               | 199           | locomotoras        |                  |                     | 135.7140       | 22.8363        | -89.064           |
| 253          | 65               | 207           | locomotoras        |                  |                     | 145.9437       | 60.1534        | 89.695            |
| 253          | 65               | 208           | locomotoras        |                  |                     | 141.7598       | 57.2199        | 89.578            |
| 253          | 65               | 201           | locomotoras        |                  |                     | 138.1773       | 24.9339        | -89.042           |
| 258          | 67               | 14            | MODAL              | Mode             | 1.000000            | 709.6169       | -1560.4158     | -1.664            |
| 258          | 67               | 23            | MODAL              | Mode             | 1.000000            | 269.0026       | -1323.0080     | -3.357            |
| 258          | 67               | 213           | MODAL              | Mode             | 1.000000            | 199.9899       | -1721.4873     | -0.332            |
| 258          | 67               | 203           | MODAL              | Mode             | 1.000000            | 643.1880       | -1961.2395     | 0.346             |
| 258          | 67               | 14            | MODAL              | Mode             | 2.000000            | -6752.8959     | -39265.3602    | 2.648             |
| 258          | 67               | 23            | MODAL              | Mode             | 2.000000            | -7322.8438     | -39299.7361    | 2.370             |
| 258          | 67               | 213           | MODAL              | Mode             | 2.000000            | -7300.0323     | -39161.7970    | 2.361             |
| 258          | 67               | 203           | MODAL              | Mode             | 2.000000            | -6861.7330     | -39123.8065    | 2.619             |
| 258          | 67               | 14            | MODAL              | Mode             | 3.000000            | 23545.6594     | 4821.4265      | -87.039           |
| 258          | 67               | 23            | MODAL              | Mode             | 3.000000            | 23639.6466     | 5222.7669      | -87.369           |
| 258          | 67               | 213           | MODAL              | Mode             | 3.000000            | 23540.1622     | 5198.9425      | -87.402           |
| 258          | 67               | 203           | MODAL              | Mode             | 3.000000            | 23444.4743     | 4902.8161      | -87.097           |
| 258          | 67               | 14            | MODAL              | Mode             | 4.000000            | -11273.3266    | -32657.6915    | 6.483             |
| 258          | 67               | 23            | MODAL              | Mode             | 4.000000            | -10932.6137    | -27108.0059    | 6.996             |
| 258          | 67               | 213           | MODAL              | Mode             | 4.000000            | -10960.8483    | -27480.6989    | 9.012             |
| 258          | 67               | 203           | MODAL              | Mode             | 4.000000            | -11436.4091    | -32987.7168    | 8.027             |
| 258          | 67               | 14            | MODAL              | Mode             | 5.000000            | 2153.3754      | 478.6349       | 87.729            |
| 258          | 67               | 23            | MODAL              | Mode             | 5.000000            | 1719.8873      | -27.6617       | -89.246           |
| 258          | 67               | 213           | MODAL              | Mode             | 5.000000            | 1147.7851      | -165.6934      | -89.909           |
| 258          | 67               | 203           | MODAL              | Mode             | 5.000000            | 1599.5262      | 338.9548       | 86.103            |
| 258          | 67               | 14            | MODAL              | Mode             | 6.000000            | -8164.1280     | -22977.9618    | 7.454             |
| 258          | 67               | 23            | MODAL              | Mode             | 6.000000            | -7647.4398     | -19114.7772    | 8.167             |
| 258          | 67               | 213           | MODAL              | Mode             | 6.000000            | -7597.8538     | -19082.7342    | 10.147            |
| 258          | 67               | 203           | MODAL              | Mode             | 6.000000            | -8224.7974     | -22906.6382    | 9.001             |
| 258          | 67               | 14            | MODAL              | Mode             | 7.000000            | 6842.1629      | 1903.0359      | -12.517           |
| 258          | 67               | 23            | MODAL              | Mode             | 7.000000            | 7355.3002      | 3176.0711      | -14.023           |
| 258          | 67               | 213           | MODAL              | Mode             | 7.000000            | 7258.8427      | 3102.1865      | -11.810           |
| 258          | 67               | 203           | MODAL              | Mode             | 7.000000            | 6769.8129      | 1781.9894      | -10.408           |
| 258          | 67               | 14            | MODAL              | Mode             | 8.000000            | 4634.7943      | 1780.1433      | 26.102            |
| 258          | 67               | 23            | MODAL              | Mode             | 8.000000            | 3488.0382      | 1371.9744      | 32.933            |
| 258          | 67               | 213           | MODAL              | Mode             | 8.000000            | 3153.5878      | 479.5791       | 26.143            |
| 258          | 67               | 203           | MODAL              | Mode             | 8.000000            | 4370.5915      | 863.1331       | 22.039            |
| 258          | 67               | 14            | MODAL              | Mode             | 9.000000            | -15438.6320    | -46040.7438    | -86.836           |
| 258          | 67               | 23            | MODAL              | Mode             | 9.000000            | -27111.1705    | -55769.7041    | -88.085           |
| 258          | 67               | 213           | MODAL              | Mode             | 9.000000            | -27063.6723    | -54922.6817    | -86.095           |
| 258          | 67               | 203           | MODAL              | Mode             | 9.000000            | -15296.0158    | -45275.5688    | -84.938           |
| 258          | 67               | 14            | MODAL              | Mode             | 10.000000           | -4987.3651     | -13526.6563    | -81.814           |
| 258          | 67               | 23            | MODAL              | Mode             | 10.000000           | -8879.4165     | -16543.4691    | -82.958           |
| 258          | 67               | 213           | MODAL              | Mode             | 10.000000           | -8855.9358     | -16328.3787    | -80.335           |
| 258          | 67               | 203           | MODAL              | Mode             | 10.000000           | -4955.8798     | -13347.6326    | -79.452           |
| 258          | 67               | 14            | MODAL              | Mode             | 11.000000           | -66493.3209    | -164288.547    | 89.813            |
| 258          | 67               | 23            | MODAL              | Mode             | 11.000000           | -66555.6571    | -158561.327    | 89.676            |
| 258          | 67               | 213           | MODAL              | Mode             | 11.000000           | -64835.2679    | -158647.667    | 89.908            |
| 258          | 67               | 203           | MODAL              | Mode             | 11.000000           | -64812.9656    | -164046.598    | -89.999           |
| 258          | 67               | 14            | MODAL              | Mode             | 12.000000           | 23371.1187     | 7404.9413      | -27.171           |
| 258          | 67               | 23            | MODAL              | Mode             | 12.000000           | 35969.5386     | 11465.0457     | -10.285           |
| 258          | 67               | 213           | MODAL              | Mode             | 12.000000           | 40774.1957     | 23890.3721     | -22.271           |
| 258          | 67               | 203           | MODAL              | Mode             | 12.000000           | 31930.7960     | 15687.5063     | -47.626           |
| 258          | 67               | 14            | locomotoras        |                  |                     | 146.4423       | 70.5615        | -87.806           |
| 258          | 67               | 23            | locomotoras        |                  |                     | 147.1719       | 52.5743        | -86.503           |
| 258          | 67               | 213           | locomotoras        |                  |                     | 144.3712       | 54.6337        | -87.090           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 258          | 67               | 203           | locomotoras        |                  |                     | 139.7162       | 65.6070        | -88.383           |
| 259          | 68               | 203           | MODAL              | Mode             | 1.000000            | 644.4298       | -1954.4665     | 0.050             |
| 259          | 68               | 213           | MODAL              | Mode             | 1.000000            | 202.0459       | -1712.7799     | -0.749            |
| 259          | 68               | 214           | MODAL              | Mode             | 1.000000            | 138.8607       | -2113.8266     | 1.433             |
| 259          | 68               | 205           | MODAL              | Mode             | 1.000000            | 584.2513       | -2354.8469     | 1.631             |
| 259          | 68               | 203           | MODAL              | Mode             | 2.000000            | -6848.7145     | -39077.7788    | 2.682             |
| 259          | 68               | 213           | MODAL              | Mode             | 2.000000            | -7290.4725     | -39129.8387    | 2.418             |
| 259          | 68               | 214           | MODAL              | Mode             | 2.000000            | -7294.6401     | -38895.7194    | 2.381             |
| 259          | 68               | 205           | MODAL              | Mode             | 2.000000            | -6891.1212     | -38824.5227    | 2.638             |
| 259          | 68               | 203           | MODAL              | Mode             | 3.000000            | 23409.4045     | 4893.7876      | -87.044           |
| 259          | 68               | 213           | MODAL              | Mode             | 3.000000            | 23516.0976     | 5192.2603      | -87.348           |
| 259          | 68               | 214           | MODAL              | Mode             | 3.000000            | 23338.9868     | 5188.5633      | -87.418           |
| 259          | 68               | 205           | MODAL              | Mode             | 3.000000            | 23218.4213     | 4920.2705      | -87.122           |
| 259          | 68               | 203           | MODAL              | Mode             | 4.000000            | -11316.3014    | -33278.1638    | 9.261             |
| 259          | 68               | 213           | MODAL              | Mode             | 4.000000            | -10822.1334    | -27849.4878    | 10.658            |
| 259          | 68               | 214           | MODAL              | Mode             | 4.000000            | -10799.5396    | -28225.8614    | 12.468            |
| 259          | 68               | 205           | MODAL              | Mode             | 4.000000            | -11339.7387    | -33562.9226    | 10.707            |
| 259          | 68               | 203           | MODAL              | Mode             | 5.000000            | 1618.6873      | 349.7707       | -89.977           |
| 259          | 68               | 213           | MODAL              | Mode             | 5.000000            | 1186.3613      | -166.0469      | -85.956           |
| 259          | 68               | 214           | MODAL              | Mode             | 5.000000            | 615.1695       | -303.8702      | -85.286           |
| 259          | 68               | 205           | MODAL              | Mode             | 5.000000            | 1062.3382      | 206.8091       | 88.868            |
| 259          | 68               | 203           | MODAL              | Mode             | 6.000000            | -8122.6034     | -23135.5725    | 10.330            |
| 259          | 68               | 213           | MODAL              | Mode             | 6.000000            | -7477.5937     | -19372.3089    | 11.891            |
| 259          | 68               | 214           | MODAL              | Mode             | 6.000000            | -7392.3259     | -19332.1538    | 13.766            |
| 259          | 68               | 205           | MODAL              | Mode             | 6.000000            | -8070.5512     | -23017.2689    | 11.840            |
| 259          | 68               | 203           | MODAL              | Mode             | 7.000000            | 6718.3432      | 1739.9027      | -9.187            |
| 259          | 68               | 213           | MODAL              | Mode             | 7.000000            | 7206.6919      | 3068.5860      | -10.455           |
| 259          | 68               | 214           | MODAL              | Mode             | 7.000000            | 7118.7976      | 2966.3629      | -8.147            |
| 259          | 68               | 205           | MODAL              | Mode             | 7.000000            | 6656.4795      | 1591.3262      | -7.084            |
| 259          | 68               | 203           | MODAL              | Mode             | 8.000000            | 4310.6094      | 982.9519       | 20.911            |
| 259          | 68               | 213           | MODAL              | Mode             | 8.000000            | 3087.3891      | 625.7995       | 24.998            |
| 259          | 68               | 214           | MODAL              | Mode             | 8.000000            | 2809.9447      | -320.2089      | 20.682            |
| 259          | 68               | 205           | MODAL              | Mode             | 8.000000            | 4075.4648      | 36.7606        | 18.246            |
| 259          | 68               | 203           | MODAL              | Mode             | 9.000000            | -14136.9089    | -45314.2028    | -83.032           |
| 259          | 68               | 213           | MODAL              | Mode             | 9.000000            | -26043.7239    | -54916.1957    | -84.209           |
| 259          | 68               | 214           | MODAL              | Mode             | 9.000000            | -25809.3585    | -54106.9689    | -82.125           |
| 259          | 68               | 205           | MODAL              | Mode             | 9.000000            | -13842.6990    | -44636.7136    | -81.092           |
| 259          | 68               | 203           | MODAL              | Mode             | 10.000000           | -4522.2349     | -13427.7273    | -77.453           |
| 259          | 68               | 213           | MODAL              | Mode             | 10.000000           | -8469.8375     | -16391.6738    | -78.264           |
| 259          | 68               | 214           | MODAL              | Mode             | 10.000000           | -8366.0016     | -16201.7949    | -75.642           |
| 259          | 68               | 205           | MODAL              | Mode             | 10.000000           | -4429.2566     | -13287.3471    | -75.138           |
| 259          | 68               | 203           | MODAL              | Mode             | 11.000000           | -64594.4209    | -164003.580    | -89.884           |
| 259          | 68               | 213           | MODAL              | Mode             | 11.000000           | -65270.3923    | -158737.561    | 89.706            |
| 259          | 68               | 214           | MODAL              | Mode             | 11.000000           | -63510.5622    | -158522.727    | 89.949            |
| 259          | 68               | 205           | MODAL              | Mode             | 11.000000           | -62827.0975    | -163425.582    | -89.688           |
| 259          | 68               | 203           | MODAL              | Mode             | 12.000000           | 30132.3554     | 16635.8640     | -46.954           |
| 259          | 68               | 213           | MODAL              | Mode             | 12.000000           | 39743.2427     | 24171.4243     | -18.200           |
| 259          | 68               | 214           | MODAL              | Mode             | 12.000000           | 46710.5948     | 34212.0484     | -41.068           |
| 259          | 68               | 205           | MODAL              | Mode             | 12.000000           | 41789.1445     | 21545.0028     | -62.523           |
| 259          | 68               | 203           | locomotoras        |                  |                     | 138.9874       | 65.4683        | -88.546           |
| 259          | 68               | 213           | locomotoras        |                  |                     | 143.8645       | 54.5675        | -87.313           |
| 259          | 68               | 214           | locomotoras        |                  |                     | 141.6648       | 55.6961        | -88.047           |
| 259          | 68               | 205           | locomotoras        |                  |                     | 134.5721       | 61.8860        | -89.267           |
| 261          | 70               | 23            | MODAL              | Mode             | 1.000000            | 652.1984       | -1233.5558     | -1.230            |
| 261          | 70               | 11            | MODAL              | Mode             | 1.000000            | 180.5113       | -1008.4577     | -3.565            |
| 261          | 70               | 200           | MODAL              | Mode             | 1.000000            | 110.4188       | -1411.8962     | 0.288             |
| 261          | 70               | 213           | MODAL              | Mode             | 1.000000            | 584.6875       | -1638.4943     | 1.040             |
| 261          | 70               | 23            | MODAL              | Mode             | 2.000000            | -7323.9184     | -39385.7866    | 2.094             |
| 261          | 70               | 11            | MODAL              | Mode             | 2.000000            | -7767.3387     | -39399.7190    | 1.857             |
| 261          | 70               | 200           | MODAL              | Mode             | 2.000000            | -7742.9134     | -39285.6428    | 1.851             |
| 261          | 70               | 213           | MODAL              | Mode             | 2.000000            | -7419.2516     | -39270.3983    | 2.068             |
| 261          | 70               | 23            | MODAL              | Mode             | 3.000000            | 23697.2262     | 5219.3457      | -87.699           |
| 261          | 70               | 11            | MODAL              | Mode             | 3.000000            | 23753.6854     | 5538.9902      | -87.988           |
| 261          | 70               | 200           | MODAL              | Mode             | 3.000000            | 23671.7012     | 5515.5058      | -88.009           |
| 261          | 70               | 213           | MODAL              | Mode             | 3.000000            | 23614.9410     | 5292.6034      | -87.747           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 261          | 70               | 23            | MODAL              | Mode             | 4.000000            | -10666.9470    | -27194.8457    | 5.739             |
| 261          | 70               | 11            | MODAL              | Mode             | 4.000000            | -9655.3148     | -21362.8699    | 6.426             |
| 261          | 70               | 200           | MODAL              | Mode             | 4.000000            | -9665.9184     | -21670.8898    | 9.321             |
| 261          | 70               | 213           | MODAL              | Mode             | 4.000000            | -10805.9738    | -27550.6273    | 7.819             |
| 261          | 70               | 23            | MODAL              | Mode             | 5.000000            | 1829.6373      | 581.9616       | 88.952            |
| 261          | 70               | 11            | MODAL              | Mode             | 5.000000            | 1357.5692      | 1.4645         | -87.381           |
| 261          | 70               | 200           | MODAL              | Mode             | 5.000000            | 765.8861       | -130.5125      | -87.365           |
| 261          | 70               | 213           | MODAL              | Mode             | 5.000000            | 1258.0330      | 445.0968       | 87.113            |
| 261          | 70               | 23            | MODAL              | Mode             | 6.000000            | -7765.9055     | -19225.8632    | 6.796             |
| 261          | 70               | 11            | MODAL              | Mode             | 6.000000            | -6788.9376     | -15131.6160    | 7.760             |
| 261          | 70               | 200           | MODAL              | Mode             | 6.000000            | -6728.7140     | -15060.6389    | 10.630            |
| 261          | 70               | 213           | MODAL              | Mode             | 6.000000            | -7810.2427     | -19183.3893    | 8.889             |
| 261          | 70               | 23            | MODAL              | Mode             | 7.000000            | 7400.6653      | 3274.8221      | -12.987           |
| 261          | 70               | 11            | MODAL              | Mode             | 7.000000            | 7876.3834      | 4355.0751      | -14.535           |
| 261          | 70               | 200           | MODAL              | Mode             | 7.000000            | 7785.5182      | 4302.5747      | -12.414           |
| 261          | 70               | 213           | MODAL              | Mode             | 7.000000            | 7338.8557      | 3182.3948      | -10.876           |
| 261          | 70               | 23            | MODAL              | Mode             | 8.000000            | 4377.4524      | 1705.7506      | 24.413            |
| 261          | 70               | 11            | MODAL              | Mode             | 8.000000            | 2942.8692      | 1226.5505      | 33.539            |
| 261          | 70               | 200           | MODAL              | Mode             | 8.000000            | 2587.2192      | 288.3081       | 25.104            |
| 261          | 70               | 213           | MODAL              | Mode             | 8.000000            | 4099.9001      | 753.7259       | 20.424            |
| 261          | 70               | 23            | MODAL              | Mode             | 9.000000            | -26913.2538    | -56239.9482    | -88.979           |
| 261          | 70               | 11            | MODAL              | Mode             | 9.000000            | -36851.0093    | -65312.3208    | 89.934            |
| 261          | 70               | 200           | MODAL              | Mode             | 9.000000            | -36840.6042    | -64501.9677    | -88.441           |
| 261          | 70               | 213           | MODAL              | Mode             | 9.000000            | -26842.9589    | -55518.3481    | -87.360           |
| 261          | 70               | 23            | MODAL              | Mode             | 10.000000           | -8817.4091     | -16615.8407    | -84.449           |
| 261          | 70               | 11            | MODAL              | Mode             | 10.000000           | -12135.4442    | -19438.0808    | -85.767           |
| 261          | 70               | 200           | MODAL              | Mode             | 10.000000           | -12130.8468    | -19210.9784    | -83.520           |
| 261          | 70               | 213           | MODAL              | Mode             | 10.000000           | -8805.1541     | -16431.7269    | -82.317           |
| 261          | 70               | 23            | MODAL              | Mode             | 11.000000           | -67019.9999    | -159970.720    | 89.940            |
| 261          | 70               | 11            | MODAL              | Mode             | 11.000000           | -61446.0611    | -142627.065    | 89.833            |
| 261          | 70               | 200           | MODAL              | Mode             | 11.000000           | -57878.4677    | -143138.496    | 89.991            |
| 261          | 70               | 213           | MODAL              | Mode             | 11.000000           | -65105.4620    | -160457.226    | 89.940            |
| 261          | 70               | 23            | MODAL              | Mode             | 12.000000           | 22543.6090     | 7715.0381      | -21.949           |
| 261          | 70               | 11            | MODAL              | Mode             | 12.000000           | 34293.4266     | 10401.7093     | -6.567            |
| 261          | 70               | 200           | MODAL              | Mode             | 12.000000           | 38700.4909     | 23286.1812     | -17.084           |
| 261          | 70               | 213           | MODAL              | Mode             | 12.000000           | 30618.0923     | 17046.4872     | -45.117           |
| 261          | 70               | 23            | locomotoras        |                  |                     | 147.2970       | 53.4529        | -87.819           |
| 261          | 70               | 11            | locomotoras        |                  |                     | 152.2220       | 71.0319        | -87.928           |
| 261          | 70               | 200           | locomotoras        |                  |                     | 158.5886       | 67.8866        | -87.793           |
| 261          | 70               | 213           | locomotoras        |                  |                     | 144.5739       | 55.2868        | -88.543           |
| 262          | 71               | 213           | MODAL              | Mode             | 1.000000            | 586.0561       | -1629.0993     | 0.678             |
| 262          | 71               | 200           | MODAL              | Mode             | 1.000000            | 112.8646       | -1399.6300     | -0.274            |
| 262          | 71               | 202           | MODAL              | Mode             | 1.000000            | 50.4028        | -1806.9990     | 2.277             |
| 262          | 71               | 214           | MODAL              | Mode             | 1.000000            | 523.7803       | -2034.1484     | 2.389             |
| 262          | 71               | 213           | MODAL              | Mode             | 2.000000            | -7410.1377     | -39237.9941    | 2.122             |
| 262          | 71               | 200           | MODAL              | Mode             | 2.000000            | -7736.9663     | -39266.8038    | 1.902             |
| 262          | 71               | 202           | MODAL              | Mode             | 2.000000            | -7733.9018     | -39056.2859    | 1.867             |
| 262          | 71               | 214           | MODAL              | Mode             | 2.000000            | -7443.6676     | -39009.3865    | 2.080             |
| 262          | 71               | 213           | MODAL              | Mode             | 3.000000            | 23590.5789     | 5286.2186      | -87.697           |
| 262          | 71               | 200           | MODAL              | Mode             | 3.000000            | 23657.7687     | 5511.3018      | -87.956           |
| 262          | 71               | 202           | MODAL              | Mode             | 3.000000            | 23498.0216     | 5503.9946      | -88.016           |
| 262          | 71               | 214           | MODAL              | Mode             | 3.000000            | 23416.9455     | 5307.5492      | -87.767           |
| 262          | 71               | 213           | MODAL              | Mode             | 4.000000            | -10691.0739    | -27895.6012    | 9.444             |
| 262          | 71               | 200           | MODAL              | Mode             | 4.000000            | -9539.1723     | -22186.7744    | 11.544            |
| 262          | 71               | 202           | MODAL              | Mode             | 4.000000            | -9433.5478     | -22534.3830    | 14.037            |
| 262          | 71               | 214           | MODAL              | Mode             | 4.000000            | -10719.4826    | -28250.0988    | 11.352            |
| 262          | 71               | 213           | MODAL              | Mode             | 5.000000            | 1291.0124      | 450.3399       | -86.470           |
| 262          | 71               | 200           | MODAL              | Mode             | 5.000000            | 825.9527       | -140.8934      | -81.616           |
| 262          | 71               | 202           | MODAL              | Mode             | 5.000000            | 244.1244       | -282.9554      | -76.465           |
| 262          | 71               | 214           | MODAL              | Mode             | 5.000000            | 718.0288       | 311.8779       | -85.024           |
| 262          | 71               | 213           | MODAL              | Mode             | 6.000000            | -7708.7854     | -19454.1612    | 10.651            |
| 262          | 71               | 200           | MODAL              | Mode             | 6.000000            | -6614.1642     | -15462.9653    | 12.975            |
| 262          | 71               | 202           | MODAL              | Mode             | 6.000000            | -6466.0496     | -15412.4511    | 15.611            |
| 262          | 71               | 214           | MODAL              | Mode             | 6.000000            | -7665.4149     | -19399.9054    | 12.674            |
| 262          | 71               | 213           | MODAL              | Mode             | 7.000000            | 7290.4782      | 3145.0210      | -9.541            |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 262          | 71               | 200           | MODAL              | Mode             | 7.000000            | 7741.7715      | 4281.5551      | -11.090           |
| 262          | 71               | 202           | MODAL              | Mode             | 7.000000            | 7656.7779      | 4205.2715      | -8.800            |
| 262          | 71               | 214           | MODAL              | Mode             | 7.000000            | 7225.7432      | 3024.4218      | -7.429            |
| 262          | 71               | 213           | MODAL              | Mode             | 8.000000            | 4046.4148      | 887.2329       | 19.170            |
| 262          | 71               | 200           | MODAL              | Mode             | 8.000000            | 2530.6609      | 471.3986       | 23.831            |
| 262          | 71               | 202           | MODAL              | Mode             | 8.000000            | 2240.1961      | -530.7109      | 18.987            |
| 262          | 71               | 214           | MODAL              | Mode             | 8.000000            | 3796.6491      | -89.3426       | 16.662            |
| 262          | 71               | 213           | MODAL              | Mode             | 9.000000            | -25867.8771    | -55466.9956    | -85.520           |
| 262          | 71               | 200           | MODAL              | Mode             | 9.000000            | -36078.0569    | -64428.4838    | -86.836           |
| 262          | 71               | 202           | MODAL              | Mode             | 9.000000            | -35923.4024    | -63646.4919    | -85.087           |
| 262          | 71               | 214           | MODAL              | Mode             | 9.000000            | -25638.1057    | -54684.6266    | -83.822           |
| 262          | 71               | 213           | MODAL              | Mode             | 10.000000           | -8440.9114     | -16473.1663    | -80.224           |
| 262          | 71               | 200           | MODAL              | Mode             | 10.000000           | -11841.1174    | -19234.3373    | -81.595           |
| 262          | 71               | 202           | MODAL              | Mode             | 10.000000           | -11769.0629    | -19030.9566    | -79.252           |
| 262          | 71               | 214           | MODAL              | Mode             | 10.000000           | -8358.9339     | -16275.4067    | -78.047           |
| 262          | 71               | 213           | MODAL              | Mode             | 11.000000           | -65541.2254    | -160546.481    | 89.741            |
| 262          | 71               | 200           | MODAL              | Mode             | 11.000000           | -60465.5252    | -143671.369    | 89.284            |
| 262          | 71               | 202           | MODAL              | Mode             | 11.000000           | -56836.3788    | -143881.543    | 89.472            |
| 262          | 71               | 214           | MODAL              | Mode             | 11.000000           | -63572.8495    | -160701.276    | 89.750            |
| 262          | 71               | 213           | MODAL              | Mode             | 12.000000           | 28939.8413     | 17974.8374     | -43.838           |
| 262          | 71               | 200           | MODAL              | Mode             | 12.000000           | 38050.4288     | 23697.7696     | -12.942           |
| 262          | 71               | 202           | MODAL              | Mode             | 12.000000           | 44269.8332     | 34528.1191     | -37.728           |
| 262          | 71               | 214           | MODAL              | Mode             | 12.000000           | 40776.3899     | 23311.3034     | -62.887           |
| 262          | 71               | 213           | locomotoras        |                  |                     | 144.1339       | 55.1539        | -89.172           |
| 262          | 71               | 200           | locomotoras        |                  |                     | 159.4435       | 68.0419        | -88.403           |
| 262          | 71               | 202           | locomotoras        |                  |                     | 148.6188       | 58.6928        | -89.151           |
| 262          | 71               | 214           | locomotoras        |                  |                     | 142.8522       | 59.7997        | 89.632            |
| 264          | 73               | 17            | MODAL              | Mode             | 1.000000            | 977.5992       | -170.7093      | 86.937            |
| 264          | 73               | 26            | MODAL              | Mode             | 1.000000            | 1198.7125      | -645.1397      | 89.145            |
| 264          | 73               | 215           | MODAL              | Mode             | 1.000000            | 796.6977       | -721.3982      | 85.886            |
| 264          | 73               | 207           | MODAL              | Mode             | 1.000000            | 587.6071       | -258.6866      | 80.124            |
| 264          | 73               | 17            | MODAL              | Mode             | 2.000000            | -7771.7048     | -39361.6746    | 1.772             |
| 264          | 73               | 26            | MODAL              | Mode             | 2.000000            | -7336.4706     | -39336.4876    | 1.995             |
| 264          | 73               | 215           | MODAL              | Mode             | 2.000000            | -7219.3426     | -39343.6594    | 2.004             |
| 264          | 73               | 207           | MODAL              | Mode             | 2.000000            | -7782.2278     | -39366.9018    | 1.758             |
| 264          | 73               | 17            | MODAL              | Mode             | 3.000000            | 23532.7772     | 5450.8533      | -88.079           |
| 264          | 73               | 26            | MODAL              | Mode             | 3.000000            | 23411.8526     | 5124.6127      | -87.801           |
| 264          | 73               | 215           | MODAL              | Mode             | 3.000000            | 23409.3959     | 5034.1561      | -87.757           |
| 264          | 73               | 207           | MODAL              | Mode             | 3.000000            | 23528.4947     | 5462.4056      | -88.065           |
| 264          | 73               | 17            | MODAL              | Mode             | 4.000000            | 20697.2756     | 9384.4200      | -86.456           |
| 264          | 73               | 26            | MODAL              | Mode             | 4.000000            | 26685.5696     | 10448.2419     | -86.250           |
| 264          | 73               | 215           | MODAL              | Mode             | 4.000000            | 26343.5911     | 10188.7157     | -88.467           |
| 264          | 73               | 207           | MODAL              | Mode             | 4.000000            | 20449.7250     | 9234.1871      | -89.672           |
| 264          | 73               | 17            | MODAL              | Mode             | 5.000000            | -1.9746        | -1303.7288     | -1.123            |
| 264          | 73               | 26            | MODAL              | Mode             | 5.000000            | -574.6125      | -1800.0819     | -4.865            |
| 264          | 73               | 215           | MODAL              | Mode             | 5.000000            | -710.5701      | -2369.8275     | -2.920            |
| 264          | 73               | 207           | MODAL              | Mode             | 5.000000            | -133.8785      | -1894.4660     | -0.133            |
| 264          | 73               | 17            | MODAL              | Mode             | 6.000000            | 14385.9017     | 6574.2347      | -85.182           |
| 264          | 73               | 26            | MODAL              | Mode             | 6.000000            | 18603.5620     | 7579.1589      | -85.295           |
| 264          | 73               | 215           | MODAL              | Mode             | 6.000000            | 18639.7347     | 7446.1523      | -87.447           |
| 264          | 73               | 207           | MODAL              | Mode             | 6.000000            | 14483.0376     | 6537.1172      | -88.234           |
| 264          | 73               | 17            | MODAL              | Mode             | 7.000000            | 8189.2298      | 4670.6027      | -15.363           |
| 264          | 73               | 26            | MODAL              | Mode             | 7.000000            | 7777.4389      | 3668.2381      | -13.937           |
| 264          | 73               | 215           | MODAL              | Mode             | 7.000000            | 7836.6046      | 3747.1268      | -15.987           |
| 264          | 73               | 207           | MODAL              | Mode             | 7.000000            | 8272.5473      | 4711.3367      | -17.314           |
| 264          | 73               | 17            | MODAL              | Mode             | 8.000000            | -678.8888      | -2601.4786     | -53.501           |
| 264          | 73               | 26            | MODAL              | Mode             | 8.000000            | -1289.1740     | -4071.5688     | -62.796           |
| 264          | 73               | 215           | MODAL              | Mode             | 8.000000            | -2163.4386     | -4420.9645     | -55.979           |
| 264          | 73               | 207           | MODAL              | Mode             | 8.000000            | -1446.9590     | -3126.7368     | -40.893           |
| 264          | 73               | 17            | MODAL              | Mode             | 9.000000            | -39578.0311    | -68596.6826    | 88.386            |
| 264          | 73               | 26            | MODAL              | Mode             | 9.000000            | -30238.8253    | -59964.7210    | 89.079            |
| 264          | 73               | 215           | MODAL              | Mode             | 9.000000            | -30184.9033    | -60634.8420    | 87.678            |
| 264          | 73               | 207           | MODAL              | Mode             | 9.000000            | -39454.4079    | -69307.1613    | 86.997            |
| 264          | 73               | 17            | MODAL              | Mode             | 10.000000           | -13127.3798    | -20532.9445    | -87.958           |
| 264          | 73               | 26            | MODAL              | Mode             | 10.000000           | -10025.5214    | -17848.0418    | -87.028           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 264          | 73               | 215           | MODAL              | Mode             | 10.000000           | -9981.3725     | -18029.8797    | -88.872           |
| 264          | 73               | 207           | MODAL              | Mode             | 10.000000           | -13069.9227    | -20741.3968    | -89.850           |
| 264          | 73               | 17            | MODAL              | Mode             | 11.000000           | 134545.2248    | 55617.9828     | 0.995             |
| 264          | 73               | 26            | MODAL              | Mode             | 11.000000           | 154688.2216    | 64648.5597     | 0.503             |
| 264          | 73               | 215           | MODAL              | Mode             | 11.000000           | 153692.7800    | 66455.9981     | 0.577             |
| 264          | 73               | 207           | MODAL              | Mode             | 11.000000           | 133553.2637    | 58990.3833     | 0.962             |
| 264          | 73               | 17            | MODAL              | Mode             | 12.000000           | -9425.1211     | -33092.4828    | 79.580            |
| 264          | 73               | 26            | MODAL              | Mode             | 12.000000           | -6495.7544     | -23029.7662    | 62.785            |
| 264          | 73               | 215           | MODAL              | Mode             | 12.000000           | 5289.1804      | -17415.2266    | 76.815            |
| 264          | 73               | 207           | MODAL              | Mode             | 12.000000           | 3942.2885      | -28965.1716    | 85.501            |
| 264          | 73               | 17            | locomotoras        |                  |                     | 151.3361       | 71.1690        | -88.418           |
| 264          | 73               | 26            | locomotoras        |                  |                     | 147.2177       | 53.5000        | -86.928           |
| 264          | 73               | 215           | locomotoras        |                  |                     | 144.6534       | 54.0624        | -87.052           |
| 264          | 73               | 207           | locomotoras        |                  |                     | 147.2974       | 68.1440        | -88.460           |
| 265          | 74               | 207           | MODAL              | Mode             | 1.000000            | 594.7895       | -250.7998      | 81.261            |
| 265          | 74               | 215           | MODAL              | Mode             | 1.000000            | 803.9422       | -717.5356      | 86.460            |
| 265          | 74               | 216           | MODAL              | Mode             | 1.000000            | 411.0448       | -806.0457      | 81.630            |
| 265          | 74               | 208           | MODAL              | Mode             | 1.000000            | 241.4004       | -379.1864      | 68.832            |
| 265          | 74               | 207           | MODAL              | Mode             | 2.000000            | -7788.6269     | -39396.5261    | 1.746             |
| 265          | 74               | 215           | MODAL              | Mode             | 2.000000            | -7228.4151     | -39382.7104    | 1.977             |
| 265          | 74               | 216           | MODAL              | Mode             | 2.000000            | -7131.6303     | -39293.5802    | 1.958             |
| 265          | 74               | 208           | MODAL              | Mode             | 2.000000            | -7745.4922     | -39288.1066    | 1.714             |
| 265          | 74               | 207           | MODAL              | Mode             | 3.000000            | 23554.9992     | 5467.2892      | -88.050           |
| 265          | 74               | 215           | MODAL              | Mode             | 3.000000            | 23441.8069     | 5040.5460      | -87.755           |
| 265          | 74               | 216           | MODAL              | Mode             | 3.000000            | 23362.1495     | 4964.7821      | -87.748           |
| 265          | 74               | 208           | MODAL              | Mode             | 3.000000            | 23459.3841     | 5434.1717      | -88.061           |
| 265          | 74               | 207           | MODAL              | Mode             | 4.000000            | 20156.3079     | 9149.5556      | 87.442            |
| 265          | 74               | 215           | MODAL              | Mode             | 4.000000            | 26139.1142     | 10160.6784     | 89.602            |
| 265          | 74               | 216           | MODAL              | Mode             | 4.000000            | 25828.1353     | 9815.9542      | 87.297            |
| 265          | 74               | 208           | MODAL              | Mode             | 4.000000            | 19989.9431     | 8825.1188      | 84.144            |
| 265          | 74               | 207           | MODAL              | Mode             | 5.000000            | -119.7229      | -1859.1112     | -3.343            |
| 265          | 74               | 215           | MODAL              | Mode             | 5.000000            | -689.4718      | -2352.9403     | -6.147            |
| 265          | 74               | 216           | MODAL              | Mode             | 5.000000            | -826.6057      | -2918.7121     | -4.319            |
| 265          | 74               | 208           | MODAL              | Mode             | 5.000000            | -252.0935      | -2445.7113     | -2.063            |
| 265          | 74               | 207           | MODAL              | Mode             | 6.000000            | 14247.3963     | 6494.2596      | 88.710            |
| 265          | 74               | 215           | MODAL              | Mode             | 6.000000            | 18476.1034     | 7439.1448      | -89.538           |
| 265          | 74               | 216           | MODAL              | Mode             | 6.000000            | 18517.9312     | 7249.4135      | 88.338            |
| 265          | 74               | 208           | MODAL              | Mode             | 6.000000            | 14381.9195     | 6338.2779      | 85.776            |
| 265          | 74               | 207           | MODAL              | Mode             | 7.000000            | 8319.5465      | 4723.7863      | -18.246           |
| 265          | 74               | 215           | MODAL              | Mode             | 7.000000            | 7895.4471      | 3769.1512      | -17.070           |
| 265          | 74               | 216           | MODAL              | Mode             | 7.000000            | 7954.9228      | 3825.5074      | -19.032           |
| 265          | 74               | 208           | MODAL              | Mode             | 7.000000            | 8390.1759      | 4741.3118      | -20.063           |
| 265          | 74               | 207           | MODAL              | Mode             | 8.000000            | -1263.3492     | -3181.6559     | -42.694           |
| 265          | 74               | 215           | MODAL              | Mode             | 8.000000            | -1999.6982     | -4499.6452     | -55.560           |
| 265          | 74               | 216           | MODAL              | Mode             | 8.000000            | -2777.9987     | -4944.0785     | -46.719           |
| 265          | 74               | 208           | MODAL              | Mode             | 8.000000            | -1876.0671     | -3856.5427     | -30.542           |
| 265          | 74               | 207           | MODAL              | Mode             | 9.000000            | -40019.3303    | -69530.2682    | 85.601            |
| 265          | 74               | 215           | MODAL              | Mode             | 9.000000            | -30911.5458    | -60904.9308    | 85.893            |
| 265          | 74               | 216           | MODAL              | Mode             | 9.000000            | -30734.7690    | -61537.4351    | 84.609            |
| 265          | 74               | 208           | MODAL              | Mode             | 9.000000            | -39754.3035    | -70129.4739    | 84.325            |
| 265          | 74               | 207           | MODAL              | Mode             | 10.000000           | -13272.8210    | -20789.6643    | 88.325            |
| 265          | 74               | 215           | MODAL              | Mode             | 10.000000           | -10244.3168    | -18082.4071    | 88.873            |
| 265          | 74               | 216           | MODAL              | Mode             | 10.000000           | -10144.2775    | -18261.2699    | 87.202            |
| 265          | 74               | 208           | MODAL              | Mode             | 10.000000           | -13150.8835    | -20966.0178    | 86.621            |
| 265          | 74               | 207           | MODAL              | Mode             | 11.000000           | 133068.9762    | 56218.5539     | 1.843             |
| 265          | 74               | 215           | MODAL              | Mode             | 11.000000           | 153568.7535    | 65738.9675     | 0.969             |
| 265          | 74               | 216           | MODAL              | Mode             | 11.000000           | 152312.8701    | 67448.8077     | 1.075             |
| 265          | 74               | 208           | MODAL              | Mode             | 11.000000           | 131786.9940    | 59517.4779     | 1.874             |
| 265          | 74               | 207           | MODAL              | Mode             | 12.000000           | 4013.4422      | -29212.5348    | 83.540            |
| 265          | 74               | 215           | MODAL              | Mode             | 12.000000           | 5387.2261      | -18150.1571    | 73.900            |
| 265          | 74               | 216           | MODAL              | Mode             | 12.000000           | 18248.6213     | -13683.3318    | 81.674            |
| 265          | 74               | 208           | MODAL              | Mode             | 12.000000           | 17555.0003     | -25273.1493    | 87.218            |
| 265          | 74               | 207           | locomotoras        |                  |                     | 146.6574       | 68.0129        | -88.314           |
| 265          | 74               | 215           | locomotoras        |                  |                     | 144.4448       | 54.0055        | -86.922           |
| 265          | 74               | 216           | locomotoras        |                  |                     | 143.7295       | 55.0293        | -87.126           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 265          | 74               | 208           | locomotoras        |                  |                     | 142.4786       | 64.6564        | -88.510           |
| 267          | 76               | 26            | MODAL              | Mode             | 1.000000            | 1286.4734      | -260.1940      | 87.075            |
| 267          | 76               | 20            | MODAL              | Mode             | 1.000000            | 1520.4377      | -703.7660      | 88.695            |
| 267          | 76               | 210           | MODAL              | Mode             | 1.000000            | 1121.0815      | -778.1361      | 85.990            |
| 267          | 76               | 215           | MODAL              | Mode             | 1.000000            | 895.4893       | -342.3968      | 82.465            |
| 267          | 76               | 26            | MODAL              | Mode             | 2.000000            | -7337.5235     | -39253.2624    | 2.264             |
| 267          | 76               | 20            | MODAL              | Mode             | 2.000000            | -6780.5245     | -39209.5369    | 2.525             |
| 267          | 76               | 210           | MODAL              | Mode             | 2.000000            | -6655.4130     | -39242.0920    | 2.537             |
| 267          | 76               | 215           | MODAL              | Mode             | 2.000000            | -7344.6219     | -39284.2908    | 2.255             |
| 267          | 76               | 26            | MODAL              | Mode             | 3.000000            | 23357.4738     | 5127.8260      | -87.485           |
| 267          | 76               | 20            | MODAL              | Mode             | 3.000000            | 23203.6016     | 4729.9050      | -87.171           |
| 267          | 76               | 210           | MODAL              | Mode             | 3.000000            | 23219.5897     | 4635.8822      | -87.118           |
| 267          | 76               | 215           | MODAL              | Mode             | 3.000000            | 23373.0990     | 5138.0807      | -87.458           |
| 267          | 76               | 26            | MODAL              | Mode             | 4.000000            | 26577.6109     | 10739.0660     | -85.040           |
| 267          | 76               | 20            | MODAL              | Mode             | 4.000000            | 32216.4866     | 11130.3044     | -85.054           |
| 267          | 76               | 210           | MODAL              | Mode             | 4.000000            | 31857.4196     | 10874.0583     | -86.691           |
| 267          | 76               | 215           | MODAL              | Mode             | 4.000000            | 26220.0862     | 10613.7443     | -87.265           |
| 267          | 76               | 26            | MODAL              | Mode             | 5.000000            | 27.9385        | -1682.7407     | -1.893            |
| 267          | 76               | 20            | MODAL              | Mode             | 5.000000            | -472.9407      | -2137.3231     | -4.801            |
| 267          | 76               | 210           | MODAL              | Mode             | 5.000000            | -610.5084      | -2690.8691     | -3.282            |
| 267          | 76               | 215           | MODAL              | Mode             | 5.000000            | -109.8787      | -2254.8677     | -0.936            |
| 267          | 76               | 26            | MODAL              | Mode             | 6.000000            | 18475.4755     | 7482.7185      | -83.897           |
| 267          | 76               | 20            | MODAL              | Mode             | 6.000000            | 22410.3051     | 8026.7735      | -84.141           |
| 267          | 76               | 210           | MODAL              | Mode             | 6.000000            | 22442.3194     | 7897.0054      | -85.732           |
| 267          | 76               | 215           | MODAL              | Mode             | 6.000000            | 18500.6802     | 7463.6421      | -86.012           |
| 267          | 76               | 26            | MODAL              | Mode             | 7.000000            | 7726.5815      | 3565.1237      | -14.993           |
| 267          | 76               | 20            | MODAL              | Mode             | 7.000000            | 7257.5346      | 2349.1952      | -13.484           |
| 267          | 76               | 210           | MODAL              | Mode             | 7.000000            | 7334.7540      | 2453.7634      | -15.571           |
| 267          | 76               | 215           | MODAL              | Mode             | 7.000000            | 7822.9391      | 3622.7616      | -17.096           |
| 267          | 76               | 26            | MODAL              | Mode             | 8.000000            | -916.4892      | -3224.6601     | -54.128           |
| 267          | 76               | 20            | MODAL              | Mode             | 8.000000            | -1439.9063     | -4420.5050     | -61.103           |
| 267          | 76               | 210           | MODAL              | Mode             | 8.000000            | -2273.0078     | -4761.7353     | -54.594           |
| 267          | 76               | 215           | MODAL              | Mode             | 8.000000            | -1674.6000     | -3695.8490     | -44.342           |
| 267          | 76               | 26            | MODAL              | Mode             | 9.000000            | -30453.1927    | -59479.6373    | 89.863            |
| 267          | 76               | 20            | MODAL              | Mode             | 9.000000            | -19201.1553    | -49965.3593    | -89.123           |
| 267          | 76               | 210           | MODAL              | Mode             | 9.000000            | -19189.1434    | -50760.8673    | 89.184            |
| 267          | 76               | 215           | MODAL              | Mode             | 9.000000            | -30328.2988    | -60296.6099    | 88.124            |
| 267          | 76               | 26            | MODAL              | Mode             | 10.000000           | -10101.2392    | -17755.5755    | -85.662           |
| 267          | 76               | 20            | MODAL              | Mode             | 10.000000           | -6361.3921     | -14803.9255    | -84.642           |
| 267          | 76               | 210           | MODAL              | Mode             | 10.000000           | -6329.2255     | -15010.0645    | -86.790           |
| 267          | 76               | 215           | MODAL              | Mode             | 10.000000           | -10047.3697    | -17979.2201    | -87.978           |
| 267          | 76               | 26            | MODAL              | Mode             | 11.000000           | 153453.2335    | 64196.6828     | 0.213             |
| 267          | 76               | 20            | MODAL              | Mode             | 11.000000           | 161917.7487    | 66327.6228     | -0.037            |
| 267          | 76               | 210           | MODAL              | Mode             | 11.000000           | 161628.6197    | 67881.1201     | -0.164            |
| 267          | 76               | 215           | MODAL              | Mode             | 11.000000           | 152854.5488    | 65832.5838     | 0.048             |
| 267          | 76               | 26            | MODAL              | Mode             | 12.000000           | -10915.1242    | -35735.1746    | 75.823            |
| 267          | 76               | 20            | MODAL              | Mode             | 12.000000           | -6364.1516     | -24727.4882    | 58.899            |
| 267          | 76               | 210           | MODAL              | Mode             | 12.000000           | 4520.8899      | -18756.8726    | 73.104            |
| 267          | 76               | 215           | MODAL              | Mode             | 12.000000           | 2224.0217      | -31467.9807    | 82.698            |
| 267          | 76               | 26            | locomotoras        |                  |                     | 146.7214       | 53.0352        | -87.451           |
| 267          | 76               | 20            | locomotoras        |                  |                     | 146.5653       | 70.8551        | -87.150           |
| 267          | 76               | 210           | locomotoras        |                  |                     | 156.7085       | 68.0954        | -86.661           |
| 267          | 76               | 215           | locomotoras        |                  |                     | 144.5290       | 54.5664        | -87.850           |
| 268          | 77               | 215           | MODAL              | Mode             | 1.000000            | 900.8587       | -336.6590      | 83.190            |
| 268          | 77               | 210           | MODAL              | Mode             | 1.000000            | 1125.9133      | -774.8497      | 86.434            |
| 268          | 77               | 212           | MODAL              | Mode             | 1.000000            | 733.1531       | -857.9437      | 82.708            |
| 268          | 77               | 216           | MODAL              | Mode             | 1.000000            | 527.9854       | -443.1978      | 76.004            |
| 268          | 77               | 215           | MODAL              | Mode             | 2.000000            | -7353.2487     | -39323.7875    | 2.240             |
| 268          | 77               | 210           | MODAL              | Mode             | 2.000000            | -6668.3986     | -39295.3307    | 2.496             |
| 268          | 77               | 212           | MODAL              | Mode             | 2.000000            | -6593.9770     | -39234.5717    | 2.478             |
| 268          | 77               | 216           | MODAL              | Mode             | 2.000000            | -7284.3916     | -39240.0373    | 2.217             |
| 268          | 77               | 215           | MODAL              | Mode             | 3.000000            | 23406.0078     | 5143.9729      | -87.439           |
| 268          | 77               | 210           | MODAL              | Mode             | 3.000000            | 23262.6871     | 4644.6773      | -87.125           |
| 268          | 77               | 212           | MODAL              | Mode             | 3.000000            | 23203.7947     | 4587.7537      | -87.110           |
| 268          | 77               | 216           | MODAL              | Mode             | 3.000000            | 23329.8378     | 5092.8221      | -87.430           |



| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 268          | 77               | 215           | MODAL              | Mode             | 4.000000            | 25993.9989     | 10607.3174     | -89.184           |
| 268          | 77               | 210           | MODAL              | Mode             | 4.000000            | 31668.8242     | 10893.8212     | -88.138           |
| 268          | 77               | 212           | MODAL              | Mode             | 4.000000            | 31312.4489     | 10653.1697     | -89.873           |
| 268          | 77               | 216           | MODAL              | Mode             | 4.000000            | 25644.7949     | 10290.8383     | 88.481            |
| 268          | 77               | 215           | MODAL              | Mode             | 5.000000            | -96.5578       | -2230.2031     | -3.413            |
| 268          | 77               | 210           | MODAL              | Mode             | 5.000000            | -591.8888      | -2680.4277     | -5.699            |
| 268          | 77               | 212           | MODAL              | Mode             | 5.000000            | -733.1411      | -3231.5898     | -4.281            |
| 268          | 77               | 216           | MODAL              | Mode             | 5.000000            | -230.8296      | -2798.2457     | -2.326            |
| 268          | 77               | 215           | MODAL              | Mode             | 6.000000            | 18317.9251     | 7475.7584      | -88.033           |
| 268          | 77               | 210           | MODAL              | Mode             | 6.000000            | 22290.0890     | 7924.4770      | -87.284           |
| 268          | 77               | 212           | MODAL              | Mode             | 6.000000            | 22308.3296     | 7815.5201      | -88.906           |
| 268          | 77               | 216           | MODAL              | Mode             | 6.000000            | 18329.4107     | 7313.9834      | 89.849            |
| 268          | 77               | 215           | MODAL              | Mode             | 7.000000            | 7883.8958      | 3642.6719      | -18.125           |
| 268          | 77               | 210           | MODAL              | Mode             | 7.000000            | 7401.8702      | 2476.7962      | -16.639           |
| 268          | 77               | 212           | MODAL              | Mode             | 7.000000            | 7480.4920      | 2554.2375      | -18.677           |
| 268          | 77               | 216           | MODAL              | Mode             | 7.000000            | 7978.5104      | 3675.7710      | -20.089           |
| 268          | 77               | 215           | MODAL              | Mode             | 8.000000            | -1514.4661     | -3770.9233     | -45.130           |
| 268          | 77               | 210           | MODAL              | Mode             | 8.000000            | -2122.8997     | -4848.1605     | -54.202           |
| 268          | 77               | 212           | MODAL              | Mode             | 8.000000            | -2866.2620     | -5284.4081     | -46.191           |
| 268          | 77               | 216           | MODAL              | Mode             | 8.000000            | -2142.9642     | -4361.2343     | -34.957           |
| 268          | 77               | 215           | MODAL              | Mode             | 9.000000            | -31072.4228    | -60549.2172    | 86.365            |
| 268          | 77               | 210           | MODAL              | Mode             | 9.000000            | -20044.0898    | -51016.8436    | 87.140            |
| 268          | 77               | 212           | MODAL              | Mode             | 9.000000            | -19869.8728    | -51725.6211    | 85.549            |
| 268          | 77               | 216           | MODAL              | Mode             | 9.000000            | -30803.3210    | -61390.3749    | 84.800            |
| 268          | 77               | 215           | MODAL              | Mode             | 10.000000           | -10320.0199    | -18022.0416    | 89.827            |
| 268          | 77               | 210           | MODAL              | Mode             | 10.000000           | -6648.4598     | -15043.0235    | -89.250           |
| 268          | 77               | 212           | MODAL              | Mode             | 10.000000           | -6547.7176     | -15227.1546    | 88.735            |
| 268          | 77               | 216           | MODAL              | Mode             | 10.000000           | -10199.3800    | -18266.8953    | 87.750            |
| 268          | 77               | 215           | MODAL              | Mode             | 11.000000           | 152719.6720    | 65126.4036     | 0.445             |
| 268          | 77               | 210           | MODAL              | Mode             | 11.000000           | 161617.6893    | 67828.5277     | -0.112            |
| 268          | 77               | 212           | MODAL              | Mode             | 11.000000           | 161018.3385    | 69300.1604     | -0.230            |
| 268          | 77               | 216           | MODAL              | Mode             | 11.000000           | 151788.8505    | 66664.3403     | 0.300             |
| 268          | 77               | 215           | MODAL              | Mode             | 12.000000           | 2054.8061      | -31935.6500    | 80.604            |
| 268          | 77               | 210           | MODAL              | Mode             | 12.000000           | 4722.1302      | -19681.4551    | 70.310            |
| 268          | 77               | 212           | MODAL              | Mode             | 12.000000           | 16920.0627     | -15072.5381    | 78.851            |
| 268          | 77               | 216           | MODAL              | Mode             | 12.000000           | 15518.1979     | -27985.0776    | 84.951            |
| 268          | 77               | 215           | locomotoras        |                  |                     | 144.3598       | 54.4701        | -88.365           |
| 268          | 77               | 210           | locomotoras        |                  |                     | 157.7772       | 68.3025        | -87.286           |
| 268          | 77               | 212           | locomotoras        |                  |                     | 145.2160       | 58.5159        | -87.839           |
| 268          | 77               | 216           | locomotoras        |                  |                     | 144.6121       | 59.1228        | -89.079           |
| 271          | 80               | 218           | MODAL              | Mode             | 1.000000            | 1176.9328      | -26.5400       | -4.696            |
| 271          | 80               | 217           | MODAL              | Mode             | 1.000000            | 698.4354       | -575.9088      | -80.111           |
| 271          | 80               | 219           | MODAL              | Mode             | 1.000000            | 272.2414       | -624.0314      | -81.185           |
| 271          | 80               | 220           | MODAL              | Mode             | 1.000000            | 1099.6514      | -435.0153      | -0.674            |
| 271          | 80               | 218           | MODAL              | Mode             | 2.000000            | -7131.0081     | -39404.4342    | 1.005             |
| 271          | 80               | 217           | MODAL              | Mode             | 2.000000            | -8565.3218     | -39393.5694    | 0.550             |
| 271          | 80               | 219           | MODAL              | Mode             | 2.000000            | -8421.2271     | -39514.5742    | 0.626             |
| 271          | 80               | 220           | MODAL              | Mode             | 2.000000            | -7365.4375     | -39549.0466    | 1.002             |
| 271          | 80               | 218           | MODAL              | Mode             | 3.000000            | 23726.4438     | 5003.5951      | -89.092           |
| 271          | 80               | 217           | MODAL              | Mode             | 3.000000            | 23738.0967     | 6113.7701      | -89.733           |
| 271          | 80               | 219           | MODAL              | Mode             | 3.000000            | 23837.4204     | 5997.9639      | -89.624           |
| 271          | 80               | 220           | MODAL              | Mode             | 3.000000            | 23851.2161     | 5195.4220      | -89.097           |
| 271          | 80               | 218           | MODAL              | Mode             | 4.000000            | -8279.1457     | -20460.4127    | -7.160            |
| 271          | 80               | 217           | MODAL              | Mode             | 4.000000            | 3005.5949      | -1315.5453     | -51.963           |
| 271          | 80               | 219           | MODAL              | Mode             | 4.000000            | 2179.8877      | -865.0718      | -54.593           |
| 271          | 80               | 220           | MODAL              | Mode             | 4.000000            | -8715.3673     | -20588.0612    | -4.164            |
| 271          | 80               | 218           | MODAL              | Mode             | 5.000000            | 2752.6436      | 1535.2119      | 79.406            |
| 271          | 80               | 217           | MODAL              | Mode             | 5.000000            | 909.7898       | -831.9894      | -89.869           |
| 271          | 80               | 219           | MODAL              | Mode             | 5.000000            | 304.1395       | -949.2159      | 89.184            |
| 271          | 80               | 220           | MODAL              | Mode             | 5.000000            | 2198.5396      | 1379.0050      | 72.137            |
| 271          | 80               | 218           | MODAL              | Mode             | 6.000000            | -6526.4811     | -15124.0237    | -6.578            |
| 271          | 80               | 217           | MODAL              | Mode             | 6.000000            | 1893.6813      | -889.8531      | -42.940           |
| 271          | 80               | 219           | MODAL              | Mode             | 6.000000            | 1494.8164      | -418.4181      | -45.126           |
| 271          | 80               | 220           | MODAL              | Mode             | 6.000000            | -6794.6562     | -14951.9869    | -3.931            |
| 271          | 80               | 218           | MODAL              | Mode             | 7.000000            | 7842.8888      | 4686.6223      | -18.345           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 271          | 80               | 217           | MODAL              | Mode             | 7.000000            | 9045.5791      | 6228.5018      | -14.005           |
| 271          | 80               | 219           | MODAL              | Mode             | 7.000000            | 9012.3204      | 6289.5864      | -13.822           |
| 271          | 80               | 220           | MODAL              | Mode             | 7.000000            | 7856.4603      | 4628.4538      | -16.508           |
| 271          | 80               | 218           | MODAL              | Mode             | 8.000000            | 5712.9450      | 3521.4231      | 26.730            |
| 271          | 80               | 217           | MODAL              | Mode             | 8.000000            | 1878.0160      | -1245.0537     | 89.158            |
| 271          | 80               | 219           | MODAL              | Mode             | 8.000000            | 812.6362       | -1508.4826     | 86.809            |
| 271          | 80               | 220           | MODAL              | Mode             | 8.000000            | 5419.8984      | 2542.5864      | 21.072            |
| 271          | 80               | 218           | MODAL              | Mode             | 9.000000            | -37978.6991    | -65763.8394    | 84.881            |
| 271          | 80               | 217           | MODAL              | Mode             | 9.000000            | -52897.4101    | -85790.0182    | 87.698            |
| 271          | 80               | 219           | MODAL              | Mode             | 9.000000            | -53268.1147    | -85612.8588    | 88.176            |
| 271          | 80               | 220           | MODAL              | Mode             | 9.000000            | -37981.9638    | -65637.8994    | 85.609            |
| 271          | 80               | 218           | MODAL              | Mode             | 10.000000           | -12435.8932    | -19367.7937    | 87.329            |
| 271          | 80               | 217           | MODAL              | Mode             | 10.000000           | -17503.5219    | -25943.7309    | -89.928           |
| 271          | 80               | 219           | MODAL              | Mode             | 10.000000           | -17634.3669    | -25878.2904    | -89.247           |
| 271          | 80               | 220           | MODAL              | Mode             | 10.000000           | -12488.6339    | -19356.4718    | 88.294            |
| 271          | 80               | 218           | MODAL              | Mode             | 11.000000           | -64070.3702    | -142659.671    | -88.182           |
| 271          | 80               | 217           | MODAL              | Mode             | 11.000000           | 7717.1775      | -2354.8664     | -12.930           |
| 271          | 80               | 219           | MODAL              | Mode             | 11.000000           | 5785.7332      | 594.9023       | -23.062           |
| 271          | 80               | 220           | MODAL              | Mode             | 11.000000           | -60409.5387    | -144334.495    | -88.528           |
| 271          | 80               | 218           | MODAL              | Mode             | 12.000000           | -3731.9262     | -23500.2072    | -13.595           |
| 271          | 80               | 217           | MODAL              | Mode             | 12.000000           | 17912.5877     | -23811.4956    | 3.862             |
| 271          | 80               | 219           | MODAL              | Mode             | 12.000000           | 21913.8101     | -9480.7831     | 2.323             |
| 271          | 80               | 220           | MODAL              | Mode             | 12.000000           | 1907.5283      | -12168.7393    | -30.299           |
| 271          | 80               | 218           | locomotoras        |                  |                     | 142.1863       | 56.9575        | 89.565            |
| 271          | 80               | 217           | locomotoras        |                  |                     | 138.2392       | 24.8621        | -89.100           |
| 271          | 80               | 219           | locomotoras        |                  |                     | 135.7885       | 22.7871        | -89.116           |
| 271          | 80               | 220           | locomotoras        |                  |                     | 146.3485       | 59.8657        | 89.691            |
| 272          | 81               | 220           | MODAL              | Mode             | 1.000000            | 1102.6938      | -423.1959      | -1.298            |
| 272          | 81               | 219           | MODAL              | Mode             | 1.000000            | 290.4110       | -626.7913      | -80.238           |
| 272          | 81               | 6             | MODAL              | Mode             | 1.000000            | -135.7795      | -674.8361      | -82.125           |
| 272          | 81               | 11            | MODAL              | Mode             | 1.000000            | 1033.2514      | -836.7246      | 1.387             |
| 272          | 81               | 220           | MODAL              | Mode             | 2.000000            | -7359.2618     | -39520.5264    | 1.023             |
| 272          | 81               | 219           | MODAL              | Mode             | 2.000000            | -8420.8092     | -39511.2039    | 0.609             |
| 272          | 81               | 6             | MODAL              | Mode             | 2.000000            | -8250.4728     | -39526.0009    | 0.661             |
| 272          | 81               | 11            | MODAL              | Mode             | 2.000000            | -7583.6537     | -39559.2108    | 0.995             |
| 272          | 81               | 220           | MODAL              | Mode             | 3.000000            | 23829.1974     | 5190.8828      | -89.086           |
| 272          | 81               | 219           | MODAL              | Mode             | 3.000000            | 23836.3026     | 5997.8206      | -89.640           |
| 272          | 81               | 6             | MODAL              | Mode             | 3.000000            | 23850.2309     | 5859.4118      | -89.564           |
| 272          | 81               | 11            | MODAL              | Mode             | 3.000000            | 23868.4955     | 5373.1731      | -89.124           |
| 272          | 81               | 220           | MODAL              | Mode             | 4.000000            | -8834.6478     | -20853.5202    | -1.435            |
| 272          | 81               | 219           | MODAL              | Mode             | 4.000000            | 1374.0734      | -489.5980      | -56.263           |
| 272          | 81               | 6             | MODAL              | Mode             | 4.000000            | 644.2621       | -134.5688      | -74.385           |
| 272          | 81               | 11            | MODAL              | Mode             | 4.000000            | -9130.1367     | -21056.0854    | 1.628             |
| 272          | 81               | 220           | MODAL              | Mode             | 5.000000            | 2190.0909      | 1437.3871      | 79.072            |
| 272          | 81               | 219           | MODAL              | Mode             | 5.000000            | 353.2492       | -946.1959      | -86.129           |
| 272          | 81               | 6             | MODAL              | Mode             | 5.000000            | -253.9961      | -1061.0274     | -85.303           |
| 272          | 81               | 11            | MODAL              | Mode             | 5.000000            | 1652.2077      | 1259.8618      | 63.030            |
| 272          | 81               | 220           | MODAL              | Mode             | 6.000000            | -6878.2573     | -15152.5232    | -0.928            |
| 272          | 81               | 219           | MODAL              | Mode             | 6.000000            | 905.3096       | -146.7470      | -39.428           |
| 272          | 81               | 6             | MODAL              | Mode             | 6.000000            | 500.6838       | 330.7955       | -44.939           |
| 272          | 81               | 11            | MODAL              | Mode             | 6.000000            | -7051.5860     | -15013.0446    | 2.019             |
| 272          | 81               | 220           | MODAL              | Mode             | 7.000000            | 7807.7404      | 4611.4170      | -15.311           |
| 272          | 81               | 219           | MODAL              | Mode             | 7.000000            | 9012.3866      | 6283.7736      | -13.853           |
| 272          | 81               | 6             | MODAL              | Mode             | 7.000000            | 8955.1463      | 6331.8254      | -13.555           |
| 272          | 81               | 11            | MODAL              | Mode             | 7.000000            | 7813.0789      | 4532.9306      | -13.479           |
| 272          | 81               | 220           | MODAL              | Mode             | 8.000000            | 5367.8938      | 2719.3265      | 19.639            |
| 272          | 81               | 219           | MODAL              | Mode             | 8.000000            | 920.6062       | -1478.3080     | -89.772           |
| 272          | 81               | 6             | MODAL              | Mode             | 8.000000            | -150.9659      | -1735.3855     | 87.309            |
| 272          | 81               | 11            | MODAL              | Mode             | 8.000000            | 5109.7123      | 1694.4673      | 16.350            |
| 272          | 81               | 220           | MODAL              | Mode             | 9.000000            | -37383.9559    | -65403.3535    | 87.210            |
| 272          | 81               | 219           | MODAL              | Mode             | 9.000000            | -53228.1164    | -85606.0830    | 88.148            |
| 272          | 81               | 6             | MODAL              | Mode             | 9.000000            | -53492.5877    | -85247.8445    | 88.679            |
| 272          | 81               | 11            | MODAL              | Mode             | 9.000000            | -37299.2318    | -65169.4052    | 87.983            |
| 272          | 81               | 220           | MODAL              | Mode             | 10.000000           | -12271.1353    | -19306.1814    | -89.543           |
| 272          | 81               | 219           | MODAL              | Mode             | 10.000000           | -17619.6238    | -25875.2844    | -89.255           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 272          | 81               | 6             | MODAL              | Mode             | 10.000000           | -17701.5618    | -25746.8684    | -88.488           |
| 272          | 81               | 11            | MODAL              | Mode             | 10.000000           | -12282.7128    | -19262.9419    | -88.508           |
| 272          | 81               | 220           | MODAL              | Mode             | 11.000000           | -63108.0463    | -144819.192    | -89.383           |
| 272          | 81               | 219           | MODAL              | Mode             | 11.000000           | 4357.4268      | -1777.6256     | 0.970             |
| 272          | 81               | 6             | MODAL              | Mode             | 11.000000           | 2317.3035      | 1278.5793      | 25.266            |
| 272          | 81               | 11            | MODAL              | Mode             | 11.000000           | -59343.3776    | -146228.808    | -89.640           |
| 272          | 81               | 220           | MODAL              | Mode             | 12.000000           | 755.7970       | -11213.2456    | -26.982           |
| 272          | 81               | 219           | MODAL              | Mode             | 12.000000           | 22042.8180     | -9674.8292     | 4.455             |
| 272          | 81               | 6             | MODAL              | Mode             | 12.000000           | 25869.2092     | 4751.1246      | 2.450             |
| 272          | 81               | 11            | MODAL              | Mode             | 12.000000           | 10075.1486     | -3295.5648     | -52.792           |
| 272          | 81               | 220           | locomotoras        |                  |                     | 146.9643       | 59.9952        | 89.732            |
| 272          | 81               | 219           | locomotoras        |                  |                     | 135.6795       | 22.7756        | -89.183           |
| 272          | 81               | 6             | locomotoras        |                  |                     | 136.5144       | 21.6165        | -88.984           |
| 272          | 81               | 11            | locomotoras        |                  |                     | 150.7660       | 62.7772        | 89.931            |
| 277          | 83               | 217           | MODAL              | Mode             | 1.000000            | 946.6664       | 740.1606       | -76.373           |
| 277          | 83               | 225           | MODAL              | Mode             | 1.000000            | 1603.6895      | -873.2124      | -86.197           |
| 277          | 83               | 226           | MODAL              | Mode             | 1.000000            | 1189.3734      | -936.4243      | -87.703           |
| 277          | 83               | 219           | MODAL              | Mode             | 1.000000            | 694.2759       | 519.4175       | 11.017            |
| 277          | 83               | 217           | MODAL              | Mode             | 2.000000            | -7896.9421     | -39249.7691    | 0.740             |
| 277          | 83               | 225           | MODAL              | Mode             | 2.000000            | -7946.3243     | -39203.7381    | 0.955             |
| 277          | 83               | 226           | MODAL              | Mode             | 2.000000            | -7780.5719     | -39376.1936    | 1.028             |
| 277          | 83               | 219           | MODAL              | Mode             | 2.000000            | -8087.2114     | -39441.1238    | 0.743             |
| 277          | 83               | 217           | MODAL              | Mode             | 3.000000            | 23628.0028     | 5566.7103      | -89.496           |
| 277          | 83               | 225           | MODAL              | Mode             | 3.000000            | 23403.0443     | 5572.3415      | -89.275           |
| 277          | 83               | 226           | MODAL              | Mode             | 3.000000            | 23534.3671     | 5442.5746      | -89.153           |
| 277          | 83               | 219           | MODAL              | Mode             | 3.000000            | 23781.0583     | 5724.3891      | -89.475           |
| 277          | 83               | 217           | MODAL              | Mode             | 4.000000            | 3315.6721      | -1179.1341     | -47.486           |
| 277          | 83               | 225           | MODAL              | Mode             | 4.000000            | 22257.7168     | 8948.3574      | -78.117           |
| 277          | 83               | 226           | MODAL              | Mode             | 4.000000            | 21929.1748     | 8913.5781      | -80.778           |
| 277          | 83               | 219           | MODAL              | Mode             | 4.000000            | 2482.8249      | -706.1348      | -47.984           |
| 277          | 83               | 217           | MODAL              | Mode             | 5.000000            | 1496.9727      | 1008.9607      | 52.947            |
| 277          | 83               | 225           | MODAL              | Mode             | 5.000000            | -450.4098      | -1061.9082     | 88.132            |
| 277          | 83               | 226           | MODAL              | Mode             | 5.000000            | -1034.8515     | -1199.7815     | 76.772            |
| 277          | 83               | 219           | MODAL              | Mode             | 5.000000            | 1207.4129      | 581.5378       | 27.406            |
| 277          | 83               | 217           | MODAL              | Mode             | 6.000000            | 1721.1022      | -1544.4606     | -45.302           |
| 277          | 83               | 225           | MODAL              | Mode             | 6.000000            | 15093.0462     | 6723.3117      | -76.363           |
| 277          | 83               | 226           | MODAL              | Mode             | 6.000000            | 15149.2022     | 6757.5845      | -79.403           |
| 277          | 83               | 219           | MODAL              | Mode             | 6.000000            | 1339.9654      | -1084.5677     | -47.742           |
| 277          | 83               | 217           | MODAL              | Mode             | 7.000000            | 8761.4504      | 6353.2856      | -12.442           |
| 277          | 83               | 225           | MODAL              | Mode             | 7.000000            | 8024.7689      | 4542.9997      | -7.240            |
| 277          | 83               | 226           | MODAL              | Mode             | 7.000000            | 8036.9537      | 4674.4682      | -8.915            |
| 277          | 83               | 219           | MODAL              | Mode             | 7.000000            | 8861.9774      | 6351.0393      | -13.098           |
| 277          | 83               | 217           | MODAL              | Mode             | 8.000000            | 2512.2277      | 2349.7745      | 4.187             |
| 277          | 83               | 225           | MODAL              | Mode             | 8.000000            | 373.9894       | -4001.8087     | -79.050           |
| 277          | 83               | 226           | MODAL              | Mode             | 8.000000            | -671.5005      | -4247.9682     | -77.815           |
| 277          | 83               | 219           | MODAL              | Mode             | 8.000000            | 2279.4950      | 1271.2652      | 5.358             |
| 277          | 83               | 217           | MODAL              | Mode             | 9.000000            | -53567.9508    | -84118.4577    | 89.937            |
| 277          | 83               | 225           | MODAL              | Mode             | 9.000000            | -37594.0475    | -67331.5664    | -87.438           |
| 277          | 83               | 226           | MODAL              | Mode             | 9.000000            | -37874.9303    | -67773.6045    | -88.215           |
| 277          | 83               | 219           | MODAL              | Mode             | 9.000000            | -53602.8765    | -84770.4748    | 89.302            |
| 277          | 83               | 217           | MODAL              | Mode             | 10.000000           | -17669.7529    | -25345.6266    | -86.751           |
| 277          | 83               | 225           | MODAL              | Mode             | 10.000000           | -12427.7032    | -20179.6771    | -82.904           |
| 277          | 83               | 226           | MODAL              | Mode             | 10.000000           | -12509.5129    | -20290.8949    | -83.901           |
| 277          | 83               | 219           | MODAL              | Mode             | 10.000000           | -17716.0523    | -25574.1427    | -87.652           |
| 277          | 83               | 217           | MODAL              | Mode             | 11.000000           | 3074.7035      | -5638.7823     | -31.116           |
| 277          | 83               | 225           | MODAL              | Mode             | 11.000000           | 141580.5156    | 54077.4483     | -1.285            |
| 277          | 83               | 226           | MODAL              | Mode             | 11.000000           | 140553.7998    | 57845.8850     | -1.101            |
| 277          | 83               | 219           | MODAL              | Mode             | 11.000000           | 2846.4639      | -4432.7657     | -50.492           |
| 277          | 83               | 217           | MODAL              | Mode             | 12.000000           | -31210.5111    | -32020.2287    | 13.800            |
| 277          | 83               | 225           | MODAL              | Mode             | 12.000000           | -6021.7002     | -34062.4235    | 15.204            |
| 277          | 83               | 226           | MODAL              | Mode             | 12.000000           | -2432.3426     | -20256.8543    | 19.273            |
| 277          | 83               | 219           | MODAL              | Mode             | 12.000000           | -17686.0003    | -27847.1075    | -82.071           |
| 277          | 83               | 217           | locomotoras        |                  |                     | 136.4130       | 18.1632        | -88.545           |
| 277          | 83               | 225           | locomotoras        |                  |                     | 149.7004       | 69.4825        | -89.451           |
| 277          | 83               | 226           | locomotoras        |                  |                     | 159.4638       | 68.4100        | -88.803           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 277          | 83               | 219           | locomotoras        |                  |                     | 134.7906       | 19.4390        | -88.851           |
| 278          | 84               | 219           | MODAL              | Mode             | 1.000000            | 691.9926       | 537.1105       | 5.719             |
| 278          | 84               | 226           | MODAL              | Mode             | 1.000000            | 1203.1159      | -935.2834      | -87.299           |
| 278          | 84               | 17            | MODAL              | Mode             | 1.000000            | 788.4354       | -1001.2527     | -89.318           |
| 278          | 84               | 6             | MODAL              | Mode             | 1.000000            | 644.0335       | 111.0599       | 10.502            |
| 278          | 84               | 219           | MODAL              | Mode             | 2.000000            | -8086.8722     | -39437.6748    | 0.722             |
| 278          | 84               | 226           | MODAL              | Mode             | 2.000000            | -7785.7040     | -39397.0819    | 0.987             |
| 278          | 84               | 17            | MODAL              | Mode             | 2.000000            | -7589.9905     | -39462.9325    | 1.039             |
| 278          | 84               | 6             | MODAL              | Mode             | 2.000000            | -8268.0833     | -39526.1070    | 0.699             |
| 278          | 84               | 219           | MODAL              | Mode             | 3.000000            | 23779.8876     | 5724.2988      | -89.496           |
| 278          | 84               | 226           | MODAL              | Mode             | 3.000000            | 23553.2508     | 5446.6219      | -89.177           |
| 278          | 84               | 17            | MODAL              | Mode             | 3.000000            | 23599.2235     | 5290.9831      | -89.086           |
| 278          | 84               | 6             | MODAL              | Mode             | 3.000000            | 23850.2085     | 5873.6028      | -89.510           |
| 278          | 84               | 219           | MODAL              | Mode             | 4.000000            | 1682.2647      | -335.9151      | -45.637           |
| 278          | 84               | 226           | MODAL              | Mode             | 4.000000            | 21459.7237     | 9000.4378      | -83.028           |
| 278          | 84               | 17            | MODAL              | Mode             | 4.000000            | 21181.4268     | 8842.9896      | -85.959           |
| 278          | 84               | 6             | MODAL              | Mode             | 4.000000            | 838.9243       | 135.8325       | -44.700           |
| 278          | 84               | 219           | MODAL              | Mode             | 5.000000            | 1142.3492      | 698.7311       | 21.361            |
| 278          | 84               | 226           | MODAL              | Mode             | 5.000000            | -982.0237      | -1203.3643     | -72.315           |
| 278          | 84               | 17            | MODAL              | Mode             | 5.000000            | -1302.4892     | -1602.4882     | -8.990            |
| 278          | 84               | 6             | MODAL              | Mode             | 5.000000            | 1004.4559      | 116.2890       | 11.386            |
| 278          | 84               | 219           | MODAL              | Mode             | 6.000000            | 735.3606       | -797.7985      | -45.372           |
| 278          | 84               | 226           | MODAL              | Mode             | 6.000000            | 14783.8608     | 6840.7922      | -82.010           |
| 278          | 84               | 17            | MODAL              | Mode             | 6.000000            | 14876.1891     | 6774.6547      | -85.142           |
| 278          | 84               | 6             | MODAL              | Mode             | 6.000000            | 359.4111       | -350.1688      | -54.114           |
| 278          | 84               | 219           | MODAL              | Mode             | 7.000000            | 8862.9298      | 6344.3405      | -13.176           |
| 278          | 84               | 226           | MODAL              | Mode             | 7.000000            | 8071.6123      | 4698.1106      | -10.195           |
| 278          | 84               | 17            | MODAL              | Mode             | 7.000000            | 8073.4626      | 4808.4827      | -11.937           |
| 278          | 84               | 6             | MODAL              | Mode             | 7.000000            | 8942.5304      | 6329.1360      | -13.657           |
| 278          | 84               | 219           | MODAL              | Mode             | 8.000000            | 2295.8785      | 1393.0263      | -2.799            |
| 278          | 84               | 226           | MODAL              | Mode             | 8.000000            | -509.6262      | -4279.3715     | -76.267           |
| 278          | 84               | 17            | MODAL              | Mode             | 8.000000            | -1546.5241     | -4532.3657     | -74.038           |
| 278          | 84               | 6             | MODAL              | Mode             | 8.000000            | 2048.6464      | 319.3703       | 1.272             |
| 278          | 84               | 219           | MODAL              | Mode             | 9.000000            | -53563.0224    | -84763.5549    | 89.243            |
| 278          | 84               | 226           | MODAL              | Mode             | 9.000000            | -38562.4297    | -67877.2919    | -89.706           |
| 278          | 84               | 17            | MODAL              | Mode             | 9.000000            | -38749.6765    | -68190.3673    | 89.556            |
| 278          | 84               | 6             | MODAL              | Mode             | 9.000000            | -53492.0323    | -85263.4030    | 88.677            |
| 278          | 84               | 219           | MODAL              | Mode             | 10.000000           | -17701.8963    | -25570.5496    | -87.713           |
| 278          | 84               | 226           | MODAL              | Mode             | 10.000000           | -12763.8495    | -20286.2337    | -85.737           |
| 278          | 84               | 17            | MODAL              | Mode             | 10.000000           | -12802.2889    | -20355.9070    | -86.695           |
| 278          | 84               | 6             | MODAL              | Mode             | 10.000000           | -17699.2164    | -25747.4753    | -88.516           |
| 278          | 84               | 219           | MODAL              | Mode             | 11.000000           | -971.0257      | -4416.1104     | -35.279           |
| 278          | 84               | 226           | MODAL              | Mode             | 11.000000           | 139992.0503    | 55210.7675     | -0.255            |
| 278          | 84               | 17            | MODAL              | Mode             | 11.000000           | 138710.1108    | 58901.3122     | -3.410E-03        |
| 278          | 84               | 6             | MODAL              | Mode             | 11.000000           | 345.9857       | -4748.9830     | -74.351           |
| 278          | 84               | 219           | MODAL              | Mode             | 12.000000           | -17928.8637    | -27669.2824    | -88.734           |
| 278          | 84               | 226           | MODAL              | Mode             | 12.000000           | -1621.6819     | -21287.2538    | 22.124            |
| 278          | 84               | 17            | MODAL              | Mode             | 12.000000           | 2833.7131      | -8330.6542     | 35.493            |
| 278          | 84               | 6             | MODAL              | Mode             | 12.000000           | -3540.7015     | -24015.2400    | -84.950           |
| 278          | 84               | 219           | locomotoras        |                  |                     | 134.6936       | 19.4156        | -89.216           |
| 278          | 84               | 226           | locomotoras        |                  |                     | 158.6059       | 68.2217        | -89.037           |
| 278          | 84               | 17            | locomotoras        |                  |                     | 151.0843       | 63.2152        | -89.455           |
| 278          | 84               | 6             | locomotoras        |                  |                     | 136.4940       | 21.6779        | -89.418           |
| 283          | 86               | 221           | MODAL              | Mode             | 1.000000            | 859.4948       | -779.5113      | -7.133            |
| 283          | 86               | 231           | MODAL              | Mode             | 1.000000            | 444.3556       | -570.0069      | -13.354           |
| 283          | 86               | 232           | MODAL              | Mode             | 1.000000            | 340.7057       | -944.4934      | -6.547            |
| 283          | 86               | 223           | MODAL              | Mode             | 1.000000            | 777.6897       | -1172.0496     | -3.519            |
| 283          | 86               | 221           | MODAL              | Mode             | 2.000000            | -6575.6731     | -39348.0396    | 2.535             |
| 283          | 86               | 231           | MODAL              | Mode             | 2.000000            | -7277.3215     | -39328.4617    | 2.268             |
| 283          | 86               | 232           | MODAL              | Mode             | 2.000000            | -7346.8842     | -39409.0577    | 2.295             |
| 283          | 86               | 223           | MODAL              | Mode             | 2.000000            | -6652.6241     | -39404.8316    | 2.557             |
| 283          | 86               | 221           | MODAL              | Mode             | 3.000000            | 23582.7032     | 4682.1191      | -87.086           |
| 283          | 86               | 231           | MODAL              | Mode             | 3.000000            | 23636.1585     | 5190.1873      | -87.416           |
| 283          | 86               | 232           | MODAL              | Mode             | 3.000000            | 23713.0414     | 5243.7174      | -87.401           |
| 283          | 86               | 223           | MODAL              | Mode             | 3.000000            | 23641.5465     | 4742.3723      | -87.078           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 283          | 86               | 221           | MODAL              | Mode             | 4.000000            | -10878.7506    | -31514.3610    | 0.344             |
| 283          | 86               | 231           | MODAL              | Mode             | 4.000000            | -10570.4621    | -25869.5438    | -1.272            |
| 283          | 86               | 232           | MODAL              | Mode             | 4.000000            | -10881.7456    | -26222.5554    | 1.057             |
| 283          | 86               | 223           | MODAL              | Mode             | 4.000000            | -11119.4956    | -31869.9324    | 2.069             |
| 283          | 86               | 221           | MODAL              | Mode             | 5.000000            | 3231.1108      | 722.9981       | 85.468            |
| 283          | 86               | 231           | MODAL              | Mode             | 5.000000            | 2803.3577      | 223.1006       | 87.441            |
| 283          | 86               | 232           | MODAL              | Mode             | 5.000000            | 2237.3207      | 87.9941        | 86.304            |
| 283          | 86               | 223           | MODAL              | Mode             | 5.000000            | 2682.0631      | 581.3638       | 83.996            |
| 283          | 86               | 221           | MODAL              | Mode             | 6.000000            | -8023.2689     | -22688.6902    | 1.337             |
| 283          | 86               | 231           | MODAL              | Mode             | 6.000000            | -7557.5534     | -18729.1009    | 0.142             |
| 283          | 86               | 232           | MODAL              | Mode             | 6.000000            | -7715.9294     | -18720.6394    | 2.219             |
| 283          | 86               | 223           | MODAL              | Mode             | 6.000000            | -8133.6012     | -22669.1982    | 2.928             |
| 283          | 86               | 221           | MODAL              | Mode             | 7.000000            | 7138.5018      | 2118.9758      | -18.875           |
| 283          | 86               | 231           | MODAL              | Mode             | 7.000000            | 7678.5560      | 3291.4130      | -20.355           |
| 283          | 86               | 232           | MODAL              | Mode             | 7.000000            | 7580.3527      | 3268.3906      | -18.422           |
| 283          | 86               | 223           | MODAL              | Mode             | 7.000000            | 7056.0073      | 2051.4667      | -16.866           |
| 283          | 86               | 221           | MODAL              | Mode             | 8.000000            | 5504.1672      | 3152.7884      | 41.460            |
| 283          | 86               | 231           | MODAL              | Mode             | 8.000000            | 4624.0567      | 2529.1860      | 52.907            |
| 283          | 86               | 232           | MODAL              | Mode             | 8.000000            | 4072.3263      | 1862.1703      | 42.400            |
| 283          | 86               | 223           | MODAL              | Mode             | 8.000000            | 5102.7596      | 2375.2489      | 33.657            |
| 283          | 86               | 221           | MODAL              | Mode             | 9.000000            | -17137.4721    | -47974.6676    | 85.467            |
| 283          | 86               | 231           | MODAL              | Mode             | 9.000000            | -28357.0734    | -57902.8063    | 84.596            |
| 283          | 86               | 232           | MODAL              | Mode             | 9.000000            | -28637.6495    | -57017.0025    | 86.246            |
| 283          | 86               | 223           | MODAL              | Mode             | 9.000000            | -17315.3432    | -47223.8287    | 87.145            |
| 283          | 86               | 221           | MODAL              | Mode             | 10.000000           | -5562.0844     | -13932.3666    | 88.804            |
| 283          | 86               | 231           | MODAL              | Mode             | 10.000000           | -9316.6064     | -17059.5693    | 87.666            |
| 283          | 86               | 232           | MODAL              | Mode             | 10.000000           | -9442.8823     | -16802.8046    | 89.882            |
| 283          | 86               | 223           | MODAL              | Mode             | 10.000000           | -5666.6150     | -13736.8897    | -89.054           |
| 283          | 86               | 221           | MODAL              | Mode             | 11.000000           | -69946.5481    | -163866.851    | 89.366            |
| 283          | 86               | 231           | MODAL              | Mode             | 11.000000           | -68799.9958    | -157232.633    | 89.822            |
| 283          | 86               | 232           | MODAL              | Mode             | 11.000000           | -67255.5342    | -157968.209    | -89.972           |
| 283          | 86               | 223           | MODAL              | Mode             | 11.000000           | -68442.3837    | -164275.598    | 89.540            |
| 283          | 86               | 221           | MODAL              | Mode             | 12.000000           | 15395.7348     | -16720.9246    | -10.590           |
| 283          | 86               | 231           | MODAL              | Mode             | 12.000000           | 29071.7631     | -15071.3029    | -4.627            |
| 283          | 86               | 232           | MODAL              | Mode             | 12.000000           | 32939.7057     | -1503.1831     | -8.792            |
| 283          | 86               | 223           | MODAL              | Mode             | 12.000000           | 19880.9435     | -4378.4334     | -19.000           |
| 283          | 86               | 221           | locomotoras        |                  |                     | 145.8307       | 58.3413        | -87.793           |
| 283          | 86               | 231           | locomotoras        |                  |                     | 145.0875       | 58.8742        | -89.024           |
| 283          | 86               | 232           | locomotoras        |                  |                     | 144.7844       | 54.2227        | -88.312           |
| 283          | 86               | 223           | locomotoras        |                  |                     | 158.4141       | 68.1289        | -87.235           |
| 284          | 87               | 223           | MODAL              | Mode             | 1.000000            | 780.8845       | -1167.4830     | -3.951            |
| 284          | 87               | 232           | MODAL              | Mode             | 1.000000            | 346.2363       | -939.1854      | -7.243            |
| 284          | 87               | 23            | MODAL              | Mode             | 1.000000            | 265.6190       | -1330.4097     | -2.823            |
| 284          | 87               | 14            | MODAL              | Mode             | 1.000000            | 707.5787       | -1566.2545     | -1.309            |
| 284          | 87               | 223           | MODAL              | Mode             | 2.000000            | -6639.2824     | -39351.8019    | 2.603             |
| 284          | 87               | 232           | MODAL              | Mode             | 2.000000            | -7337.9536     | -39369.6854    | 2.316             |
| 284          | 87               | 23            | MODAL              | Mode             | 2.000000            | -7332.1941     | -39335.4305    | 2.329             |
| 284          | 87               | 14            | MODAL              | Mode             | 2.000000            | -6766.0032     | -39314.9086    | 2.595             |
| 284          | 87               | 223           | MODAL              | Mode             | 3.000000            | 23600.6027     | 4733.0961      | -87.049           |
| 284          | 87               | 232           | MODAL              | Mode             | 3.000000            | 23682.6235     | 5237.5399      | -87.397           |
| 284          | 87               | 23            | MODAL              | Mode             | 3.000000            | 23666.8887     | 5229.2927      | -87.401           |
| 284          | 87               | 14            | MODAL              | Mode             | 3.000000            | 23583.6875     | 4830.5169      | -87.079           |
| 284          | 87               | 223           | MODAL              | Mode             | 4.000000            | -11095.3588    | -32057.5272    | 3.508             |
| 284          | 87               | 232           | MODAL              | Mode             | 4.000000            | -10882.7227    | -26446.7737    | 2.972             |
| 284          | 87               | 23            | MODAL              | Mode             | 4.000000            | -11005.4505    | -26807.4843    | 5.186             |
| 284          | 87               | 14            | MODAL              | Mode             | 4.000000            | -11349.1902    | -32414.5751    | 5.136             |
| 284          | 87               | 223           | MODAL              | Mode             | 5.000000            | 2691.3980      | 600.7578       | 86.370            |
| 284          | 87               | 232           | MODAL              | Mode             | 5.000000            | 2260.7219      | 102.1487       | 88.745            |
| 284          | 87               | 23            | MODAL              | Mode             | 5.000000            | 1690.7731      | -36.4478       | 87.704            |
| 284          | 87               | 14            | MODAL              | Mode             | 5.000000            | 2140.2333      | 462.3804       | 84.762            |
| 284          | 87               | 223           | MODAL              | Mode             | 6.000000            | -8103.0640     | -22820.7131    | 4.452             |
| 284          | 87               | 232           | MODAL              | Mode             | 6.000000            | -7699.9378     | -18901.9236    | 4.201             |
| 284          | 87               | 23            | MODAL              | Mode             | 6.000000            | -7717.7998     | -18877.0314    | 6.269             |
| 284          | 87               | 14            | MODAL              | Mode             | 6.000000            | -8232.9648     | -22784.9453    | 6.014             |
| 284          | 87               | 223           | MODAL              | Mode             | 7.000000            | 6984.8902      | 2028.9042      | -15.763           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 284          | 87               | 232           | MODAL              | Mode             | 7.000000            | 7514.1914      | 3248.5706      | -17.337           |
| 284          | 87               | 23            | MODAL              | Mode             | 7.000000            | 7415.7628      | 3201.5418      | -15.249           |
| 284          | 87               | 14            | MODAL              | Mode             | 7.000000            | 6904.2877      | 1934.6357      | -13.694           |
| 284          | 87               | 223           | MODAL              | Mode             | 8.000000            | 5020.2790      | 2512.4592      | 33.057            |
| 284          | 87               | 232           | MODAL              | Mode             | 8.000000            | 3996.3541      | 2015.2805      | 42.845            |
| 284          | 87               | 23            | MODAL              | Mode             | 8.000000            | 3563.9664      | 1217.4599      | 33.491            |
| 284          | 87               | 14            | MODAL              | Mode             | 8.000000            | 4706.6336      | 1650.9455      | 27.097            |
| 284          | 87               | 223           | MODAL              | Mode             | 9.000000            | -16447.1242    | -46966.4988    | 89.300            |
| 284          | 87               | 232           | MODAL              | Mode             | 9.000000            | -27869.6705    | -56753.7957    | 88.140            |
| 284          | 87               | 23            | MODAL              | Mode             | 9.000000            | -28000.9925    | -55909.3874    | 89.986            |
| 284          | 87               | 14            | MODAL              | Mode             | 9.000000            | -16457.7704    | -46145.7970    | -88.906           |
| 284          | 87               | 223           | MODAL              | Mode             | 10.000000           | -5339.2456     | -13707.0873    | -86.456           |
| 284          | 87               | 232           | MODAL              | Mode             | 10.000000           | -9158.6299     | -16760.0646    | -87.738           |
| 284          | 87               | 23            | MODAL              | Mode             | 10.000000           | -9215.4282     | -16532.6467    | -85.252           |
| 284          | 87               | 14            | MODAL              | Mode             | 10.000000           | -5372.9602     | -13496.8890    | -84.164           |
| 284          | 87               | 223           | MODAL              | Mode             | 11.000000           | -68277.3079    | -164241.755    | 89.564            |
| 284          | 87               | 232           | MODAL              | Mode             | 11.000000           | -67742.8664    | -158068.304    | 89.712            |
| 284          | 87               | 23            | MODAL              | Mode             | 11.000000           | -66094.4997    | -158465.668    | 89.932            |
| 284          | 87               | 14            | MODAL              | Mode             | 11.000000           | -66684.5559    | -164327.811    | 89.745            |
| 284          | 87               | 223           | MODAL              | Mode             | 12.000000           | 18957.5021     | -4235.4408     | -16.074           |
| 284          | 87               | 232           | MODAL              | Mode             | 12.000000           | 32480.3434     | -1744.4960     | -6.672            |
| 284          | 87               | 23            | MODAL              | Mode             | 12.000000           | 36623.5239     | 11538.8602     | -13.231           |
| 284          | 87               | 14            | MODAL              | Mode             | 12.000000           | 24755.4650     | 6838.5543      | -30.362           |
| 284          | 87               | 223           | locomotoras        |                  |                     | 157.3606       | 67.9202        | -86.602           |
| 284          | 87               | 232           | locomotoras        |                  |                     | 144.9652       | 54.3179        | -87.788           |
| 284          | 87               | 23            | locomotoras        |                  |                     | 147.1285       | 52.8099        | -87.386           |
| 284          | 87               | 14            | locomotoras        |                  |                     | 147.1575       | 70.6544        | -87.063           |
| 286          | 89               | 231           | MODAL              | Mode             | 1.000000            | 807.9790       | -453.6919      | -8.007            |
| 286          | 89               | 218           | MODAL              | Mode             | 1.000000            | 376.5282       | -276.1933      | -19.617           |
| 286          | 89               | 220           | MODAL              | Mode             | 1.000000            | 254.3507       | -634.9382      | -8.115            |
| 286          | 89               | 232           | MODAL              | Mode             | 1.000000            | 721.2307       | -847.1922      | -3.381            |
| 286          | 89               | 231           | MODAL              | Mode             | 2.000000            | -7125.7881     | -39384.8282    | 2.001             |
| 286          | 89               | 218           | MODAL              | Mode             | 2.000000            | -7744.9908     | -39355.3406    | 1.751             |
| 286          | 89               | 220           | MODAL              | Mode             | 2.000000            | -7789.0620     | -39460.3303    | 1.787             |
| 286          | 89               | 232           | MODAL              | Mode             | 2.000000            | -7224.0321     | -39470.9773    | 2.023             |
| 286          | 89               | 231           | MODAL              | Mode             | 3.000000            | 23671.7329     | 5060.1954      | -87.751           |
| 286          | 89               | 218           | MODAL              | Mode             | 3.000000            | 23695.4595     | 5522.6183      | -88.072           |
| 286          | 89               | 220           | MODAL              | Mode             | 3.000000            | 23790.4826     | 5557.6176      | -88.037           |
| 286          | 89               | 232           | MODAL              | Mode             | 3.000000            | 23752.1030     | 5138.9715      | -87.734           |
| 286          | 89               | 231           | MODAL              | Mode             | 4.000000            | -10094.5333    | -26055.9444    | -2.497            |
| 286          | 89               | 218           | MODAL              | Mode             | 4.000000            | -9143.7577     | -20237.1099    | -5.623            |
| 286          | 89               | 220           | MODAL              | Mode             | 4.000000            | -9462.3186     | -20397.7859    | -2.325            |
| 286          | 89               | 232           | MODAL              | Mode             | 4.000000            | -10437.2990    | -26370.1704    | -0.196            |
| 286          | 89               | 231           | MODAL              | Mode             | 5.000000            | 2923.9521      | 818.4048       | 85.429            |
| 286          | 89               | 218           | MODAL              | Mode             | 5.000000            | 2454.6713      | 246.1383       | 87.714            |
| 286          | 89               | 220           | MODAL              | Mode             | 5.000000            | 1869.0613      | 112.7320       | 86.380            |
| 286          | 89               | 232           | MODAL              | Mode             | 5.000000            | 2360.2363      | 680.4243       | 83.549            |
| 286          | 89               | 231           | MODAL              | Mode             | 6.000000            | -7493.0023     | -18918.7347    | -1.385            |
| 286          | 89               | 218           | MODAL              | Mode             | 6.000000            | -6609.1698     | -14797.8038    | -3.834            |
| 286          | 89               | 220           | MODAL              | Mode             | 6.000000            | -6759.7717     | -14660.5826    | -0.965            |
| 286          | 89               | 232           | MODAL              | Mode             | 6.000000            | -7681.9086     | -18880.0819    | 0.702             |
| 286          | 89               | 231           | MODAL              | Mode             | 7.000000            | 7649.7276      | 3438.1388      | -19.367           |
| 286          | 89               | 218           | MODAL              | Mode             | 7.000000            | 8140.9867      | 4417.9484      | -20.477           |
| 286          | 89               | 220           | MODAL              | Mode             | 7.000000            | 8065.9226      | 4412.0088      | -18.682           |
| 286          | 89               | 232           | MODAL              | Mode             | 7.000000            | 7585.1659      | 3393.0003      | -17.426           |
| 286          | 89               | 231           | MODAL              | Mode             | 8.000000            | 5251.7813      | 3121.5058      | 40.747            |
| 286          | 89               | 218           | MODAL              | Mode             | 8.000000            | 4181.1584      | 2323.4915      | 57.265            |
| 286          | 89               | 220           | MODAL              | Mode             | 8.000000            | 3547.4943      | 1668.0062      | 44.498            |
| 286          | 89               | 232           | MODAL              | Mode             | 8.000000            | 4841.8922      | 2309.5094      | 32.294            |
| 286          | 89               | 231           | MODAL              | Mode             | 9.000000            | -28258.6697    | -58094.7201    | 84.335            |
| 286          | 89               | 218           | MODAL              | Mode             | 9.000000            | -37691.4237    | -67132.3266    | 83.954            |
| 286          | 89               | 220           | MODAL              | Mode             | 9.000000            | -37975.2012    | -66472.8188    | 85.309            |
| 286          | 89               | 232           | MODAL              | Mode             | 9.000000            | -28453.4804    | -57405.1832    | 85.701            |
| 286          | 89               | 231           | MODAL              | Mode             | 10.000000           | -9251.0088     | -17064.1367    | 86.992            |
| 286          | 89               | 218           | MODAL              | Mode             | 10.000000           | -12405.8353    | -19919.7743    | 86.262            |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 286          | 89               | 220           | MODAL              | Mode             | 10.000000           | -12537.8151    | -19725.2101    | 88.096            |
| 286          | 89               | 232           | MODAL              | Mode             | 10.000000           | -9359.6527     | -16867.8002    | 88.795            |
| 286          | 89               | 231           | MODAL              | Mode             | 11.000000           | -69621.3749    | -157886.351    | -89.439           |
| 286          | 89               | 218           | MODAL              | Mode             | 11.000000           | -63051.6956    | -139720.008    | -88.808           |
| 286          | 89               | 220           | MODAL              | Mode             | 11.000000           | -59626.7824    | -140822.386    | -88.740           |
| 286          | 89               | 232           | MODAL              | Mode             | 11.000000           | -67891.0099    | -158973.099    | -89.479           |
| 286          | 89               | 231           | MODAL              | Mode             | 12.000000           | 14686.1996     | -17774.7754    | -7.709            |
| 286          | 89               | 218           | MODAL              | Mode             | 12.000000           | 27007.5145     | -16833.9856    | -2.362            |
| 286          | 89               | 220           | MODAL              | Mode             | 12.000000           | 30874.6815     | -3235.4809     | -5.803            |
| 286          | 89               | 232           | MODAL              | Mode             | 12.000000           | 19027.5260     | -4762.7546     | -15.159           |
| 286          | 89               | 231           | locomotoras        |                  |                     | 144.2157       | 54.7969        | -87.099           |
| 286          | 89               | 218           | locomotoras        |                  |                     | 142.8871       | 64.5237        | -88.458           |
| 286          | 89               | 220           | locomotoras        |                  |                     | 147.0433       | 67.8292        | -88.256           |
| 286          | 89               | 232           | locomotoras        |                  |                     | 144.8841       | 53.7814        | -86.895           |
| 287          | 90               | 232           | MODAL              | Mode             | 1.000000            | 724.9558       | -840.0788      | -3.937            |
| 287          | 90               | 220           | MODAL              | Mode             | 1.000000            | 261.8093       | -627.5351      | -9.194            |
| 287          | 90               | 11            | MODAL              | Mode             | 1.000000            | 176.3130       | -1019.0282     | -2.803            |
| 287          | 90               | 23            | MODAL              | Mode             | 1.000000            | 649.8905       | -1242.0332     | -0.786            |
| 287          | 90               | 232           | MODAL              | Mode             | 2.000000            | -7214.6849     | -39432.0215    | 2.056             |
| 287          | 90               | 220           | MODAL              | Mode             | 2.000000            | -7782.6970     | -39431.9995    | 1.804             |
| 287          | 90               | 11            | MODAL              | Mode             | 2.000000            | -7773.5365     | -39423.2452    | 1.822             |
| 287          | 90               | 23            | MODAL              | Mode             | 2.000000            | -7333.1296     | -39421.6200    | 2.051             |
| 287          | 90               | 232           | MODAL              | Mode             | 3.000000            | 23722.1155     | 5132.3637      | -87.714           |
| 287          | 90               | 220           | MODAL              | Mode             | 3.000000            | 23768.4963     | 5553.0459      | -88.030           |
| 287          | 90               | 11            | MODAL              | Mode             | 3.000000            | 23771.5885     | 5543.4143      | -88.020           |
| 287          | 90               | 23            | MODAL              | Mode             | 3.000000            | 23724.5121     | 5225.8277      | -87.733           |
| 287          | 90               | 232           | MODAL              | Mode             | 4.000000            | -10460.4035    | -26572.2613    | 1.730             |
| 287          | 90               | 220           | MODAL              | Mode             | 4.000000            | -9543.3865     | -20701.4574    | 0.573             |
| 287          | 90               | 11            | MODAL              | Mode             | 4.000000            | -9688.2805     | -20942.5464    | 3.785             |
| 287          | 90               | 23            | MODAL              | Mode             | 4.000000            | -10717.6713    | -26916.4366    | 3.942             |
| 287          | 90               | 232           | MODAL              | Mode             | 5.000000            | 2375.8123      | 702.4041       | 86.718            |
| 287          | 90               | 220           | MODAL              | Mode             | 5.000000            | 1903.7811      | 127.9456       | 89.548            |
| 287          | 90               | 11            | MODAL              | Mode             | 5.000000            | 1314.1504      | -4.9824        | 88.448            |
| 287          | 90               | 23            | MODAL              | Mode             | 5.000000            | 1808.3679      | 565.3307       | 84.668            |
| 287          | 90               | 232           | MODAL              | Mode             | 6.000000            | -7685.0350     | -19042.2480    | 2.751             |
| 287          | 90               | 220           | MODAL              | Mode             | 6.000000            | -6799.3241     | -14905.1675    | 2.023             |
| 287          | 90               | 11            | MODAL              | Mode             | 6.000000            | -6832.7601     | -14801.4346    | 4.998             |
| 287          | 90               | 23            | MODAL              | Mode             | 6.000000            | -7818.0486     | -19006.3343    | 4.862             |
| 287          | 90               | 232           | MODAL              | Mode             | 7.000000            | 7521.0950      | 3371.0899      | -16.283           |
| 287          | 90               | 220           | MODAL              | Mode             | 7.000000            | 8012.6652      | 4399.5095      | -17.662           |
| 287          | 90               | 11            | MODAL              | Mode             | 7.000000            | 7926.2355      | 4370.5611      | -15.712           |
| 287          | 90               | 23            | MODAL              | Mode             | 7.000000            | 7457.7836      | 3303.6371      | -14.235           |
| 287          | 90               | 232           | MODAL              | Mode             | 8.000000            | 4766.8189      | 2461.7206      | 31.656            |
| 287          | 90               | 220           | MODAL              | Mode             | 8.000000            | 3489.2371      | 1850.9990      | 45.879            |
| 287          | 90               | 11            | MODAL              | Mode             | 8.000000            | 3008.6377      | 1035.0813      | 33.797            |
| 287          | 90               | 23            | MODAL              | Mode             | 8.000000            | 4442.4432      | 1562.1737      | 25.517            |
| 287          | 90               | 232           | MODAL              | Mode             | 9.000000            | -27706.1045    | -57121.3733    | 87.618            |
| 287          | 90               | 220           | MODAL              | Mode             | 9.000000            | -37384.7108    | -66230.7554    | 86.845            |
| 287          | 90               | 11            | MODAL              | Mode             | 9.000000            | -37523.1448    | -65475.1468    | 88.334            |
| 287          | 90               | 23            | MODAL              | Mode             | 9.000000            | -27773.6960    | -56409.0113    | 89.122            |
| 287          | 90               | 232           | MODAL              | Mode             | 10.000000           | -9086.9226     | -16813.5378    | -88.764           |
| 287          | 90               | 220           | MODAL              | Mode             | 10.000000           | -12322.5879    | -19672.6483    | -89.868           |
| 287          | 90               | 11            | MODAL              | Mode             | 10.000000           | -12387.6663    | -19453.2268    | -87.807           |
| 287          | 90               | 23            | MODAL              | Mode             | 10.000000           | -9137.3810     | -16621.0581    | -86.757           |
| 287          | 90               | 232           | MODAL              | Mode             | 11.000000           | -68386.7121    | -159064.824    | -89.789           |
| 287          | 90               | 220           | MODAL              | Mode             | 11.000000           | -62313.3461    | -141319.027    | -89.534           |
| 287          | 90               | 11            | MODAL              | Mode             | 11.000000           | -58809.4678    | -142109.244    | -89.417           |
| 287          | 90               | 23            | MODAL              | Mode             | 11.000000           | -66555.0206    | -159878.883    | -89.804           |
| 287          | 90               | 232           | MODAL              | Mode             | 12.000000           | 18307.6981     | -4743.6019     | -12.165           |
| 287          | 90               | 220           | MODAL              | Mode             | 12.000000           | 30646.5698     | -3203.6068     | -3.857            |
| 287          | 90               | 11            | MODAL              | Mode             | 12.000000           | 34656.8007     | 10257.8649     | -9.316            |
| 287          | 90               | 23            | MODAL              | Mode             | 12.000000           | 23696.3582     | 7290.0887      | -25.780           |
| 287          | 90               | 232           | locomotoras        |                  |                     | 145.1027       | 53.8389        | -87.017           |
| 287          | 90               | 220           | locomotoras        |                  |                     | 147.6624       | 67.9555        | -88.394           |
| 287          | 90               | 11            | locomotoras        |                  |                     | 151.6263       | 70.9086        | -88.346           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 287          | 90               | 23            | locomotoras        |                  |                     | 147.6412       | 53.3008        | -86.890           |
| 289          | 92               | 225           | MODAL              | Mode             | 1.000000            | 1765.4536      | -42.7913       | -87.762           |
| 289          | 92               | 233           | MODAL              | Mode             | 1.000000            | 1991.4082      | -517.2830      | -87.606           |
| 289          | 92               | 234           | MODAL              | Mode             | 1.000000            | 1585.7875      | -580.4732      | -89.353           |
| 289          | 92               | 226           | MODAL              | Mode             | 1.000000            | 1357.8721      | -106.2014      | 89.597            |
| 289          | 92               | 225           | MODAL              | Mode             | 2.000000            | -7729.7969     | -38999.7068    | 1.799             |
| 289          | 92               | 233           | MODAL              | Mode             | 2.000000            | -7444.6238     | -38931.3448    | 2.006             |
| 289          | 92               | 234           | MODAL              | Mode             | 2.000000            | -7412.6185     | -39156.1489    | 2.053             |
| 289          | 92               | 226           | MODAL              | Mode             | 2.000000            | -7733.7961     | -39206.3480    | 1.838             |
| 289          | 92               | 225           | MODAL              | Mode             | 3.000000            | 23254.5219     | 5407.6132      | -88.169           |
| 289          | 92               | 233           | MODAL              | Mode             | 3.000000            | 23102.2633     | 5201.2589      | -87.927           |
| 289          | 92               | 234           | MODAL              | Mode             | 3.000000            | 23273.9701     | 5182.5867      | -87.832           |
| 289          | 92               | 226           | MODAL              | Mode             | 3.000000            | 23411.6950     | 5416.3455      | -88.084           |
| 289          | 92               | 225           | MODAL              | Mode             | 4.000000            | 22286.9274     | 9144.3288      | -76.177           |
| 289          | 92               | 233           | MODAL              | Mode             | 4.000000            | 28023.8367     | 10460.5234     | -78.811           |
| 289          | 92               | 234           | MODAL              | Mode             | 4.000000            | 27670.0866     | 10431.0449     | -80.728           |
| 289          | 92               | 226           | MODAL              | Mode             | 4.000000            | 21930.4635     | 9245.7603      | -78.676           |
| 289          | 92               | 225           | MODAL              | Mode             | 5.000000            | 281.8632       | -238.4121      | 15.200            |
| 289          | 92               | 233           | MODAL              | Mode             | 5.000000            | -317.3536      | -711.6693      | 7.124             |
| 289          | 92               | 234           | MODAL              | Mode             | 5.000000            | -456.3488      | -1285.4630     | 4.507             |
| 289          | 92               | 226           | MODAL              | Mode             | 5.000000            | 137.6998       | -818.2921      | 9.206             |
| 289          | 92               | 225           | MODAL              | Mode             | 6.000000            | 15010.2376     | 6209.0344      | -74.326           |
| 289          | 92               | 233           | MODAL              | Mode             | 6.000000            | 19011.7016     | 7427.3576      | -77.334           |
| 289          | 92               | 234           | MODAL              | Mode             | 6.000000            | 19060.8774     | 7472.2307      | -79.393           |
| 289          | 92               | 226           | MODAL              | Mode             | 6.000000            | 15046.9227     | 6357.2613      | -77.014           |
| 289          | 92               | 225           | MODAL              | Mode             | 7.000000            | 7931.3738      | 4485.5550      | -8.717            |
| 289          | 92               | 233           | MODAL              | Mode             | 7.000000            | 7556.7480      | 3368.7694      | -7.317            |
| 289          | 92               | 234           | MODAL              | Mode             | 7.000000            | 7620.6150      | 3500.6636      | -9.397            |
| 289          | 92               | 226           | MODAL              | Mode             | 7.000000            | 8016.2389      | 4573.0755      | -10.965           |
| 289          | 92               | 225           | MODAL              | Mode             | 8.000000            | 819.1409       | -1783.1447     | -69.920           |
| 289          | 92               | 233           | MODAL              | Mode             | 8.000000            | 310.8494       | -3394.3808     | -72.620           |
| 289          | 92               | 234           | MODAL              | Mode             | 8.000000            | -655.5056      | -3651.3471     | -69.705           |
| 289          | 92               | 226           | MODAL              | Mode             | 8.000000            | -164.8661      | -2086.3179     | -64.162           |
| 289          | 92               | 225           | MODAL              | Mode             | 9.000000            | -38051.5120    | -66814.8119    | -85.545           |
| 289          | 92               | 233           | MODAL              | Mode             | 9.000000            | -28168.3924    | -58265.2578    | -84.337           |
| 289          | 92               | 234           | MODAL              | Mode             | 9.000000            | -28399.6768    | -59041.1498    | -85.912           |
| 289          | 92               | 226           | MODAL              | Mode             | 9.000000            | -38207.9797    | -67584.6425    | -87.167           |
| 289          | 92               | 225           | MODAL              | Mode             | 10.000000           | -12543.7863    | -20102.7370    | -80.133           |
| 289          | 92               | 233           | MODAL              | Mode             | 10.000000           | -9276.8298     | -17488.9072    | -78.937           |
| 289          | 92               | 234           | MODAL              | Mode             | 10.000000           | -9359.5766     | -17691.8597    | -80.943           |
| 289          | 92               | 226           | MODAL              | Mode             | 10.000000           | -12616.6681    | -20310.5512    | -82.286           |
| 289          | 92               | 225           | MODAL              | Mode             | 11.000000           | 136765.3051    | 54070.1693     | -0.439            |
| 289          | 92               | 233           | MODAL              | Mode             | 11.000000           | 155990.8517    | 62154.6362     | -0.209            |
| 289          | 92               | 234           | MODAL              | Mode             | 11.000000           | 155626.9530    | 64093.5121     | -0.169            |
| 289          | 92               | 226           | MODAL              | Mode             | 11.000000           | 136329.3261    | 57559.1823     | -0.566            |
| 289          | 92               | 225           | MODAL              | Mode             | 12.000000           | -33113.8404    | -43387.3386    | 49.196            |
| 289          | 92               | 233           | MODAL              | Mode             | 12.000000           | -22187.8624    | -40529.8548    | 27.127            |
| 289          | 92               | 234           | MODAL              | Mode             | 12.000000           | -16947.7147    | -28613.6174    | 44.651            |
| 289          | 92               | 226           | MODAL              | Mode             | 12.000000           | -22799.3909    | -36619.0156    | 74.829            |
| 289          | 92               | 225           | locomotoras        |                  |                     | 148.3524       | 58.9830        | -89.294           |
| 289          | 92               | 233           | locomotoras        |                  |                     | 142.4578       | 59.9694        | 89.485            |
| 289          | 92               | 234           | locomotoras        |                  |                     | 143.6709       | 55.3106        | -89.285           |
| 289          | 92               | 226           | locomotoras        |                  |                     | 159.4109       | 68.3965        | -88.509           |
| 290          | 93               | 226           | MODAL              | Mode             | 1.000000            | 1370.2194      | -103.6653      | -89.820           |
| 290          | 93               | 234           | MODAL              | Mode             | 1.000000            | 1595.3773      | -579.0509      | -88.981           |
| 290          | 93               | 26            | MODAL              | Mode             | 1.000000            | 1190.0597      | -647.5302      | 88.688            |
| 290          | 93               | 17            | MODAL              | Mode             | 1.000000            | 967.0273       | -175.0953      | 86.141            |
| 290          | 93               | 226           | MODAL              | Mode             | 2.000000            | -7739.7017     | -39226.4629    | 1.792             |
| 290          | 93               | 234           | MODAL              | Mode             | 2.000000            | -7421.4390     | -39188.6500    | 2.003             |
| 290          | 93               | 26            | MODAL              | Mode             | 2.000000            | -7327.5471     | -39300.5569    | 2.033             |
| 290          | 93               | 17            | MODAL              | Mode             | 2.000000            | -7765.5058     | -39336.8669    | 1.802             |
| 290          | 93               | 226           | MODAL              | Mode             | 3.000000            | 23430.1853     | 5420.7862      | -88.115           |
| 290          | 93               | 234           | MODAL              | Mode             | 3.000000            | 23300.7926     | 5188.7508      | -87.861           |
| 290          | 93               | 26            | MODAL              | Mode             | 3.000000            | 23382.1295     | 5118.3471      | -87.789           |
| 290          | 93               | 17            | MODAL              | Mode             | 3.000000            | 23510.3425     | 5446.1433      | -88.070           |



| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 290          | 93               | 226           | MODAL              | Mode             | 4.000000            | 21423.4351     | 9370.1974      | -80.911           |
| 290          | 93               | 234           | MODAL              | Mode             | 4.000000            | 27321.3794     | 10542.3927     | -82.360           |
| 290          | 93               | 26            | MODAL              | Mode             | 4.000000            | 26967.0097     | 10401.7857     | -84.446           |
| 290          | 93               | 17            | MODAL              | Mode             | 4.000000            | 21107.7615     | 9354.6723      | -83.813           |
| 290          | 93               | 226           | MODAL              | Mode             | 5.000000            | 124.5394       | -755.8867      | 3.402             |
| 290          | 93               | 234           | MODAL              | Mode             | 5.000000            | -454.0256      | -1249.2277     | -2.051            |
| 290          | 93               | 26            | MODAL              | Mode             | 5.000000            | -589.7156      | -1823.2626     | -0.491            |
| 290          | 93               | 17            | MODAL              | Mode             | 5.000000            | -6.7710        | -1348.3666     | 3.107             |
| 290          | 93               | 226           | MODAL              | Mode             | 6.000000            | 14649.1211     | 6472.9292      | -79.412           |
| 290          | 93               | 234           | MODAL              | Mode             | 6.000000            | 18785.9965     | 7572.5938      | -81.188           |
| 290          | 93               | 26            | MODAL              | Mode             | 6.000000            | 18825.9744     | 7529.4065      | -83.322           |
| 290          | 93               | 17            | MODAL              | Mode             | 6.000000            | 14709.5197     | 6531.3350      | -82.352           |
| 290          | 93               | 226           | MODAL              | Mode             | 7.000000            | 8055.6687      | 4591.9468      | -12.184           |
| 290          | 93               | 234           | MODAL              | Mode             | 7.000000            | 7665.5463      | 3536.2738      | -10.662           |
| 290          | 93               | 26            | MODAL              | Mode             | 7.000000            | 7724.7142      | 3640.1937      | -12.756           |
| 290          | 93               | 17            | MODAL              | Mode             | 7.000000            | 8144.7842      | 4656.1006      | -14.283           |
| 290          | 93               | 226           | MODAL              | Mode             | 8.000000            | 27.5527        | -2148.2659     | -62.993           |
| 290          | 93               | 234           | MODAL              | Mode             | 8.000000            | -509.6414      | -3709.3893     | -68.413           |
| 290          | 93               | 26            | MODAL              | Mode             | 8.000000            | -1445.5967     | -4001.5993     | -63.831           |
| 290          | 93               | 17            | MODAL              | Mode             | 8.000000            | -876.9133      | -2533.1051     | -53.346           |
| 290          | 93               | 226           | MODAL              | Mode             | 9.000000            | -38922.9439    | -67660.8652    | -88.644           |
| 290          | 93               | 234           | MODAL              | Mode             | 9.000000            | -29332.1690    | -59101.1977    | -87.644           |
| 290          | 93               | 26            | MODAL              | Mode             | 9.000000            | -29410.4171    | -59797.8434    | -89.146           |
| 290          | 93               | 17            | MODAL              | Mode             | 9.000000            | -38942.3614    | -68442.1050    | 89.848            |
| 290          | 93               | 226           | MODAL              | Mode             | 10.000000           | -12883.9103    | -20292.9843    | -84.057           |
| 290          | 93               | 234           | MODAL              | Mode             | 10.000000           | -9704.7785     | -17658.0411    | -82.923           |
| 290          | 93               | 26            | MODAL              | Mode             | 10.000000           | -9720.4809     | -17839.3816    | -84.879           |
| 290          | 93               | 17            | MODAL              | Mode             | 10.000000           | -12892.8277    | -20516.7981    | -86.111           |
| 290          | 93               | 226           | MODAL              | Mode             | 11.000000           | 135790.3026    | 54901.3387     | 0.238             |
| 290          | 93               | 234           | MODAL              | Mode             | 11.000000           | 155496.4996    | 63443.4604     | 0.112             |
| 290          | 93               | 26            | MODAL              | Mode             | 11.000000           | 154817.3202    | 65331.0072     | 0.166             |
| 290          | 93               | 17            | MODAL              | Mode             | 11.000000           | 135060.2273    | 58332.3901     | 0.151             |
| 290          | 93               | 226           | MODAL              | Mode             | 12.000000           | -22303.0319    | -37335.1134    | 70.798            |
| 290          | 93               | 234           | MODAL              | Mode             | 12.000000           | -16001.7987    | -30245.3628    | 43.794            |
| 290          | 93               | 26            | MODAL              | Mode             | 12.000000           | -7002.4679     | -21859.2384    | 66.312            |
| 290          | 93               | 17            | MODAL              | Mode             | 12.000000           | -9623.3595     | -32694.0940    | 82.348            |
| 290          | 93               | 226           | locomotoras        |                  |                     | 158.5220       | 68.2392        | -87.880           |
| 290          | 93               | 234           | locomotoras        |                  |                     | 144.1294       | 55.4521        | -88.623           |
| 290          | 93               | 26            | locomotoras        |                  |                     | 146.8615       | 53.6497        | -87.874           |
| 290          | 93               | 17            | locomotoras        |                  |                     | 151.9496       | 71.3007        | -88.015           |
| 292          | 95               | 233           | MODAL              | Mode             | 1.000000            | 2070.4724      | -131.5090      | -88.549           |
| 292          | 95               | 228           | MODAL              | Mode             | 1.000000            | 2310.1214      | -578.6947      | -88.321           |
| 292          | 95               | 230           | MODAL              | Mode             | 1.000000            | 1908.8529      | -639.7683      | -89.924           |
| 292          | 95               | 234           | MODAL              | Mode             | 1.000000            | 1668.8267      | -195.6514      | 89.216            |
| 292          | 95               | 233           | MODAL              | Mode             | 2.000000            | -7297.7454     | -38820.5883    | 2.298             |
| 292          | 95               | 228           | MODAL              | Mode             | 2.000000            | -6902.7788     | -38727.8059    | 2.548             |
| 292          | 95               | 230           | MODAL              | Mode             | 2.000000            | -6862.4011     | -38976.6123    | 2.596             |
| 292          | 95               | 234           | MODAL              | Mode             | 2.000000            | -7295.1152     | -39050.8854    | 2.339             |
| 292          | 95               | 233           | MODAL              | Mode             | 3.000000            | 23027.2903     | 5083.4321      | -87.594           |
| 292          | 95               | 228           | MODAL              | Mode             | 3.000000            | 22838.6821     | 4814.6407      | -87.308           |
| 292          | 95               | 230           | MODAL              | Mode             | 3.000000            | 23026.9173     | 4790.9613      | -87.205           |
| 292          | 95               | 234           | MODAL              | Mode             | 3.000000            | 23202.5517     | 5089.4786      | -87.500           |
| 292          | 95               | 233           | MODAL              | Mode             | 4.000000            | 27999.1648     | 10546.3120     | -77.716           |
| 292          | 95               | 228           | MODAL              | Mode             | 4.000000            | 33374.8083     | 11129.5815     | -79.447           |
| 292          | 95               | 230           | MODAL              | Mode             | 4.000000            | 33087.2066     | 11105.9638     | -80.902           |
| 292          | 95               | 234           | MODAL              | Mode             | 4.000000            | 27623.6071     | 10566.4800     | -79.539           |
| 292          | 95               | 233           | MODAL              | Mode             | 5.000000            | 297.9520       | -607.6303      | 5.764             |
| 292          | 95               | 228           | MODAL              | Mode             | 5.000000            | -215.8287      | -1058.0031     | -1.342E-03        |
| 292          | 95               | 230           | MODAL              | Mode             | 5.000000            | -358.0348      | -1616.9636     | 0.770             |
| 292          | 95               | 234           | MODAL              | Mode             | 5.000000            | 160.2148       | -1180.2976     | 4.720             |
| 292          | 95               | 233           | MODAL              | Mode             | 6.000000            | 18945.5725     | 7160.8208      | -76.244           |
| 292          | 95               | 228           | MODAL              | Mode             | 6.000000            | 22660.7555     | 7864.8958      | -78.210           |
| 292          | 95               | 230           | MODAL              | Mode             | 6.000000            | 22771.4391     | 7918.7465      | -79.746           |
| 292          | 95               | 234           | MODAL              | Mode             | 6.000000            | 18980.4285     | 7246.2998      | -78.159           |
| 292          | 95               | 233           | MODAL              | Mode             | 7.000000            | 7437.9139      | 3310.9337      | -8.033            |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 292          | 95               | 228           | MODAL              | Mode             | 7.000000            | 7018.1233      | 1985.3934      | -6.954            |
| 292          | 95               | 230           | MODAL              | Mode             | 7.000000            | 7079.6659      | 2145.0755      | -9.050            |
| 292          | 95               | 234           | MODAL              | Mode             | 7.000000            | 7526.3871      | 3423.7466      | -10.328           |
| 292          | 95               | 233           | MODAL              | Mode             | 8.000000            | 549.3142       | -2419.9063     | -68.150           |
| 292          | 95               | 228           | MODAL              | Mode             | 8.000000            | 112.9354       | -3749.8399     | -70.867           |
| 292          | 95               | 230           | MODAL              | Mode             | 8.000000            | -819.9972      | -3995.8643     | -67.777           |
| 292          | 95               | 234           | MODAL              | Mode             | 8.000000            | -378.8351      | -2711.9535     | -63.110           |
| 292          | 95               | 233           | MODAL              | Mode             | 9.000000            | -28352.0684    | -57661.8849    | -82.725           |
| 292          | 95               | 228           | MODAL              | Mode             | 9.000000            | -16659.1584    | -48425.4740    | -81.689           |
| 292          | 95               | 230           | MODAL              | Mode             | 9.000000            | -16941.7870    | -49114.5493    | -83.526           |
| 292          | 95               | 234           | MODAL              | Mode             | 9.000000            | -28578.5521    | -58481.2714    | -84.687           |
| 292          | 95               | 233           | MODAL              | Mode             | 10.000000           | -9292.4887     | -17393.6663    | -76.627           |
| 292          | 95               | 228           | MODAL              | Mode             | 10.000000           | -5446.0000     | -14563.8944    | -76.034           |
| 292          | 95               | 230           | MODAL              | Mode             | 10.000000           | -5537.2718     | -14714.8696    | -78.228           |
| 292          | 95               | 234           | MODAL              | Mode             | 10.000000           | -9393.4012     | -17595.6306    | -79.096           |
| 292          | 95               | 233           | MODAL              | Mode             | 11.000000           | 154018.1885    | 62082.0909     | -0.039            |
| 292          | 95               | 228           | MODAL              | Mode             | 11.000000           | 161516.1436    | 62995.8532     | 0.278             |
| 292          | 95               | 230           | MODAL              | Mode             | 11.000000           | 161887.9536    | 64717.1068     | 0.135             |
| 292          | 95               | 234           | MODAL              | Mode             | 11.000000           | 154016.3902    | 63820.2682     | -0.232            |
| 292          | 95               | 233           | MODAL              | Mode             | 12.000000           | -33171.4380    | -46335.5910    | 47.565            |
| 292          | 95               | 228           | MODAL              | Mode             | 12.000000           | -21007.7344    | -41909.2655    | 27.955            |
| 292          | 95               | 230           | MODAL              | Mode             | 12.000000           | -16063.8236    | -30301.2428    | 42.783            |
| 292          | 95               | 234           | MODAL              | Mode             | 12.000000           | -23490.1357    | -39023.5006    | 70.053            |
| 292          | 95               | 233           | locomotoras        |                  |                     | 141.2536       | 55.8910        | -88.172           |
| 292          | 95               | 228           | locomotoras        |                  |                     | 134.0206       | 62.0846        | -89.433           |
| 292          | 95               | 230           | locomotoras        |                  |                     | 138.4143       | 65.6687        | -88.690           |
| 292          | 95               | 234           | locomotoras        |                  |                     | 143.4008       | 54.7627        | -87.420           |
| 293          | 96               | 234           | MODAL              | Mode             | 1.000000            | 1677.7269      | -193.5395      | 89.645            |
| 293          | 96               | 230           | MODAL              | Mode             | 1.000000            | 1915.9122      | -638.4861      | -89.621           |
| 293          | 96               | 20            | MODAL              | Mode             | 1.000000            | 1514.3167      | -705.8632      | 88.332            |
| 293          | 96               | 26            | MODAL              | Mode             | 1.000000            | 1278.9173      | -263.6813      | 86.523            |
| 293          | 96               | 234           | MODAL              | Mode             | 2.000000            | -7304.3338     | -39082.9884    | 2.287             |
| 293          | 96               | 230           | MODAL              | Mode             | 2.000000            | -6874.9677     | -39022.7418    | 2.539             |
| 293          | 96               | 20            | MODAL              | Mode             | 2.000000            | -6767.8161     | -39159.8378    | 2.572             |
| 293          | 96               | 26            | MODAL              | Mode             | 2.000000            | -7328.4962     | -39217.4357    | 2.300             |
| 293          | 96               | 234           | MODAL              | Mode             | 3.000000            | 23229.1866     | 5095.8302      | -87.532           |
| 293          | 96               | 230           | MODAL              | Mode             | 3.000000            | 23064.0927     | 4799.4550      | -87.236           |
| 293          | 96               | 20            | MODAL              | Mode             | 3.000000            | 23163.4483     | 4721.3146      | -87.154           |
| 293          | 96               | 26            | MODAL              | Mode             | 3.000000            | 23327.7104     | 5121.6006      | -87.475           |
| 293          | 96               | 234           | MODAL              | Mode             | 4.000000            | 27251.3844     | 10701.3433     | -81.195           |
| 293          | 96               | 230           | MODAL              | Mode             | 4.000000            | 32794.0638     | 11223.1661     | -82.144           |
| 293          | 96               | 20            | MODAL              | Mode             | 4.000000            | 32461.4739     | 11058.0674     | -83.698           |
| 293          | 96               | 26            | MODAL              | Mode             | 4.000000            | 26880.6715     | 10670.9894     | -83.223           |
| 293          | 96               | 234           | MODAL              | Mode             | 5.000000            | 157.7594       | -1139.2837     | 0.709             |
| 293          | 96               | 230           | MODAL              | Mode             | 5.000000            | -349.2611      | -1595.5054     | -3.233            |
| 293          | 96               | 20            | MODAL              | Mode             | 5.000000            | -487.9526      | -2152.0022     | -1.775            |
| 293          | 96               | 26            | MODAL              | Mode             | 5.000000            | 20.4610        | -1713.5470     | 1.206             |
| 293          | 96               | 234           | MODAL              | Mode             | 6.000000            | 18686.6742     | 7365.5362      | -79.936           |
| 293          | 96               | 230           | MODAL              | Mode             | 6.000000            | 22539.6607     | 8019.9140      | -81.098           |
| 293          | 96               | 20            | MODAL              | Mode             | 6.000000            | 22605.1838     | 7959.9092      | -82.674           |
| 293          | 96               | 26            | MODAL              | Mode             | 6.000000            | 18716.0755     | 7414.7785      | -81.961           |
| 293          | 96               | 234           | MODAL              | Mode             | 7.000000            | 7574.9435      | 3455.7316      | -11.616           |
| 293          | 96               | 230           | MODAL              | Mode             | 7.000000            | 7128.4864      | 2186.0735      | -10.231           |
| 293          | 96               | 20            | MODAL              | Mode             | 7.000000            | 7198.7616      | 2317.8799      | -12.345           |
| 293          | 96               | 26            | MODAL              | Mode             | 7.000000            | 7670.5980      | 3540.3383      | -13.830           |
| 293          | 96               | 234           | MODAL              | Mode             | 8.000000            | -219.4440      | -2783.5226     | -62.044           |
| 293          | 96               | 230           | MODAL              | Mode             | 8.000000            | -686.1846      | -4060.9632     | -66.634           |
| 293          | 96               | 20            | MODAL              | Mode             | 8.000000            | -1583.4212     | -4343.2715     | -62.013           |
| 293          | 96               | 26            | MODAL              | Mode             | 8.000000            | -1082.3442     | -3145.2583     | -54.410           |
| 293          | 96               | 234           | MODAL              | Mode             | 9.000000            | -29551.9243    | -58500.4394    | -86.466           |
| 293          | 96               | 230           | MODAL              | Mode             | 9.000000            | -18069.5721    | -49093.0528    | -85.360           |
| 293          | 96               | 20            | MODAL              | Mode             | 9.000000            | -18205.3545    | -49851.3712    | -87.149           |
| 293          | 96               | 26            | MODAL              | Mode             | 9.000000            | -29598.9696    | -59338.5746    | -88.336           |
| 293          | 96               | 234           | MODAL              | Mode             | 10.000000           | -9758.8542     | -17541.5611    | -81.071           |
| 293          | 96               | 230           | MODAL              | Mode             | 10.000000           | -5956.7675     | -14644.0423    | -80.174           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 293          | 96               | 20            | MODAL              | Mode             | 10.000000           | -5987.7482     | -14826.6717    | -82.393           |
| 293          | 96               | 26            | MODAL              | Mode             | 10.000000           | -9781.9940     | -17761.1200    | -83.519           |
| 293          | 96               | 234           | MODAL              | Mode             | 11.000000           | 153884.7343    | 63171.4190     | 0.054             |
| 293          | 96               | 230           | MODAL              | Mode             | 11.000000           | 161887.4115    | 64717.1533     | 0.091             |
| 293          | 96               | 20            | MODAL              | Mode             | 11.000000           | 161923.1318    | 66354.1827     | -0.044            |
| 293          | 96               | 26            | MODAL              | Mode             | 11.000000           | 153587.7403    | 64873.7221     | -0.127            |
| 293          | 96               | 234           | MODAL              | Mode             | 12.000000           | -23115.1416    | -40084.3242    | 66.241            |
| 293          | 96               | 230           | MODAL              | Mode             | 12.000000           | -15113.0512    | -32045.2876    | 42.238            |
| 293          | 96               | 20            | MODAL              | Mode             | 12.000000           | -6973.3623     | -23357.2716    | 61.810            |
| 293          | 96               | 26            | MODAL              | Mode             | 12.000000           | -10924.8196    | -35061.6648    | 78.706            |
| 293          | 96               | 234           | locomotoras        |                  |                     | 143.9314       | 54.8321        | -87.180           |
| 293          | 96               | 230           | locomotoras        |                  |                     | 139.1510       | 65.8092        | -88.517           |
| 293          | 96               | 20            | locomotoras        |                  |                     | 145.8399       | 70.7581        | -87.918           |
| 293          | 96               | 26            | locomotoras        |                  |                     | 146.7474       | 52.8026        | -86.574           |
| 346          | 141              | 7             | MODAL              | Mode             | 1.000000            | 1183.0596      | -3206.0093     | -4.943            |
| 346          | 141              | 267           | MODAL              | Mode             | 1.000000            | -94.0607       | -2031.9306     | -9.290            |
| 346          | 141              | 268           | MODAL              | Mode             | 1.000000            | -153.8695      | -2312.0200     | -6.395            |
| 346          | 141              | 204           | MODAL              | Mode             | 1.000000            | 1145.1463      | -3498.2088     | -3.779            |
| 346          | 141              | 7             | MODAL              | Mode             | 2.000000            | -121.5754      | -30410.3938    | 6.793             |
| 346          | 141              | 267           | MODAL              | Mode             | 2.000000            | -4653.0378     | -29999.5747    | 4.595             |
| 346          | 141              | 268           | MODAL              | Mode             | 2.000000            | -4527.0369     | -29774.1732    | 4.628             |
| 346          | 141              | 204           | MODAL              | Mode             | 2.000000            | -381.4775      | -29967.4755    | 6.814             |
| 346          | 141              | 7             | MODAL              | Mode             | 3.000000            | 17606.1438     | 254.6913       | -82.542           |
| 346          | 141              | 267           | MODAL              | Mode             | 3.000000            | 17809.9269     | 3240.1032      | -85.082           |
| 346          | 141              | 268           | MODAL              | Mode             | 3.000000            | 17641.1502     | 3124.7312      | -85.086           |
| 346          | 141              | 204           | MODAL              | Mode             | 3.000000            | 17261.0150     | 447.5437       | -82.538           |
| 346          | 141              | 7             | MODAL              | Mode             | 4.000000            | -144.9436      | -48104.0973    | 10.376            |
| 346          | 141              | 267           | MODAL              | Mode             | 4.000000            | -9870.5746     | -32781.0541    | 11.232            |
| 346          | 141              | 268           | MODAL              | Mode             | 4.000000            | -9681.9824     | -32976.8160    | 12.075            |
| 346          | 141              | 204           | MODAL              | Mode             | 4.000000            | -667.9817      | -47751.1683    | 10.875            |
| 346          | 141              | 7             | MODAL              | Mode             | 5.000000            | 1740.9591      | 617.1494       | 72.233            |
| 346          | 141              | 267           | MODAL              | Mode             | 5.000000            | 1784.0883      | -1307.8705     | 87.495            |
| 346          | 141              | 268           | MODAL              | Mode             | 5.000000            | 1386.9005      | -1470.1746     | 86.343            |
| 346          | 141              | 204           | MODAL              | Mode             | 5.000000            | 1406.1894      | 481.0627       | 59.919            |
| 346          | 141              | 7             | MODAL              | Mode             | 6.000000            | -878.8566      | -32555.5115    | 11.350            |
| 346          | 141              | 267           | MODAL              | Mode             | 6.000000            | -6188.8441     | -22646.0828    | 11.622            |
| 346          | 141              | 268           | MODAL              | Mode             | 6.000000            | -5960.8728     | -22508.3884    | 12.391            |
| 346          | 141              | 204           | MODAL              | Mode             | 6.000000            | -1274.5815     | -31934.2239    | 11.906            |
| 346          | 141              | 7             | MODAL              | Mode             | 7.000000            | 2148.9460      | -6579.7736     | -11.075           |
| 346          | 141              | 267           | MODAL              | Mode             | 7.000000            | 4989.7632      | -1109.1409     | -12.734           |
| 346          | 141              | 268           | MODAL              | Mode             | 7.000000            | 4955.4788      | -1230.7733     | -11.090           |
| 346          | 141              | 204           | MODAL              | Mode             | 7.000000            | 2022.2860      | -6724.0048     | -10.139           |
| 346          | 141              | 7             | MODAL              | Mode             | 8.000000            | 1893.0362      | 849.4945       | -21.854           |
| 346          | 141              | 267           | MODAL              | Mode             | 8.000000            | 1970.9988      | 1137.0575      | 27.442            |
| 346          | 141              | 268           | MODAL              | Mode             | 8.000000            | 1827.6143      | 469.1457       | 19.413            |
| 346          | 141              | 204           | MODAL              | Mode             | 8.000000            | 1815.1782      | 281.4678       | -9.955            |
| 346          | 141              | 7             | MODAL              | Mode             | 9.000000            | 61579.0957     | 363.8235       | -76.216           |
| 346          | 141              | 267           | MODAL              | Mode             | 9.000000            | 7113.5302      | -24951.3903    | -75.885           |
| 346          | 141              | 268           | MODAL              | Mode             | 9.000000            | 7621.7928      | -24735.5067    | -73.991           |
| 346          | 141              | 204           | MODAL              | Mode             | 9.000000            | 61480.3116     | 1038.3150      | -75.093           |
| 346          | 141              | 7             | MODAL              | Mode             | 10.000000           | 20380.2964     | 494.8649       | -72.758           |
| 346          | 141              | 267           | MODAL              | Mode             | 10.000000           | 2599.8781      | -7793.9064     | -70.945           |
| 346          | 141              | 268           | MODAL              | Mode             | 10.000000           | 2721.7864      | -7801.9557     | -69.038           |
| 346          | 141              | 204           | MODAL              | Mode             | 10.000000           | 20161.9425     | 689.4762       | -71.462           |
| 346          | 141              | 7             | MODAL              | Mode             | 11.000000           | 52354.2059     | -3737.6288     | -86.430           |
| 346          | 141              | 267           | MODAL              | Mode             | 11.000000           | -41091.6920    | -130634.789    | -87.133           |
| 346          | 141              | 268           | MODAL              | Mode             | 11.000000           | -40959.6250    | -129135.078    | -86.188           |
| 346          | 141              | 204           | MODAL              | Mode             | 11.000000           | 53441.5016     | -2674.7875     | -84.837           |
| 346          | 141              | 7             | MODAL              | Mode             | 12.000000           | 7136.9287      | -22931.6091    | 89.085            |
| 346          | 141              | 267           | MODAL              | Mode             | 12.000000           | 41525.4944     | 16401.1540     | -0.612            |
| 346          | 141              | 268           | MODAL              | Mode             | 12.000000           | 43181.9077     | 26288.6466     | -5.048            |
| 346          | 141              | 204           | MODAL              | Mode             | 12.000000           | 16161.2872     | -22616.0600    | -88.876           |
| 346          | 141              | 7             | locomotoras        |                  |                     | 73.6870        | 0.1028         | -85.215           |
| 346          | 141              | 267           | locomotoras        |                  |                     | 93.8277        | 20.5776        | -86.824           |
| 346          | 141              | 268           | locomotoras        |                  |                     | 94.0479        | 20.6186        | -87.121           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 346          | 141              | 204           | locomotoras        |                  |                     | 72.1299        | -0.0143        | -85.581           |
| 347          | 142              | 267           | MODAL              | Mode             | 1.000000            | 956.3376       | -2245.0808     | -2.511            |
| 347          | 142              | 14            | MODAL              | Mode             | 1.000000            | 148.4277       | -1710.3317     | -4.995            |
| 347          | 142              | 203           | MODAL              | Mode             | 1.000000            | 78.6875        | -2099.2939     | -2.034            |
| 347          | 142              | 268           | MODAL              | Mode             | 1.000000            | 897.7397       | -2637.2735     | -0.906            |
| 347          | 142              | 267           | MODAL              | Mode             | 2.000000            | -4945.8798     | -38994.7782    | 3.802             |
| 347          | 142              | 14            | MODAL              | Mode             | 2.000000            | -6673.8300     | -39091.9403    | 3.097             |
| 347          | 142              | 203           | MODAL              | Mode             | 2.000000            | -6620.0554     | -38918.2957    | 3.093             |
| 347          | 142              | 268           | MODAL              | Mode             | 2.000000            | -5109.5944     | -38772.4460    | 3.772             |
| 347          | 142              | 267           | MODAL              | Mode             | 3.000000            | 23159.8379     | 3558.9019      | -85.750           |
| 347          | 142              | 14            | MODAL              | Mode             | 3.000000            | 23432.8180     | 4758.3939      | -86.552           |
| 347          | 142              | 203           | MODAL              | Mode             | 3.000000            | 23307.0848     | 4706.0819      | -86.587           |
| 347          | 142              | 268           | MODAL              | Mode             | 3.000000            | 22995.2516     | 3677.9654      | -85.816           |
| 347          | 142              | 267           | MODAL              | Mode             | 4.000000            | -9714.2476     | -42601.7242    | 7.674             |
| 347          | 142              | 14            | MODAL              | Mode             | 4.000000            | -11629.8896    | -32451.8079    | 8.454             |
| 347          | 142              | 203           | MODAL              | Mode             | 4.000000            | -11605.6454    | -32802.6593    | 9.897             |
| 347          | 142              | 268           | MODAL              | Mode             | 4.000000            | -9989.8086     | -42864.3694    | 8.614             |
| 347          | 142              | 267           | MODAL              | Mode             | 5.000000            | 2661.1609      | 379.5908       | 85.838            |
| 347          | 142              | 14            | MODAL              | Mode             | 5.000000            | 1987.4948      | -424.5151      | 89.990            |
| 347          | 142              | 203           | MODAL              | Mode             | 5.000000            | 1435.5464      | -567.1161      | 89.200            |
| 347          | 142              | 268           | MODAL              | Mode             | 5.000000            | 2136.3465      | 246.1961       | 84.131            |
| 347          | 142              | 267           | MODAL              | Mode             | 6.000000            | -7162.2488     | -29682.9073    | 8.457             |
| 347          | 142              | 14            | MODAL              | Mode             | 6.000000            | -7918.8670     | -22757.4598    | 9.427             |
| 347          | 142              | 203           | MODAL              | Mode             | 6.000000            | -7822.6630     | -22695.7628    | 10.821            |
| 347          | 142              | 268           | MODAL              | Mode             | 6.000000            | -7312.4620     | -29532.1236    | 9.403             |
| 347          | 142              | 267           | MODAL              | Mode             | 7.000000            | 5625.1197      | -1264.9404     | -11.553           |
| 347          | 142              | 14            | MODAL              | Mode             | 7.000000            | 6721.3368      | 1716.1859      | -14.126           |
| 347          | 142              | 203           | MODAL              | Mode             | 7.000000            | 6610.3228      | 1617.0090      | -11.940           |
| 347          | 142              | 268           | MODAL              | Mode             | 7.000000            | 5553.2351      | -1437.0690     | -9.737            |
| 347          | 142              | 267           | MODAL              | Mode             | 8.000000            | 4618.0261      | 1899.0258      | 25.107            |
| 347          | 142              | 14            | MODAL              | Mode             | 8.000000            | 3320.1128      | 1305.3958      | 36.629            |
| 347          | 142              | 203           | MODAL              | Mode             | 8.000000            | 2983.2403      | 466.4398       | 28.809            |
| 347          | 142              | 268           | MODAL              | Mode             | 8.000000            | 4449.8284      | 1045.6310      | 21.125            |
| 347          | 142              | 267           | MODAL              | Mode             | 9.000000            | 11512.0271     | -25960.8077    | -82.603           |
| 347          | 142              | 14            | MODAL              | Mode             | 9.000000            | -15810.6449    | -45105.6068    | -84.632           |
| 347          | 142              | 203           | MODAL              | Mode             | 9.000000            | -15622.7147    | -44309.2024    | -82.261           |
| 347          | 142              | 268           | MODAL              | Mode             | 9.000000            | 11910.4488     | -25249.2546    | -80.739           |
| 347          | 142              | 267           | MODAL              | Mode             | 10.000000           | 3968.4357      | -7428.8722     | -77.771           |
| 347          | 142              | 14            | MODAL              | Mode             | 10.000000           | -5073.2361     | -13429.1758    | -78.657           |
| 347          | 142              | 203           | MODAL              | Mode             | 10.000000           | -4999.3796     | -13262.0156    | -75.806           |
| 347          | 142              | 268           | MODAL              | Mode             | 10.000000           | 4033.8944      | -7271.8781     | -75.674           |
| 347          | 142              | 267           | MODAL              | Mode             | 11.000000           | -45592.5370    | -138143.204    | 89.587            |
| 347          | 142              | 14            | MODAL              | Mode             | 11.000000           | -65745.4436    | -161937.203    | 89.391            |
| 347          | 142              | 203           | MODAL              | Mode             | 11.000000           | -64360.7172    | -161074.706    | 89.916            |
| 347          | 142              | 268           | MODAL              | Mode             | 11.000000           | -45116.3156    | -137156.133    | -89.954           |
| 347          | 142              | 267           | MODAL              | Mode             | 12.000000           | 16251.2052     | 575.0277       | -50.199           |
| 347          | 142              | 14            | MODAL              | Mode             | 12.000000           | 42047.6169     | 13883.1470     | -9.793            |
| 347          | 142              | 203           | MODAL              | Mode             | 12.000000           | 46178.2089     | 26252.5056     | -19.591           |
| 347          | 142              | 268           | MODAL              | Mode             | 12.000000           | 27495.8658     | 4536.4439      | -63.189           |
| 347          | 142              | 267           | locomotoras        |                  |                     | 121.3910       | 22.2216        | -87.864           |
| 347          | 142              | 14            | locomotoras        |                  |                     | 144.8811       | 61.0218        | -88.573           |
| 347          | 142              | 203           | locomotoras        |                  |                     | 138.7589       | 58.7144        | -89.360           |
| 347          | 142              | 268           | locomotoras        |                  |                     | 121.8152       | 22.4156        | -88.245           |
| 348          | 143              | 204           | MODAL              | Mode             | 1.000000            | 1145.4868      | -3499.5537     | -3.826            |
| 348          | 143              | 268           | MODAL              | Mode             | 1.000000            | -151.6024      | -2314.0568     | -6.651            |
| 348          | 143              | 269           | MODAL              | Mode             | 1.000000            | -202.6772      | -2598.5351     | -4.304            |
| 348          | 143              | 206           | MODAL              | Mode             | 1.000000            | 1110.6907      | -3789.7667     | -2.794            |
| 348          | 143              | 204           | MODAL              | Mode             | 2.000000            | -338.1332      | -29911.5078    | 7.032             |
| 348          | 143              | 268           | MODAL              | Mode             | 2.000000            | -4509.4255     | -29722.3637    | 4.715             |
| 348          | 143              | 269           | MODAL              | Mode             | 2.000000            | -4377.8664     | -29420.6742    | 4.725             |
| 348          | 143              | 206           | MODAL              | Mode             | 2.000000            | -589.2640      | -29392.4984    | 7.045             |
| 348          | 143              | 204           | MODAL              | Mode             | 3.000000            | 17220.8525     | 417.6983       | -82.299           |
| 348          | 143              | 268           | MODAL              | Mode             | 3.000000            | 17602.6953     | 3113.7595      | -85.019           |
| 348          | 143              | 269           | MODAL              | Mode             | 3.000000            | 17372.6891     | 2992.7696      | -85.055           |
| 348          | 143              | 206           | MODAL              | Mode             | 3.000000            | 16813.8402     | 603.2118       | -82.307           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 348          | 143              | 204           | MODAL              | Mode             | 4.000000            | -488.7143      | -47834.5249    | 11.368            |
| 348          | 143              | 268           | MODAL              | Mode             | 4.000000            | -9527.4460     | -33120.5062    | 12.879            |
| 348          | 143              | 269           | MODAL              | Mode             | 4.000000            | -9304.2567     | -33247.6392    | 13.648            |
| 348          | 143              | 206           | MODAL              | Mode             | 4.000000            | -988.7464      | -47380.5693    | 11.881            |
| 348          | 143              | 204           | MODAL              | Mode             | 5.000000            | 1408.0172      | 501.6184       | 60.810            |
| 348          | 143              | 268           | MODAL              | Mode             | 5.000000            | 1393.7692      | -1461.9600     | 87.389            |
| 348          | 143              | 269           | MODAL              | Mode             | 5.000000            | 1000.1398      | -1629.9588     | 86.119            |
| 348          | 143              | 206           | MODAL              | Mode             | 5.000000            | 1178.4726      | 254.4819       | 45.832            |
| 348          | 143              | 204           | MODAL              | Mode             | 6.000000            | -1136.3041     | -32012.6617    | 12.442            |
| 348          | 143              | 268           | MODAL              | Mode             | 6.000000            | -5846.5889     | -22621.4071    | 13.211            |
| 348          | 143              | 269           | MODAL              | Mode             | 6.000000            | -5592.2875     | -22420.8971    | 13.928            |
| 348          | 143              | 206           | MODAL              | Mode             | 6.000000            | -1510.3951     | -31302.9591    | 13.037            |
| 348          | 143              | 204           | MODAL              | Mode             | 7.000000            | 1979.3033      | -6780.7136     | -9.621            |
| 348          | 143              | 268           | MODAL              | Mode             | 7.000000            | 4909.8375      | -1273.6246     | -10.309           |
| 348          | 143              | 269           | MODAL              | Mode             | 7.000000            | 4893.5229      | -1414.2556     | -8.711            |
| 348          | 143              | 206           | MODAL              | Mode             | 7.000000            | 1860.2919      | -6922.3737     | -8.716            |
| 348          | 143              | 204           | MODAL              | Mode             | 8.000000            | 1833.6175      | 224.7088       | -12.098           |
| 348          | 143              | 268           | MODAL              | Mode             | 8.000000            | 1773.7959      | 509.4293       | 16.209            |
| 348          | 143              | 269           | MODAL              | Mode             | 8.000000            | 1666.9957      | -186.0070      | 13.624            |
| 348          | 143              | 206           | MODAL              | Mode             | 8.000000            | 1802.5221      | -383.5743      | -6.143            |
| 348          | 143              | 204           | MODAL              | Mode             | 9.000000            | 62647.8713     | 543.2237       | -74.195           |
| 348          | 143              | 268           | MODAL              | Mode             | 9.000000            | 8788.0893      | -25114.7134    | -72.779           |
| 348          | 143              | 269           | MODAL              | Mode             | 9.000000            | 9378.6344      | -24989.0596    | -71.044           |
| 348          | 143              | 206           | MODAL              | Mode             | 9.000000            | 62500.2050     | 1143.0972      | -73.063           |
| 348          | 143              | 204           | MODAL              | Mode             | 10.000000           | 20587.2942     | 475.2125       | -70.605           |
| 348          | 143              | 268           | MODAL              | Mode             | 10.000000           | 3140.5388      | -7970.9707     | -68.012           |
| 348          | 143              | 269           | MODAL              | Mode             | 10.000000           | 3282.9082      | -8004.1244     | -66.294           |
| 348          | 143              | 206           | MODAL              | Mode             | 10.000000           | 20348.4583     | 637.6055       | -69.275           |
| 348          | 143              | 204           | MODAL              | Mode             | 11.000000           | 56164.6686     | -2637.7265     | -82.983           |
| 348          | 143              | 268           | MODAL              | Mode             | 11.000000           | -39060.6033    | -128920.886    | -85.604           |
| 348          | 143              | 269           | MODAL              | Mode             | 11.000000           | -38797.7245    | -127321.039    | -84.624           |
| 348          | 143              | 206           | MODAL              | Mode             | 11.000000           | 57317.5655     | -1667.6719     | -81.446           |
| 348          | 143              | 204           | MODAL              | Mode             | 12.000000           | 15507.3603     | -22729.2452    | 89.812            |
| 348          | 143              | 268           | MODAL              | Mode             | 12.000000           | 42940.9804     | 25852.1184     | -0.711            |
| 348          | 143              | 269           | MODAL              | Mode             | 12.000000           | 44504.4782     | 35432.0889     | -8.980            |
| 348          | 143              | 206           | MODAL              | Mode             | 12.000000           | 24228.5434     | -22279.8762    | -88.729           |
| 348          | 143              | 204           | locomotoras        |                  |                     | 71.8547        | -0.0420        | -85.695           |
| 348          | 143              | 268           | locomotoras        |                  |                     | 93.2109        | 20.4932        | -87.399           |
| 348          | 143              | 269           | locomotoras        |                  |                     | 92.7905        | 20.0388        | -87.725           |
| 348          | 143              | 206           | locomotoras        |                  |                     | 70.2647        | 0.2120         | -86.118           |
| 349          | 144              | 268           | MODAL              | Mode             | 1.000000            | 898.1900       | -2637.4262     | -1.093            |
| 349          | 144              | 203           | MODAL              | Mode             | 1.000000            | 81.0746        | -2093.6662     | -2.395            |
| 349          | 144              | 205           | MODAL              | Mode             | 1.000000            | 18.7045        | -2485.9219     | -0.165            |
| 349          | 144              | 269           | MODAL              | Mode             | 1.000000            | 844.6852       | -3028.5738     | 0.244             |
| 349          | 144              | 268           | MODAL              | Mode             | 2.000000            | -5087.2759     | -38705.0416    | 3.868             |
| 349          | 144              | 203           | MODAL              | Mode             | 2.000000            | -6606.6190     | -38872.6859    | 3.153             |
| 349          | 144              | 205           | MODAL              | Mode             | 2.000000            | -6558.3740     | -38601.5205    | 3.125             |
| 349          | 144              | 269           | MODAL              | Mode             | 2.000000            | -5216.0367     | -38377.8514    | 3.821             |
| 349          | 144              | 268           | MODAL              | Mode             | 3.000000            | 22946.0136     | 3663.3222      | -85.731           |
| 349          | 144              | 203           | MODAL              | Mode             | 3.000000            | 23272.1625     | 4696.9059      | -86.538           |
| 349          | 144              | 205           | MODAL              | Mode             | 3.000000            | 23067.8646     | 4647.1728      | -86.605           |
| 349          | 144              | 269           | MODAL              | Mode             | 3.000000            | 22697.2442     | 3752.8417      | -85.821           |
| 349          | 144              | 268           | MODAL              | Mode             | 4.000000            | -9834.6908     | -43005.4690    | 9.429             |
| 349          | 144              | 203           | MODAL              | Mode             | 4.000000            | -11455.2481    | -33123.3959    | 11.113            |
| 349          | 144              | 205           | MODAL              | Mode             | 4.000000            | -11391.5451    | -33438.5864    | 12.429            |
| 349          | 144              | 269           | MODAL              | Mode             | 4.000000            | -10027.1140    | -43182.9493    | 10.340            |
| 349          | 144              | 268           | MODAL              | Mode             | 5.000000            | 2140.9160      | 261.1210       | 86.240            |
| 349          | 144              | 203           | MODAL              | Mode             | 5.000000            | 1461.8777      | -563.4705      | -88.322           |
| 349          | 144              | 205           | MODAL              | Mode             | 5.000000            | 910.1582       | -705.2415      | -88.845           |
| 349          | 144              | 269           | MODAL              | Mode             | 5.000000            | 1617.1239      | 120.7587       | 84.285            |
| 349          | 144              | 268           | MODAL              | Mode             | 6.000000            | -7190.2292     | -29652.7213    | 10.278            |
| 349          | 144              | 203           | MODAL              | Mode             | 6.000000            | -7698.8081     | -22946.3581    | 12.093            |
| 349          | 144              | 205           | MODAL              | Mode             | 6.000000            | -7574.4887     | -22845.3872    | 13.420            |
| 349          | 144              | 269           | MODAL              | Mode             | 6.000000            | -7271.1607     | -29424.1815    | 11.226            |
| 349          | 144              | 268           | MODAL              | Mode             | 7.000000            | 5497.1562      | -1495.3622     | -8.781            |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 349          | 144              | 203           | MODAL              | Mode             | 7.000000            | 6552.5115      | 1581.2638      | -10.705           |
| 349          | 144              | 205           | MODAL              | Mode             | 7.000000            | 6453.4793      | 1451.5605      | -8.472            |
| 349          | 144              | 269           | MODAL              | Mode             | 7.000000            | 5442.8446      | -1691.5955     | -7.001            |
| 349          | 144              | 268           | MODAL              | Mode             | 8.000000            | 4378.3180      | 1099.6485      | 19.727            |
| 349          | 144              | 203           | MODAL              | Mode             | 8.000000            | 2908.6105      | 600.9062       | 27.736            |
| 349          | 144              | 205           | MODAL              | Mode             | 8.000000            | 2645.1796      | -305.9933      | 22.655            |
| 349          | 144              | 269           | MODAL              | Mode             | 8.000000            | 4236.0389      | 219.6544       | 17.311            |
| 349          | 144              | 268           | MODAL              | Mode             | 9.000000            | 13198.3830     | -25519.9167    | -79.027           |
| 349          | 144              | 203           | MODAL              | Mode             | 9.000000            | -14368.0244    | -44443.4198    | -80.372           |
| 349          | 144              | 205           | MODAL              | Mode             | 9.000000            | -13970.4595    | -43728.6492    | -78.003           |
| 349          | 144              | 269           | MODAL              | Mode             | 9.000000            | 13710.5739     | -24936.3460    | -77.205           |
| 349          | 144              | 268           | MODAL              | Mode             | 10.000000           | 4515.8134      | -7431.0248     | -74.023           |
| 349          | 144              | 203           | MODAL              | Mode             | 10.000000           | -4528.2057     | -13379.6393    | -73.989           |
| 349          | 144              | 205           | MODAL              | Mode             | 10.000000           | -4375.6937     | -13244.8579    | -71.295           |
| 349          | 144              | 269           | MODAL              | Mode             | 10.000000           | 4618.9526      | -7321.7442     | -72.013           |
| 349          | 144              | 268           | MODAL              | Mode             | 11.000000           | -42821.1674    | -136720.063    | -89.180           |
| 349          | 144              | 203           | MODAL              | Mode             | 11.000000           | -64142.9433    | -161030.918    | -89.964           |
| 349          | 144              | 205           | MODAL              | Mode             | 11.000000           | -62661.8265    | -159896.989    | -89.429           |
| 349          | 144              | 269           | MODAL              | Mode             | 11.000000           | -42246.9277    | -135470.709    | -88.703           |
| 349          | 144              | 268           | MODAL              | Mode             | 12.000000           | 25785.5614     | 5371.1727      | -64.838           |
| 349          | 144              | 203           | MODAL              | Mode             | 12.000000           | 45170.7187     | 26409.9129     | -15.702           |
| 349          | 144              | 205           | MODAL              | Mode             | 12.000000           | 50754.8168     | 36996.3694     | -34.410           |
| 349          | 144              | 269           | MODAL              | Mode             | 12.000000           | 38108.0490     | 8056.9740      | -70.841           |
| 349          | 144              | 268           | locomotoras        |                  |                     | 120.7604       | 22.2265        | -88.359           |
| 349          | 144              | 203           | locomotoras        |                  |                     | 138.0246       | 58.5812        | -89.569           |
| 349          | 144              | 205           | locomotoras        |                  |                     | 133.6406       | 56.1128        | 89.918            |
| 349          | 144              | 269           | locomotoras        |                  |                     | 120.4643       | 23.0753        | -88.692           |
| 354          | 149              | 222           | MODAL              | Mode             | 1.000000            | 1268.8471      | -2614.2284     | -7.640            |
| 354          | 149              | 270           | MODAL              | Mode             | 1.000000            | 58.6346        | -1490.6617     | -16.743           |
| 354          | 149              | 271           | MODAL              | Mode             | 1.000000            | -30.0664       | -1750.9551     | -12.259           |
| 354          | 149              | 224           | MODAL              | Mode             | 1.000000            | 1223.1673      | -2908.0281     | -6.135            |
| 354          | 149              | 222           | MODAL              | Mode             | 2.000000            | 322.7431       | -31182.1271    | 6.313             |
| 354          | 149              | 270           | MODAL              | Mode             | 2.000000            | -4900.4629     | -30322.6726    | 4.302             |
| 354          | 149              | 271           | MODAL              | Mode             | 2.000000            | -4801.9648     | -30254.9448    | 4.381             |
| 354          | 149              | 224           | MODAL              | Mode             | 2.000000            | 59.3344        | -30895.0723    | 6.354             |
| 354          | 149              | 222           | MODAL              | Mode             | 3.000000            | 18192.0178     | -79.8699       | -83.024           |
| 354          | 149              | 270           | MODAL              | Mode             | 3.000000            | 18038.1339     | 3457.2898      | -85.275           |
| 354          | 149              | 271           | MODAL              | Mode             | 3.000000            | 17996.2873     | 3366.4271      | -85.217           |
| 354          | 149              | 224           | MODAL              | Mode             | 3.000000            | 17973.9861     | 115.8354       | -82.997           |
| 354          | 149              | 222           | MODAL              | Mode             | 4.000000            | 632.1050       | -48389.2707    | 8.416             |
| 354          | 149              | 270           | MODAL              | Mode             | 4.000000            | -10362.5410    | -31972.1939    | 7.477             |
| 354          | 149              | 271           | MODAL              | Mode             | 4.000000            | -10272.2928    | -32293.0651    | 8.506             |
| 354          | 149              | 224           | MODAL              | Mode             | 4.000000            | 76.9836        | -48237.0251    | 8.899             |
| 354          | 149              | 222           | MODAL              | Mode             | 5.000000            | 2557.8429      | 689.7307       | 83.076            |
| 354          | 149              | 270           | MODAL              | Mode             | 5.000000            | 2574.1979      | -1015.2191     | 87.574            |
| 354          | 149              | 271           | MODAL              | Mode             | 5.000000            | 2173.5679      | -1166.4610     | 86.621            |
| 354          | 149              | 224           | MODAL              | Mode             | 5.000000            | 2130.8717      | 656.9536       | 78.176            |
| 354          | 149              | 222           | MODAL              | Mode             | 6.000000            | -290.3318      | -33410.2733    | 9.257             |
| 354          | 149              | 270           | MODAL              | Mode             | 6.000000            | -6730.6635     | -22555.3580    | 8.076             |
| 354          | 149              | 271           | MODAL              | Mode             | 6.000000            | -6577.1306     | -22538.5221    | 8.981             |
| 354          | 149              | 224           | MODAL              | Mode             | 6.000000            | -714.9656      | -32967.9728    | 9.756             |
| 354          | 149              | 222           | MODAL              | Mode             | 7.000000            | 2523.2809      | -6196.6959     | -14.069           |
| 354          | 149              | 270           | MODAL              | Mode             | 7.000000            | 5217.5012      | -859.6269      | -17.574           |
| 354          | 149              | 271           | MODAL              | Mode             | 7.000000            | 5150.9894      | -942.9760      | -15.927           |
| 354          | 149              | 224           | MODAL              | Mode             | 7.000000            | 2381.3432      | -6340.8569     | -13.091           |
| 354          | 149              | 222           | MODAL              | Mode             | 8.000000            | 2619.4301      | 1505.7256      | -65.416           |
| 354          | 149              | 270           | MODAL              | Mode             | 8.000000            | 2883.2176      | 1898.7087      | 67.162            |
| 354          | 149              | 271           | MODAL              | Mode             | 8.000000            | 2418.6475      | 1542.0020      | 48.866            |
| 354          | 149              | 224           | MODAL              | Mode             | 8.000000            | 2057.0177      | 1419.0055      | -45.348           |
| 354          | 149              | 222           | MODAL              | Mode             | 9.000000            | 59531.8128     | -448.8959      | -80.420           |
| 354          | 149              | 270           | MODAL              | Mode             | 9.000000            | 4357.3655      | -25214.5206    | -83.159           |
| 354          | 149              | 271           | MODAL              | Mode             | 9.000000            | 4634.1625      | -24776.5081    | -81.028           |
| 354          | 149              | 224           | MODAL              | Mode             | 9.000000            | 59510.8364     | 383.5336       | -79.324           |
| 354          | 149              | 222           | MODAL              | Mode             | 10.000000           | 19975.6099     | 366.1711       | -77.200           |
| 354          | 149              | 270           | MODAL              | Mode             | 10.000000           | 1679.0249      | -7606.9372     | -78.168           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 354          | 149              | 271           | MODAL              | Mode             | 10.000000           | 1733.3497      | -7546.0176     | -75.909           |
| 354          | 149              | 224           | MODAL              | Mode             | 10.000000           | 19794.4562     | 626.4206       | -75.980           |
| 354          | 149              | 222           | MODAL              | Mode             | 11.000000           | 45762.0120     | -7035.5767     | 86.101            |
| 354          | 149              | 270           | MODAL              | Mode             | 11.000000           | -44560.1495    | -133822.328    | 89.925            |
| 354          | 149              | 271           | MODAL              | Mode             | 11.000000           | -44715.2993    | -132593.274    | -89.204           |
| 354          | 149              | 224           | MODAL              | Mode             | 11.000000           | 46637.5587     | -5740.3043     | 87.736            |
| 354          | 149              | 222           | MODAL              | Mode             | 12.000000           | -10305.8091    | -22943.4854    | 84.098            |
| 354          | 149              | 270           | MODAL              | Mode             | 12.000000           | 38129.0696     | -2937.2578     | -0.449            |
| 354          | 149              | 271           | MODAL              | Mode             | 12.000000           | 40087.3985     | 7221.2689      | -2.696            |
| 354          | 149              | 224           | MODAL              | Mode             | 12.000000           | -978.6046      | -22839.7136    | -89.780           |
| 354          | 149              | 222           | locomotoras        |                  |                     | 75.7412        | -1.1986        | -84.618           |
| 354          | 149              | 270           | locomotoras        |                  |                     | 96.1006        | 22.4708        | -85.558           |
| 354          | 149              | 271           | locomotoras        |                  |                     | 94.5498        | 21.3347        | -85.848           |
| 354          | 149              | 224           | locomotoras        |                  |                     | 75.7858        | -0.3516        | -84.901           |
| 355          | 150              | 270           | MODAL              | Mode             | 1.000000            | 1088.9133      | -1461.2495     | -6.428            |
| 355          | 150              | 221           | MODAL              | Mode             | 1.000000            | 325.7540       | -969.8233      | -13.837           |
| 355          | 150              | 223           | MODAL              | Mode             | 1.000000            | 221.5887       | -1335.4207     | -8.079            |
| 355          | 150              | 271           | MODAL              | Mode             | 1.000000            | 1017.7382      | -1849.9075     | -3.984            |
| 355          | 150              | 270           | MODAL              | Mode             | 2.000000            | -4645.0640     | -39279.4382    | 3.651             |
| 355          | 150              | 221           | MODAL              | Mode             | 2.000000            | -6723.9112     | -39220.7630    | 2.941             |
| 355          | 150              | 223           | MODAL              | Mode             | 2.000000            | -6736.7894     | -39263.1208    | 2.979             |
| 355          | 150              | 271           | MODAL              | Mode             | 2.000000            | -4810.7563     | -39257.0583    | 3.662             |
| 355          | 150              | 270           | MODAL              | Mode             | 3.000000            | 23350.2458     | 3330.7582      | -85.807           |
| 355          | 150              | 221           | MODAL              | Mode             | 3.000000            | 23504.9425     | 4809.1105      | -86.633           |
| 355          | 150              | 223           | MODAL              | Mode             | 3.000000            | 23553.1922     | 4813.1752      | -86.615           |
| 355          | 150              | 271           | MODAL              | Mode             | 3.000000            | 23346.6665     | 3454.7271      | -85.821           |
| 355          | 150              | 270           | MODAL              | Mode             | 4.000000            | -9257.7255     | -41676.4541    | 4.016             |
| 355          | 150              | 221           | MODAL              | Mode             | 4.000000            | -11543.0941    | -31154.9273    | 2.361             |
| 355          | 150              | 223           | MODAL              | Mode             | 4.000000            | -11741.6891    | -31569.5621    | 4.066             |
| 355          | 150              | 271           | MODAL              | Mode             | 4.000000            | -9605.3368     | -42079.1200    | 5.023             |
| 355          | 150              | 270           | MODAL              | Mode             | 5.000000            | 3708.8361      | 600.2748       | 85.403            |
| 355          | 150              | 221           | MODAL              | Mode             | 5.000000            | 3047.4141      | -163.2296      | 87.893            |
| 355          | 150              | 223           | MODAL              | Mode             | 5.000000            | 2499.4236      | -301.9220      | 86.992            |
| 355          | 150              | 271           | MODAL              | Mode             | 5.000000            | 3184.0953      | 476.6443       | 84.085            |
| 355          | 150              | 270           | MODAL              | Mode             | 6.000000            | -6939.3045     | -29608.9803    | 4.779             |
| 355          | 150              | 221           | MODAL              | Mode             | 6.000000            | -8037.4508     | -22359.7818    | 3.532             |
| 355          | 150              | 223           | MODAL              | Mode             | 6.000000            | -8107.2818     | -22382.0070    | 5.062             |
| 355          | 150              | 271           | MODAL              | Mode             | 6.000000            | -7145.8404     | -29595.2364    | 5.730             |
| 355          | 150              | 270           | MODAL              | Mode             | 7.000000            | 5951.9429      | -909.2094      | -17.029           |
| 355          | 150              | 221           | MODAL              | Mode             | 7.000000            | 7117.5492      | 1874.6412      | -20.361           |
| 355          | 150              | 223           | MODAL              | Mode             | 7.000000            | 6987.3820      | 1829.4890      | -18.422           |
| 355          | 150              | 271           | MODAL              | Mode             | 7.000000            | 5852.5573      | -1032.7261     | -15.222           |
| 355          | 150              | 270           | MODAL              | Mode             | 8.000000            | 5350.2537      | 3239.7767      | 43.053            |
| 355          | 150              | 221           | MODAL              | Mode             | 8.000000            | 4519.6890      | 2343.4825      | 56.807            |
| 355          | 150              | 223           | MODAL              | Mode             | 8.000000            | 3940.6760      | 1751.2942      | 46.429            |
| 355          | 150              | 271           | MODAL              | Mode             | 8.000000            | 5030.1665      | 2547.3710      | 34.051            |
| 355          | 150              | 270           | MODAL              | Mode             | 9.000000            | 8995.5731      | -27602.3399    | 89.851            |
| 355          | 150              | 221           | MODAL              | Mode             | 9.000000            | -17620.4716    | -47250.0090    | 86.698            |
| 355          | 150              | 223           | MODAL              | Mode             | 9.000000            | -17825.6680    | -46216.5375    | 88.776            |
| 355          | 150              | 271           | MODAL              | Mode             | 9.000000            | 9129.3386      | -26717.7145    | -88.342           |
| 355          | 150              | 270           | MODAL              | Mode             | 10.000000           | 3163.5188      | -7696.5589     | -86.056           |
| 355          | 150              | 221           | MODAL              | Mode             | 10.000000           | -5756.0782     | -13847.4329    | -89.046           |
| 355          | 150              | 223           | MODAL              | Mode             | 10.000000           | -5847.1240     | -13570.3898    | -86.346           |
| 355          | 150              | 271           | MODAL              | Mode             | 10.000000           | 3134.4418      | -7467.6654     | -83.974           |
| 355          | 150              | 270           | MODAL              | Mode             | 11.000000           | -50634.5760    | -140375.564    | 87.212            |
| 355          | 150              | 221           | MODAL              | Mode             | 11.000000           | -68571.7253    | -162860.596    | 88.252            |
| 355          | 150              | 223           | MODAL              | Mode             | 11.000000           | -67384.9315    | -162585.461    | 88.767            |
| 355          | 150              | 271           | MODAL              | Mode             | 11.000000           | -50387.9436    | -139897.429    | 87.640            |
| 355          | 150              | 270           | MODAL              | Mode             | 12.000000           | 5622.5831      | -17548.5827    | -19.177           |
| 355          | 150              | 221           | MODAL              | Mode             | 12.000000           | 36003.9014     | -12096.6198    | -5.079            |
| 355          | 150              | 223           | MODAL              | Mode             | 12.000000           | 39540.6617     | 1227.9999      | -8.897            |
| 355          | 150              | 271           | MODAL              | Mode             | 12.000000           | 11129.1414     | -7899.7991     | -34.086           |
| 355          | 150              | 270           | locomotoras        |                  |                     | 122.3394       | 17.6617        | -85.491           |
| 355          | 150              | 221           | locomotoras        |                  |                     | 146.5604       | 68.9424        | -86.207           |
| 355          | 150              | 223           | locomotoras        |                  |                     | 158.0072       | 68.1838        | -86.398           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 355          | 150              | 271           | locomotoras        |                  |                     | 121.1642       | 19.0741        | -86.180           |
| 356          | 151              | 224           | MODAL              | Mode             | 1.000000            | 1223.9805      | -2910.6336     | -6.205            |
| 356          | 151              | 271           | MODAL              | Mode             | 1.000000            | -25.4322       | -1756.0442     | -12.595           |
| 356          | 151              | 267           | MODAL              | Mode             | 1.000000            | -97.3508       | -2028.5291     | -8.993            |
| 356          | 151              | 7             | MODAL              | Mode             | 1.000000            | 1182.5253      | -3204.0853     | -4.885            |
| 356          | 151              | 224           | MODAL              | Mode             | 2.000000            | 100.0100       | -30834.3329    | 6.553             |
| 356          | 151              | 271           | MODAL              | Mode             | 2.000000            | -4785.0645     | -30200.2786    | 4.457             |
| 356          | 151              | 267           | MODAL              | Mode             | 2.000000            | -4670.2655     | -30052.9524    | 4.514             |
| 356          | 151              | 7             | MODAL              | Mode             | 2.000000            | -163.6920      | -30468.7669    | 6.584             |
| 356          | 151              | 224           | MODAL              | Mode             | 3.000000            | 17930.2272     | 87.7655        | -82.783           |
| 356          | 151              | 271           | MODAL              | Mode             | 3.000000            | 17955.5917     | 3355.9577      | -85.167           |
| 356          | 151              | 267           | MODAL              | Mode             | 3.000000            | 17849.6194     | 3250.8022      | -85.140           |
| 356          | 151              | 7             | MODAL              | Mode             | 3.000000            | 17648.1159     | 283.7519       | -82.768           |
| 356          | 151              | 224           | MODAL              | Mode             | 4.000000            | 230.0926       | -48288.5818    | 9.393             |
| 356          | 151              | 271           | MODAL              | Mode             | 4.000000            | -10153.5986    | -32395.7607    | 9.436             |
| 356          | 151              | 267           | MODAL              | Mode             | 4.000000            | -10008.7323    | -32656.4009    | 10.367            |
| 356          | 151              | 7             | MODAL              | Mode             | 4.000000            | -311.4758      | -48036.3698    | 9.882             |
| 356          | 151              | 224           | MODAL              | Mode             | 5.000000            | 2135.0898      | 669.0062       | 79.087            |
| 356          | 151              | 271           | MODAL              | Mode             | 5.000000            | 2177.9264      | -1158.9567     | 87.554            |
| 356          | 151              | 267           | MODAL              | Mode             | 5.000000            | 1778.4313      | -1315.6868     | 86.508            |
| 356          | 151              | 7             | MODAL              | Mode             | 5.000000            | 1737.6845      | 601.1486       | 71.250            |
| 356          | 151              | 224           | MODAL              | Mode             | 6.000000            | -595.4298      | -33021.3893    | 10.290            |
| 356          | 151              | 271           | MODAL              | Mode             | 6.000000            | -6486.8746     | -22622.7795    | 9.914             |
| 356          | 151              | 267           | MODAL              | Mode             | 6.000000            | -6292.1139     | -22546.5092    | 10.747            |
| 356          | 151              | 7             | MODAL              | Mode             | 6.000000            | -1008.0651     | -32489.3647    | 10.814            |
| 356          | 151              | 224           | MODAL              | Mode             | 7.000000            | 2330.2845      | -6384.5776     | -12.561           |
| 356          | 151              | 271           | MODAL              | Mode             | 7.000000            | 5092.9222      | -971.2615      | -15.169           |
| 356          | 151              | 267           | MODAL              | Mode             | 7.000000            | 5041.7711      | -1073.6778     | -13.509           |
| 356          | 151              | 7             | MODAL              | Mode             | 7.000000            | 2195.9731      | -6529.5840     | -11.601           |
| 356          | 151              | 224           | MODAL              | Mode             | 8.000000            | 2107.5188      | 1324.6193      | -44.213           |
| 356          | 151              | 271           | MODAL              | Mode             | 8.000000            | 2320.5449      | 1621.7388      | 49.350            |
| 356          | 151              | 267           | MODAL              | Mode             | 8.000000            | 2050.9920      | 1073.0043      | 30.668            |
| 356          | 151              | 7             | MODAL              | Mode             | 8.000000            | 1856.8723      | 926.7246       | -19.297           |
| 356          | 151              | 224           | MODAL              | Mode             | 9.000000            | 60535.2923     | 35.2066        | -78.294           |
| 356          | 151              | 271           | MODAL              | Mode             | 9.000000            | 5622.3381      | -24972.1307    | -79.359           |
| 356          | 151              | 267           | MODAL              | Mode             | 9.000000            | 6025.0934      | -24653.2657    | -77.325           |
| 356          | 151              | 7             | MODAL              | Mode             | 9.000000            | 60479.0525     | 789.0100       | -77.183           |
| 356          | 151              | 224           | MODAL              | Mode             | 10.000000           | 20174.7233     | 459.1990       | -74.959           |
| 356          | 151              | 271           | MODAL              | Mode             | 10.000000           | 2106.8457      | -7667.1621     | -74.327           |
| 356          | 151              | 267           | MODAL              | Mode             | 10.000000           | 2199.3628      | -7644.6289     | -72.232           |
| 356          | 151              | 7             | MODAL              | Mode             | 10.000000           | 19975.7473     | 687.1129       | -73.700           |
| 356          | 151              | 224           | MODAL              | Mode             | 11.000000           | 48871.8445     | -5195.4081     | 89.908            |
| 356          | 151              | 271           | MODAL              | Mode             | 11.000000           | -42926.6885    | -132276.824    | -88.625           |
| 356          | 151              | 267           | MODAL              | Mode             | 11.000000           | -42934.7814    | -130902.326    | -87.717           |
| 356          | 151              | 7             | MODAL              | Mode             | 11.000000           | 49865.8494     | -4020.9889     | -88.463           |
| 356          | 151              | 224           | MODAL              | Mode             | 12.000000           | -1504.8199     | -22986.9853    | 87.669            |
| 356          | 151              | 271           | MODAL              | Mode             | 12.000000           | 39915.2859     | 6779.3834      | -0.524            |
| 356          | 151              | 267           | MODAL              | Mode             | 12.000000           | 41724.2788     | 16849.1189     | -3.525            |
| 356          | 151              | 7             | MODAL              | Mode             | 12.000000           | 7737.0642      | -22810.2668    | -89.171           |
| 356          | 151              | 224           | locomotoras        |                  |                     | 75.6033        | -0.3852        | -84.889           |
| 356          | 151              | 271           | locomotoras        |                  |                     | 93.5355        | 21.2181        | -86.209           |
| 356          | 151              | 267           | locomotoras        |                  |                     | 94.7899        | 20.6894        | -86.393           |
| 356          | 151              | 7             | locomotoras        |                  |                     | 73.8898        | 0.1486         | -85.235           |
| 357          | 152              | 271           | MODAL              | Mode             | 1.000000            | 1019.5724      | -1852.3296     | -4.251            |
| 357          | 152              | 223           | MODAL              | Mode             | 1.000000            | 227.1938       | -1333.2644     | -8.621            |
| 357          | 152              | 14            | MODAL              | Mode             | 1.000000            | 144.7374       | -1714.5183     | -4.552            |
| 357          | 152              | 267           | MODAL              | Mode             | 1.000000            | 955.3203       | -2243.9194     | -2.289            |
| 357          | 152              | 271           | MODAL              | Mode             | 2.000000            | -4790.3862     | -39184.9324    | 3.729             |
| 357          | 152              | 223           | MODAL              | Mode             | 2.000000            | -6722.9678     | -39210.5710    | 3.027             |
| 357          | 152              | 14            | MODAL              | Mode             | 2.000000            | -6687.2857     | -39141.1403    | 3.045             |
| 357          | 152              | 267           | MODAL              | Mode             | 2.000000            | -4967.4377     | -39064.4742    | 3.718             |
| 357          | 152              | 271           | MODAL              | Mode             | 3.000000            | 23293.5775     | 3441.6881      | -85.777           |
| 357          | 152              | 223           | MODAL              | Mode             | 3.000000            | 23512.4838     | 4803.6636      | -86.583           |
| 357          | 152              | 14            | MODAL              | Mode             | 3.000000            | 23470.7423     | 4767.5881      | -86.589           |
| 357          | 152              | 267           | MODAL              | Mode             | 3.000000            | 23210.9242     | 3572.9440      | -85.817           |



| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 357          | 152              | 271           | MODAL              | Mode             | 4.000000            | -9509.7648     | -42154.0146    | 5.867             |
| 357          | 152              | 223           | MODAL              | Mode             | 4.000000            | -11681.6779    | -31793.0313    | 5.534             |
| 357          | 152              | 14            | MODAL              | Mode             | 4.000000            | -11738.4966    | -32175.9481    | 7.115             |
| 357          | 152              | 267           | MODAL              | Mode             | 4.000000            | -9840.8567     | -42492.5690    | 6.837             |
| 357          | 152              | 271           | MODAL              | Mode             | 5.000000            | 3184.1167      | 491.9551       | 85.579            |
| 357          | 152              | 223           | MODAL              | Mode             | 5.000000            | 2516.9110      | -290.6805      | 88.787            |
| 357          | 152              | 14            | MODAL              | Mode             | 5.000000            | 1966.1980      | -432.6149      | 87.906            |
| 357          | 152              | 267           | MODAL              | Mode             | 5.000000            | 2659.0123      | 364.3258       | 84.083            |
| 357          | 152              | 271           | MODAL              | Mode             | 6.000000            | -7068.0197     | -29665.3041    | 6.620             |
| 357          | 152              | 223           | MODAL              | Mode             | 6.000000            | -8048.6619     | -22561.6045    | 6.570             |
| 357          | 152              | 14            | MODAL              | Mode             | 6.000000            | -8012.1062     | -22540.0410    | 8.039             |
| 357          | 152              | 267           | MODAL              | Mode             | 6.000000            | -7263.1445     | -29586.7886    | 7.565             |
| 357          | 152              | 271           | MODAL              | Mode             | 7.000000            | 5778.0811      | -1069.8563     | -14.317           |
| 357          | 152              | 223           | MODAL              | Mode             | 7.000000            | 6910.7752      | 1812.4162      | -17.364           |
| 357          | 152              | 14            | MODAL              | Mode             | 7.000000            | 6789.4387      | 1741.8084      | -15.280           |
| 357          | 152              | 267           | MODAL              | Mode             | 7.000000            | 5690.9011      | -1217.6701     | -12.493           |
| 357          | 152              | 271           | MODAL              | Mode             | 8.000000            | 4926.0805      | 2627.7203      | 32.905            |
| 357          | 152              | 223           | MODAL              | Mode             | 8.000000            | 3856.1621      | 1890.5378      | 47.125            |
| 357          | 152              | 14            | MODAL              | Mode             | 8.000000            | 3404.8631      | 1163.2869      | 36.990            |
| 357          | 152              | 267           | MODAL              | Mode             | 8.000000            | 4705.1854      | 1832.4680      | 26.533            |
| 357          | 152              | 271           | MODAL              | Mode             | 9.000000            | 10102.2195     | -26666.2624    | -86.346           |
| 357          | 152              | 223           | MODAL              | Mode             | 9.000000            | -16891.9683    | -46024.6883    | -89.004           |
| 357          | 152              | 14            | MODAL              | Mode             | 9.000000            | -16911.7734    | -45128.6699    | -86.726           |
| 357          | 152              | 267           | MODAL              | Mode             | 9.000000            | 10373.9599     | -25844.1772    | -84.488           |
| 357          | 152              | 271           | MODAL              | Mode             | 10.000000           | 3512.4929      | -7519.5656     | -81.824           |
| 357          | 152              | 223           | MODAL              | Mode             | 10.000000           | -5485.4672     | -13574.8748    | -83.764           |
| 357          | 152              | 14            | MODAL              | Mode             | 10.000000           | -5495.7931     | -13362.4467    | -80.891           |
| 357          | 152              | 267           | MODAL              | Mode             | 10.000000           | 3533.4753      | -7318.6235     | -79.700           |
| 357          | 152              | 271           | MODAL              | Mode             | 11.000000           | -48199.9101    | -139364.784    | 88.384            |
| 357          | 152              | 223           | MODAL              | Mode             | 11.000000           | -67221.1756    | -162550.299    | 88.797            |
| 357          | 152              | 14            | MODAL              | Mode             | 11.000000           | -65934.7092    | -161978.436    | 89.316            |
| 357          | 152              | 267           | MODAL              | Mode             | 11.000000           | -47832.5308    | -138631.083    | 88.827            |
| 357          | 152              | 271           | MODAL              | Mode             | 12.000000           | 9612.2135      | -7176.4313     | -31.533           |
| 357          | 152              | 223           | MODAL              | Mode             | 12.000000           | 39034.5225     | 953.6902       | -6.840            |
| 357          | 152              | 14            | MODAL              | Mode             | 12.000000           | 42730.6642     | 14018.0590     | -12.578           |
| 357          | 152              | 267           | MODAL              | Mode             | 12.000000           | 18068.5335     | -406.4112      | -50.282           |
| 357          | 152              | 271           | locomotoras        |                  |                     | 119.8014       | 18.9753        | -87.131           |
| 357          | 152              | 223           | locomotoras        |                  |                     | 156.8981       | 68.0307        | -87.012           |
| 357          | 152              | 14            | locomotoras        |                  |                     | 145.6172       | 61.0937        | -88.014           |
| 357          | 152              | 267           | locomotoras        |                  |                     | 122.5695       | 22.4313        | -87.811           |
| 386          | 181              | 20            | MODAL              | Mode             | 1.000000            | 1668.1420      | -136.0653      | 85.404            |
| 386          | 181              | 288           | MODAL              | Mode             | 1.000000            | 2197.3290      | -956.4490      | 87.803            |
| 386          | 181              | 289           | MODAL              | Mode             | 1.000000            | 1804.6037      | -1021.4811     | 85.824            |
| 386          | 181              | 210           | MODAL              | Mode             | 1.000000            | 1286.6368      | -220.0254      | 81.187            |
| 386          | 181              | 20            | MODAL              | Mode             | 2.000000            | -6705.5149     | -39040.1068    | 2.959             |
| 386          | 181              | 288           | MODAL              | Mode             | 2.000000            | -5006.6700     | -38915.0875    | 3.629             |
| 386          | 181              | 289           | MODAL              | Mode             | 2.000000            | -4830.1532     | -39029.6927    | 3.645             |
| 386          | 181              | 210           | MODAL              | Mode             | 2.000000            | -6742.8936     | -39105.2565    | 2.945             |
| 386          | 181              | 20            | MODAL              | Mode             | 3.000000            | 23096.6276     | 4667.0128      | -86.715           |
| 386          | 181              | 288           | MODAL              | Mode             | 3.000000            | 22698.2709     | 3501.9373      | -85.948           |
| 386          | 181              | 289           | MODAL              | Mode             | 3.000000            | 22778.5857     | 3374.1206      | -85.884           |
| 386          | 181              | 210           | MODAL              | Mode             | 3.000000            | 23137.4185     | 4705.1253      | -86.686           |
| 386          | 181              | 20            | MODAL              | Mode             | 4.000000            | 31976.6392     | 11529.3502     | -83.110           |
| 386          | 181              | 288           | MODAL              | Mode             | 4.000000            | 42465.6969     | 9751.0869      | -83.327           |
| 386          | 181              | 289           | MODAL              | Mode             | 4.000000            | 42124.2260     | 9416.9041      | -84.304           |
| 386          | 181              | 210           | MODAL              | Mode             | 4.000000            | 31592.4370     | 11470.1097     | -84.707           |
| 386          | 181              | 20            | MODAL              | Mode             | 5.000000            | 428.6274       | -1962.7259     | -1.726            |
| 386          | 181              | 288           | MODAL              | Mode             | 5.000000            | -377.0072      | -2680.6594     | -5.503            |
| 386          | 181              | 289           | MODAL              | Mode             | 5.000000            | -504.1967      | -3208.3864     | -4.094            |
| 386          | 181              | 210           | MODAL              | Mode             | 5.000000            | 287.2071       | -2515.8299     | -0.915            |
| 386          | 181              | 20            | MODAL              | Mode             | 6.000000            | 22165.8377     | 7813.3282      | -82.123           |
| 386          | 181              | 288           | MODAL              | Mode             | 6.000000            | 29345.1631     | 7150.5920      | -82.580           |
| 386          | 181              | 289           | MODAL              | Mode             | 6.000000            | 29418.6683     | 6955.4528      | -83.538           |
| 386          | 181              | 210           | MODAL              | Mode             | 6.000000            | 22183.4378     | 7848.6961      | -83.626           |
| 386          | 181              | 20            | MODAL              | Mode             | 7.000000            | 7130.1428      | 2151.0159      | -15.147           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 386          | 181              | 288           | MODAL              | Mode             | 7.000000            | 6054.1073      | -778.7962      | -12.455           |
| 386          | 181              | 289           | MODAL              | Mode             | 7.000000            | 6137.5642      | -624.6069      | -14.309           |
| 386          | 181              | 210           | MODAL              | Mode             | 7.000000            | 7251.8545      | 2230.1150      | -17.261           |
| 386          | 181              | 20            | MODAL              | Mode             | 8.000000            | -908.6645      | -3160.5305     | -50.228           |
| 386          | 181              | 288           | MODAL              | Mode             | 8.000000            | -1783.4656     | -4603.2928     | -61.105           |
| 386          | 181              | 289           | MODAL              | Mode             | 8.000000            | -2539.7471     | -4858.5288     | -54.091           |
| 386          | 181              | 210           | MODAL              | Mode             | 8.000000            | -1589.8601     | -3656.4220     | -40.045           |
| 386          | 181              | 20            | MODAL              | Mode             | 9.000000            | -19649.7548    | -48945.0480    | -87.094           |
| 386          | 181              | 288           | MODAL              | Mode             | 9.000000            | 7685.0134      | -29312.2987    | -84.891           |
| 386          | 181              | 289           | MODAL              | Mode             | 9.000000            | 7458.8382      | -30131.6338    | -86.692           |
| 386          | 181              | 210           | MODAL              | Mode             | 9.000000            | -19614.5352    | -49843.4492    | -89.267           |
| 386          | 181              | 20            | MODAL              | Mode             | 10.000000           | -6488.0786     | -14651.2897    | -81.578           |
| 386          | 181              | 288           | MODAL              | Mode             | 10.000000           | 2567.2577      | -8494.8472     | -80.258           |
| 386          | 181              | 289           | MODAL              | Mode             | 10.000000           | 2557.9850      | -8697.6995     | -82.323           |
| 386          | 181              | 210           | MODAL              | Mode             | 10.000000           | -6473.6477     | -14871.3364    | -84.319           |
| 386          | 181              | 20            | MODAL              | Mode             | 11.000000           | 159876.1735    | 65585.7720     | -0.512            |
| 386          | 181              | 288           | MODAL              | Mode             | 11.000000           | 141146.8804    | 50607.5458     | -1.089            |
| 386          | 181              | 289           | MODAL              | Mode             | 11.000000           | 141674.0413    | 50774.7166     | -1.458            |
| 386          | 181              | 210           | MODAL              | Mode             | 11.000000           | 160235.0365    | 66842.0281     | -0.983            |
| 386          | 181              | 20            | MODAL              | Mode             | 12.000000           | -13695.9866    | -42588.9118    | 76.755            |
| 386          | 181              | 288           | MODAL              | Mode             | 12.000000           | 298.9040       | -18965.9081    | 40.465            |
| 386          | 181              | 289           | MODAL              | Mode             | 12.000000           | 7111.2144      | -10555.7984    | 58.194            |
| 386          | 181              | 210           | MODAL              | Mode             | 12.000000           | -753.6588      | -38783.8377    | 82.626            |
| 386          | 181              | 20            | locomotoras        |                  |                     | 145.0385       | 61.3036        | -88.113           |
| 386          | 181              | 288           | locomotoras        |                  |                     | 121.5717       | 22.4465        | -87.893           |
| 386          | 181              | 289           | locomotoras        |                  |                     | 118.8156       | 19.0043        | -87.198           |
| 386          | 181              | 210           | locomotoras        |                  |                     | 156.2610       | 68.2229        | -87.091           |
| 387          | 182              | 288           | MODAL              | Mode             | 1.000000            | 1996.9864      | 119.9625       | 80.879            |
| 387          | 182              | 9             | MODAL              | Mode             | 1.000000            | 3202.8306      | -1199.2670     | 85.223            |
| 387          | 182              | 209           | MODAL              | Mode             | 1.000000            | 2907.6320      | -1240.7199     | 83.911            |
| 387          | 182              | 289           | MODAL              | Mode             | 1.000000            | 1724.6527      | 46.3605        | 77.151            |
| 387          | 182              | 288           | MODAL              | Mode             | 2.000000            | -4705.7604     | -29939.3922    | 4.378             |
| 387          | 182              | 9             | MODAL              | Mode             | 2.000000            | -165.8346      | -30296.9747    | 6.505             |
| 387          | 182              | 209           | MODAL              | Mode             | 2.000000            | 100.2681       | -30659.4325    | 6.479             |
| 387          | 182              | 289           | MODAL              | Mode             | 2.000000            | -4825.2870     | -30083.3576    | 4.324             |
| 387          | 182              | 288           | MODAL              | Mode             | 3.000000            | 17459.1015     | 3174.6154      | -85.382           |
| 387          | 182              | 9             | MODAL              | Mode             | 3.000000            | 17039.6118     | 280.9550       | -82.931           |
| 387          | 182              | 209           | MODAL              | Mode             | 3.000000            | 17315.8961     | 88.5412        | -82.925           |
| 387          | 182              | 289           | MODAL              | Mode             | 3.000000            | 17563.7830     | 3282.5564      | -85.389           |
| 387          | 182              | 288           | MODAL              | Mode             | 4.000000            | 32604.8389     | 9919.7108      | -79.841           |
| 387          | 182              | 9             | MODAL              | Mode             | 4.000000            | 48650.2548     | 326.1977       | -80.212           |
| 387          | 182              | 209           | MODAL              | Mode             | 4.000000            | 48916.6854     | -228.2551      | -80.700           |
| 387          | 182              | 289           | MODAL              | Mode             | 4.000000            | 32343.7475     | 10072.4144     | -80.783           |
| 387          | 182              | 288           | MODAL              | Mode             | 5.000000            | 1349.3557      | -1788.5225     | -3.246            |
| 387          | 182              | 9             | MODAL              | Mode             | 5.000000            | -640.2512      | -1790.3191     | -17.977           |
| 387          | 182              | 209           | MODAL              | Mode             | 5.000000            | -702.9656      | -2193.5055     | -10.413           |
| 387          | 182              | 289           | MODAL              | Mode             | 5.000000            | 1191.8733      | -2190.1142     | -2.250            |
| 387          | 182              | 288           | MODAL              | Mode             | 6.000000            | 22334.4969     | 6161.8687      | -79.439           |
| 387          | 182              | 9             | MODAL              | Mode             | 6.000000            | 32746.8613     | 1034.9004      | -79.281           |
| 387          | 182              | 209           | MODAL              | Mode             | 6.000000            | 33286.6794     | 614.0351       | -79.805           |
| 387          | 182              | 289           | MODAL              | Mode             | 6.000000            | 22407.8277     | 6362.8026      | -80.288           |
| 387          | 182              | 288           | MODAL              | Mode             | 7.000000            | 5382.0842      | -737.0610      | -13.466           |
| 387          | 182              | 9             | MODAL              | Mode             | 7.000000            | 2264.4366      | -6437.3900     | -11.946           |
| 387          | 182              | 209           | MODAL              | Mode             | 7.000000            | 2400.4271      | -6284.4885     | -12.943           |
| 387          | 182              | 289           | MODAL              | Mode             | 7.000000            | 5434.7358      | -631.2688      | -15.140           |
| 387          | 182              | 288           | MODAL              | Mode             | 8.000000            | -982.8518      | -1932.6035     | -52.291           |
| 387          | 182              | 9             | MODAL              | Mode             | 8.000000            | -1236.6330     | -1904.2907     | 62.090            |
| 387          | 182              | 209           | MODAL              | Mode             | 8.000000            | -1483.6347     | -2296.0798     | 32.920            |
| 387          | 182              | 289           | MODAL              | Mode             | 8.000000            | -1448.1229     | -2283.6669     | -33.301           |
| 387          | 182              | 288           | MODAL              | Mode             | 9.000000            | 3719.1587      | -28064.7686    | -77.795           |
| 387          | 182              | 9             | MODAL              | Mode             | 9.000000            | 61098.4811     | 902.3070       | -77.251           |
| 387          | 182              | 209           | MODAL              | Mode             | 9.000000            | 61192.6148     | 136.9284       | -78.374           |
| 387          | 182              | 289           | MODAL              | Mode             | 9.000000            | 3359.3926      | -28402.2894    | -79.796           |
| 387          | 182              | 288           | MODAL              | Mode             | 10.000000           | 1370.6658      | -8794.6775     | -72.862           |
| 387          | 182              | 9             | MODAL              | Mode             | 10.000000           | 20188.9444     | 734.4679       | -73.757           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 387          | 182              | 209           | MODAL              | Mode             | 10.000000           | 20398.8635     | 503.6037       | -75.033           |
| 387          | 182              | 289           | MODAL              | Mode             | 10.000000           | 1288.0818      | -8826.0365     | -74.941           |
| 387          | 182              | 288           | MODAL              | Mode             | 11.000000           | 134069.7884    | 45150.7547     | 2.217             |
| 387          | 182              | 9             | MODAL              | Mode             | 11.000000           | 3796.2485      | -47287.4632    | 0.789             |
| 387          | 182              | 209           | MODAL              | Mode             | 11.000000           | 4952.0640      | -46455.7881    | -0.844            |
| 387          | 182              | 289           | MODAL              | Mode             | 11.000000           | 135313.2458    | 44961.6561     | 1.363             |
| 387          | 182              | 288           | MODAL              | Mode             | 12.000000           | -17144.0037    | -42976.4059    | 85.784            |
| 387          | 182              | 9             | MODAL              | Mode             | 12.000000           | 22953.6186     | -7682.8268     | 1.856             |
| 387          | 182              | 209           | MODAL              | Mode             | 12.000000           | 23078.3173     | 1504.9988      | -0.803            |
| 387          | 182              | 289           | MODAL              | Mode             | 12.000000           | -7141.5885     | -41103.1654    | 88.846            |
| 387          | 182              | 288           | locomotoras        |                  |                     | 94.0525        | 20.7057        | -86.545           |
| 387          | 182              | 9             | locomotoras        |                  |                     | 72.1400        | 0.1086         | -85.417           |
| 387          | 182              | 209           | locomotoras        |                  |                     | 73.8177        | -0.4157        | -85.048           |
| 387          | 182              | 289           | locomotoras        |                  |                     | 92.8078        | 21.2475        | -86.353           |
| 388          | 183              | 210           | MODAL              | Mode             | 1.000000            | 1288.9827      | -214.2529      | 81.750            |
| 388          | 183              | 289           | MODAL              | Mode             | 1.000000            | 1802.3236      | -1019.6480     | 86.096            |
| 388          | 183              | 290           | MODAL              | Mode             | 1.000000            | 1412.6138      | -1091.6141     | 83.622            |
| 388          | 183              | 212           | MODAL              | Mode             | 1.000000            | 924.1469       | -320.8777      | 75.727            |
| 388          | 183              | 210           | MODAL              | Mode             | 2.000000            | -6756.3076     | -39158.0667    | 2.902             |
| 388          | 183              | 289           | MODAL              | Mode             | 2.000000            | -4849.7334     | -39101.3816    | 3.584             |
| 388          | 183              | 290           | MODAL              | Mode             | 2.000000            | -4684.3900     | -39118.1984    | 3.578             |
| 388          | 183              | 212           | MODAL              | Mode             | 2.000000            | -6744.9510     | -39111.5604    | 2.868             |
| 388          | 183              | 210           | MODAL              | Mode             | 3.000000            | 23180.3932     | 4714.0431      | -86.696           |
| 388          | 183              | 289           | MODAL              | Mode             | 3.000000            | 22832.0587     | 3385.8672      | -85.906           |
| 388          | 183              | 290           | MODAL              | Mode             | 3.000000            | 22834.4502     | 3264.9771      | -85.870           |
| 388          | 183              | 212           | MODAL              | Mode             | 3.000000            | 23132.1430     | 4712.5544      | -86.692           |
| 388          | 183              | 210           | MODAL              | Mode             | 4.000000            | 31368.4258     | 11525.2883     | -86.185           |
| 388          | 183              | 289           | MODAL              | Mode             | 4.000000            | 42044.8016     | 9508.8135      | -85.152           |
| 388          | 183              | 290           | MODAL              | Mode             | 4.000000            | 41639.2229     | 9157.8863      | -86.166           |
| 388          | 183              | 212           | MODAL              | Mode             | 4.000000            | 30953.3581     | 11322.7702     | -87.906           |
| 388          | 183              | 210           | MODAL              | Mode             | 5.000000            | 297.6951       | -2497.2570     | -2.735            |
| 388          | 183              | 289           | MODAL              | Mode             | 5.000000            | -489.3326      | -3207.4163     | -5.614            |
| 388          | 183              | 290           | MODAL              | Mode             | 5.000000            | -612.8486      | -3734.3542     | -4.358            |
| 388          | 183              | 212           | MODAL              | Mode             | 5.000000            | 159.4364       | -3047.4080     | -1.883            |
| 388          | 183              | 210           | MODAL              | Mode             | 6.000000            | 22003.0313     | 7904.3438      | -85.165           |
| 388          | 183              | 289           | MODAL              | Mode             | 6.000000            | 29344.5325     | 7030.6776      | -84.441           |
| 388          | 183              | 290           | MODAL              | Mode             | 6.000000            | 29354.4288     | 6823.7589      | -85.406           |
| 388          | 183              | 212           | MODAL              | Mode             | 6.000000            | 21979.1006     | 7832.2709      | -86.729           |
| 388          | 183              | 210           | MODAL              | Mode             | 7.000000            | 7324.5410      | 2247.5775      | -18.286           |
| 388          | 183              | 289           | MODAL              | Mode             | 7.000000            | 6211.7377      | -583.6862      | -15.215           |
| 388          | 183              | 290           | MODAL              | Mode             | 7.000000            | 6307.0924      | -454.7869      | -17.057           |
| 388          | 183              | 212           | MODAL              | Mode             | 7.000000            | 7453.7663      | 2300.4130      | -20.262           |
| 388          | 183              | 210           | MODAL              | Mode             | 8.000000            | -1443.4971     | -3739.1021     | -41.079           |
| 388          | 183              | 289           | MODAL              | Mode             | 8.000000            | -2443.9858     | -4970.0672     | -53.198           |
| 388          | 183              | 290           | MODAL              | Mode             | 8.000000            | -3089.7283     | -5332.5406     | -44.180           |
| 388          | 183              | 212           | MODAL              | Mode             | 8.000000            | -1998.2794     | -4354.7498     | -31.420           |
| 388          | 183              | 210           | MODAL              | Mode             | 9.000000            | -20528.2078    | -50040.6993    | 88.627            |
| 388          | 183              | 289           | MODAL              | Mode             | 9.000000            | 6459.5957      | -30205.4153    | -88.662           |
| 388          | 183              | 290           | MODAL              | Mode             | 9.000000            | 6370.9299      | -31076.9293    | 89.591            |
| 388          | 183              | 212           | MODAL              | Mode             | 9.000000            | -20312.7055    | -51057.4812    | 86.641            |
| 388          | 183              | 210           | MODAL              | Mode             | 10.000000           | -6823.9020     | -14873.2754    | -86.775           |
| 388          | 183              | 289           | MODAL              | Mode             | 10.000000           | 2171.9135      | -8655.2040     | -84.456           |
| 388          | 183              | 290           | MODAL              | Mode             | 10.000000           | 2213.4265      | -8882.3519     | -86.473           |
| 388          | 183              | 212           | MODAL              | Mode             | 10.000000           | -6730.6289     | -15150.0362    | -89.342           |
| 388          | 183              | 210           | MODAL              | Mode             | 11.000000           | 160221.8209    | 66791.7208     | -0.935            |
| 388          | 183              | 289           | MODAL              | Mode             | 11.000000           | 142178.5683    | 52907.1222     | -2.135            |
| 388          | 183              | 290           | MODAL              | Mode             | 11.000000           | 142445.0318    | 52959.2758     | -2.490            |
| 388          | 183              | 212           | MODAL              | Mode             | 11.000000           | 160278.5534    | 67956.6869     | -1.402            |
| 388          | 183              | 210           | MODAL              | Mode             | 12.000000           | -965.0400      | -39295.7987    | 80.620            |
| 388          | 183              | 289           | MODAL              | Mode             | 12.000000           | 7825.5821      | -12047.6084    | 55.827            |
| 388          | 183              | 290           | MODAL              | Mode             | 12.000000           | 17359.6014     | -6434.0915     | 70.182            |
| 388          | 183              | 212           | MODAL              | Mode             | 12.000000           | 12261.2402     | -35673.9116    | 84.532            |
| 388          | 183              | 210           | locomotoras        |                  |                     | 157.3809       | 68.3789        | -86.464           |
| 388          | 183              | 289           | locomotoras        |                  |                     | 120.1621       | 19.1021        | -86.232           |
| 388          | 183              | 290           | locomotoras        |                  |                     | 121.3015       | 17.6796        | -85.528           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 388          | 183              | 212           | locomotoras        |                  |                     | 145.9573       | 69.1461        | -86.271           |
| 389          | 184              | 289           | MODAL              | Mode             | 1.000000            | 1719.5225      | 51.1449        | 77.500            |
| 389          | 184              | 209           | MODAL              | Mode             | 1.000000            | 2905.1438      | -1239.9153     | 83.980            |
| 389          | 184              | 211           | MODAL              | Mode             | 1.000000            | 2609.5379      | -1285.5368     | 82.484            |
| 389          | 184              | 290           | MODAL              | Mode             | 1.000000            | 1460.1010      | -39.9018       | 72.841            |
| 389          | 184              | 289           | MODAL              | Mode             | 2.000000            | -4841.4400     | -30137.8218    | 4.255             |
| 389          | 184              | 209           | MODAL              | Mode             | 2.000000            | 60.4190        | -30720.0097    | 6.282             |
| 389          | 184              | 211           | MODAL              | Mode             | 2.000000            | 326.3607       | -31004.1996    | 6.246             |
| 389          | 184              | 290           | MODAL              | Mode             | 2.000000            | -4944.7818     | -30202.4586    | 4.178             |
| 389          | 184              | 289           | MODAL              | Mode             | 3.000000            | 17604.9366     | 3291.8650      | -85.417           |
| 389          | 184              | 209           | MODAL              | Mode             | 3.000000            | 17360.0639     | 114.6498       | -83.127           |
| 389          | 184              | 211           | MODAL              | Mode             | 3.000000            | 17573.5083     | -77.5555       | -83.136           |
| 389          | 184              | 290           | MODAL              | Mode             | 3.000000            | 17646.4552     | 3385.8654      | -85.455           |
| 389          | 184              | 289           | MODAL              | Mode             | 4.000000            | 32237.8813     | 10187.9405     | -81.719           |
| 389          | 184              | 209           | MODAL              | Mode             | 4.000000            | 48858.6980     | -75.6193       | -81.195           |
| 389          | 184              | 211           | MODAL              | Mode             | 4.000000            | 49023.3354     | -643.9524      | -81.675           |
| 389          | 184              | 290           | MODAL              | Mode             | 4.000000            | 31916.8850     | 10285.7034     | -82.762           |
| 389          | 184              | 289           | MODAL              | Mode             | 5.000000            | 1199.1968      | -2185.1865     | -3.192            |
| 389          | 184              | 209           | MODAL              | Mode             | 5.000000            | -690.7970      | -2188.7928     | -11.352           |
| 389          | 184              | 211           | MODAL              | Mode             | 5.000000            | -720.4348      | -2619.4606     | -6.629            |
| 389          | 184              | 290           | MODAL              | Mode             | 5.000000            | 1046.9206      | -2587.6177     | -2.280            |
| 389          | 184              | 289           | MODAL              | Mode             | 6.000000            | 22320.6106     | 6450.8623      | -81.233           |
| 389          | 184              | 209           | MODAL              | Mode             | 6.000000            | 33227.7945     | 733.0460       | -80.342           |
| 389          | 184              | 211           | MODAL              | Mode             | 6.000000            | 33677.1824     | 299.8355       | -80.841           |
| 389          | 184              | 290           | MODAL              | Mode             | 6.000000            | 22335.5964     | 6610.5393      | -82.158           |
| 389          | 184              | 289           | MODAL              | Mode             | 7.000000            | 5492.4979      | -599.9796      | -15.890           |
| 389          | 184              | 209           | MODAL              | Mode             | 7.000000            | 2453.7996      | -6237.9996     | -13.482           |
| 389          | 184              | 211           | MODAL              | Mode             | 7.000000            | 2597.6280      | -6086.7777     | -14.497           |
| 389          | 184              | 290           | MODAL              | Mode             | 7.000000            | 5559.8554      | -514.0042      | -17.552           |
| 389          | 184              | 289           | MODAL              | Mode             | 8.000000            | -1364.8151     | -2379.1818     | -35.210           |
| 389          | 184              | 209           | MODAL              | Mode             | 8.000000            | -1566.4753     | -2251.3939     | 29.246            |
| 389          | 184              | 211           | MODAL              | Mode             | 8.000000            | -1563.6586     | -2892.8840     | 17.834            |
| 389          | 184              | 290           | MODAL              | Mode             | 8.000000            | -1675.4086     | -2888.1653     | -20.840           |
| 389          | 184              | 289           | MODAL              | Mode             | 9.000000            | 2350.4698      | -28223.5931    | -81.426           |
| 389          | 184              | 209           | MODAL              | Mode             | 9.000000            | 60110.5019     | 486.0754       | -79.425           |
| 389          | 184              | 211           | MODAL              | Mode             | 9.000000            | 60171.5994     | -360.9810      | -80.531           |
| 389          | 184              | 290           | MODAL              | Mode             | 9.000000            | 2120.7618      | -28673.2907    | -83.509           |
| 389          | 184              | 289           | MODAL              | Mode             | 10.000000           | 907.8892       | -8711.6776     | -76.503           |
| 389          | 184              | 209           | MODAL              | Mode             | 10.000000           | 19996.5610     | 672.7548       | -76.076           |
| 389          | 184              | 211           | MODAL              | Mode             | 10.000000           | 20189.6672     | 408.1794       | -77.309           |
| 389          | 184              | 290           | MODAL              | Mode             | 10.000000           | 866.3137       | -8779.5118     | -78.727           |
| 389          | 184              | 289           | MODAL              | Mode             | 11.000000           | 135621.1508    | 46694.0143     | 0.834             |
| 389          | 184              | 209           | MODAL              | Mode             | 11.000000           | 5551.6187      | -44278.4580    | -3.122            |
| 389          | 184              | 211           | MODAL              | Mode             | 11.000000           | 6824.0641      | -43566.0248    | -4.740            |
| 389          | 184              | 290           | MODAL              | Mode             | 11.000000           | 136703.5922    | 46364.4322     | 0.017             |
| 389          | 184              | 289           | MODAL              | Mode             | 12.000000           | -7547.8648     | -41298.4163    | 86.743            |
| 389          | 184              | 209           | MODAL              | Mode             | 12.000000           | 22979.9630     | 923.2545       | 1.684             |
| 389          | 184              | 211           | MODAL              | Mode             | 12.000000           | 22974.9719     | 10248.6796     | -3.199            |
| 389          | 184              | 290           | MODAL              | Mode             | 12.000000           | 2549.6605      | -39278.8058    | 89.035            |
| 389          | 184              | 289           | locomotoras        |                  |                     | 93.8101        | 21.3627        | -85.977           |
| 389          | 184              | 209           | locomotoras        |                  |                     | 74.0021        | -0.3858        | -85.045           |
| 389          | 184              | 211           | locomotoras        |                  |                     | 73.9458        | -1.2207        | -84.744           |
| 389          | 184              | 290           | locomotoras        |                  |                     | 95.3334        | 22.5010        | -85.675           |
| 394          | 189              | 228           | MODAL              | Mode             | 1.000000            | 2440.6732      | -8.0856        | 89.893            |
| 394          | 189              | 291           | MODAL              | Mode             | 1.000000            | 2984.1046      | -844.1682      | -89.655           |
| 394          | 189              | 292           | MODAL              | Mode             | 1.000000            | 2591.7277      | -898.5002      | 89.002            |
| 394          | 189              | 230           | MODAL              | Mode             | 1.000000            | 2047.4774      | -71.4251       | 87.617            |
| 394          | 189              | 228           | MODAL              | Mode             | 2.000000            | -6574.0736     | -38508.9506    | 3.020             |
| 394          | 189              | 291           | MODAL              | Mode             | 2.000000            | -5255.6204     | -38241.9101    | 3.712             |
| 394          | 189              | 292           | MODAL              | Mode             | 2.000000            | -5127.4736     | -38562.6451    | 3.764             |
| 394          | 189              | 230           | MODAL              | Mode             | 2.000000            | -6624.0792     | -38775.6772    | 3.052             |
| 394          | 189              | 228           | MODAL              | Mode             | 3.000000            | 22693.7049     | 4543.9698      | -86.821           |
| 394          | 189              | 291           | MODAL              | Mode             | 3.000000            | 22192.1700     | 3678.1188      | -86.043           |
| 394          | 189              | 292           | MODAL              | Mode             | 3.000000            | 22436.0215     | 3591.5767      | -85.927           |
| 394          | 189              | 230           | MODAL              | Mode             | 3.000000            | 22895.3910     | 4595.7341      | -86.730           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 394          | 189              | 228           | MODAL              | Mode             | 4.000000            | 33248.5010     | 11192.4859     | -77.747           |
| 394          | 189              | 291           | MODAL              | Mode             | 4.000000            | 43172.4142     | 9947.9464      | -79.801           |
| 394          | 189              | 292           | MODAL              | Mode             | 4.000000            | 42992.1673     | 9753.1968      | -80.717           |
| 394          | 189              | 230           | MODAL              | Mode             | 4.000000            | 32930.2905     | 11254.8302     | -79.077           |
| 394          | 189              | 228           | MODAL              | Mode             | 5.000000            | 702.7834       | -904.7849      | 1.863             |
| 394          | 189              | 291           | MODAL              | Mode             | 5.000000            | -133.5430      | -1634.7896     | -4.896            |
| 394          | 189              | 292           | MODAL              | Mode             | 5.000000            | -272.7246      | -2162.2258     | -3.142            |
| 394          | 189              | 230           | MODAL              | Mode             | 5.000000            | 561.5579       | -1459.0670     | 2.215             |
| 394          | 189              | 228           | MODAL              | Mode             | 6.000000            | 22490.3191     | 7379.1348      | -76.633           |
| 394          | 189              | 291           | MODAL              | Mode             | 6.000000            | 29205.8387     | 7161.2782      | -78.866           |
| 394          | 189              | 292           | MODAL              | Mode             | 6.000000            | 29427.1146     | 7080.7096      | -79.828           |
| 394          | 189              | 230           | MODAL              | Mode             | 6.000000            | 22583.1745     | 7503.3761      | -77.988           |
| 394          | 189              | 228           | MODAL              | Mode             | 7.000000            | 6796.3975      | 1843.5078      | -8.366            |
| 394          | 189              | 291           | MODAL              | Mode             | 7.000000            | 5811.4922      | -1275.7352     | -6.924            |
| 394          | 189              | 292           | MODAL              | Mode             | 7.000000            | 5863.7416      | -1071.0369     | -8.719            |
| 394          | 189              | 230           | MODAL              | Mode             | 7.000000            | 6897.7987      | 1982.7321      | -10.618           |
| 394          | 189              | 228           | MODAL              | Mode             | 8.000000            | 469.1868       | -2332.7358     | -65.711           |
| 394          | 189              | 291           | MODAL              | Mode             | 8.000000            | -247.1636      | -4083.0782     | -71.491           |
| 394          | 189              | 292           | MODAL              | Mode             | 8.000000            | -1109.5273     | -4238.2291     | -68.568           |
| 394          | 189              | 230           | MODAL              | Mode             | 8.000000            | -412.2091      | -2618.4712     | -59.746           |
| 394          | 189              | 228           | MODAL              | Mode             | 9.000000            | -16818.4871    | -47452.5040    | -78.707           |
| 394          | 189              | 291           | MODAL              | Mode             | 9.000000            | 10984.2600     | -28329.2481    | -77.716           |
| 394          | 189              | 292           | MODAL              | Mode             | 9.000000            | 10513.7634     | -28931.8120    | -79.501           |
| 394          | 189              | 230           | MODAL              | Mode             | 9.000000            | -17192.5894    | -48202.0976    | -80.993           |
| 394          | 189              | 228           | MODAL              | Mode             | 10.000000           | -5406.9682     | -14481.6915    | -72.254           |
| 394          | 189              | 291           | MODAL              | Mode             | 10.000000           | 3650.3294      | -8464.8742     | -72.646           |
| 394          | 189              | 292           | MODAL              | Mode             | 10.000000           | 3555.5496      | -8583.4293     | -74.622           |
| 394          | 189              | 230           | MODAL              | Mode             | 10.000000           | -5554.9765     | -14634.8532    | -74.878           |
| 394          | 189              | 228           | MODAL              | Mode             | 11.000000           | 158302.6535    | 62831.6864     | 0.494             |
| 394          | 189              | 291           | MODAL              | Mode             | 11.000000           | 138393.2435    | 45566.1852     | 1.111             |
| 394          | 189              | 292           | MODAL              | Mode             | 11.000000           | 139459.3039    | 45934.9344     | 0.708             |
| 394          | 189              | 230           | MODAL              | Mode             | 11.000000           | 159229.1990    | 64266.5409     | 8.366E-03         |
| 394          | 189              | 228           | MODAL              | Mode             | 12.000000           | -36445.3393    | -50935.0618    | 54.985            |
| 394          | 189              | 291           | MODAL              | Mode             | 12.000000           | -8474.8065     | -38727.1520    | 20.177            |
| 394          | 189              | 292           | MODAL              | Mode             | 12.000000           | -5646.6787     | -26545.7533    | 26.452            |
| 394          | 189              | 230           | MODAL              | Mode             | 12.000000           | -26064.8583    | -45154.2845    | 73.198            |
| 394          | 189              | 228           | locomotoras        |                  |                     | 133.1053       | 56.3220        | 89.747            |
| 394          | 189              | 291           | locomotoras        |                  |                     | 119.5241       | 23.0709        | -88.821           |
| 394          | 189              | 292           | locomotoras        |                  |                     | 119.7963       | 22.2326        | -88.476           |
| 394          | 189              | 230           | locomotoras        |                  |                     | 137.4681       | 58.7900        | -89.720           |
| 395          | 190              | 291           | MODAL              | Mode             | 1.000000            | 2567.8066      | 227.4764       | 85.699            |
| 395          | 190              | 227           | MODAL              | Mode             | 1.000000            | 3791.6450      | -1127.2649     | 87.303            |
| 395          | 190              | 229           | MODAL              | Mode             | 1.000000            | 3499.7652      | -1162.1673     | 86.277            |
| 395          | 190              | 292           | MODAL              | Mode             | 1.000000            | 2282.7521      | 175.3522       | 83.291            |
| 395          | 190              | 291           | MODAL              | Mode             | 2.000000            | -4405.1598     | -29314.9038    | 4.571             |
| 395          | 190              | 227           | MODAL              | Mode             | 2.000000            | -598.0285      | -29228.0623    | 6.952             |
| 395          | 190              | 229           | MODAL              | Mode             | 2.000000            | -344.4099      | -29743.3833    | 6.944             |
| 395          | 190              | 292           | MODAL              | Mode             | 2.000000            | -4541.6911     | -29612.7867    | 4.565             |
| 395          | 190              | 291           | MODAL              | Mode             | 3.000000            | 16986.5992     | 2913.6513      | -85.380           |
| 395          | 190              | 227           | MODAL              | Mode             | 3.000000            | 16219.6857     | 597.8107       | -82.539           |
| 395          | 190              | 229           | MODAL              | Mode             | 3.000000            | 16618.2787     | 415.6179       | -82.506           |
| 395          | 190              | 292           | MODAL              | Mode             | 3.000000            | 17213.4133     | 3037.3072      | -85.323           |
| 395          | 190              | 291           | MODAL              | Mode             | 4.000000            | 33205.0850     | 9203.0282      | -76.531           |
| 395          | 190              | 227           | MODAL              | Mode             | 4.000000            | 47974.6196     | 1028.9575      | -78.213           |
| 395          | 190              | 229           | MODAL              | Mode             | 4.000000            | 48446.0761     | 516.3925       | -78.726           |
| 395          | 190              | 292           | MODAL              | Mode             | 4.000000            | 33077.3876     | 9434.9662      | -77.307           |
| 395          | 190              | 291           | MODAL              | Mode             | 5.000000            | 1664.8163      | -1006.3804     | -3.485            |
| 395          | 190              | 227           | MODAL              | Mode             | 5.000000            | -311.9139      | -1212.5501     | -43.377           |
| 395          | 190              | 229           | MODAL              | Mode             | 5.000000            | -549.9631      | -1451.8699     | -28.077           |
| 395          | 190              | 292           | MODAL              | Mode             | 5.000000            | 1496.7360      | -1402.8070     | -2.284            |
| 395          | 190              | 291           | MODAL              | Mode             | 6.000000            | 22224.5673     | 5452.1267      | -76.212           |
| 395          | 190              | 227           | MODAL              | Mode             | 6.000000            | 31554.7276     | 1553.6141      | -77.048           |
| 395          | 190              | 229           | MODAL              | Mode             | 6.000000            | 32273.3312     | 1171.5701      | -77.645           |
| 395          | 190              | 292           | MODAL              | Mode             | 6.000000            | 22420.4788     | 5713.0329      | -76.940           |
| 395          | 190              | 291           | MODAL              | Mode             | 7.000000            | 5229.3773      | -1092.0789     | -8.656            |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 395          | 190              | 227           | MODAL              | Mode             | 7.000000            | 1921.6390      | -6854.4108     | -8.971            |
| 395          | 190              | 229           | MODAL              | Mode             | 7.000000            | 2042.0579      | -6703.1779     | -9.911            |
| 395          | 190              | 292           | MODAL              | Mode             | 7.000000            | 5248.2638      | -946.5773      | -10.267           |
| 395          | 190              | 291           | MODAL              | Mode             | 8.000000            | 177.1150       | -1466.1527     | -74.279           |
| 395          | 190              | 227           | MODAL              | Mode             | 8.000000            | 21.7892        | -1826.8218     | 82.330            |
| 395          | 190              | 229           | MODAL              | Mode             | 8.000000            | -569.4482      | -1866.7861     | 74.445            |
| 395          | 190              | 292           | MODAL              | Mode             | 8.000000            | -502.9379      | -1586.1672     | -69.821           |
| 395          | 190              | 291           | MODAL              | Mode             | 9.000000            | 7048.6964      | -28319.4649    | -71.564           |
| 395          | 190              | 227           | MODAL              | Mode             | 9.000000            | 63177.2428     | 1259.4693      | -73.068           |
| 395          | 190              | 229           | MODAL              | Mode             | 9.000000            | 63357.4847     | 653.4708       | -74.215           |
| 395          | 190              | 292           | MODAL              | Mode             | 9.000000            | 6488.4789      | -28471.3516    | -73.297           |
| 395          | 190              | 291           | MODAL              | Mode             | 10.000000           | 2459.7391      | -9122.4413     | -66.914           |
| 395          | 190              | 227           | MODAL              | Mode             | 10.000000           | 20590.8094     | 679.9688       | -69.265           |
| 395          | 190              | 229           | MODAL              | Mode             | 10.000000           | 20838.1616     | 516.9514       | -70.614           |
| 395          | 190              | 292           | MODAL              | Mode             | 10.000000           | 2320.8174      | -9100.0261     | -68.642           |
| 395          | 190              | 291           | MODAL              | Mode             | 11.000000           | 130697.1450    | 41518.2346     | 5.115             |
| 395          | 190              | 227           | MODAL              | Mode             | 11.000000           | 1387.9882      | -54344.0820    | 8.068             |
| 395          | 190              | 229           | MODAL              | Mode             | 11.000000           | 2338.9188      | -53339.5667    | 6.503             |
| 395          | 190              | 292           | MODAL              | Mode             | 11.000000           | 132200.0053    | 41591.1755     | 4.186             |
| 395          | 190              | 291           | MODAL              | Mode             | 12.000000           | -35642.9710    | -45849.4732    | 79.951            |
| 395          | 190              | 227           | MODAL              | Mode             | 12.000000           | 22414.7349     | -23956.6776    | 1.908             |
| 395          | 190              | 229           | MODAL              | Mode             | 12.000000           | 22847.0714     | -15313.3183    | 0.614             |
| 395          | 190              | 292           | MODAL              | Mode             | 12.000000           | -26166.0141    | -44192.7427    | 88.151            |
| 395          | 190              | 291           | locomotoras        |                  |                     | 92.0979        | 20.0180        | -87.928           |
| 395          | 190              | 227           | locomotoras        |                  |                     | 68.5876        | 0.1615         | -86.374           |
| 395          | 190              | 229           | locomotoras        |                  |                     | 70.1412        | -0.0810        | -85.928           |
| 395          | 190              | 292           | locomotoras        |                  |                     | 92.5013        | 20.4877        | -87.592           |
| 396          | 191              | 230           | MODAL              | Mode             | 1.000000            | 2053.3817      | -68.9879       | 87.988            |
| 396          | 191              | 292           | MODAL              | Mode             | 1.000000            | 2591.7232      | -898.0649      | 89.192            |
| 396          | 191              | 288           | MODAL              | Mode             | 1.000000            | 2198.3425      | -957.4553      | 87.576            |
| 396          | 191              | 20            | MODAL              | Mode             | 1.000000            | 1663.7051      | -139.8467      | 84.946            |
| 396          | 191              | 230           | MODAL              | Mode             | 2.000000            | -6637.0063     | -38821.4463    | 2.998             |
| 396          | 191              | 292           | MODAL              | Mode             | 2.000000            | -5148.9777     | -38629.6300    | 3.673             |
| 396          | 191              | 288           | MODAL              | Mode             | 2.000000            | -4985.9160     | -38845.8205    | 3.708             |
| 396          | 191              | 20            | MODAL              | Mode             | 2.000000            | -6692.5161     | -38990.6982    | 3.005             |
| 396          | 191              | 230           | MODAL              | Mode             | 3.000000            | 22932.5448     | 4604.2494      | -86.758           |
| 396          | 191              | 292           | MODAL              | Mode             | 3.000000            | 22485.7487     | 3604.8791      | -85.991           |
| 396          | 191              | 288           | MODAL              | Mode             | 3.000000            | 22646.7516     | 3489.2109      | -85.901           |
| 396          | 191              | 20            | MODAL              | Mode             | 3.000000            | 23056.4582     | 4658.4383      | -86.700           |
| 396          | 191              | 230           | MODAL              | Mode             | 4.000000            | 32607.1000     | 11402.0802     | -80.303           |
| 396          | 191              | 292           | MODAL              | Mode             | 4.000000            | 42845.4061     | 9905.8417      | -81.538           |
| 396          | 191              | 288           | MODAL              | Mode             | 4.000000            | 42579.9110     | 9627.5890      | -82.484           |
| 396          | 191              | 20            | MODAL              | Mode             | 4.000000            | 32254.0668     | 11424.6729     | -81.761           |
| 396          | 191              | 230           | MODAL              | Mode             | 5.000000            | 563.6277       | -1430.9049     | -0.297            |
| 396          | 191              | 292           | MODAL              | Mode             | 5.000000            | -258.9340      | -2156.0879     | -5.294            |
| 396          | 191              | 288           | MODAL              | Mode             | 5.000000            | -391.5428      | -2684.0059     | -3.716            |
| 396          | 191              | 20            | MODAL              | Mode             | 5.000000            | 421.6224       | -1985.4119     | 0.387             |
| 396          | 191              | 230           | MODAL              | Mode             | 6.000000            | 22329.6691     | 7626.2706      | -79.283           |
| 396          | 191              | 292           | MODAL              | Mode             | 6.000000            | 29301.2722     | 7201.6067      | -80.716           |
| 396          | 191              | 288           | MODAL              | Mode             | 6.000000            | 29445.9190     | 7051.6885      | -81.675           |
| 396          | 191              | 20            | MODAL              | Mode             | 6.000000            | 22385.2337     | 7721.9465      | -80.708           |
| 396          | 191              | 230           | MODAL              | Mode             | 7.000000            | 6952.9006      | 2017.4488      | -11.817           |
| 396          | 191              | 292           | MODAL              | Mode             | 7.000000            | 5919.7068      | -1009.2687     | -9.675            |
| 396          | 191              | 288           | MODAL              | Mode             | 7.000000            | 5988.5434      | -829.7127      | -11.514           |
| 396          | 191              | 20            | MODAL              | Mode             | 7.000000            | 7065.3619      | 2125.7084      | -14.027           |
| 396          | 191              | 230           | MODAL              | Mode             | 8.000000            | -262.8978      | -2699.0687     | -58.844           |
| 396          | 191              | 292           | MODAL              | Mode             | 8.000000            | -1039.9313     | -4317.3570     | -67.125           |
| 396          | 191              | 288           | MODAL              | Mode             | 8.000000            | -1866.7235     | -4507.3969     | -62.458           |
| 396          | 191              | 20            | MODAL              | Mode             | 8.000000            | -1062.5905     | -3072.8858     | -50.222           |
| 396          | 191              | 230           | MODAL              | Mode             | 9.000000            | -18410.8028    | -48090.1730    | -82.821           |
| 396          | 191              | 292           | MODAL              | Mode             | 9.000000            | 9201.4896      | -28685.2394    | -81.207           |
| 396          | 191              | 288           | MODAL              | Mode             | 9.000000            | 8847.6552      | -29404.9007    | -83.023           |
| 396          | 191              | 20            | MODAL              | Mode             | 9.000000            | -18578.3386    | -48906.6755    | -85.092           |
| 396          | 191              | 230           | MODAL              | Mode             | 10.000000           | -6010.9379     | -14527.5602    | -76.673           |
| 396          | 191              | 292           | MODAL              | Mode             | 10.000000           | 3065.1578      | -8433.0521     | -76.283           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 396          | 191              | 288           | MODAL              | Mode             | 10.000000           | 3010.1510      | -8595.6795     | -78.333           |
| 396          | 191              | 20            | MODAL              | Mode             | 10.000000           | -6079.7713     | -14708.6993    | -79.417           |
| 396          | 191              | 230           | MODAL              | Mode             | 11.000000           | 159229.1648    | 64266.0795     | -0.037            |
| 396          | 191              | 292           | MODAL              | Mode             | 11.000000           | 139886.8874    | 48158.5083     | -7.095E-03        |
| 396          | 191              | 288           | MODAL              | Mode             | 11.000000           | 140677.5200    | 48430.9689     | -0.392            |
| 396          | 191              | 20            | MODAL              | Mode             | 11.000000           | 159881.5437    | 65612.3450     | -0.513            |
| 396          | 191              | 230           | MODAL              | Mode             | 12.000000           | -25834.5937    | -46177.8216    | 69.536            |
| 396          | 191              | 292           | MODAL              | Mode             | 12.000000           | -4800.6908     | -28251.3289    | 27.904            |
| 396          | 191              | 288           | MODAL              | Mode             | 12.000000           | -664.3444      | -17182.8348    | 40.665            |
| 396          | 191              | 20            | MODAL              | Mode             | 12.000000           | -13630.4052    | -41893.4872    | 79.448            |
| 396          | 191              | 230           | locomotoras        |                  |                     | 138.2092       | 58.9262        | -89.495           |
| 396          | 191              | 292           | locomotoras        |                  |                     | 120.8415       | 22.4197        | -88.351           |
| 396          | 191              | 288           | locomotoras        |                  |                     | 120.4050       | 22.2403        | -87.959           |
| 396          | 191              | 20            | locomotoras        |                  |                     | 144.2930       | 61.2267        | -88.686           |
| 397          | 192              | 292           | MODAL              | Mode             | 1.000000            | 2280.7645      | 177.6732       | 83.555            |
| 397          | 192              | 229           | MODAL              | Mode             | 1.000000            | 3498.5374      | -1161.8312     | 86.323            |
| 397          | 192              | 9             | MODAL              | Mode             | 1.000000            | 3204.6374      | -1199.7944     | 85.166            |
| 397          | 192              | 288           | MODAL              | Mode             | 1.000000            | 2000.3753      | 116.5792       | 80.572            |
| 397          | 192              | 292           | MODAL              | Mode             | 2.000000            | -4558.5339     | -29664.4102    | 4.483             |
| 397          | 192              | 229           | MODAL              | Mode             | 2.000000            | -386.8511      | -29799.2144    | 6.728             |
| 397          | 192              | 9             | MODAL              | Mode             | 2.000000            | -124.5863      | -30238.7494    | 6.712             |
| 397          | 192              | 288           | MODAL              | Mode             | 2.000000            | -4689.2889     | -29886.2121    | 4.453             |
| 397          | 192              | 292           | MODAL              | Mode             | 3.000000            | 17252.3929     | 3047.0953      | -85.370           |
| 397          | 192              | 229           | MODAL              | Mode             | 3.000000            | 16659.0875     | 443.2885       | -82.735           |
| 397          | 192              | 9             | MODAL              | Mode             | 3.000000            | 16997.1109     | 253.9660       | -82.715           |
| 397          | 192              | 288           | MODAL              | Mode             | 3.000000            | 17418.9231     | 3165.0852      | -85.346           |
| 397          | 192              | 292           | MODAL              | Mode             | 4.000000            | 32929.5427     | 9587.3635      | -78.117           |
| 397          | 192              | 229           | MODAL              | Mode             | 4.000000            | 48355.8011     | 695.6087       | -79.219           |
| 397          | 192              | 9             | MODAL              | Mode             | 4.000000            | 48724.6557     | 159.9362       | -79.717           |
| 397          | 192              | 288           | MODAL              | Mode             | 4.000000            | 32733.1847     | 9784.1819      | -78.970           |
| 397          | 192              | 292           | MODAL              | Mode             | 5.000000            | 1504.5579      | -1395.2096     | -3.342            |
| 397          | 192              | 229           | MODAL              | Mode             | 5.000000            | -528.7760      | -1450.1130     | -29.043           |
| 397          | 192              | 9             | MODAL              | Mode             | 5.000000            | -656.4855      | -1793.9478     | -16.946           |
| 397          | 192              | 288           | MODAL              | Mode             | 5.000000            | 1341.8195      | -1794.8221     | -2.250            |
| 397          | 192              | 292           | MODAL              | Mode             | 6.000000            | 22303.6531     | 5826.0324      | -77.770           |
| 397          | 192              | 229           | MODAL              | Mode             | 6.000000            | 32188.9981     | 1309.7396      | -78.185           |
| 397          | 192              | 9             | MODAL              | Mode             | 6.000000            | 32818.6886     | 906.0188       | -78.742           |
| 397          | 192              | 288           | MODAL              | Mode             | 6.000000            | 22437.4913     | 6060.3074      | -78.553           |
| 397          | 192              | 292           | MODAL              | Mode             | 7.000000            | 5293.8715      | -901.0915      | -11.041           |
| 397          | 192              | 229           | MODAL              | Mode             | 7.000000            | 2087.0637      | -6643.4405     | -10.439           |
| 397          | 192              | 9             | MODAL              | Mode             | 7.000000            | 2215.2356      | -6490.4771     | -11.410           |
| 397          | 192              | 288           | MODAL              | Mode             | 7.000000            | 5330.2327      | -775.3333      | -12.698           |
| 397          | 192              | 292           | MODAL              | Mode             | 8.000000            | -444.2204      | -1652.2598     | -66.392           |
| 397          | 192              | 229           | MODAL              | Mode             | 8.000000            | -630.8531      | -1837.8896     | 77.230            |
| 397          | 192              | 9             | MODAL              | Mode             | 8.000000            | -1147.4666     | -1958.1644     | 59.725            |
| 397          | 192              | 288           | MODAL              | Mode             | 8.000000            | -1066.7657     | -1838.9113     | -54.274           |
| 397          | 192              | 292           | MODAL              | Mode             | 9.000000            | 5299.6797      | -28107.1130    | -74.499           |
| 397          | 192              | 229           | MODAL              | Mode             | 9.000000            | 62125.6007     | 1156.0081      | -75.129           |
| 397          | 192              | 9             | MODAL              | Mode             | 9.000000            | 62259.7445     | 472.8072       | -76.265           |
| 397          | 192              | 288           | MODAL              | Mode             | 9.000000            | 4828.6846      | -28346.3769    | -76.377           |
| 397          | 192              | 292           | MODAL              | Mode             | 10.000000           | 1893.7223      | -8936.0091     | -69.672           |
| 397          | 192              | 229           | MODAL              | Mode             | 10.000000           | 20388.6179     | 735.4009       | -71.484           |
| 397          | 192              | 9             | MODAL              | Mode             | 10.000000           | 20616.7154     | 539.0754       | -72.797           |
| 397          | 192              | 288           | MODAL              | Mode             | 10.000000           | 1778.6229      | -8937.9731     | -71.578           |
| 397          | 192              | 292           | MODAL              | Mode             | 11.000000           | 132418.9755    | 43423.4746     | 3.645             |
| 397          | 192              | 229           | MODAL              | Mode             | 11.000000           | 2418.3150      | -50656.7202    | 4.543             |
| 397          | 192              | 9             | MODAL              | Mode             | 11.000000           | 3463.7167      | -49726.5040    | 2.932             |
| 397          | 192              | 288           | MODAL              | Mode             | 11.000000           | 133804.0612    | 43369.2515     | 2.754             |
| 397          | 192              | 292           | MODAL              | Mode             | 12.000000           | -26547.6513    | -44476.1908    | 84.067            |
| 397          | 192              | 229           | MODAL              | Mode             | 12.000000           | 22757.0485     | -15996.9812    | 1.912             |
| 397          | 192              | 9             | MODAL              | Mode             | 12.000000           | 23042.8387     | -7043.9615     | 0.141             |
| 397          | 192              | 288           | MODAL              | Mode             | 12.000000           | -16738.8772    | -42747.2125    | 88.579            |
| 397          | 192              | 292           | locomotoras        |                  |                     | 93.3299        | 20.6126        | -87.298           |
| 397          | 192              | 229           | locomotoras        |                  |                     | 70.4132        | -0.0550        | -85.799           |
| 397          | 192              | 9             | locomotoras        |                  |                     | 71.9366        | 0.0666         | -85.413           |

| Area<br>Text | AreaElem<br>Text | Joint<br>Text | OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | MMax<br>KN-m/m | MMin<br>KN-m/m | MAngle<br>Degrees |
|--------------|------------------|---------------|--------------------|------------------|---------------------|----------------|----------------|-------------------|
| 397          | 192              | 288           | locomotoras        |                  |                     | 93.1021        | 20.5938        | -86.991           |

Table: Joint Displacements, Part 1 of 2

| Joint<br>Text | OutputCase<br>Text | CaseType<br>Text | StepType<br>Text | StepNum<br>Unitless | U1<br>m    | U2<br>m    | U3<br>m   | R1<br>Radians |
|---------------|--------------------|------------------|------------------|---------------------|------------|------------|-----------|---------------|
| 6             | locomotoras        | LinStatic        |                  |                     | 5.767E-10  | -2.525E-07 | -0.000422 | 1.421E-08     |
| 7             | locomotoras        | LinStatic        |                  |                     | -7.004E-07 | -2.056E-06 | -0.000305 | 9.184E-06     |
| 9             | locomotoras        | LinStatic        |                  |                     | 6.986E-07  | 1.540E-06  | -0.000298 | -8.832E-06    |
| 11            | locomotoras        | LinStatic        |                  |                     | -2.321E-07 | -7.231E-07 | -0.000419 | 6.060E-07     |
| 14            | locomotoras        | LinStatic        |                  |                     | -3.666E-07 | -1.022E-06 | -0.000402 | 2.074E-06     |
| 17            | locomotoras        | LinStatic        |                  |                     | 2.236E-07  | 1.977E-07  | -0.000417 | -5.768E-07    |
| 20            | locomotoras        | LinStatic        |                  |                     | 3.586E-07  | 4.966E-07  | -0.000400 | -1.991E-06    |
| 23            | locomotoras        | LinStatic        |                  |                     | -3.036E-07 | -8.716E-07 | -0.000412 | 1.268E-06     |
| 26            | locomotoras        | LinStatic        |                  |                     | 2.950E-07  | 3.459E-07  | -0.000410 | -1.216E-06    |
| 102           | locomotoras        | LinStatic        |                  |                     | -7.313E-07 | -2.262E-06 | -0.000295 | 0.000020      |
| 199           | locomotoras        | LinStatic        |                  |                     | -1.486E-08 | -3.447E-07 | -0.000422 | 5.068E-06     |
| 200           | locomotoras        | LinStatic        |                  |                     | -2.434E-07 | -8.138E-07 | -0.000418 | 6.063E-06     |
| 201           | locomotoras        | LinStatic        |                  |                     | -2.206E-08 | -4.345E-07 | -0.000420 | 0.000010      |
| 202           | locomotoras        | LinStatic        |                  |                     | -2.589E-07 | -9.057E-07 | -0.000416 | 0.000011      |
| 203           | locomotoras        | LinStatic        |                  |                     | -3.793E-07 | -1.111E-06 | -0.000400 | 7.080E-06     |
| 204           | locomotoras        | LinStatic        |                  |                     | -7.130E-07 | -2.126E-06 | -0.000302 | 0.000013      |
| 205           | locomotoras        | LinStatic        |                  |                     | -3.906E-07 | -1.198E-06 | -0.000398 | 0.000012      |
| 206           | locomotoras        | LinStatic        |                  |                     | -7.213E-07 | -2.194E-06 | -0.000299 | 0.000016      |
| 207           | locomotoras        | LinStatic        |                  |                     | 2.151E-07  | 1.076E-07  | -0.000417 | 4.653E-06     |
| 208           | locomotoras        | LinStatic        |                  |                     | 1.944E-07  | 1.397E-08  | -0.000416 | 9.726E-06     |
| 209           | locomotoras        | LinStatic        |                  |                     | 6.960E-07  | 1.474E-06  | -0.000300 | -5.161E-06    |
| 210           | locomotoras        | LinStatic        |                  |                     | 3.533E-07  | 4.105E-07  | -0.000400 | 3.328E-06     |
| 211           | locomotoras        | LinStatic        |                  |                     | 6.727E-07  | 1.401E-06  | -0.000301 | -1.429E-06    |
| 212           | locomotoras        | LinStatic        |                  |                     | 3.306E-07  | 3.191E-07  | -0.000400 | 8.677E-06     |
| 213           | locomotoras        | LinStatic        |                  |                     | -3.137E-07 | -9.611E-07 | -0.000411 | 6.478E-06     |
| 214           | locomotoras        | LinStatic        |                  |                     | -3.226E-07 | -1.050E-06 | -0.000408 | 0.000012      |
| 215           | locomotoras        | LinStatic        |                  |                     | 2.783E-07  | 2.544E-07  | -0.000410 | 3.997E-06     |
| 216           | locomotoras        | LinStatic        |                  |                     | 2.756E-07  | 1.668E-07  | -0.000410 | 9.133E-06     |
| 217           | locomotoras        | LinStatic        |                  |                     | 2.314E-08  | -7.059E-08 | -0.000420 | -0.000010     |
| 218           | locomotoras        | LinStatic        |                  |                     | -2.032E-07 | -5.392E-07 | -0.000418 | -9.729E-06    |
| 219           | locomotoras        | LinStatic        |                  |                     | 1.626E-08  | -1.603E-07 | -0.000422 | -5.041E-06    |
| 220           | locomotoras        | LinStatic        |                  |                     | -2.239E-07 | -6.330E-07 | -0.000419 | -4.640E-06    |
| 221           | locomotoras        | LinStatic        |                  |                     | -3.389E-07 | -8.445E-07 | -0.000402 | -8.648E-06    |
| 222           | locomotoras        | LinStatic        |                  |                     | -6.749E-07 | -1.913E-06 | -0.000309 | 1.602E-06     |
| 223           | locomotoras        | LinStatic        |                  |                     | -3.617E-07 | -9.362E-07 | -0.000403 | -3.272E-06    |
| 224           | locomotoras        | LinStatic        |                  |                     | -6.983E-07 | -1.987E-06 | -0.000307 | 5.424E-06     |
| 225           | locomotoras        | LinStatic        |                  |                     | 2.508E-07  | 3.802E-07  | -0.000414 | -0.000011     |
| 226           | locomotoras        | LinStatic        |                  |                     | 2.349E-07  | 2.882E-07  | -0.000416 | -6.024E-06    |
| 227           | locomotoras        | LinStatic        |                  |                     | 7.197E-07  | 1.675E-06  | -0.000292 | -0.000016     |
| 228           | locomotoras        | LinStatic        |                  |                     | 3.829E-07  | 6.720E-07  | -0.000396 | -0.000012     |
| 229           | locomotoras        | LinStatic        |                  |                     | 7.110E-07  | 1.609E-06  | -0.000295 | -0.000012     |
| 230           | locomotoras        | LinStatic        |                  |                     | 3.712E-07  | 5.845E-07  | -0.000398 | -6.972E-06    |
| 231           | locomotoras        | LinStatic        |                  |                     | -2.845E-07 | -6.923E-07 | -0.000412 | -9.121E-06    |
| 232           | locomotoras        | LinStatic        |                  |                     | -2.867E-07 | -7.799E-07 | -0.000412 | -3.965E-06    |
| 233           | locomotoras        | LinStatic        |                  |                     | 3.144E-07  | 5.239E-07  | -0.000407 | -0.000011     |
| 234           | locomotoras        | LinStatic        |                  |                     | 3.056E-07  | 4.354E-07  | -0.000409 | -6.407E-06    |
| 267           | locomotoras        | LinStatic        |                  |                     | -4.901E-07 | -1.336E-06 | -0.000373 | 3.261E-06     |
| 268           | locomotoras        | LinStatic        |                  |                     | -4.983E-07 | -1.416E-06 | -0.000371 | 7.776E-06     |
| 269           | locomotoras        | LinStatic        |                  |                     | -5.091E-07 | -1.497E-06 | -0.000368 | 0.000012      |
| 270           | locomotoras        | LinStatic        |                  |                     | -4.731E-07 | -1.173E-06 | -0.000374 | -5.848E-06    |
| 271           | locomotoras        | LinStatic        |                  |                     | -4.718E-07 | -1.252E-06 | -0.000374 | -1.268E-06    |
| 288           | locomotoras        | LinStatic        |                  |                     | 4.833E-07  | 8.112E-07  | -0.000369 | -3.116E-06    |
| 289           | locomotoras        | LinStatic        |                  |                     | 4.652E-07  | 7.281E-07  | -0.000371 | 1.373E-06     |
| 290           | locomotoras        | LinStatic        |                  |                     | 4.660E-07  | 6.500E-07  | -0.000371 | 5.913E-06     |
| 291           | locomotoras        | LinStatic        |                  |                     | 5.026E-07  | 9.717E-07  | -0.000365 | -0.000012     |
| 292           | locomotoras        | LinStatic        |                  |                     | 4.920E-07  | 8.914E-07  | -0.000367 | -7.591E-06    |



Table: Joint Loads - Force, Part 1 of 2

| Joint<br>Text | LoadCase<br>Text | CoordSys<br>Text | F1<br>KN | F2<br>KN | F3<br>KN | M1<br>KN-m | M2<br>KN-m |
|---------------|------------------|------------------|----------|----------|----------|------------|------------|
| 200           | locomotoras      | GLOBAL           | 0.000    | 0.000    | -98.067  | 0.0000     | 0.0000     |
| 210           | locomotoras      | GLOBAL           | 0.000    | 0.000    | -98.067  | 0.0000     | 0.0000     |
| 223           | locomotoras      | GLOBAL           | 0.000    | 0.000    | -98.067  | 0.0000     | 0.0000     |
| 226           | locomotoras      | GLOBAL           | 0.000    | 0.000    | -98.067  | 0.0000     | 0.0000     |

Table: Joint Loads - Force, Part 2 of 2

| Joint<br>Text | LoadCase<br>Text | M3<br>KN-m |
|---------------|------------------|------------|
| 200           | locomotoras      | 0.0000     |
| 210           | locomotoras      | 0.0000     |
| 223           | locomotoras      | 0.0000     |
| 226           | locomotoras      | 0.0000     |

Table: Load Case Definitions

| LoadCase<br>Text | DesignType<br>Text | SelfWtMult<br>Unitless | AutoLoad<br>Text |
|------------------|--------------------|------------------------|------------------|
| DEAD             | DEAD               | 1.000000               |                  |
| locomotoras      | LIVE               | 0.000000               |                  |

Table: Masses 1 - Mass Source

| MassFrom<br>Text |
|------------------|
| Elements         |

Table: Material Properties 01 - General, Part 1 of 2

| Material<br>Text | Type<br>Text | UnitMass<br>KN-s2/m4 | UnitWeight<br>KN/m3 | E<br>KN/m2  | U<br>Unitless | A<br>1/C   |
|------------------|--------------|----------------------|---------------------|-------------|---------------|------------|
| ALUM             | Isotropic    | 2.7145E+00           | 2.6602E+01          | 69637054.68 | 0.330000      | 2.3580E-05 |
| CLDFRM           | Isotropic    | 7.8490E+00           | 7.6973E+01          | 203395357.7 | 0.300000      | 1.1700E-05 |
| CONC             | Isotropic    | 2.4517E+00           | 2.4517E+01          | 24821128.85 | 0.200000      | 9.9000E-06 |
| losaSupVia       | Isotropic    | 4.0310E+00           | 4.0310E+01          | 32080000.00 | 0.200000      | 0.0000E+00 |
| OTHER            | Isotropic    | 2.4007E+00           | 2.3562E+01          | 24821128.40 | 0.200000      | 9.9000E-06 |
| STEEL            | Isotropic    | 7.8490E+00           | 7.6973E+01          | 199947978.8 | 0.300000      | 1.1700E-05 |

Table: Material Properties 01 - General, Part 2 of 2

| Material<br>Text | MDampRatio<br>Unitless | VDampMass<br>1/Sec | VDampStiff<br>Sec | HDampMass<br>1/Sec2 | HDampStiff<br>Unitless | NumAdvance<br>Unitless | Color<br>Text |
|------------------|------------------------|--------------------|-------------------|---------------------|------------------------|------------------------|---------------|
| ALUM             | 0.0000                 | 0.0000             | 0.0000            | 0.0000              | 0.000000               | 0                      | Magenta       |
| CLDFRM           | 0.0000                 | 0.0000             | 0.0000            | 0.0000              | 0.000000               | 0                      | Yellow        |
| CONC             | 0.0000                 | 0.0000             | 0.0000            | 0.0000              | 0.000000               | 0                      | Red           |
| losaSupVia       | 0.0000                 | 0.0000             | 0.0000            | 0.0000              | 0.000000               | 0                      | Green         |
| OTHER            | 0.0000                 | 0.0000             | 0.0000            | 0.0000              | 0.000000               | 0                      | White         |
| STEEL            | 0.0000                 | 0.0000             | 0.0000            | 0.0000              | 0.000000               | 0                      | Cyan          |

Table: Modal Load Participation Ratios

| OutputCase<br>Text | ItemType<br>Text | Item<br>Text | Static<br>Percent | Dynamic<br>Percent |
|--------------------|------------------|--------------|-------------------|--------------------|
| MODAL              | Acceleration     | UX           | 99.6495           | 96.4654            |
| MODAL              | Acceleration     | UY           | 99.9617           | 98.2964            |
| MODAL              | Acceleration     | UZ           | 99.3837           | 75.7105            |

Table: Modal Participating Mass Ratios, Part 1 of 3

| OutputCase | StepType | StepNum   | Period   | UX        | UY        | UZ        | SumUX    | SumUY    |
|------------|----------|-----------|----------|-----------|-----------|-----------|----------|----------|
| Text       | Text     | Unitless  | Sec      | Unitless  | Unitless  | Unitless  | Unitless | Unitless |
| MODAL      | Mode     | 1.000000  | 0.138956 | 0.01375   | 0.76820   | 2.057E-09 | 0.01375  | 0.76820  |
| MODAL      | Mode     | 2.000000  | 0.084830 | 1.827E-08 | 3.936E-08 | 0.11372   | 0.01375  | 0.76820  |
| MODAL      | Mode     | 3.000000  | 0.068597 | 1.343E-07 | 1.125E-07 | 0.64091   | 0.01375  | 0.76820  |
| MODAL      | Mode     | 4.000000  | 0.063731 | 0.02579   | 0.00355   | 2.953E-05 | 0.03954  | 0.77176  |
| MODAL      | Mode     | 5.000000  | 0.062408 | 0.58830   | 0.03282   | 4.777E-07 | 0.62784  | 0.80457  |
| MODAL      | Mode     | 6.000000  | 0.055936 | 0.03764   | 0.00086   | 6.353E-08 | 0.66548  | 0.80543  |
| MODAL      | Mode     | 7.000000  | 0.047822 | 3.512E-05 | 3.902E-06 | 0.00170   | 0.66551  | 0.80543  |
| MODAL      | Mode     | 8.000000  | 0.042074 | 0.29840   | 0.17751   | 1.513E-07 | 0.96391  | 0.98295  |
| MODAL      | Mode     | 9.000000  | 0.040241 | 1.254E-07 | 6.344E-07 | 0.00012   | 0.96391  | 0.98295  |
| MODAL      | Mode     | 10.000000 | 0.037028 | 2.051E-07 | 4.518E-07 | 0.00063   | 0.96391  | 0.98295  |
| MODAL      | Mode     | 11.000000 | 0.026556 | 0.00048   | 1.961E-06 | 1.569E-08 | 0.96439  | 0.98295  |
| MODAL      | Mode     | 12.000000 | 0.024569 | 0.00026   | 1.383E-05 | 2.322E-08 | 0.96465  | 0.98296  |

Table: Modal Participating Mass Ratios, Part 2 of 3

| OutputCase | StepType | StepNum   | SumUZ     | RX        | RY        | RZ        | SumRX    | SumRY    |
|------------|----------|-----------|-----------|-----------|-----------|-----------|----------|----------|
| Text       | Text     | Unitless  | Unitless  | Unitless  | Unitless  | Unitless  | Unitless | Unitless |
| MODAL      | Mode     | 1.000000  | 2.057E-09 | 0.15379   | 0.00424   | 0.21823   | 0.15379  | 0.00424  |
| MODAL      | Mode     | 2.000000  | 0.11372   | 0.06947   | 0.06445   | 5.898E-07 | 0.22326  | 0.06870  |
| MODAL      | Mode     | 3.000000  | 0.75463   | 0.39145   | 0.36530   | 0.00050   | 0.61471  | 0.43400  |
| MODAL      | Mode     | 4.000000  | 0.75466   | 1.974E-06 | 0.00986   | 0.00290   | 0.61471  | 0.44386  |
| MODAL      | Mode     | 5.000000  | 0.75466   | 0.00289   | 0.02268   | 0.10140   | 0.61760  | 0.46653  |
| MODAL      | Mode     | 6.000000  | 0.75466   | 0.00331   | 0.24179   | 0.01574   | 0.62091  | 0.70832  |
| MODAL      | Mode     | 7.000000  | 0.75636   | 0.00101   | 0.00089   | 0.29170   | 0.62192  | 0.70921  |
| MODAL      | Mode     | 8.000000  | 0.75636   | 0.00048   | 0.04158   | 0.31876   | 0.62240  | 0.75079  |
| MODAL      | Mode     | 9.000000  | 0.75648   | 7.366E-05 | 7.095E-05 | 0.00369   | 0.62247  | 0.75086  |
| MODAL      | Mode     | 10.000000 | 0.75711   | 0.00038   | 0.00037   | 0.00238   | 0.62285  | 0.75123  |
| MODAL      | Mode     | 11.000000 | 0.75711   | 0.00086   | 0.00020   | 0.00018   | 0.62371  | 0.75142  |
| MODAL      | Mode     | 12.000000 | 0.75711   | 0.02312   | 5.133E-06 | 4.492E-05 | 0.64683  | 0.75143  |

Table: Modal Participating Mass Ratios, Part 3 of 3

| OutputCase | StepType | StepNum   | SumRZ    |
|------------|----------|-----------|----------|
| Text       | Text     | Unitless  | Unitless |
| MODAL      | Mode     | 1.000000  | 0.21823  |
| MODAL      | Mode     | 2.000000  | 0.21823  |
| MODAL      | Mode     | 3.000000  | 0.21872  |
| MODAL      | Mode     | 4.000000  | 0.22162  |
| MODAL      | Mode     | 5.000000  | 0.32302  |
| MODAL      | Mode     | 6.000000  | 0.33876  |
| MODAL      | Mode     | 7.000000  | 0.63046  |
| MODAL      | Mode     | 8.000000  | 0.94922  |
| MODAL      | Mode     | 9.000000  | 0.95292  |
| MODAL      | Mode     | 10.000000 | 0.95529  |
| MODAL      | Mode     | 11.000000 | 0.95547  |
| MODAL      | Mode     | 12.000000 | 0.95552  |

Table: Modal Participation Factors, Part 1 of 2

| OutputCase | StepType | StepNum   | Period   | UX         | UY          | UZ         | RX          | RY          |
|------------|----------|-----------|----------|------------|-------------|------------|-------------|-------------|
| Text       | Text     | Unitless  | Sec      | KN-s2      | KN-s2       | KN-s2      | KN-m-s2     | KN-m-s2     |
| MODAL      | Mode     | 1.000000  | 0.138956 | -15.562784 | -116.313071 | -0.005550  | 391.454349  | -73.408590  |
| MODAL      | Mode     | 2.000000  | 0.084830 | 0.017938   | 0.026330    | -41.260795 | -263.107827 | 286.088231  |
| MODAL      | Mode     | 3.000000  | 0.068597 | -0.048627  | -0.044504   | 97.953756  | 624.534897  | -681.078874 |
| MODAL      | Mode     | 4.000000  | 0.063731 | 21.311272  | 7.908067    | 0.664920   | 1.402326    | -111.890943 |
| MODAL      | Mode     | 5.000000  | 0.062408 | 101.786312 | 24.039631   | -0.084565  | 53.636013   | 169.689007  |
| MODAL      | Mode     | 6.000000  | 0.055936 | -25.745379 | 3.887772    | 0.030840   | -57.442881  | -554.105833 |
| MODAL      | Mode     | 7.000000  | 0.047822 | 0.786401   | -0.262144   | 5.044000   | 31.735666   | -33.618360  |
| MODAL      | Mode     | 8.000000  | 0.042074 | -72.491807 | 55.912324   | 0.047587   | 21.858393   | -229.779133 |
| MODAL      | Mode     | 9.000000  | 0.040241 | -0.046996  | 0.105698    | 1.328384   | 8.567103    | -9.492031   |
| MODAL      | Mode     | 10.000000 | 0.037028 | -0.060103  | 0.089198    | -3.061435  | -19.509132  | 21.570970   |
| MODAL      | Mode     | 11.000000 | 0.026556 | -2.911517  | 0.185843    | 0.015325   | 29.259443   | 15.836806   |

| OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | Period<br>Sec | UX<br>KN-s2 | UY<br>KN-s2 | UZ<br>KN-s2 | RX<br>KN-m-s2 | RY<br>KN-m-s2 |
|--------------------|------------------|---------------------|---------------|-------------|-------------|-------------|---------------|---------------|
| MODAL              | Mode             | 12.000000           | 0.024569      | 2.136568    | 0.493435    | 0.018647    | 151.765040    | -2.553101     |

Table: Modal Participation Factors, Part 2 of 2

| OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | RZ<br>KN-m-s2 | ModalMass<br>KN-m-s2 | ModalStiff<br>KN-m |
|--------------------|------------------|---------------------|---------------|----------------------|--------------------|
| MODAL              | Mode             | 1.000000            | -709.249896   | 9.8067               | 20050.50880        |
| MODAL              | Mode             | 2.000000            | 1.165957      | 9.8067               | 53800.21298        |
| MODAL              | Mode             | 3.000000            | -33.792656    | 9.8067               | 82275.80651        |
| MODAL              | Mode             | 4.000000            | -81.731244    | 9.8067               | 95317.42326        |
| MODAL              | Mode             | 5.000000            | -483.458664   | 9.8067               | 99403.50435        |
| MODAL              | Mode             | 6.000000            | 190.469841    | 9.8067               | 123735.6066        |
| MODAL              | Mode             | 7.000000            | 819.998281    | 9.8067               | 169288.9246        |
| MODAL              | Mode             | 8.000000            | 857.188387    | 9.8067               | 218704.7370        |
| MODAL              | Mode             | 9.000000            | 92.275258     | 9.8067               | 239084.2679        |
| MODAL              | Mode             | 10.000000           | 73.991831     | 9.8067               | 282369.4157        |
| MODAL              | Mode             | 11.000000           | 20.472147     | 9.8067               | 548972.560         |
| MODAL              | Mode             | 12.000000           | -10.175414    | 9.8067               | 641387.456         |

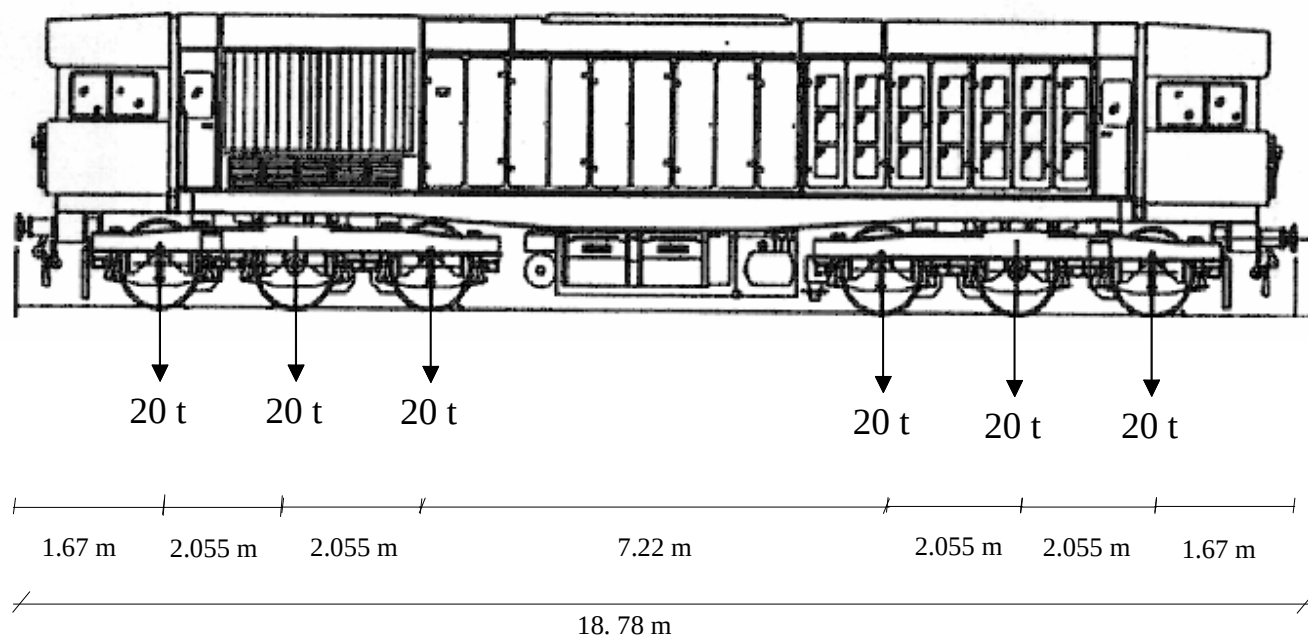
Table: Modal Periods And Frequencies

| OutputCase<br>Text | StepType<br>Text | StepNum<br>Unitless | Period<br>Sec   | Frequency<br>Cyc/sec | CircFreq<br>rad/sec | Eigenvalue<br>rad2/sec2 |
|--------------------|------------------|---------------------|-----------------|----------------------|---------------------|-------------------------|
| MODAL              | Mode             | 1.000000            | 0.138956        | 7.1965E+00           | 4.5217E+01          | 2.0446E+03              |
| <b>MODAL</b>       | <b>Mode</b>      | <b>2.000000</b>     | <b>0.084830</b> | <b>1.1788E+01</b>    | <b>7.4068E+01</b>   | <b>5.4861E+03</b>       |
| MODAL              | Mode             | 3.000000            | 0.068597        | 1.4578E+01           | 9.1596E+01          | 8.3898E+03              |
| MODAL              | Mode             | 4.000000            | 0.063731        | 1.5691E+01           | 9.8588E+01          | 9.7197E+03              |
| MODAL              | Mode             | 5.000000            | 0.062408        | 1.6024E+01           | 1.0068E+02          | 1.0136E+04              |
| MODAL              | Mode             | 6.000000            | 0.055936        | 1.7878E+01           | 1.1233E+02          | 1.2618E+04              |
| MODAL              | Mode             | 7.000000            | 0.047822        | 2.0911E+01           | 1.3139E+02          | 1.7263E+04              |
| MODAL              | Mode             | 8.000000            | 0.042074        | 2.3768E+01           | 1.4934E+02          | 2.2302E+04              |
| MODAL              | Mode             | 9.000000            | 0.040241        | 2.4851E+01           | 1.5614E+02          | 2.4380E+04              |
| MODAL              | Mode             | 10.000000           | 0.037028        | 2.7007E+01           | 1.6969E+02          | 2.8794E+04              |
| MODAL              | Mode             | 11.000000           | 0.026556        | 3.7656E+01           | 2.3660E+02          | 5.5980E+04              |
| MODAL              | Mode             | 12.000000           | 0.024569        | 4.0702E+01           | 2.5574E+02          | 6.5403E+04              |

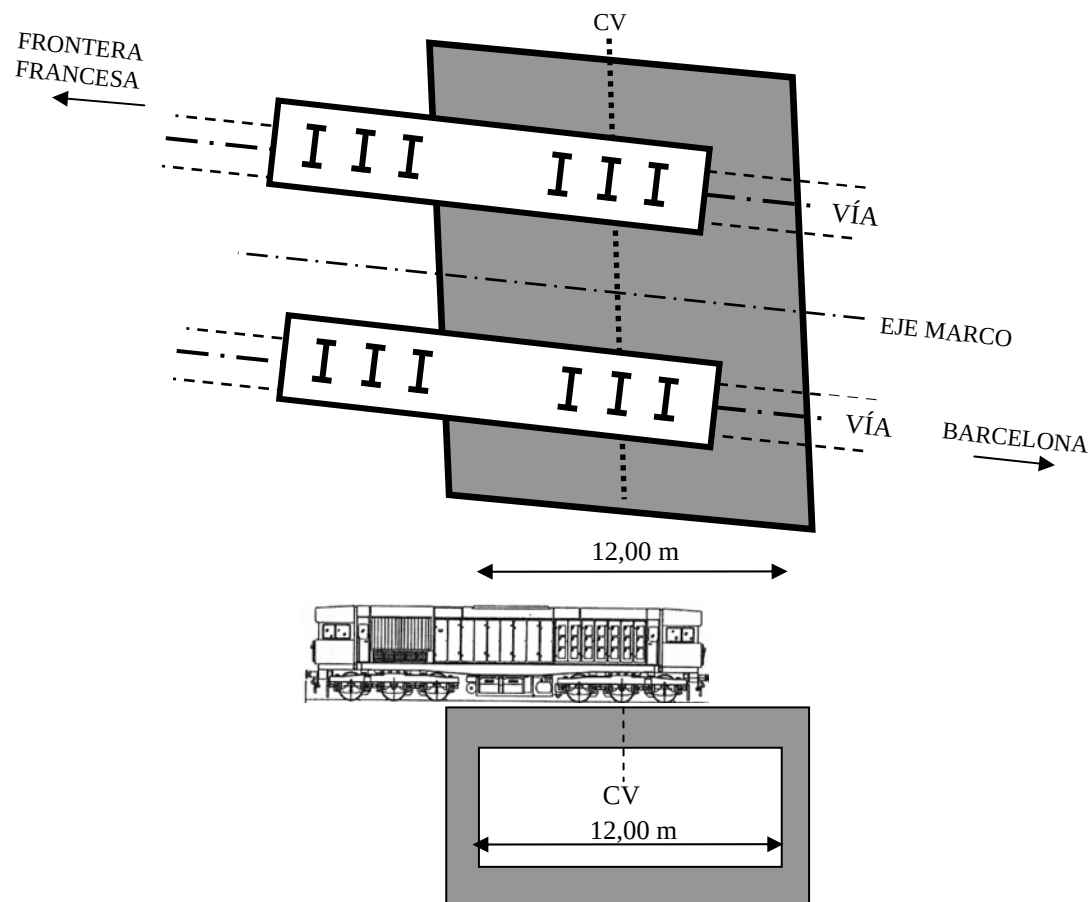
### **ANEJO 3: ESQUEMA DE INSTRUMENTACIÓN Y TREN DE CARGAS**

OBRA DE DRENAJE ODT 1.2 SITUADA EN EL P.K. 401+163 DE LA L.A.V DE  
MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA.  
TRAMO: BARCELONA SANTS-FIGUERES. SUBTRAMO: LA ROCA DEL  
VALLÉS-LLINARS DEL VALLÉS.

### TREN DE CARGA



OBRA DE DRENAJE ODT 1.2 SITUADA EN EL P.K. 401+163 DE LA L.A.V DE MADRID-  
ZARAGOZA-BARCELONA-FRONTERA FRANCESA.  
TRAMO BARCELONA SANTS-FIGUERES.  
SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS.  
**ENSAYO ESTÁTICO. POSICIÓN DEL TREN DE CARGAS**

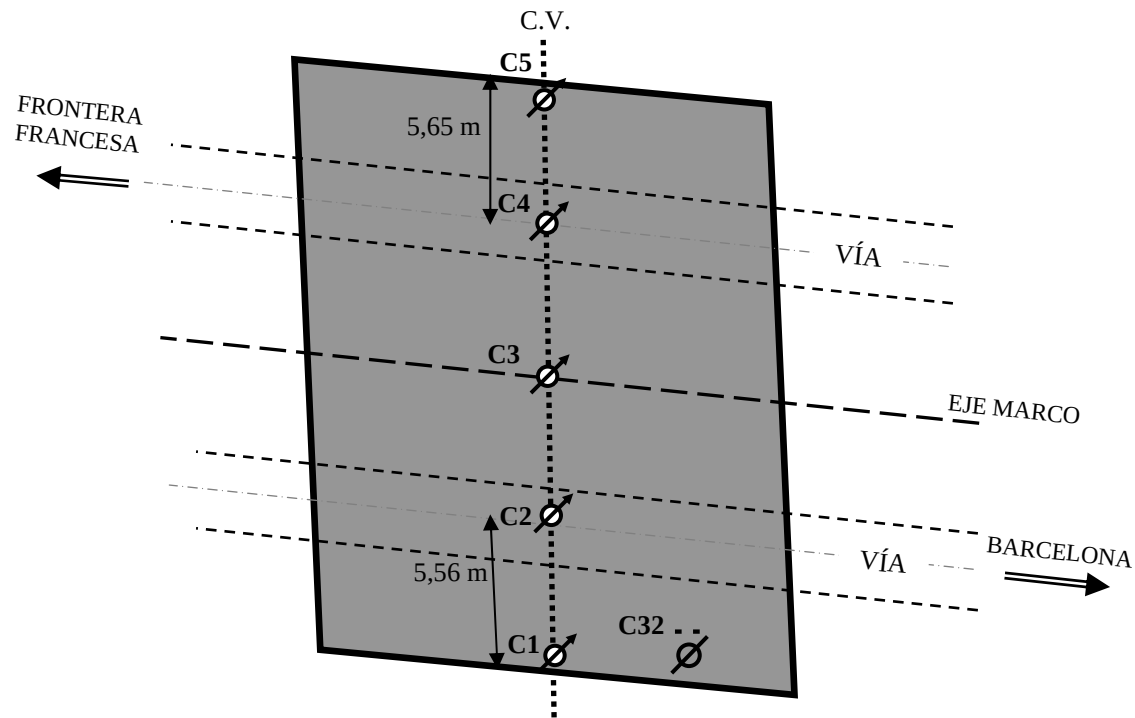


OBRA DE DRENAJE ODT 1.2 SITUADA EN EL P.K. 401+163 DE LA L.A.V DE  
MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA.

TRAMO: BARCELONA SANTS-FIGUERES.

SUBTRAMO: LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS.

### INSTRUMENTACIÓN



-  Transductor de desplazamiento (0,01 mm de apreciación)
-  Acelerómetro



**Cliente:** A.D.I.F.

**Nº O.T.:**

**Refª:** I/OC-10004/CE-1

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#### **ANEJO 4: REGISTRO DE MEDIDAS**





**Cliente:** A.D.I.F.

**Nº O.T.:**

**Refª:** I/OC-10004/CE-1

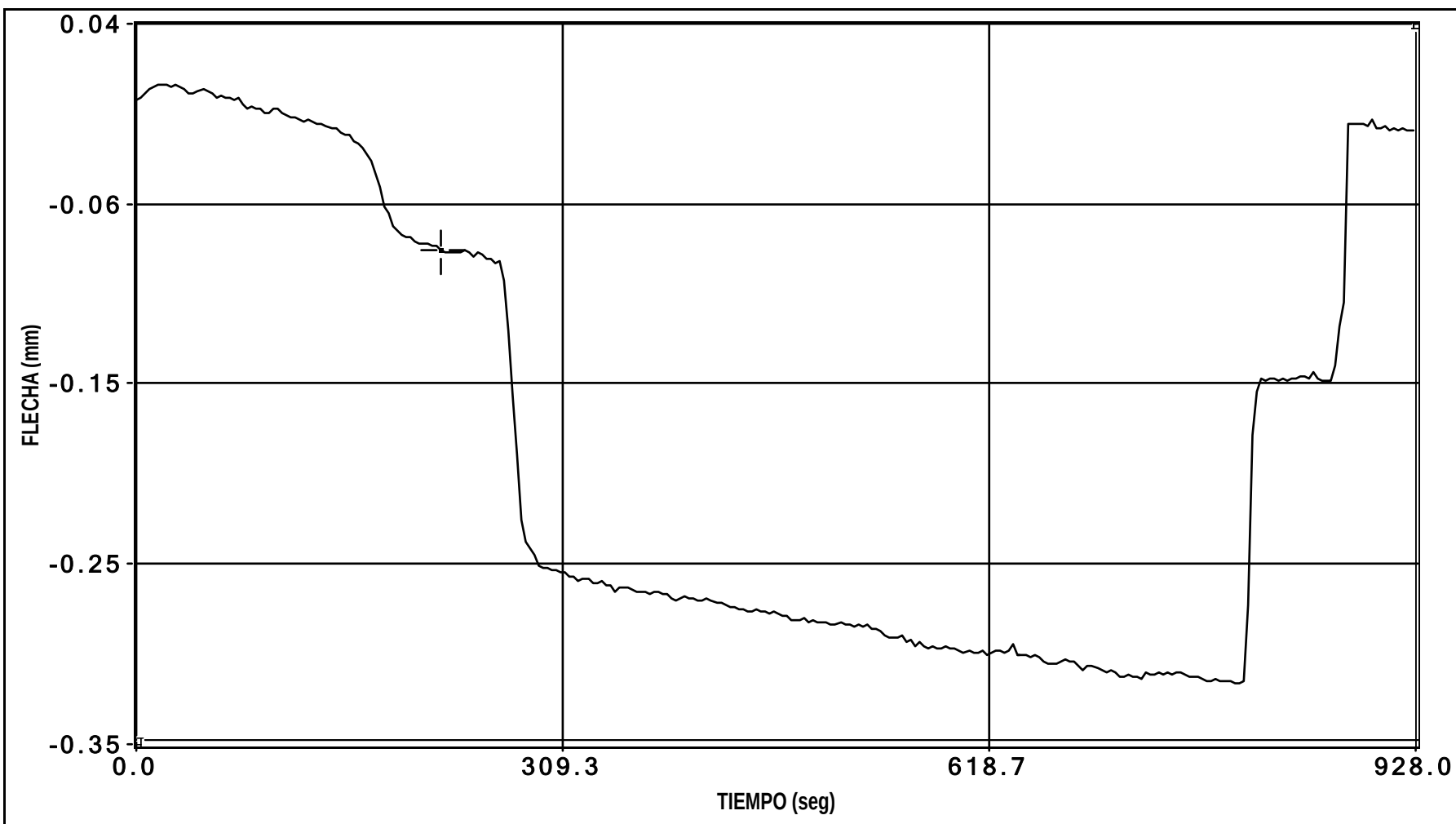
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## ENSAYO ESTÁTICO

PRUEBA:

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Fecha de la Prueba: 04/02/2010 // Hora de grabación: 21:27



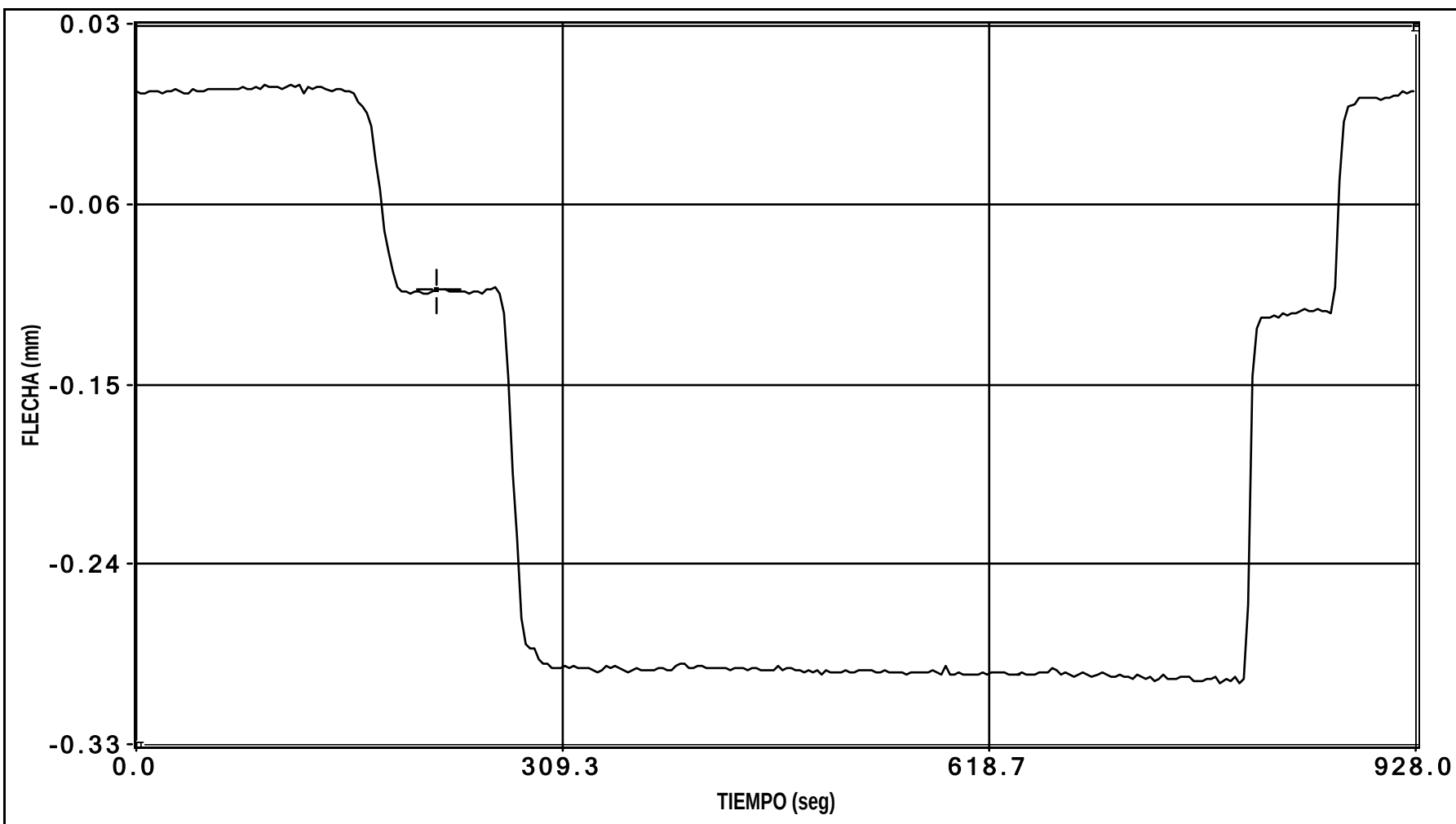
canal 1 flecha

La variación entre el punto inicial y final de la gráfica es debida a una deriva eléctrica.

PRUEBA:

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Fecha de la Prueba: 04/02/2010 // Hora de grabación: 21:27

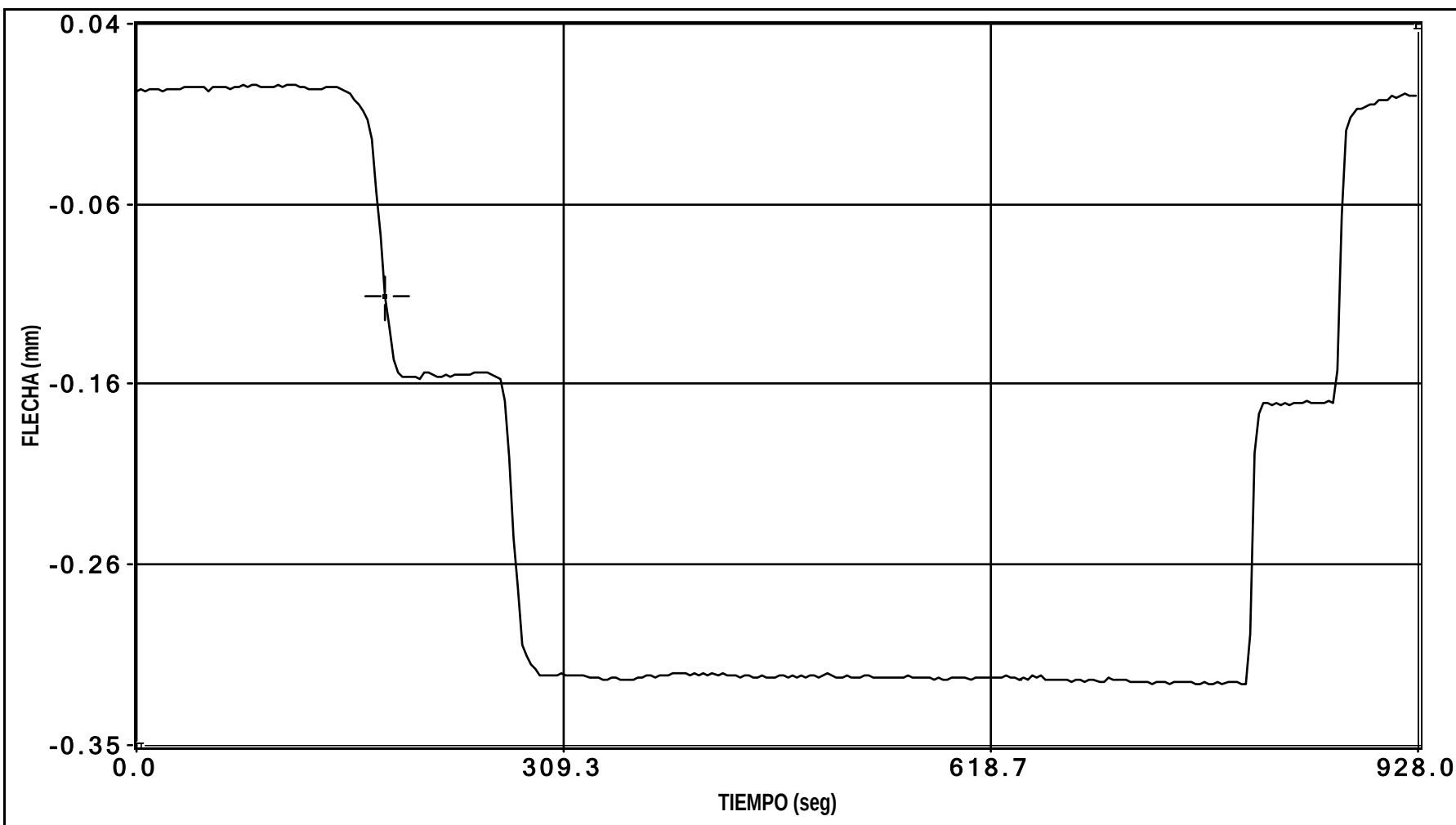


canal 2 flecha

PRUEBA:

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Fecha de la Prueba: 04/02/2010 // Hora de grabación: 21:27

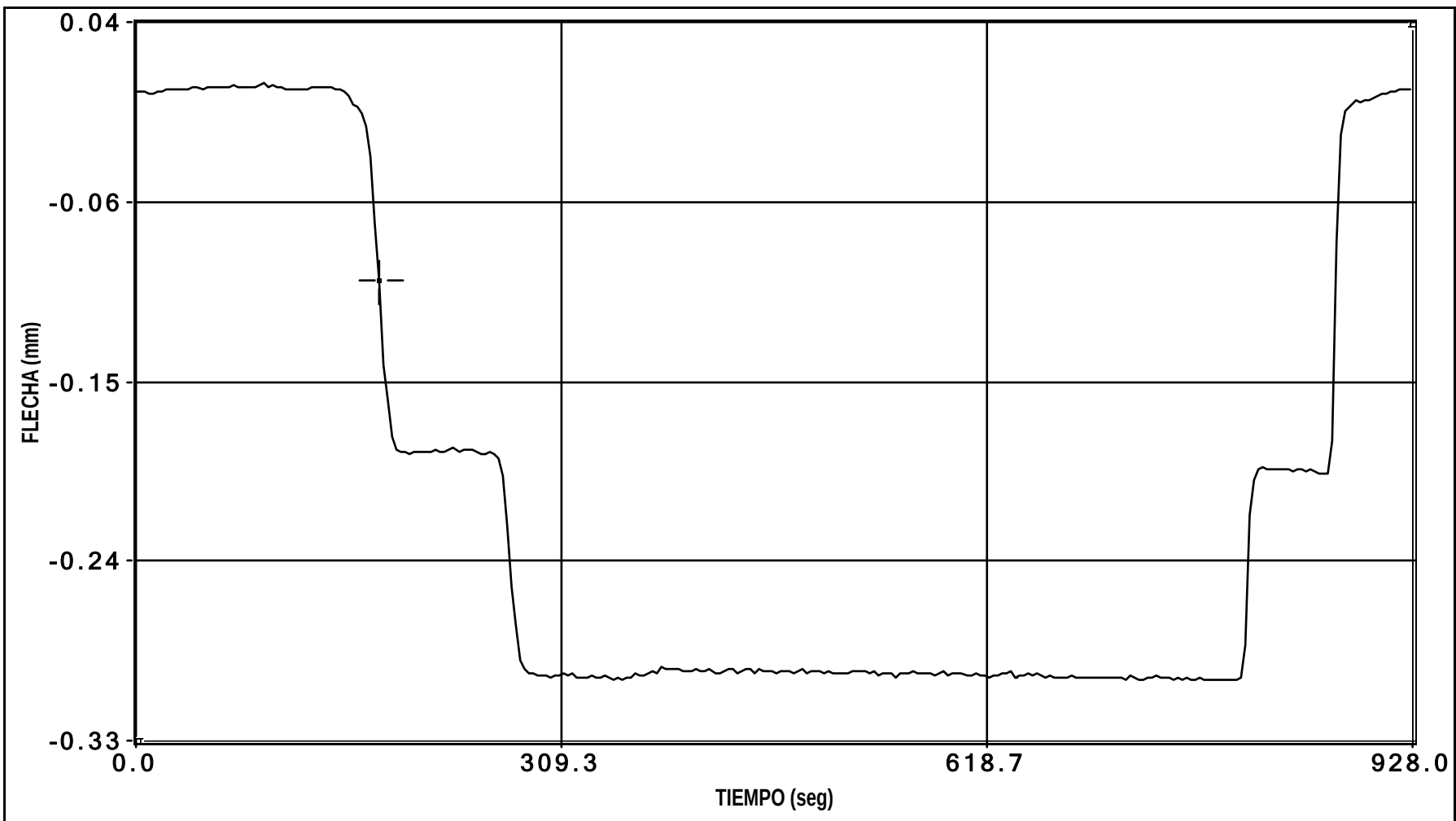


canal 3 flecha

PRUEBA:

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Fecha de la Prueba: 04/02/2010 // Hora de grabación: 21:27

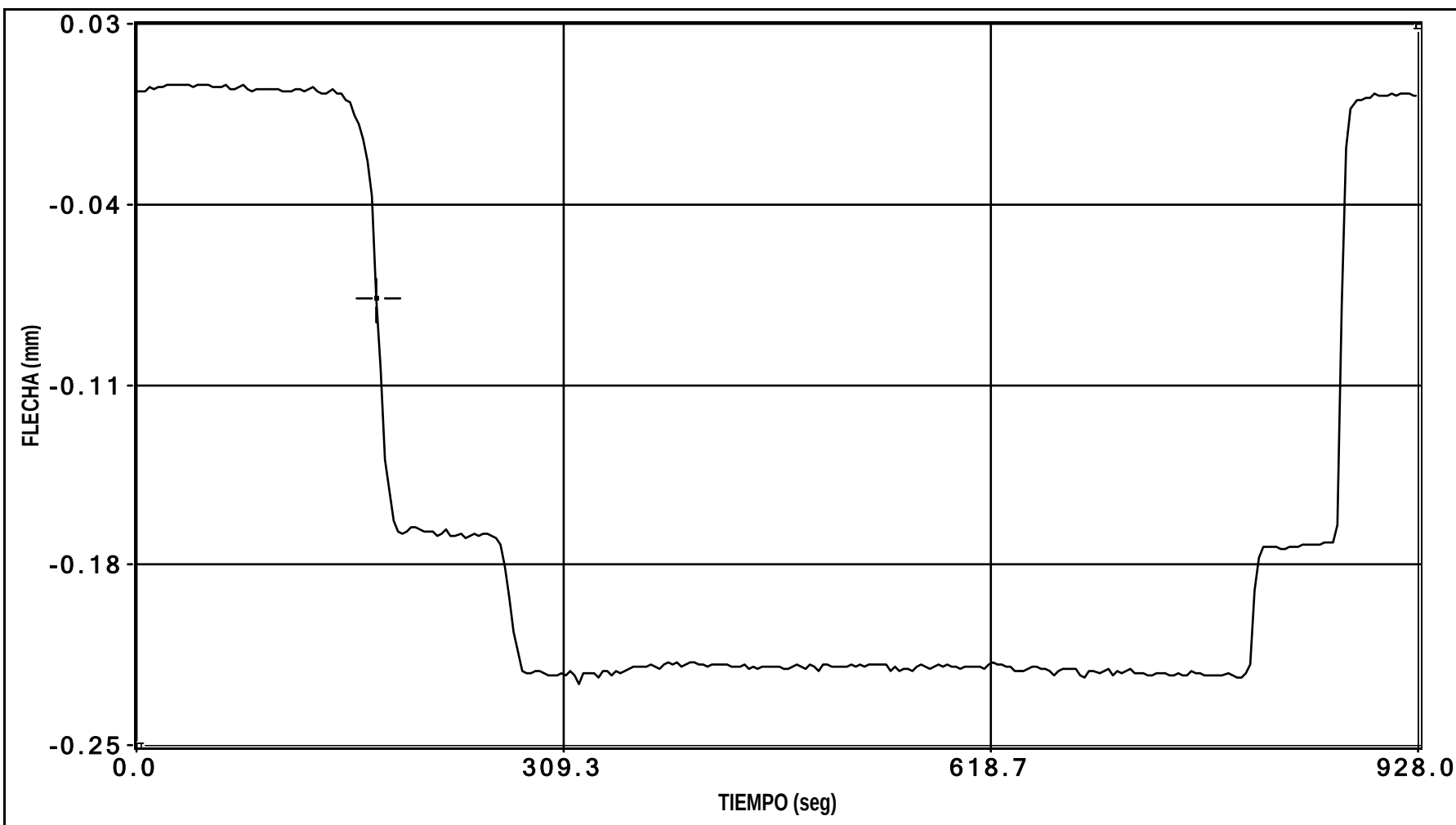


canal 4 flecha

PRUEBA:

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Fecha de la Prueba: 04/02/2010 // Hora de grabación: 21:27



canal 5 flecha



**Cliente:** A.D.I.F.

**Nº O.T.:**

**Refª:** I/OC-10004/CE-1

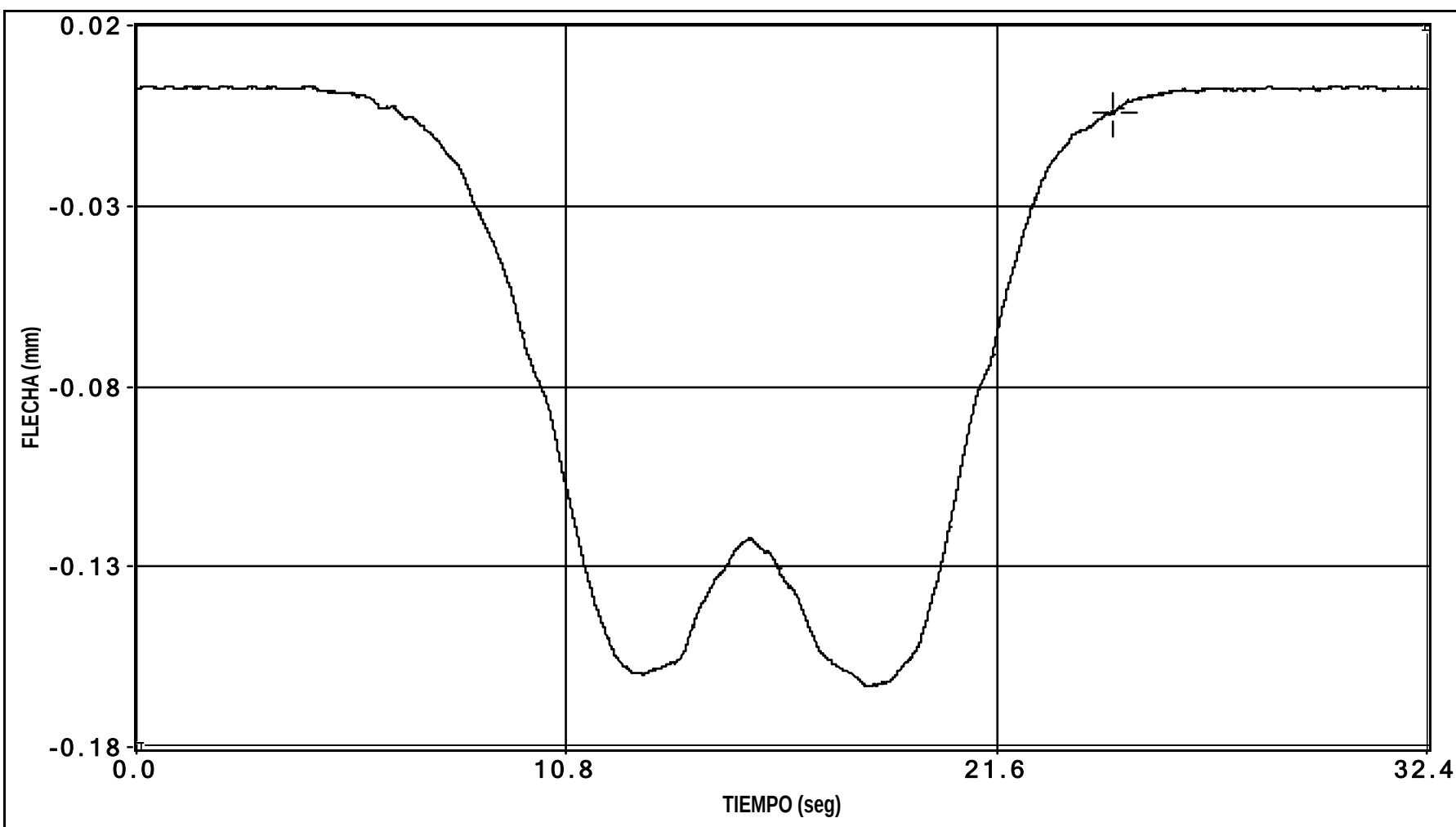
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## ENSAYO CUASIELÁSTICO

PRUEBA:

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Fecha de la Prueba: 04/02/2010 // Hora de grabación: 21:29



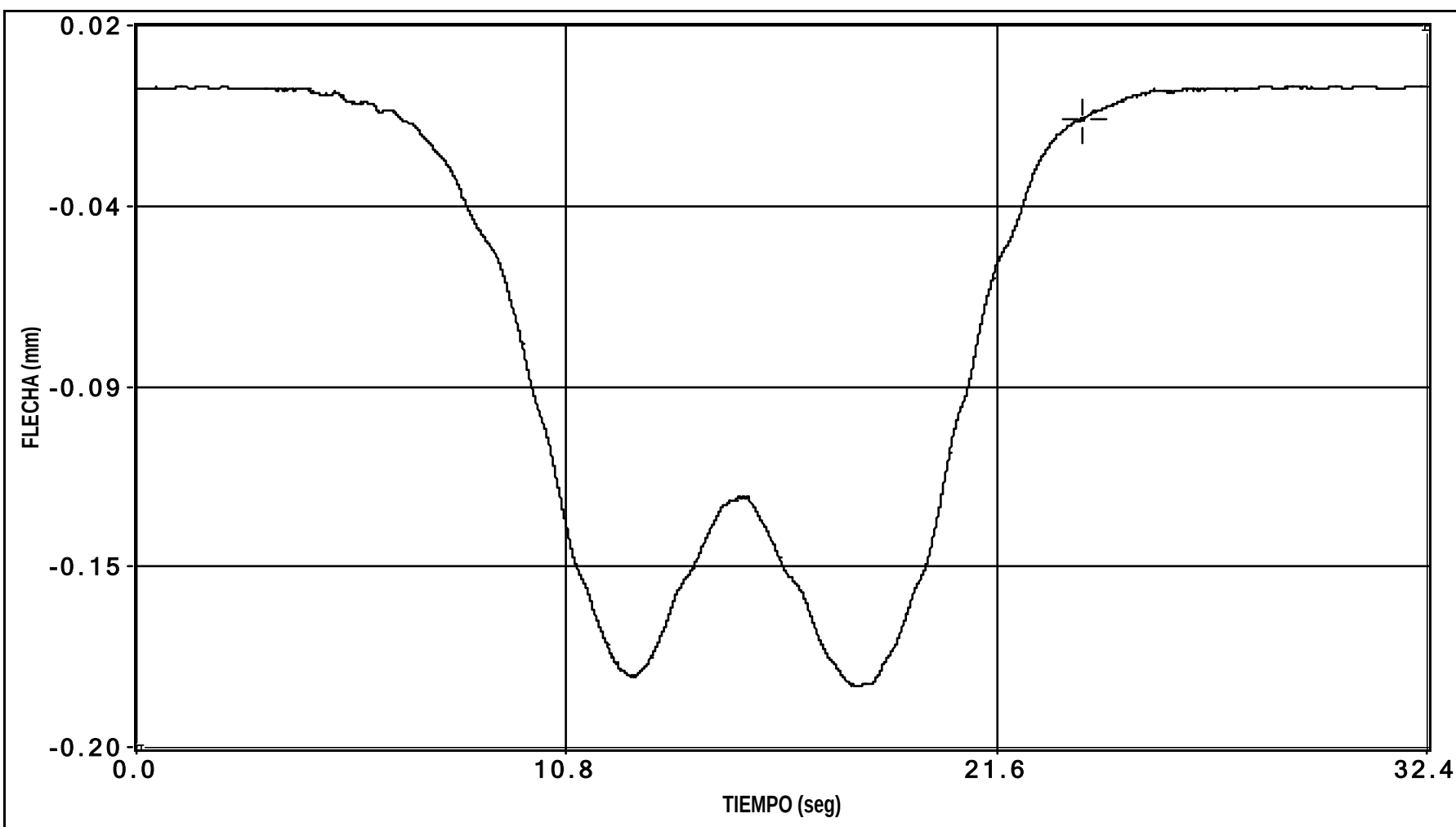
canal 1 flecha



PRUEBA:

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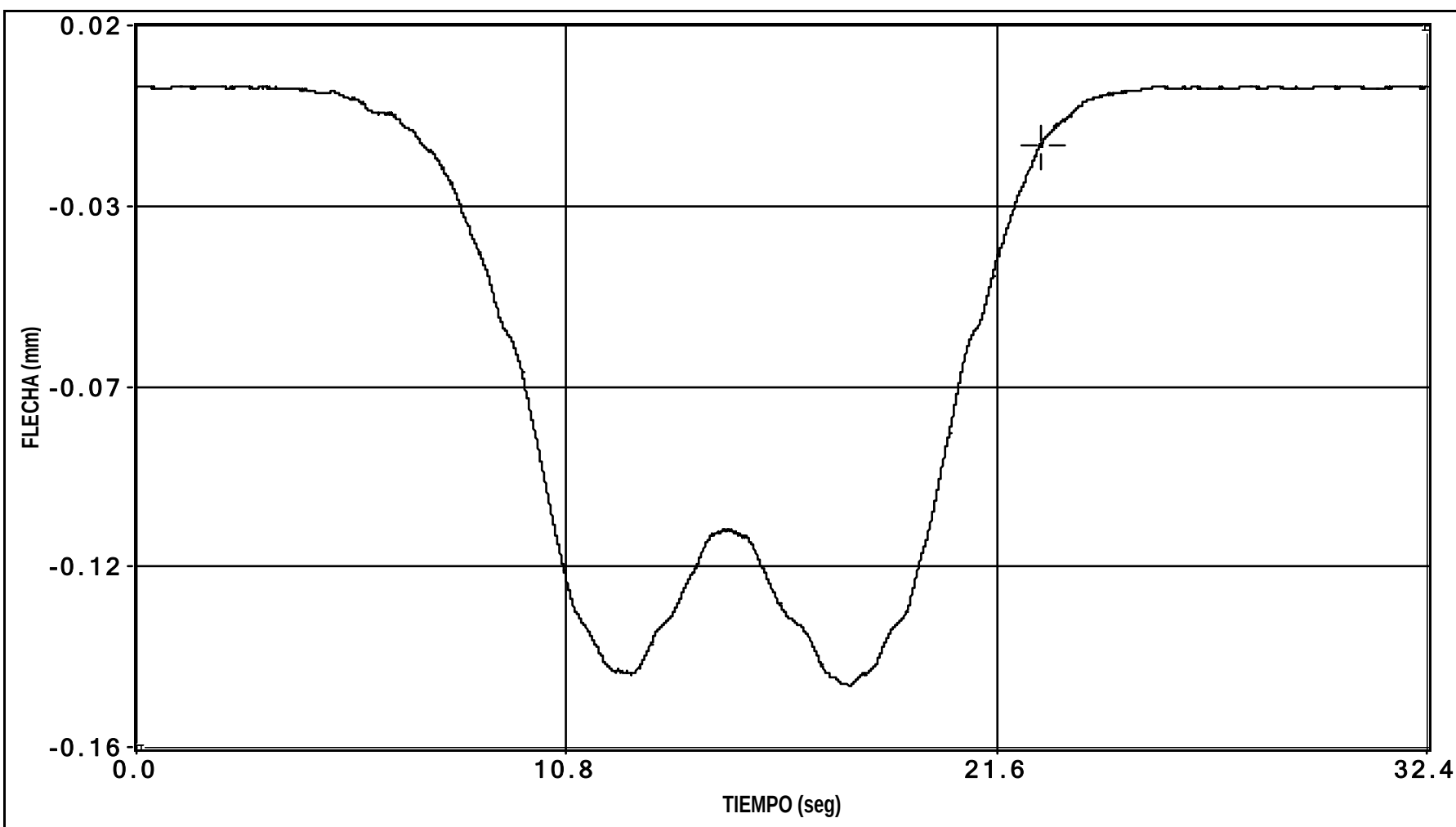


canal 2 flecha

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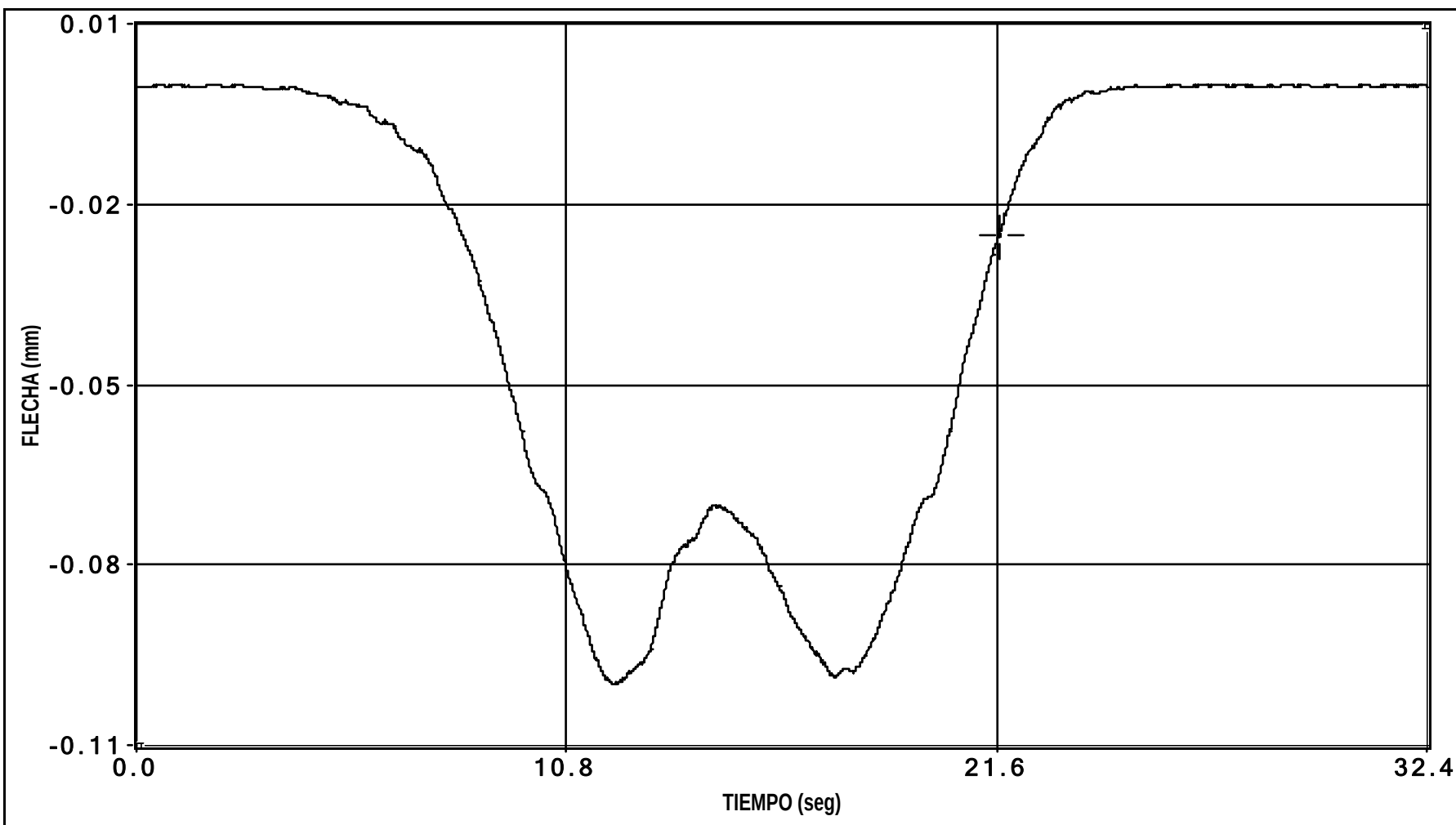


canal 3 flecha

PRUEBA:

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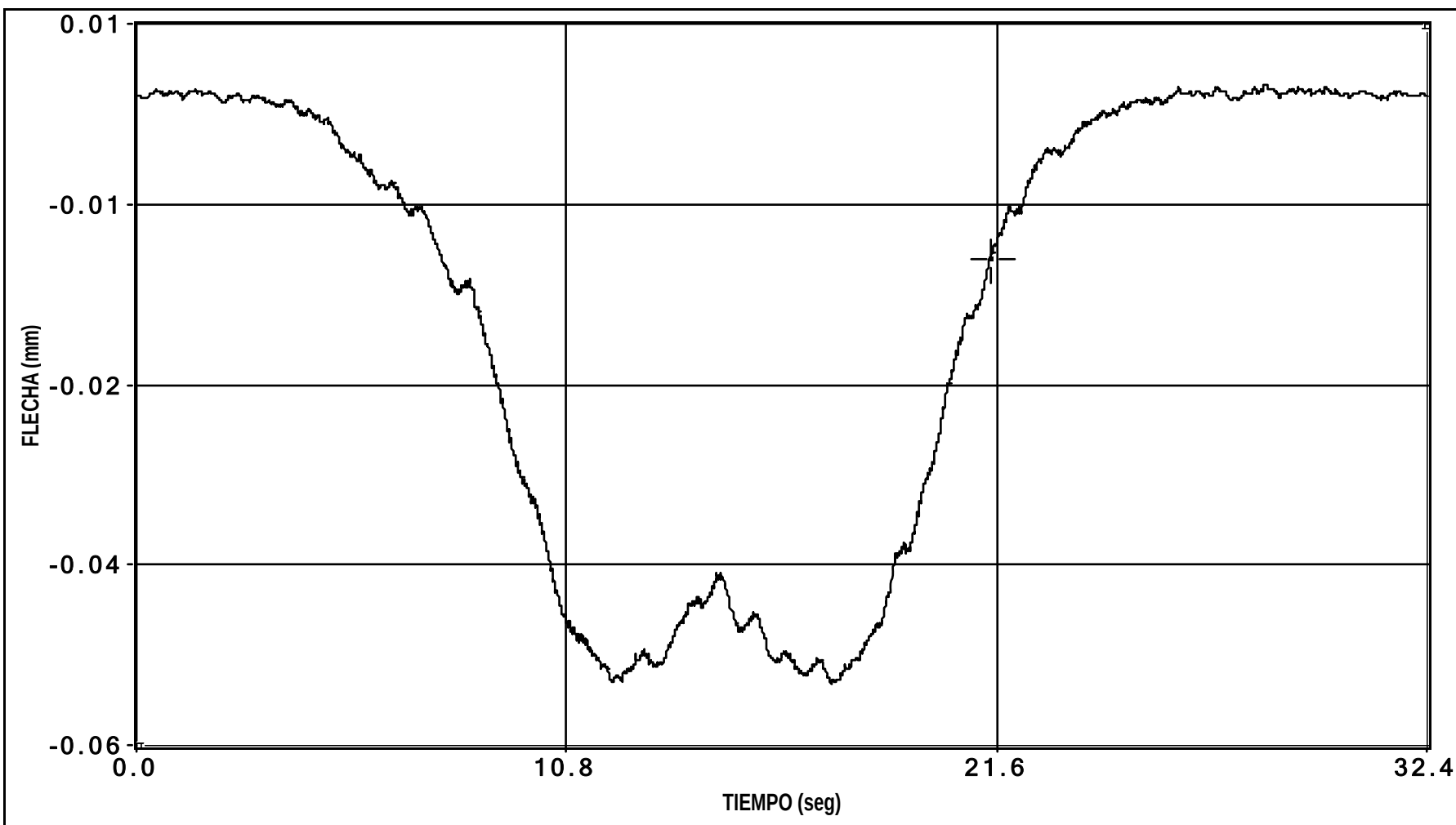


canal 4 flecha

PRUEBA:

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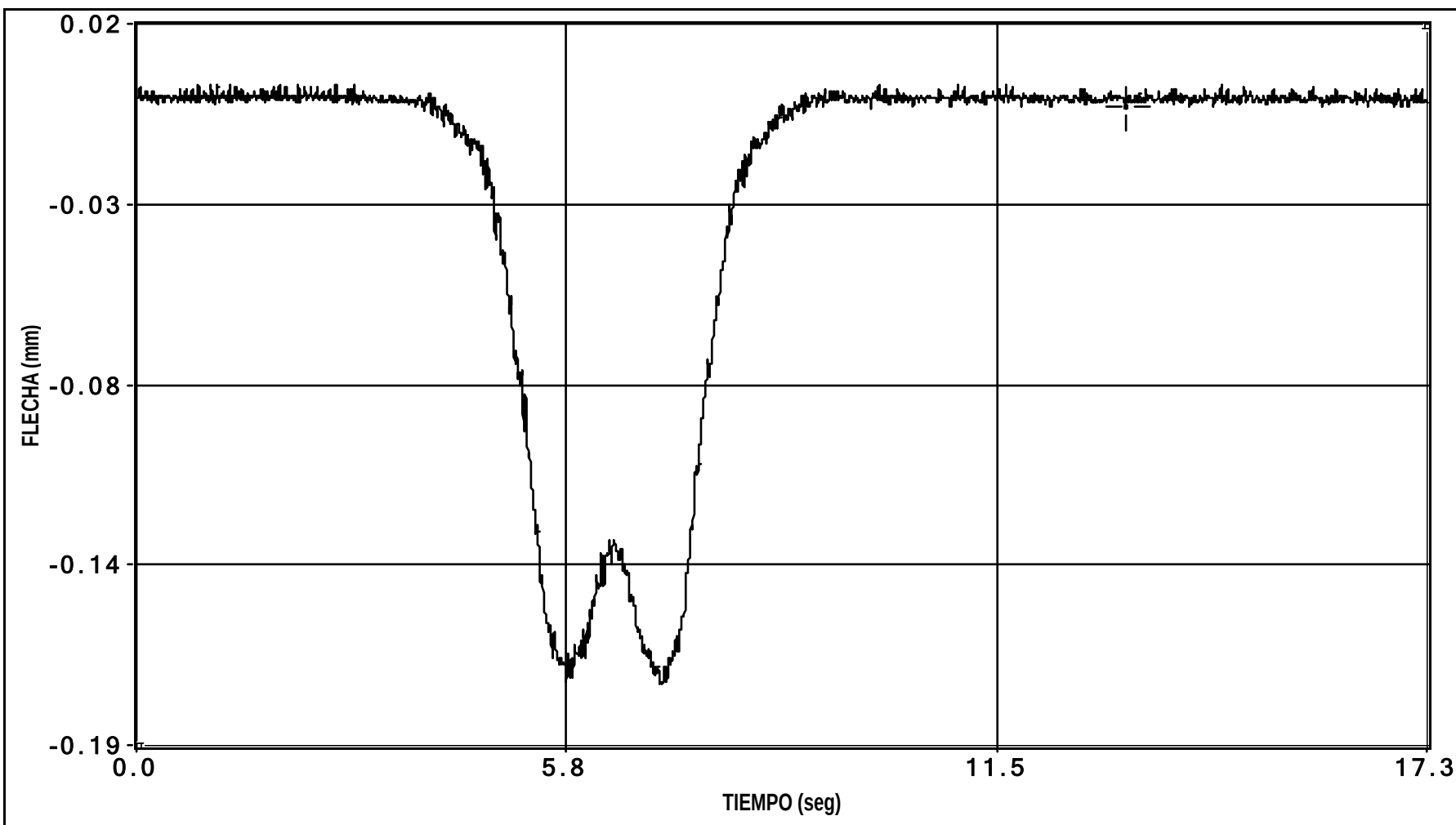
canal 5 flecha

## ENSAYO DINÁMICO LENTO

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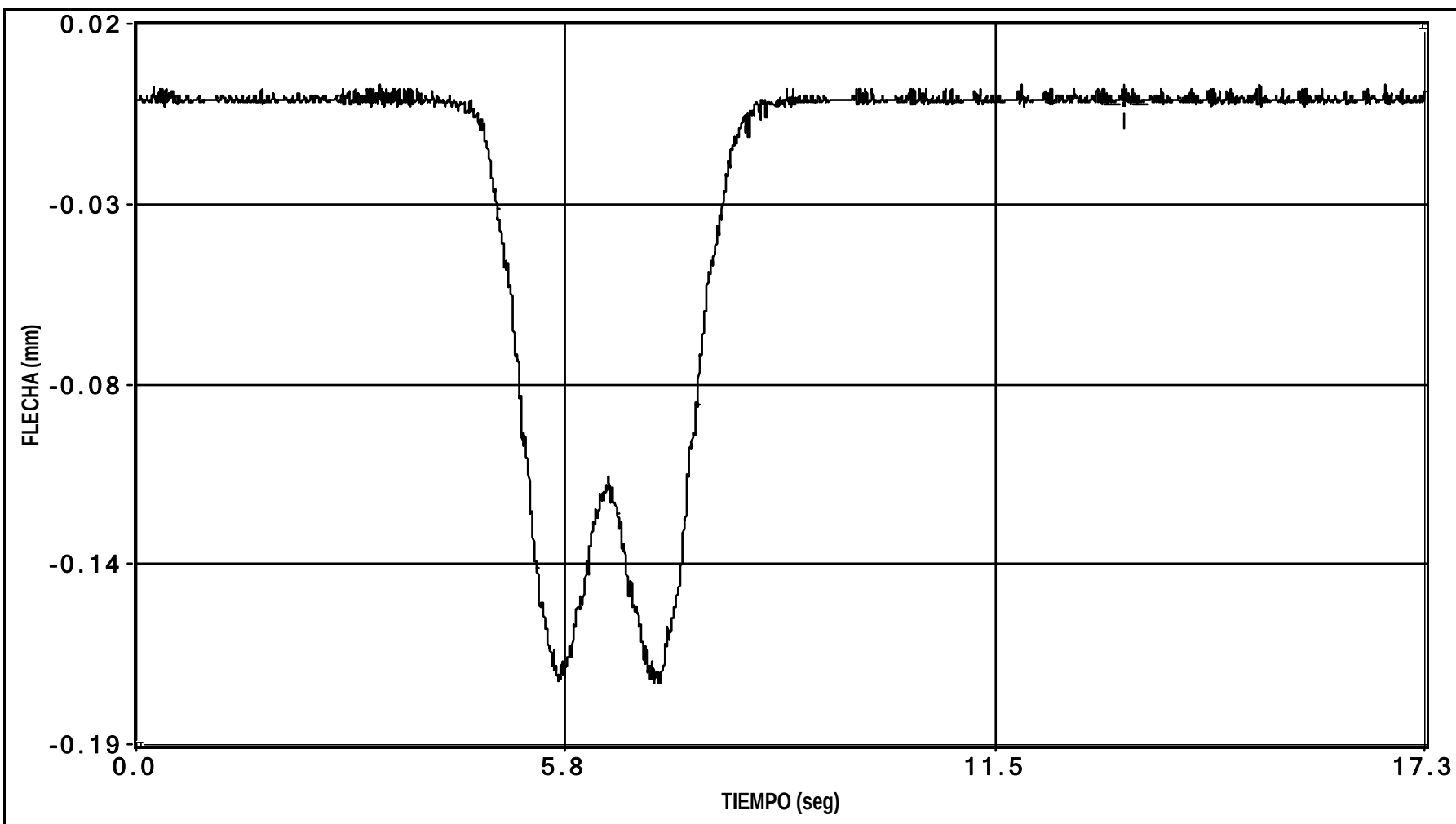


canal 1 flecha

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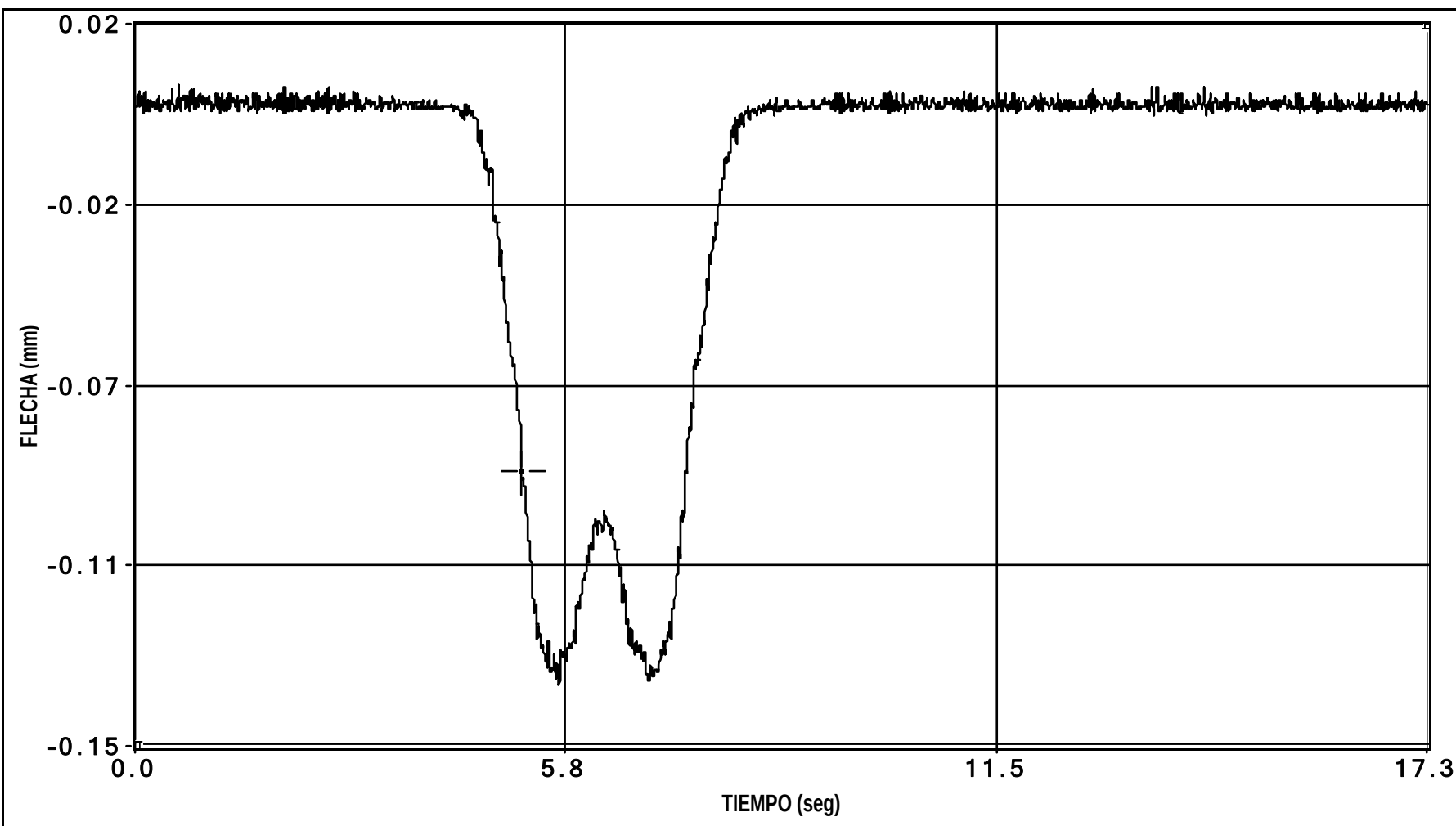


canal 2 flecha

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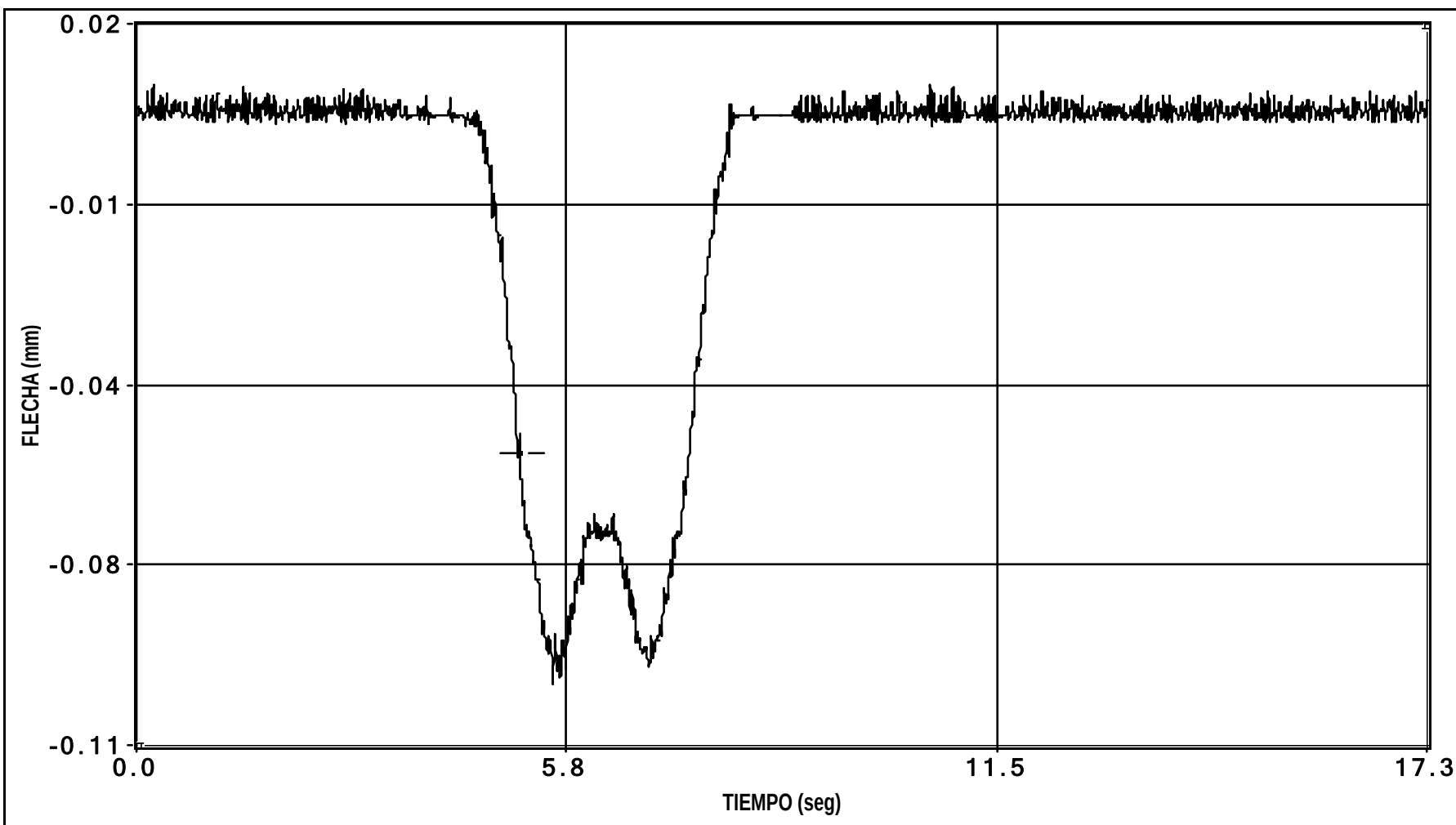
canal 3 flecha



PRUEBA:

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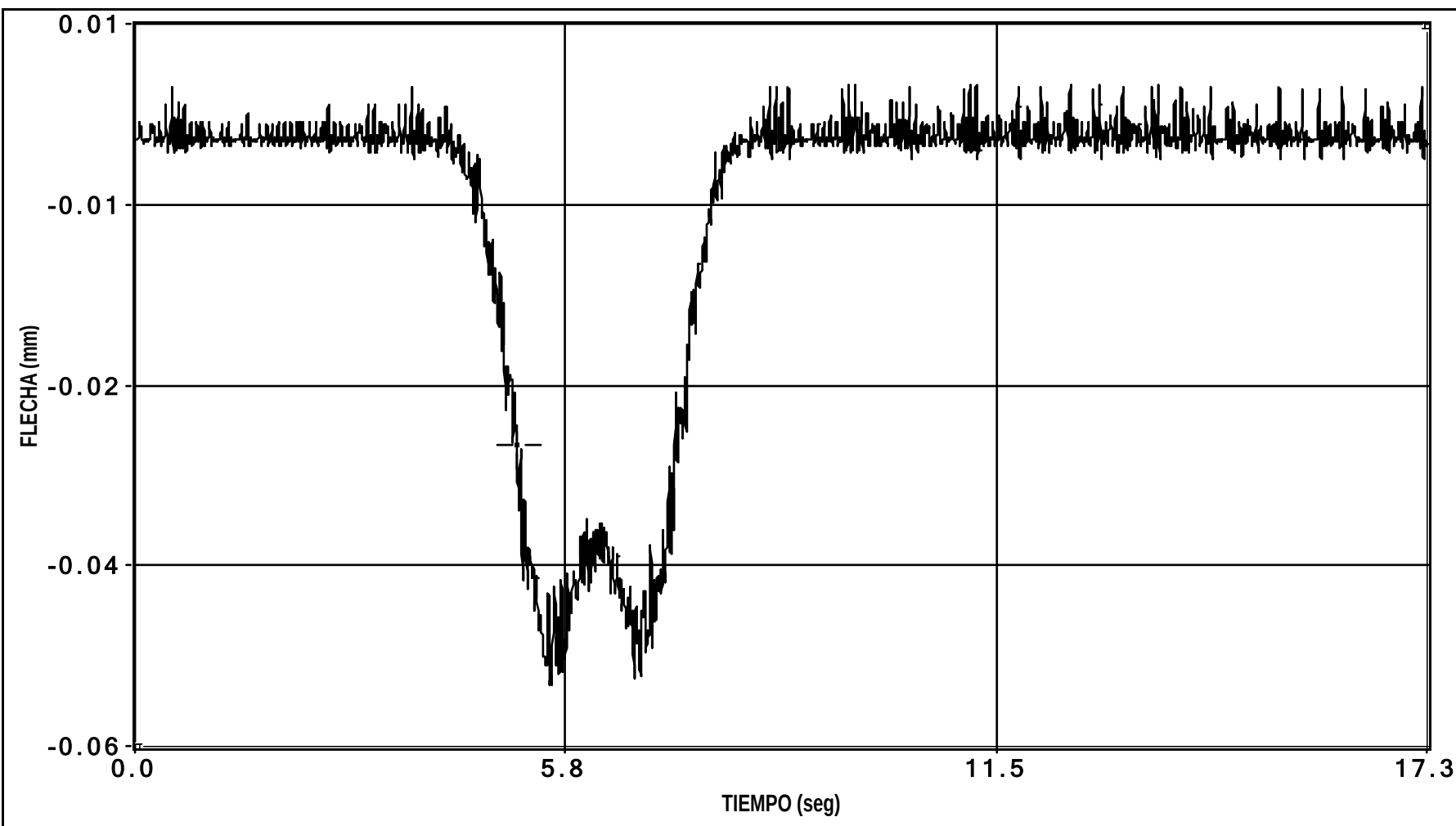


canal 4 flecha

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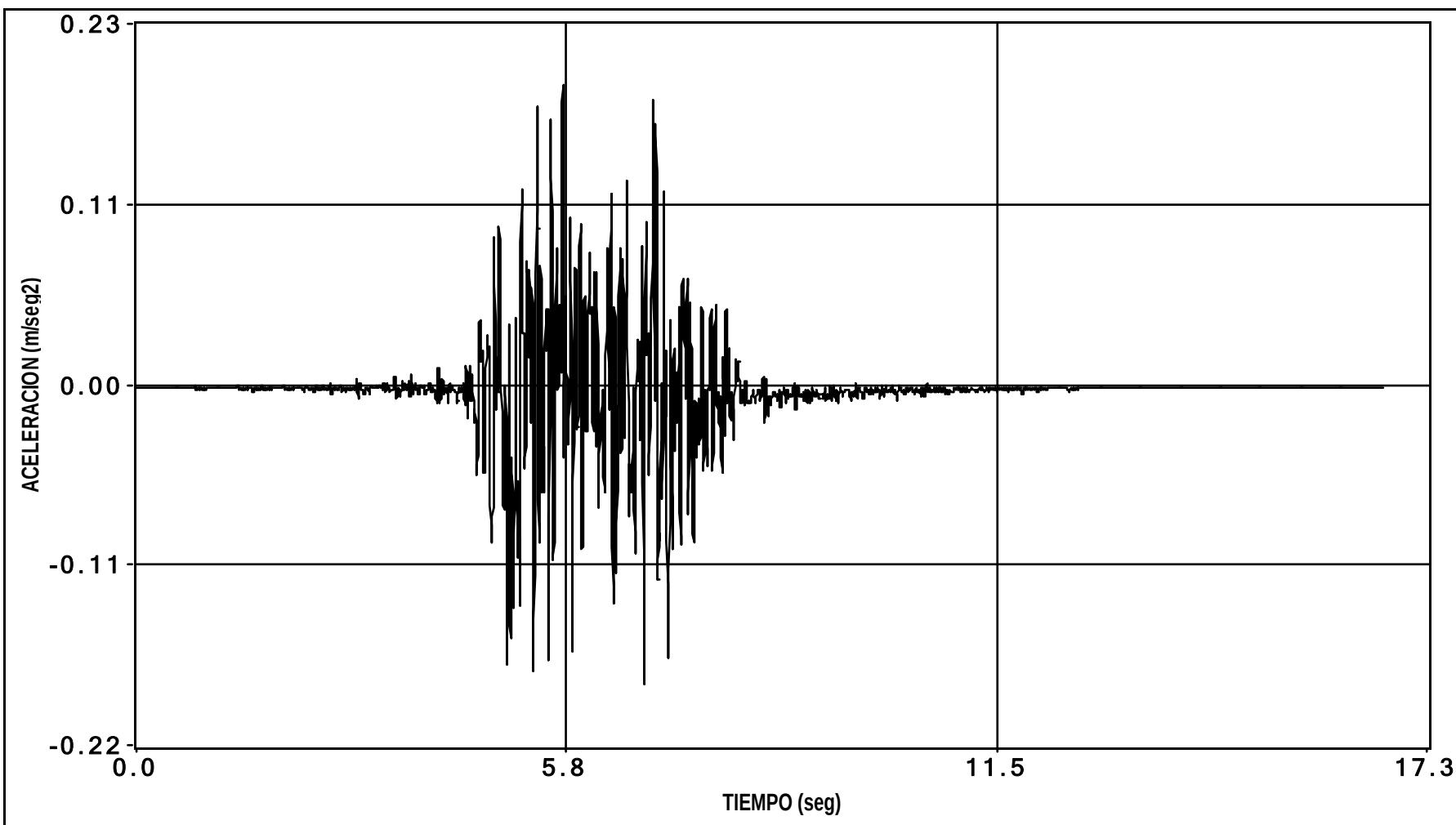
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canal 5 flecha

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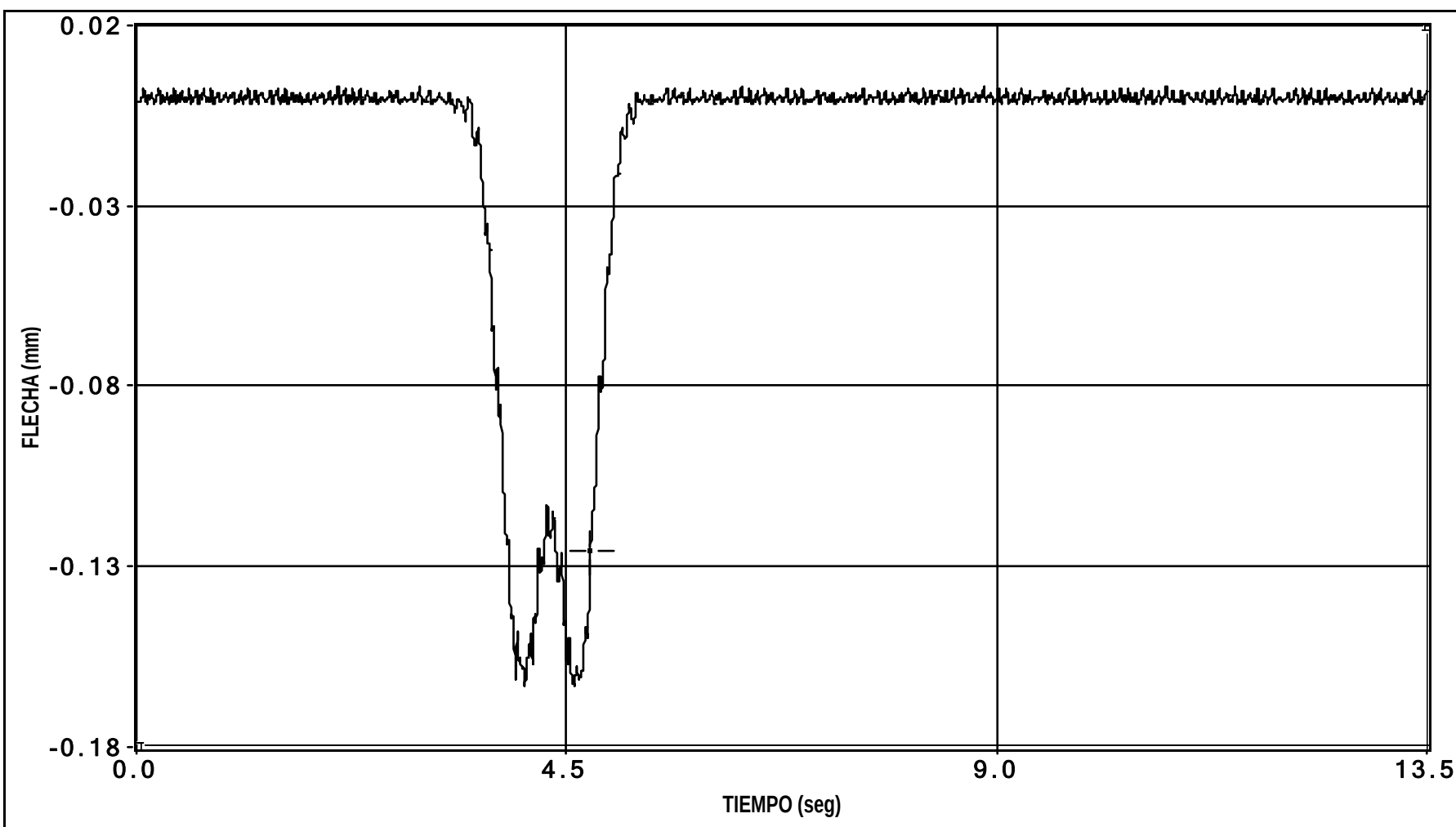


## ENSAYO DINÁMICO RÁPIDO

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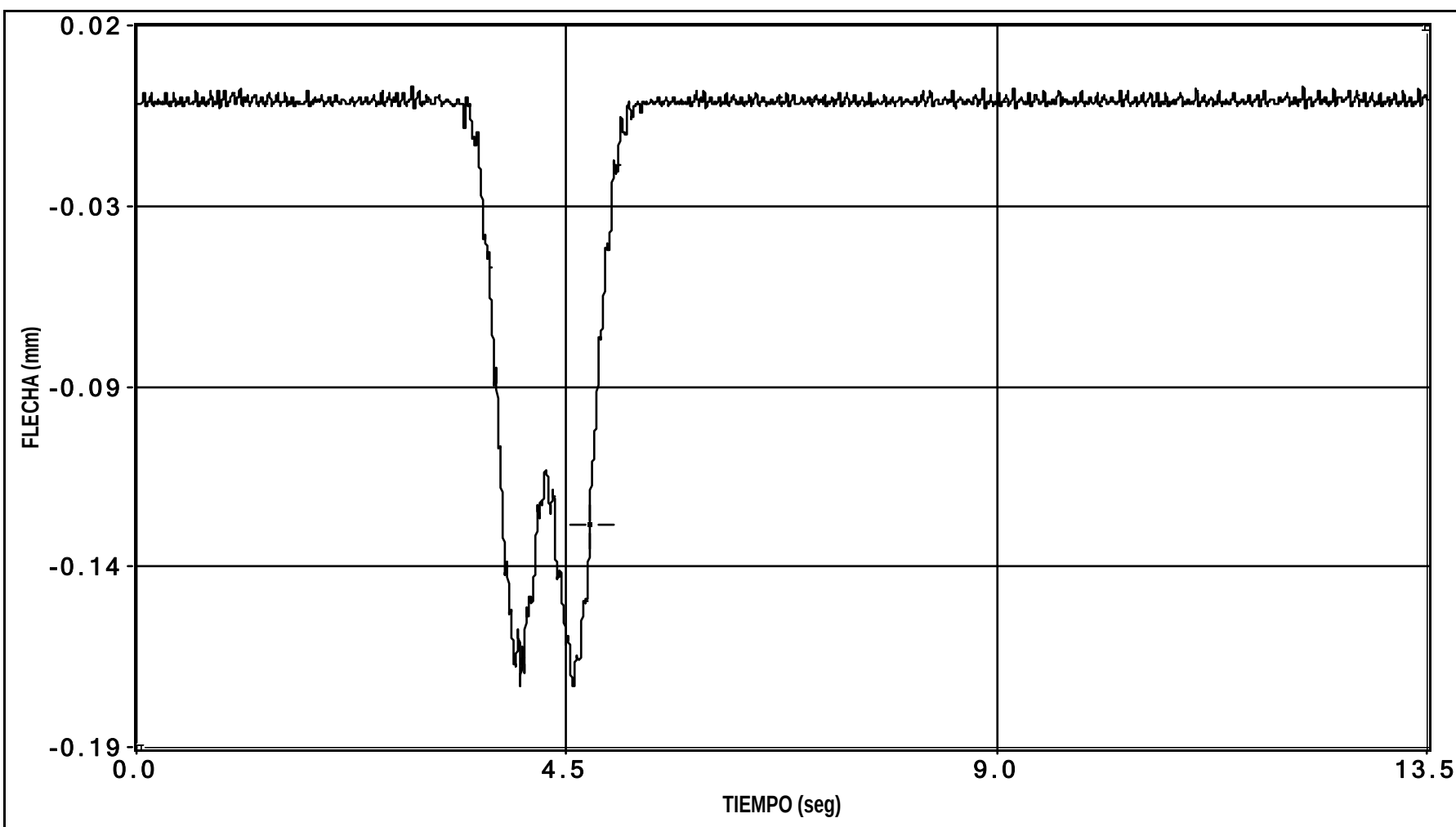


canal 1 flecha

PRUEBA:

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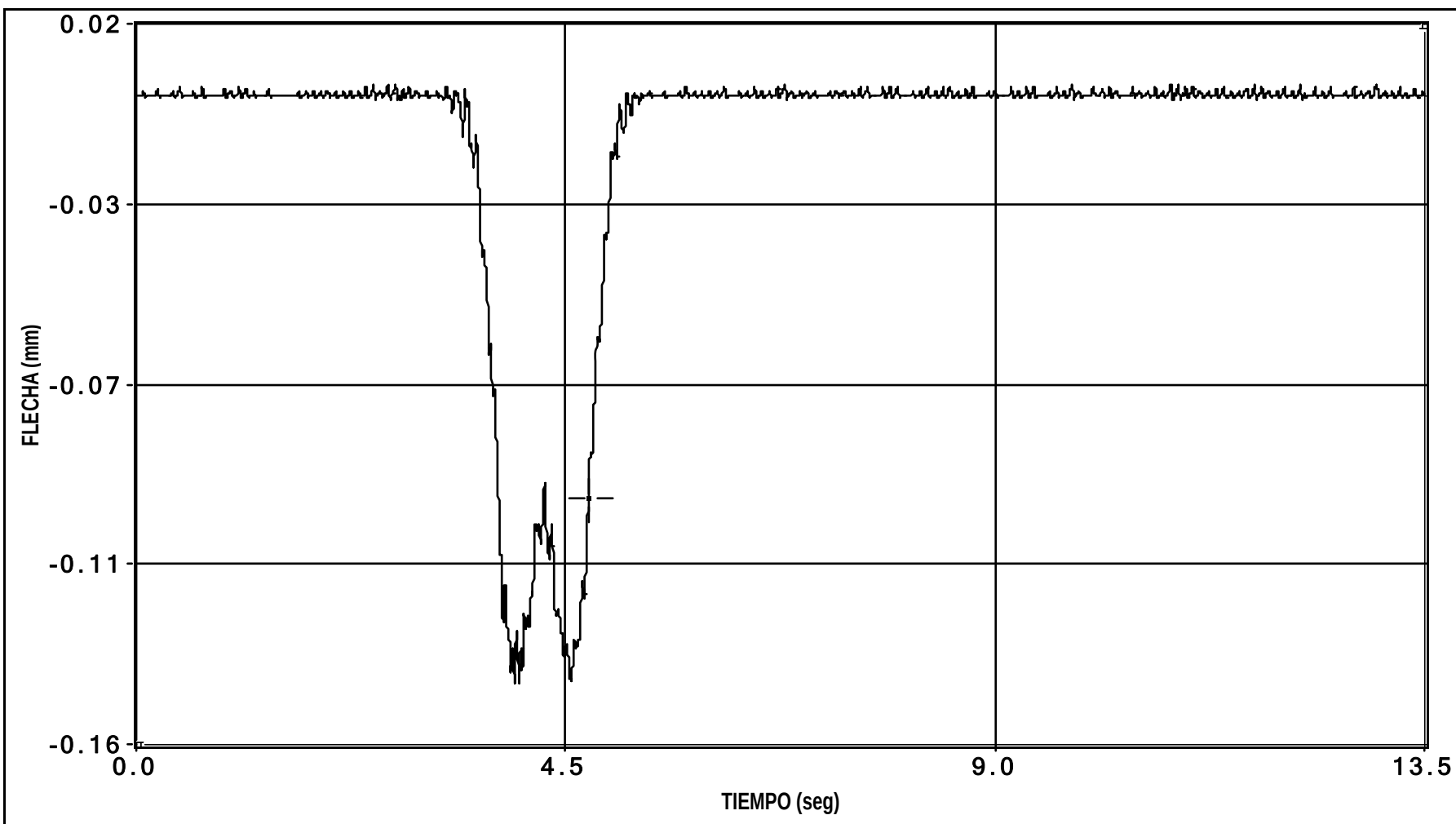


canal 2 flecha

PRUEBA:

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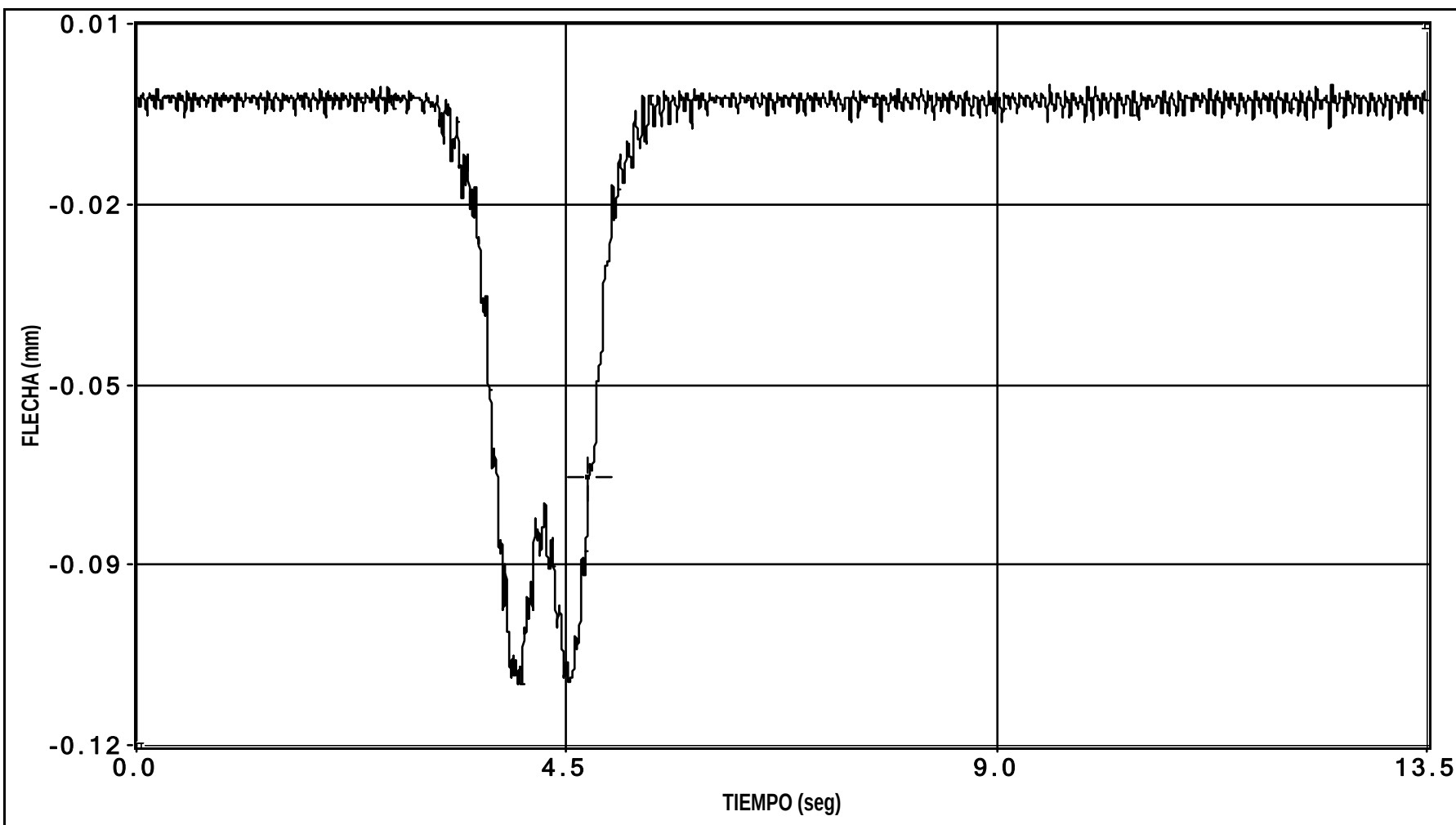


canal 3 flecha

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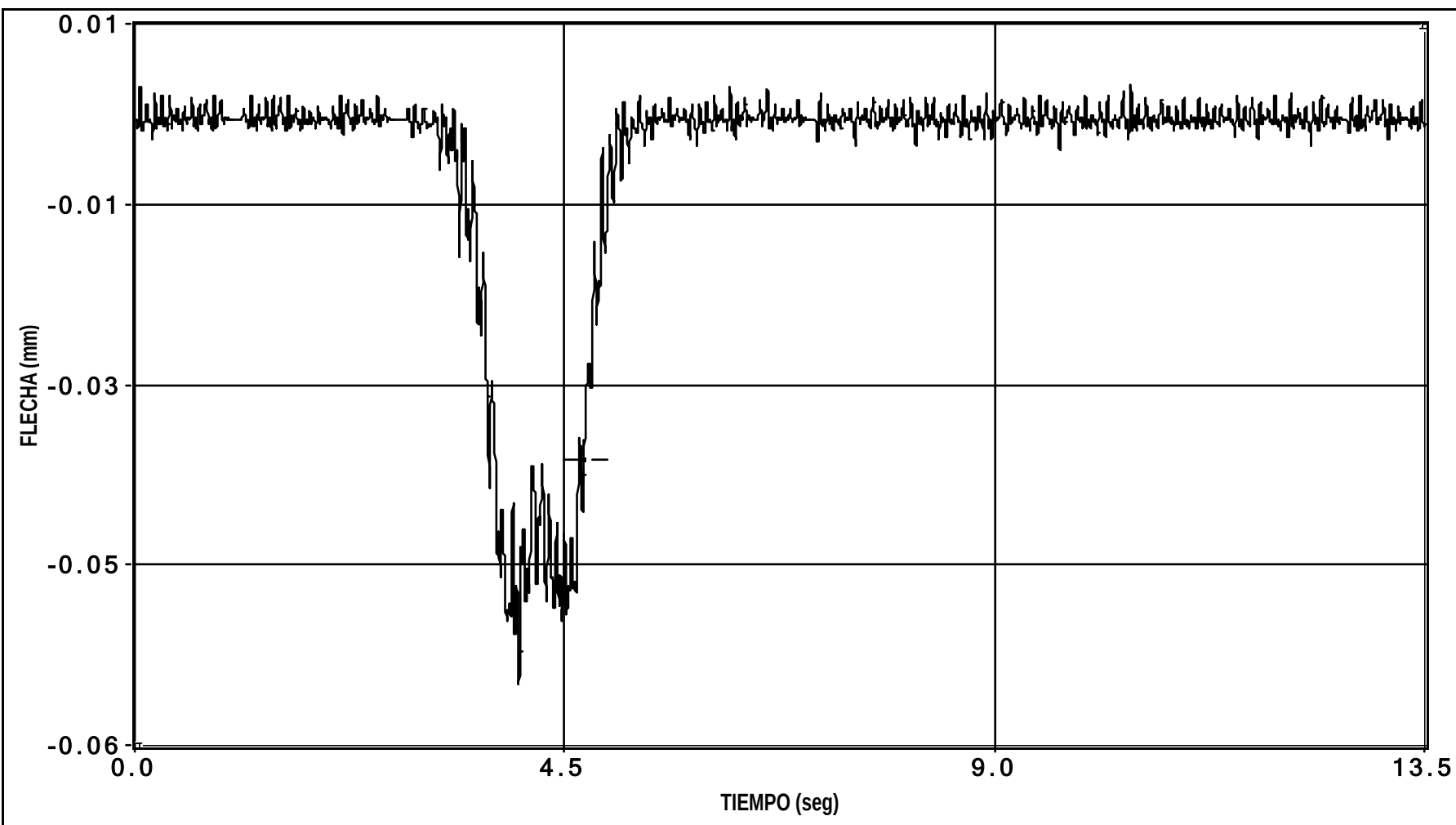
canal 4 flecha



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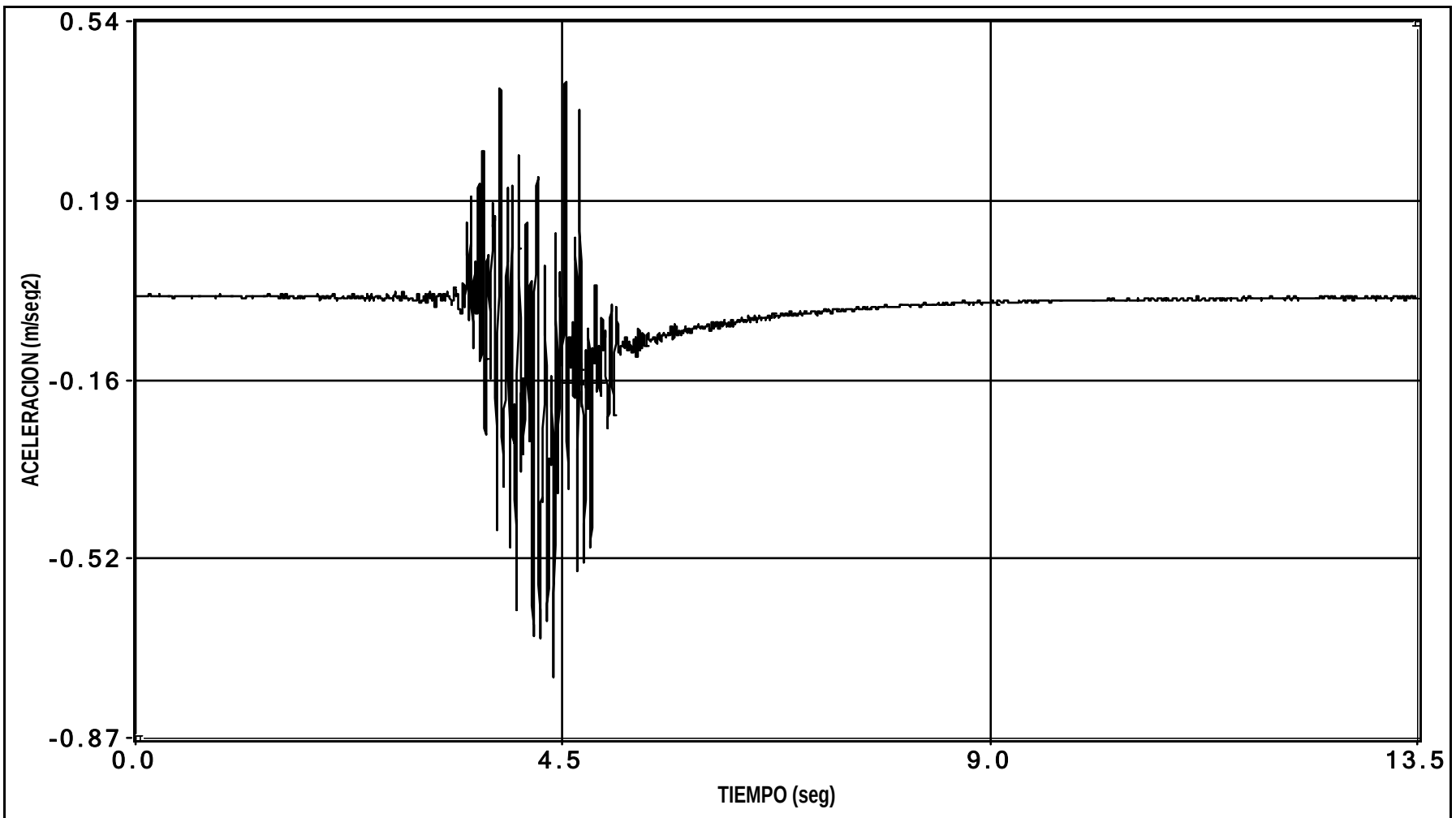


canal 5 flecha

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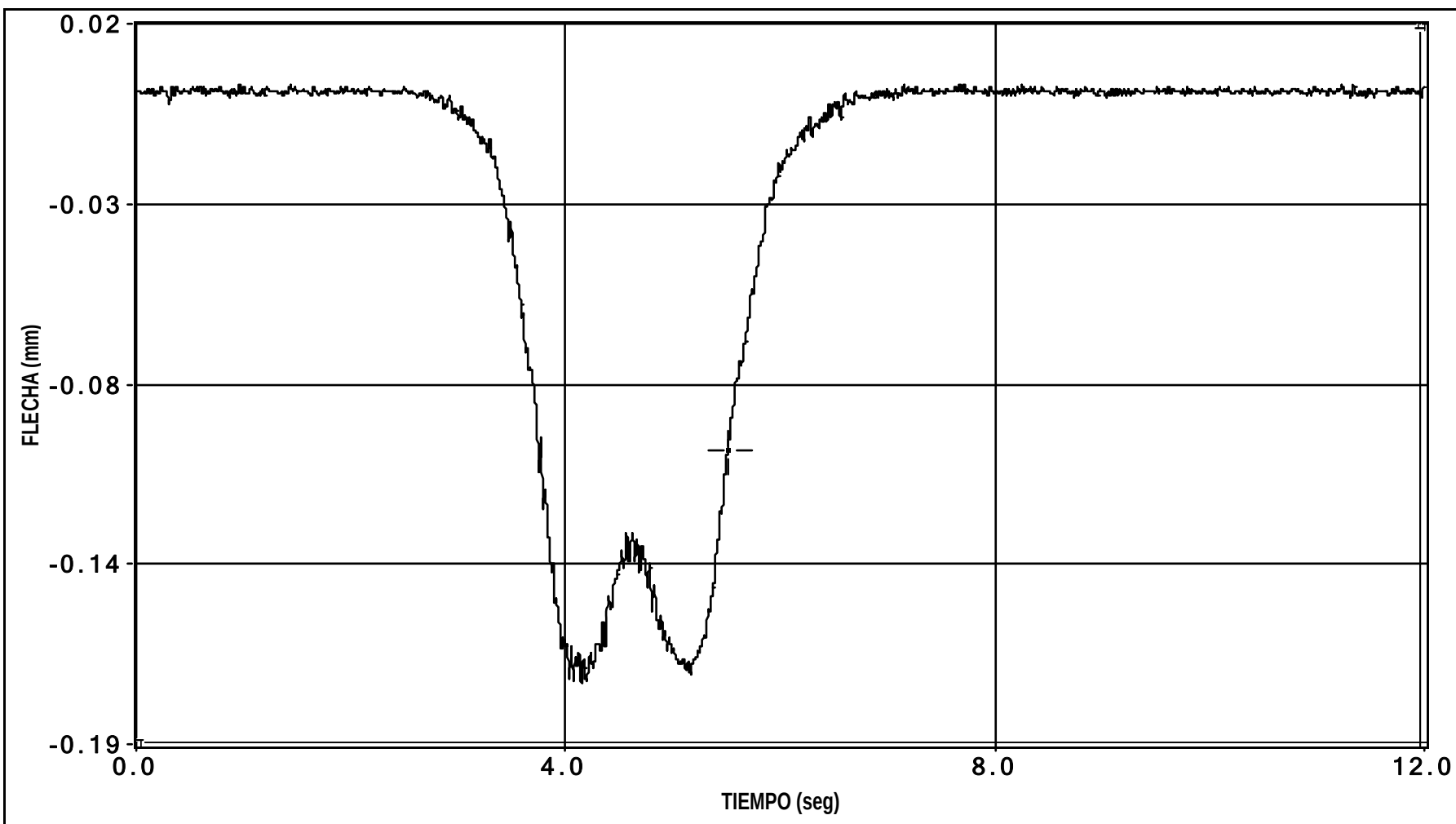
canal 32 aceleracion

## ENSAYO DE FRENADO

PRUEBA:

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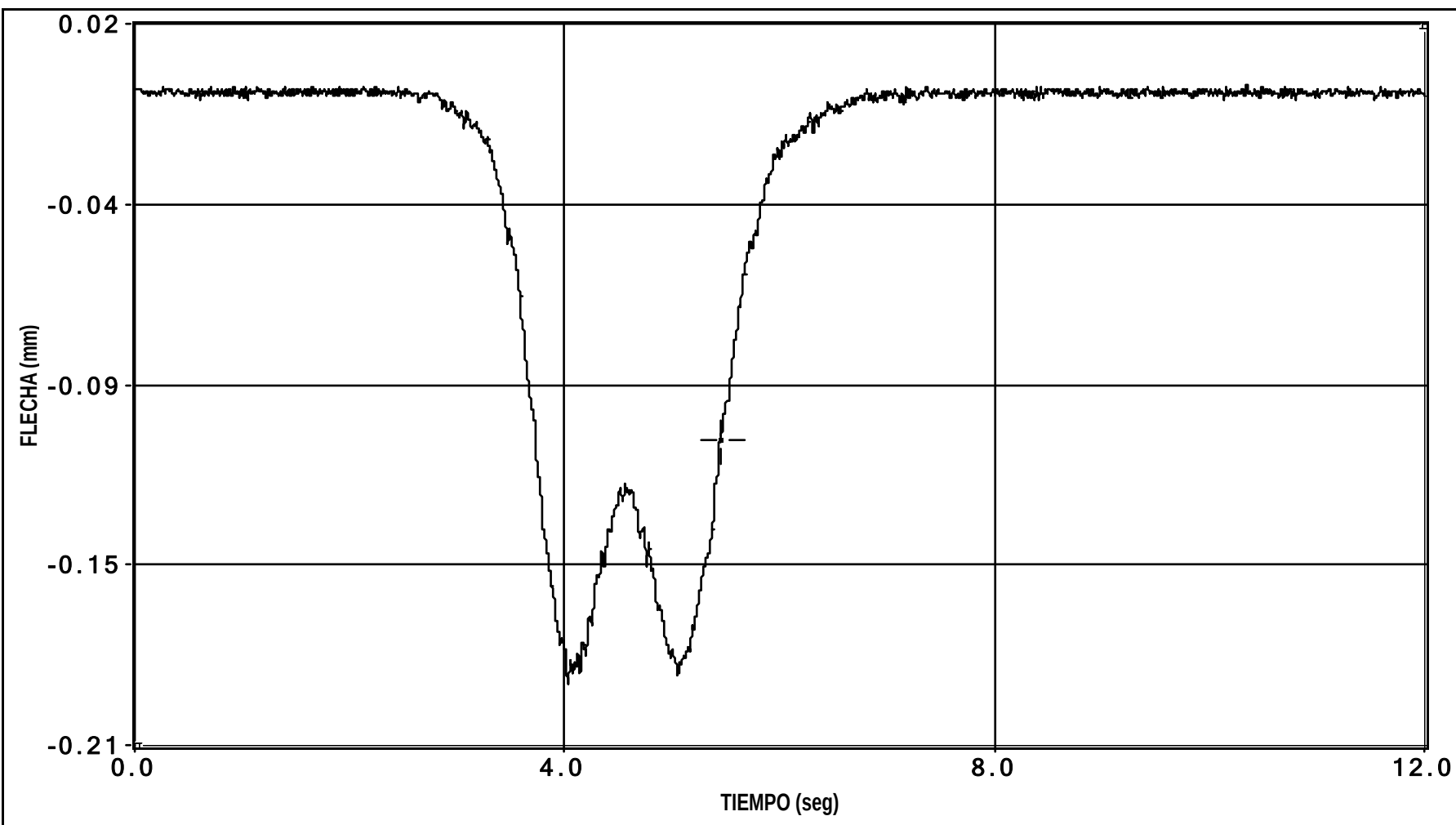


canal 1 flecha

PRUEBA:

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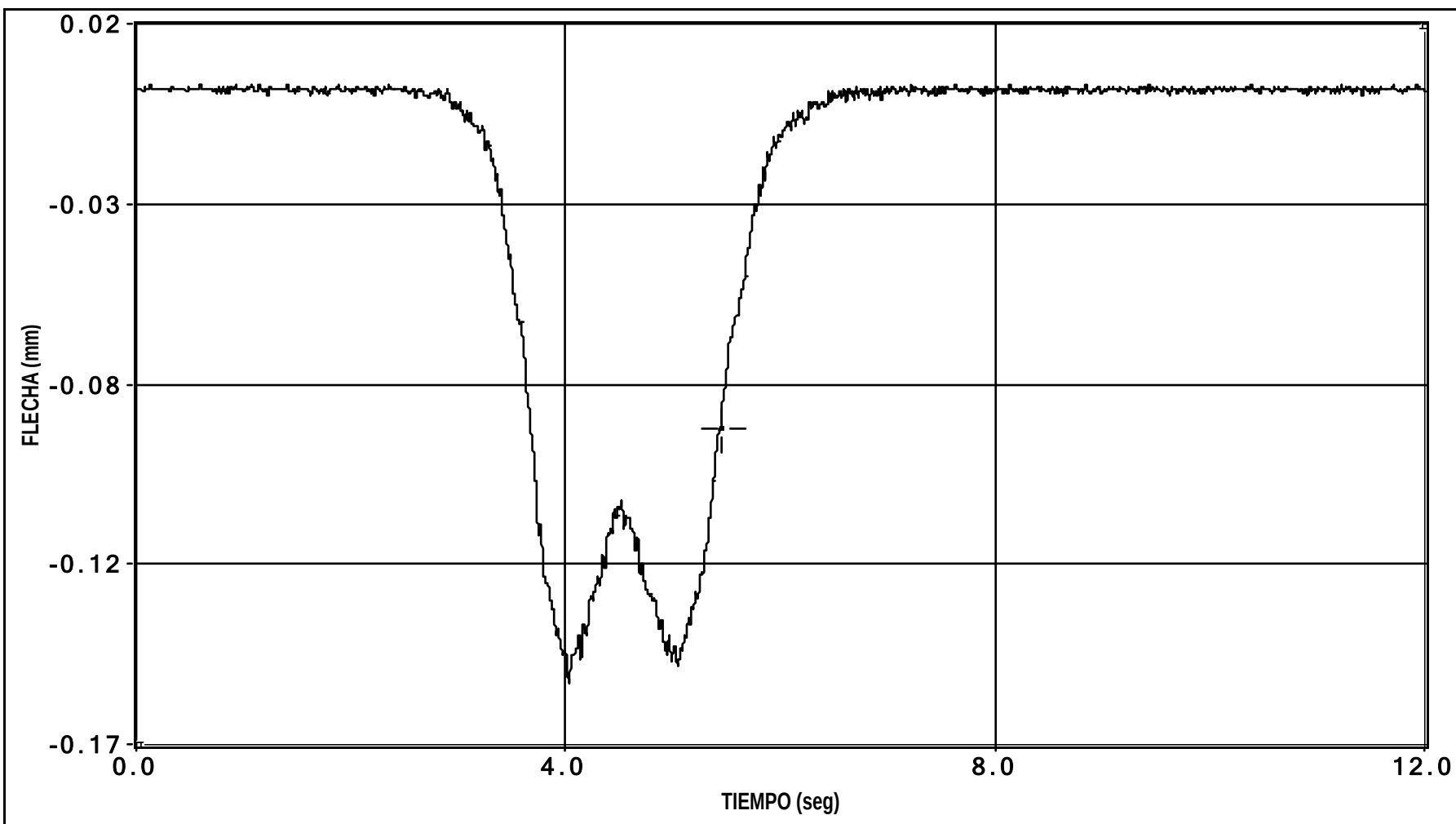


canal 2 flecha

PRUEBA:

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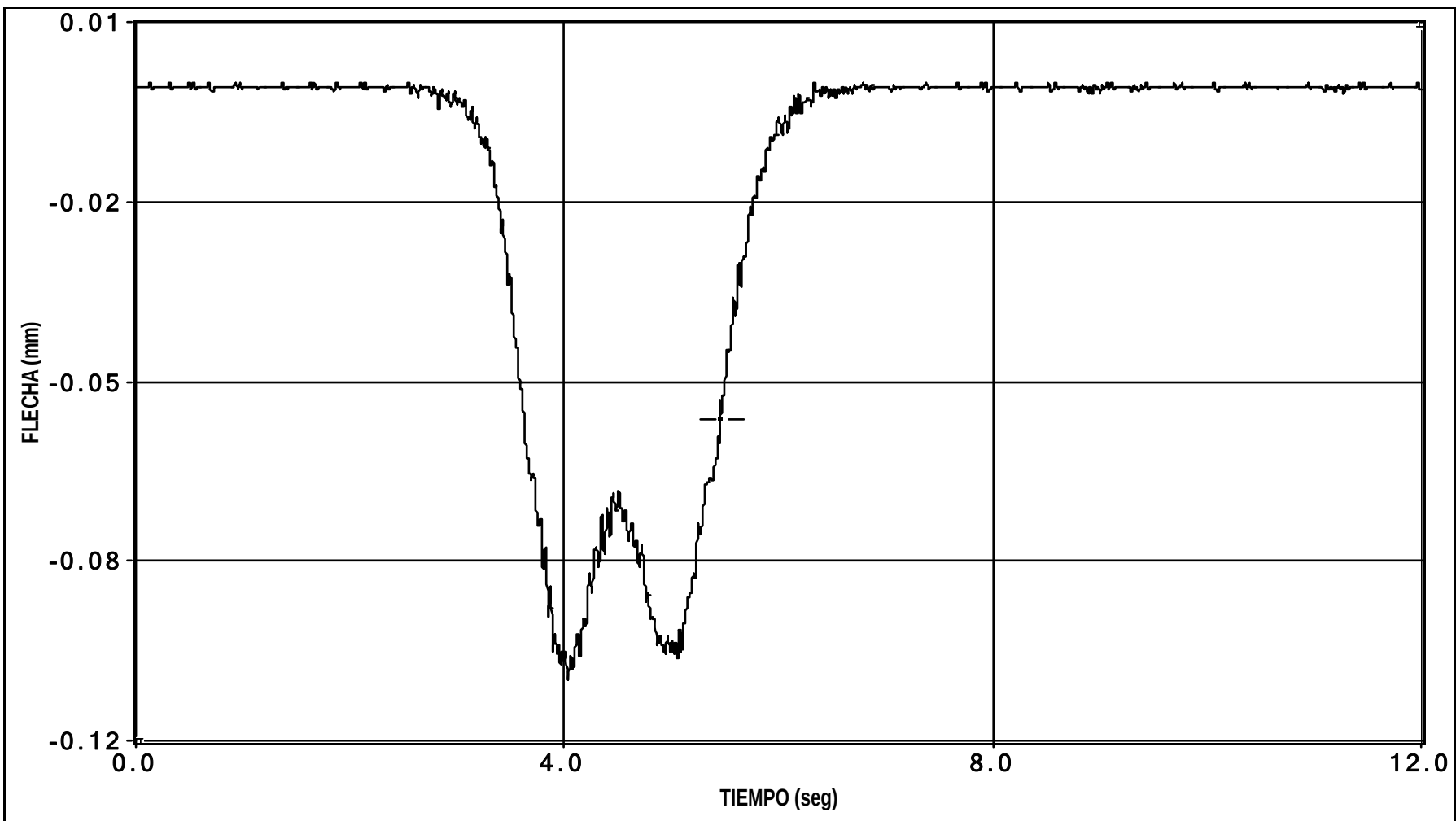


canal 3 flecha

PRUEBA:

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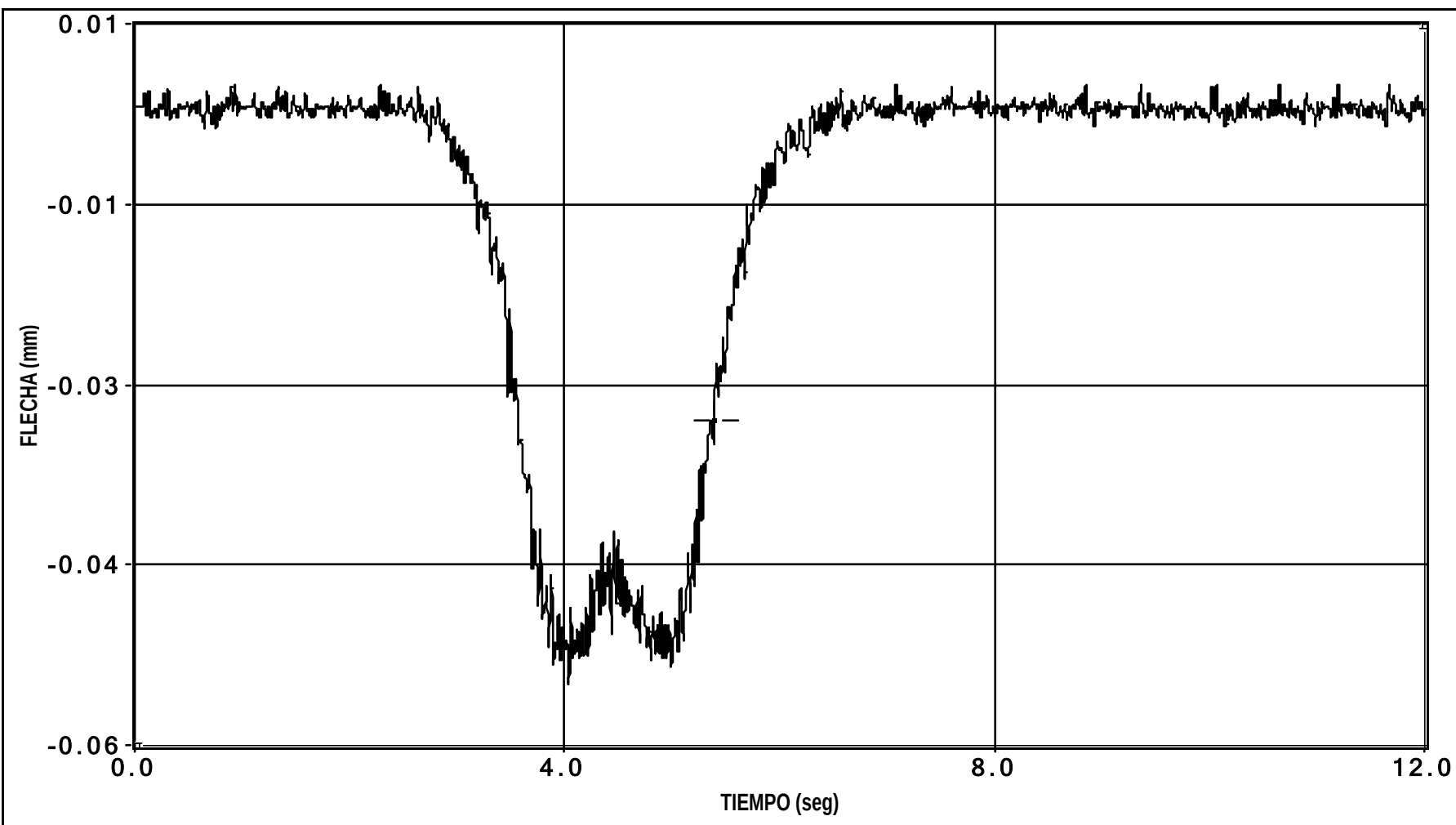


canal 4 flecha

PRUEBA:

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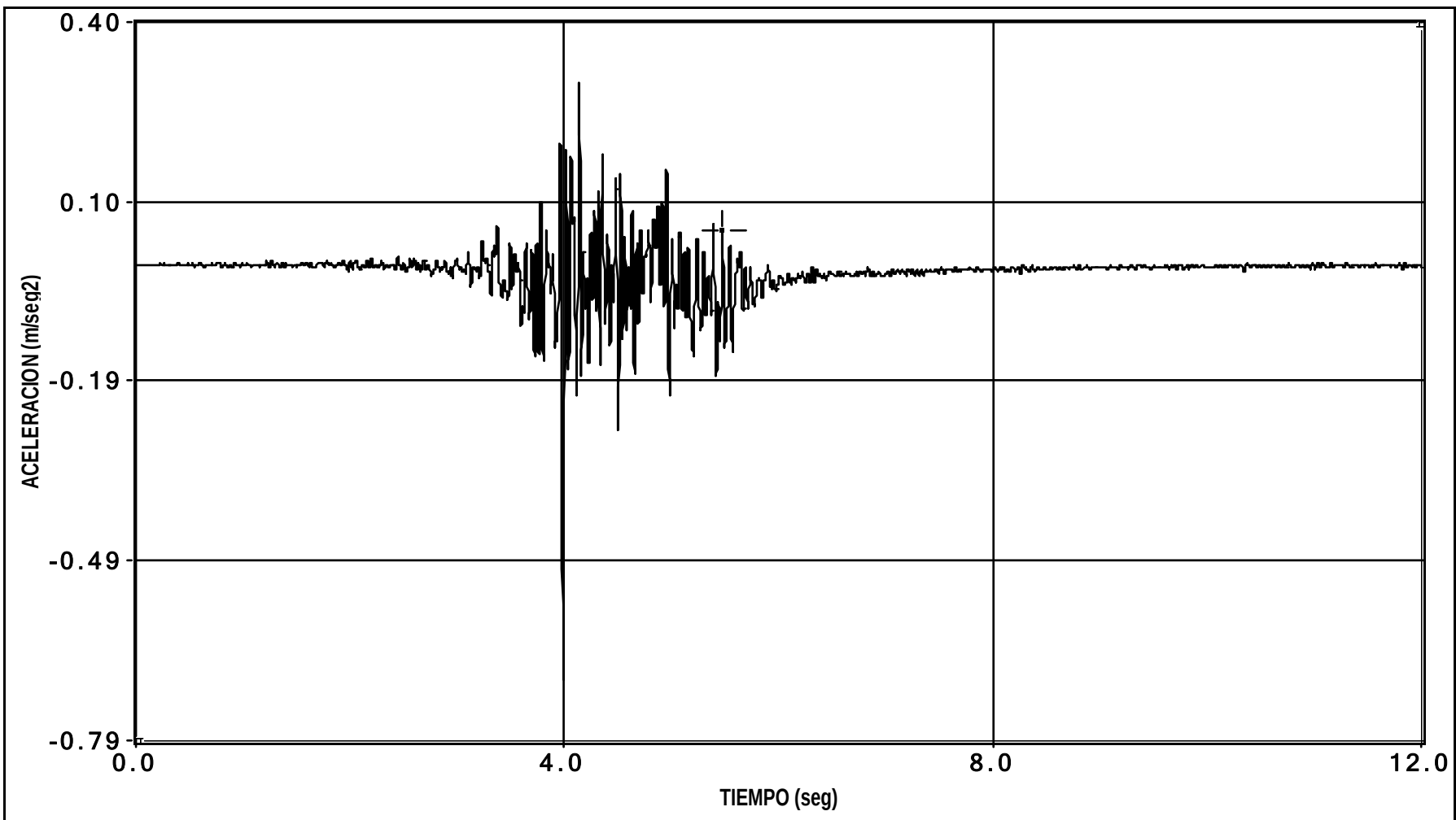
canal 5 flecha



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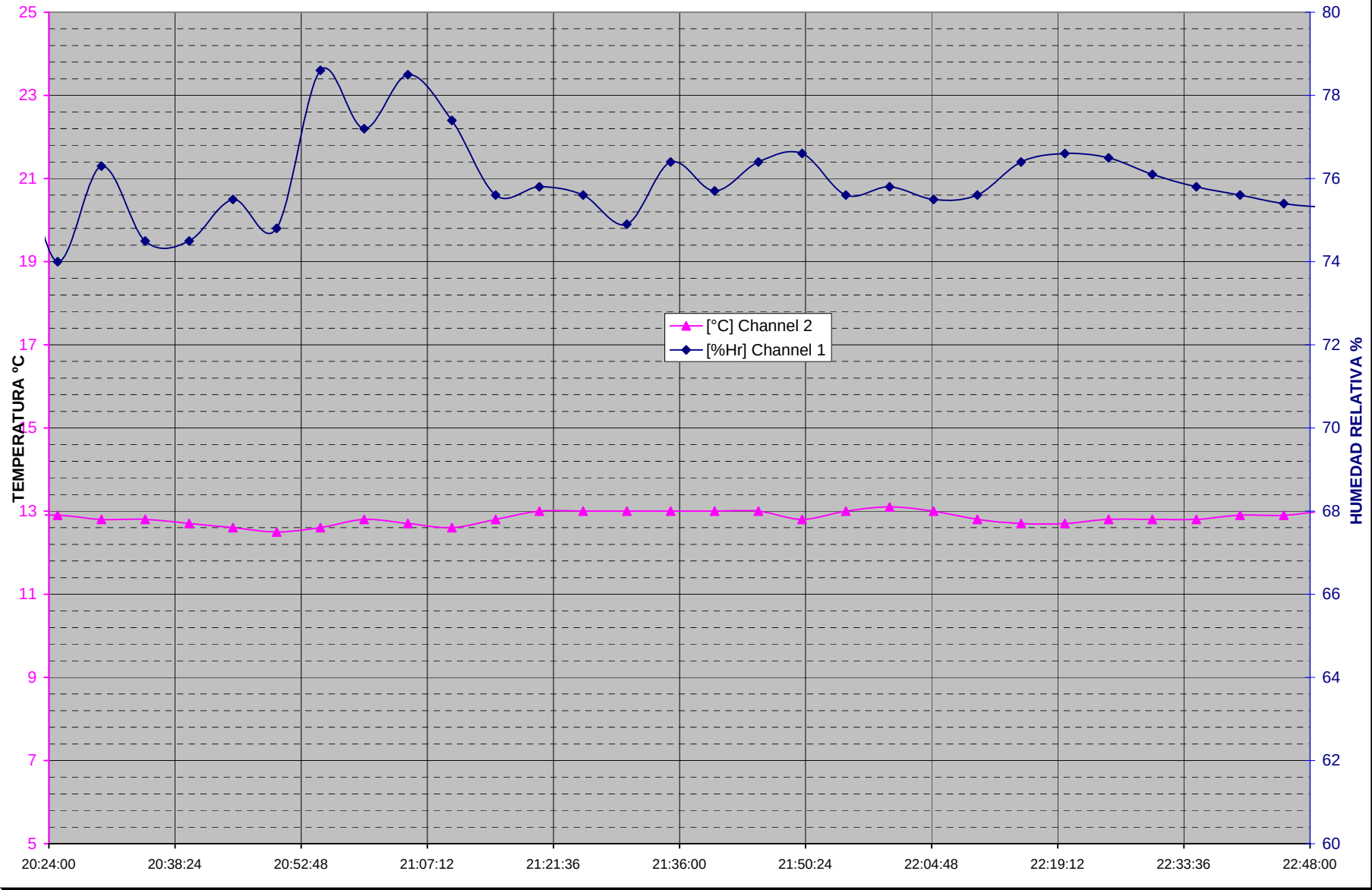
Fecha de la Prueba: 04/02/2010 // Hora de grabación: 21:46



canal 32 aceleracion

## GRÁFICO DE HUMEDAD Y TEMPERATURA

TEMPERATURA Y HUMEDAD RELATIVA DURANTE LA PRUEBA DE CARGA ODT 1.2 P.K. 401+163, PERTENECIENTE AL SUBTRAMO LA ROCA DEL VALLÉS-LLINARS DEL VALLÉS, TRAMO BARCELONA SANTS-FIGUERES L.A.V. MADRID-ZARAGOZA-BARCELONA-F. FRANCESA (04.02.2010)



## ANEJO 5: REPORTAJE FOTOGRÁFICO

**DOCUMENTACIÓN RELATIVA A LA INSPECCIÓN PRELIMINAR**

**Fotografía N°1:**  
**Alzado derecho**



**Fotografía N°2:**  
**Alzado izquierdo**



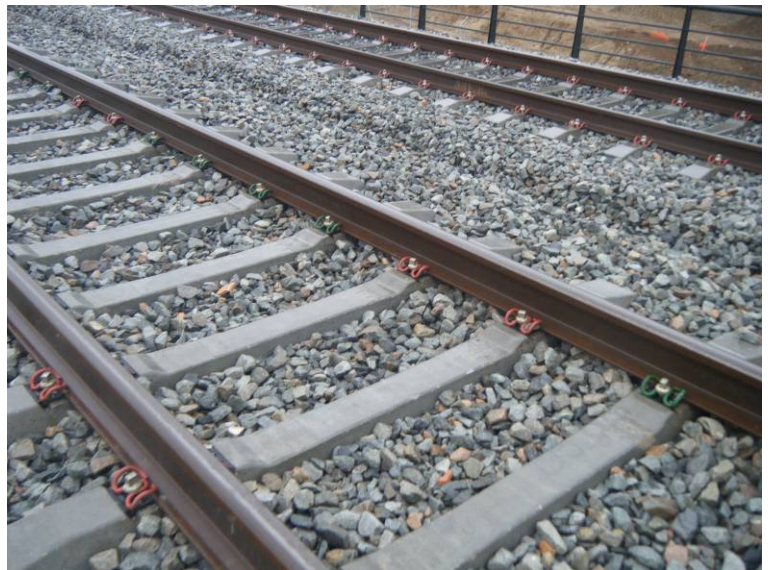
**Fotografía N°3:**  
**Detalle del estribo 1**



**Fotografía N°4:**  
**Detalle del estribo 2**



**Fotografía N°5:**  
**Material de vía**



**Fotografía N°6:**  
**Sujeciones**





**Fotografía N°7:**  
**Vista desde el estribo 1**



**Fotografía N°8:**  
**Vista desde el estribo 2**



**Fotografía N°9:**  
**Vista superior lado derecho**





**Fotografía N°10:**  
**Vista superior lado izquierdo**



**Fotografía N°11:**  
**Vista inferior**



**Fotografía N°12:**  
**Vista inferior**



**Fotografía N°13:**  
**Erosión en terraplén derecho**  
**estribo 1**



**Fotografía N°14:**  
**Desconchón en aleta derecha**  
**estribo 2**



**Fotografía N°15:**  
**Nido de grava en aleta iz-**  
**quierda estribo 1**





**Fotografía N°16:**  
**Pintadas en estribo 1**



**Fotografía N°17:**  
**Pintadas en estribo 2**

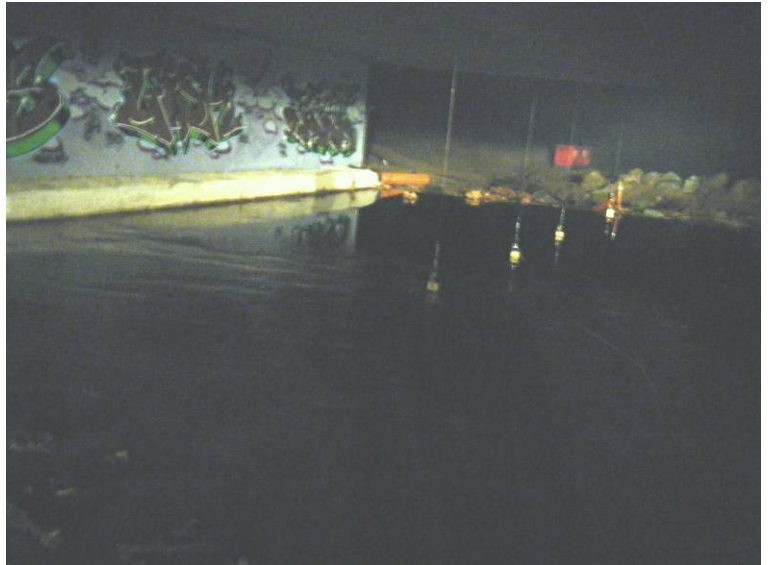


**Fotografía N°18:**  
**Detalle de la cara inferior de  
la losa superior del tablero**



**DOCUMENTACIÓN RELATIVA A LA PRUEBA DE CARGA**

**Fotografía N°1:**  
**Anillos en centro de vano du-**  
**rante la Prueba**



**Fotografía N°2:**  
**Anillos en centro de vano du-**  
**rante la Prueba**



**Fotografía N°3:**  
**Anillos en centro de vano du-**  
**rante la Prueba**





**Fotografía N°4:**  
**Detalle de uno de los anillos dis-**  
**puestos**



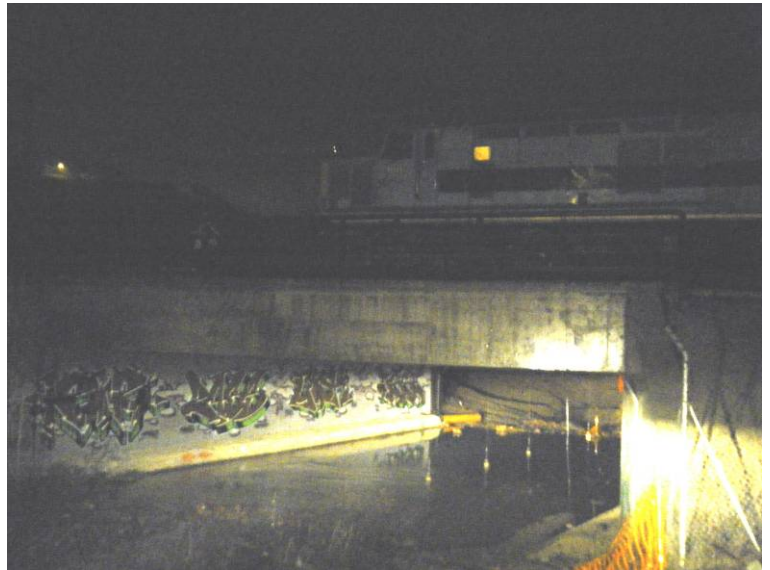
**Fotografía N°5:**  
**Detalle del termohigrógrafo**  
**empleado**



**Fotografía N°6:**  
**Prueba estática**



**Fotografía N°7:**  
**Prueba estática**



**Fotografía N°8:**  
**Ensayo estático**



**Fotografía N°9:**  
**Ensayo cuasiestático**





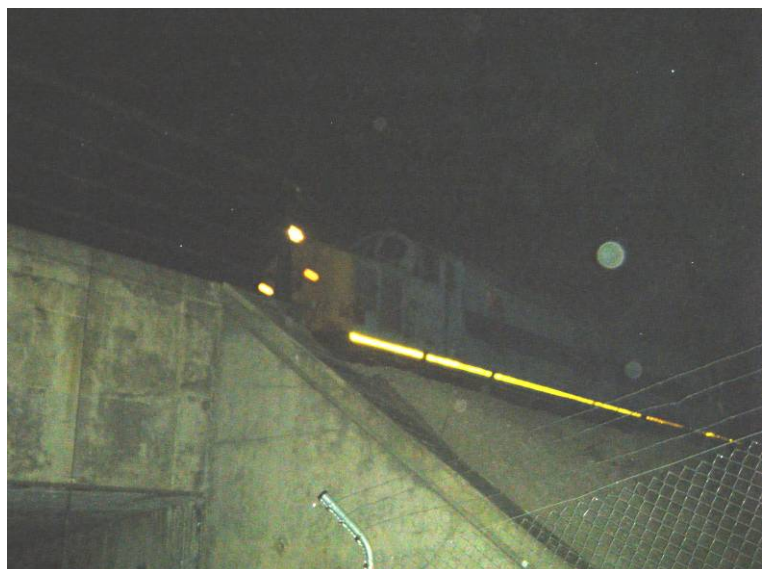
**Fotografía N°10:**  
**Ensayo dinámico lento**



**Fotografía N°11:**  
**Ensayo dinámico rápido**



**Fotografía N°12:**  
**Ensayo de frenado**





**ANEJO 6: ACTA DE LA PRUEBA DE CARGA**

**MODELO A2 DE ACTA DE PRUEBA DE CARGA****TIPO DE PRUEBA : Recepción de obra nueva****FECHA DE PRUEBA: 04/02/2010****IDENTIFICACIÓN DE LA ESTRUCTURA**

|                                               |                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ADMINISTRADOR:                                | Administrador de Infraestructuras Ferroviarias (A.D.I.F.)                                                                                                                                                                                                                                                                                                                                        |
| LÍNEA:                                        | Línea de Alta Velocidad Madrid – Zaragoza – Barcelona – Frontera Francesa                                                                                                                                                                                                                                                                                                                        |
| TRAMO:                                        | La Roca - Riudellots. Subtramo: La Roca del Vallés – Llinars del Vallés                                                                                                                                                                                                                                                                                                                          |
| P.K.:                                         | Obra: 401+162; Línea: 656+649                                                                                                                                                                                                                                                                                                                                                                    |
| PROVINCIA:                                    | Barcelona                                                                                                                                                                                                                                                                                                                                                                                        |
| DENOMINACIÓN:                                 | Obra de Drenaje 1.2                                                                                                                                                                                                                                                                                                                                                                              |
| REFERENCIA :                                  | 0175OD04                                                                                                                                                                                                                                                                                                                                                                                         |
| DESCRIPCIÓN DE LA ESTRUCTURA O PARTE DE ELLA: | Es una obra de drenaje formada por un marco de hormigón armado de 12 m de luz libre. Las losas superior e inferior del marco tienen un espesor de 1,20 m y la altura libre existente entre ambas es de 3,0 m. Los hastiales presentan un espesor de 0,75 m. El ancho total de la estructura, en dirección perpendicular al trazado de la vía, es de 17,35 m. El paso presenta un esviaje de 75°. |

**ASISTENTES**

| NOMBRES                           | ENTIDAD |
|-----------------------------------|---------|
| Fco. Javier de la Cuerda del Olmo | INTEMAC |
|                                   |         |

**CONDICIONES ATMOSFÉRICAS**

|                                |                                   |
|--------------------------------|-----------------------------------|
| Temperatura: entre 12°C y 13°C | Humedad relativa: entre 74% y 79% |
|--------------------------------|-----------------------------------|

**PUNTOS DE MEDIDA INSTALADOS**

|                         |                          | Vano 1 |  |  |  | Totales |
|-------------------------|--------------------------|--------|--|--|--|---------|
| FLECHAS                 | EQUIPO ÓPTICO            | 0      |  |  |  | 0       |
|                         | TRANS. DE DESPLAZAMIENTO | 5      |  |  |  | 5       |
| DEFORMACIONES UNITARIAS | BANDAS EXTENSOMÉTRICAS   | 0      |  |  |  | 0       |
| REGISTRO DE VIBRACIONES | ACELERÓMETROS            | 1      |  |  |  | 1       |
| OTROS                   |                          |        |  |  |  |         |

**TRENES DE CARGA UTILIZADOS**

| VEHÍCULO                                                                                                                                                                                                                                                                                                       |            | NÚMERO | MATRÍCULA | PESO UNITARIO (t.) |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------|-----------|--------------------|--------|
| PREVISTO                                                                                                                                                                                                                                                                                                       | REAL       |        |           | PREVISTO           | REAL   |
| LOCOMOTORA                                                                                                                                                                                                                                                                                                     | LOCOMOTORA | 1      | L-26      | 120,00             | 120,00 |
| LOCOMOTORA                                                                                                                                                                                                                                                                                                     | LOCOMOTORA | 2      | L-34      | 120,00             | 120,00 |
| PORCENTAJE DE SOLICITACIÓN RESPECTO A INSTRUCCIÓN: En la memoria facilitada no se han encontrado los esfuerzos de cálculo considerados en el proyecto de la estructura, por lo que no ha sido posible obtener el porcentaje de solicitud que la prueba de carga representa frente a la sobrecarga de Proyecto. |            |        |           |                    |        |
| SENTIDO DE CIRCULACIÓN PARA LAS PRUEBAS DINÁMICAS : Sentido Barcelona - Girona                                                                                                                                                                                                                                 |            |        |           |                    |        |
| HORARIO DE COMIENZO: 20:48 h                                                                                                                                                                                                                                                                                   |            |        |           |                    |        |

**RESULTADOS BÁSICOS ALCANZADOS EN LA ESTRUCTURA**

|                                                                 |          |                                |                         | Vano    |     | 1             |  |
|-----------------------------------------------------------------|----------|--------------------------------|-------------------------|---------|-----|---------------|--|
| PORCENTAJE DE RESPUESTA RESPECTO AL PROYECTO DE PRUEBA DE CARGA | Estática | En general                     | Flechas                 |         |     | 75%           |  |
|                                                                 |          |                                | Deformaciones unitarias |         |     |               |  |
|                                                                 | Dinámica | Pruebas simplificadas          | Flechas                 |         |     |               |  |
|                                                                 |          |                                | Deformaciones unitarias |         |     |               |  |
| PORCENTAJE DE RECUPERACIÓN                                      | Estática | Frecuencia propia de vibración |                         |         | 93% |               |  |
|                                                                 | Estática | En general                     | Flechas                 |         |     | 100%          |  |
|                                                                 |          |                                | Deformaciones unitarias |         |     |               |  |
| ANOMALÍAS EN LA INSPECCIÓN VISUAL: Ninguna                      |          |                                |                         |         |     |               |  |
| OBSERVACIONES:                                                  |          |                                |                         |         |     |               |  |
| CONDICIONES DE PUESTA EN SERVICIO:                              |          | APTO                           | X                       | NO APTO |     | RESTRICCIONES |  |

Firma de los Asistentes

Fco. Javier de la Cuerda



## **ANEJO 7: FICHA DE SEGUIMIENTO**

# MODELO A1 DE COMUNICACIÓN DE INSPECCIONES AL REGISTRO

|                    |           |                     |            |
|--------------------|-----------|---------------------|------------|
| TIPO DE INSPECCIÓN | PRINCIPAL | FECHA DE INSPECCIÓN | 04/02/2010 |
|--------------------|-----------|---------------------|------------|

| IDENTIFICACIÓN DE LA ESTRUCTURA |                                                                         |  |  |
|---------------------------------|-------------------------------------------------------------------------|--|--|
| ADMINISTRADOR                   | ADMINISTRADOR DE INFRAESTRUCTURAS FERROVIARIAS (A.D.I.F.)               |  |  |
| LÍNEA                           | L.A.V. MADRID-ZARAGOZA-BARCELONA-FRONTERA FRANCESA                      |  |  |
| TRAMO                           | LA ROCA DEL VALLÉS-RIUDELLOTS DE LA SELVA (SUBTRAMO: LA ROCA - LLINARS) |  |  |
| P.K.                            | Obra: 401+162; Línea: 656+649                                           |  |  |
| PROVINCIA                       | BARCELONA                                                               |  |  |
| DENOMINACIÓN                    | OBRA DE DRENAJE 1.2                                                     |  |  |
| REFERENCIA                      | 0175OD04                                                                |  |  |
| AÑO APROXIMADO DE CONSTRUCCIÓN  | 2008                                                                    |  |  |

| DATOS DEL RESPONSABLE DE LA INSPECCIÓN |                                                        |        |               |
|----------------------------------------|--------------------------------------------------------|--------|---------------|
| ENTIDAD                                | ITEMAC                                                 |        |               |
| INGENIERO RESPONSABLE                  | FCO. JAVIER DE LA CUERDA DEL OLMO                      |        |               |
| DIRECCIÓN                              | C/ BRONCE Nº 26 y 28. 28850 TORREJÓN DE ARDOZ (MADRID) |        |               |
| TELÉFONO                               | 91 675 31 00                                           | FAX    | 91 677 41 45  |
|                                        |                                                        | E-MAIL | dlc@itemac.es |

| CARACTERÍSTICAS BÁSICAS Y TIPOLOGÍA |                                              |                                                   |                                                  |                                   |                                    |
|-------------------------------------|----------------------------------------------|---------------------------------------------------|--------------------------------------------------|-----------------------------------|------------------------------------|
| Nº DE VANOS                         | 1                                            | LUCES DE CADA VANO (m):                           | 12,00                                            |                                   |                                    |
| LONGITUD TOTAL (m):                 | 12,00                                        |                                                   |                                                  |                                   |                                    |
| OBSTÁCULO SALVADO                   | CARRETERA <input type="checkbox"/>           | FF.CC. <input type="checkbox"/>                   | CAUCE <input checked="" type="checkbox"/>        |                                   |                                    |
|                                     | OTROS <input type="checkbox"/>               |                                                   | ÁNGULO DE INCIDENCIA (°) 75                      |                                   |                                    |
| LÍNEA ELECTRIFICADA                 | SI <input checked="" type="checkbox"/>       | NO <input type="checkbox"/>                       |                                                  |                                   |                                    |
| VÍA                                 | ÚNICA <input type="checkbox"/>               | DOBLE <input checked="" type="checkbox"/>         | Nº DE VÍAS: 2                                    |                                   |                                    |
|                                     | SOLDADA <input checked="" type="checkbox"/>  | CON JUNTAS <input type="checkbox"/>               |                                                  |                                   |                                    |
|                                     | ENCARRILADORA                                | SI <input type="checkbox"/>                       | NO <input checked="" type="checkbox"/>           |                                   |                                    |
|                                     | CONTRACARRILES                               | SI <input type="checkbox"/>                       | NO <input checked="" type="checkbox"/>           |                                   |                                    |
|                                     | APARATOS DE DILATACIÓN                       | SI <input type="checkbox"/>                       | NO <input checked="" type="checkbox"/>           |                                   |                                    |
|                                     | RECTA <input type="checkbox"/>               | CURVA A DCHA. <input type="checkbox"/>            | CURVA A IZQ. <input checked="" type="checkbox"/> |                                   |                                    |
|                                     |                                              |                                                   |                                                  |                                   |                                    |
| TIPOLOGÍA DE PUENTE                 | METÁLICO <input type="checkbox"/>            |                                                   |                                                  |                                   |                                    |
|                                     | FÁBRICA <input type="checkbox"/>             |                                                   |                                                  |                                   |                                    |
|                                     | HORMIGÓN <input checked="" type="checkbox"/> | TRAMOS EN ARCO <input type="checkbox"/>           |                                                  |                                   |                                    |
|                                     | OTROS <input type="checkbox"/>               | TRAMOS RECTOS <input checked="" type="checkbox"/> |                                                  |                                   |                                    |
| TIPO DE MATERIAL                    | ESTRIBOS                                     | HORMIGÓN <input checked="" type="checkbox"/>      | PIEDRA <input type="checkbox"/>                  | LADRILLO <input type="checkbox"/> |                                    |
|                                     | PILAS                                        | HORMIGÓN <input type="checkbox"/>                 | PIEDRA <input type="checkbox"/>                  | LADRILLO <input type="checkbox"/> | METÁLICAS <input type="checkbox"/> |
|                                     | ARCOS                                        | HORMIGÓN <input type="checkbox"/>                 | PIEDRA <input type="checkbox"/>                  | LADRILLO <input type="checkbox"/> | METÁLICAS <input type="checkbox"/> |
|                                     | TABLERO                                      | HORMIGÓN <input checked="" type="checkbox"/>      | LOSA <input checked="" type="checkbox"/>         | VIGAS <input type="checkbox"/>    | CAJÓN <input type="checkbox"/>     |
|                                     |                                              | METÁLICO <input type="checkbox"/>                 | VIGAS ALMA LLENA <input type="checkbox"/>        | CELOSIA <input type="checkbox"/>  |                                    |

| DAÑOS DE CLASE 1         |                              |                           |                             |                           |                              |  |
|--------------------------|------------------------------|---------------------------|-----------------------------|---------------------------|------------------------------|--|
| ELEMENTO ESTRUCTURAL     | TIPO DE DAÑOS                | LOCALIZADO O GENERALIZADO | PLAZO DE REPARACIÓN (meses) | LIMITACIÓN DE CIRCULACIÓN | REQUIERE INSPECCIÓN ESPECIAL |  |
| A ESTRIBO nº             | A GOLPES, ROTURAS            | L                         | 6                           | A VELOCIDAD               | SI                           |  |
| B PILA nº                | B FISURAS, GRIETAS           |                           | 12                          | B CARGAS                  |                              |  |
| C ARCO nº                | C DESCALCES EN CIMENTACIONES | G                         | 24                          | C GÁLIBO                  | NO                           |  |
| D TABLERO METÁLICO nº    | D DESPLOMES, BASCULAMIENTOS  | DAÑOS DETECTADOS:         | 36                          | D SEÑALIZAR               |                              |  |
| E TABLERO DE HORMIGÓN nº | E OXIDACIONES, CORROSIONES   |                           |                             |                           |                              |  |
| F VÍA I, II, ...         | F ASIENTOS, DESNIVELACIONES  |                           |                             |                           |                              |  |
| G OTROS                  | G OTROS                      |                           |                             |                           |                              |  |

| EVALUACIÓN GLOBAL DE DAÑOS RESPECTO A LA INSPECCIÓN ANTERIOR |                                          |                                     |
|--------------------------------------------------------------|------------------------------------------|-------------------------------------|
| SIN EVOLUCIÓN <input type="checkbox"/>                       | POCO IMPORTANTE <input type="checkbox"/> | IMPORTANTE <input type="checkbox"/> |

| RESULTADO DE LA INSPECCIÓN                    |                                                              |
|-----------------------------------------------|--------------------------------------------------------------|
| FAVORABLE <input checked="" type="checkbox"/> | DESFAVORABLE (CON DAÑOS DE CLASE 1) <input type="checkbox"/> |

Firma del Inspector



FCO. JAVIER DE LA CUERDA DEL OLMO  
Ingeniero de Caminos, Canales y Puertos

## **ANEJO 8: PLANIMETRÍA Y NIVELACIÓN DE LA ESTRUCTURA**



**Cliente:** A.D.I.F.

**Nº O.T.:**

**Refª:** I/OC-10004/CE-1

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En esta estructura no se ha realizado ninguna tarea de planimetría ni de nivelación.



**Cliente:** A.D.I.F.

**Nº O.T.:**

**Refª:** I/OC-10004/CE-1

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## **ANEJO 9: FICHA DE CAUCE**



**Cliente:** A.D.I.F.

**Nº O.T.:**

**Refª:** I/OC-10004/CE-1

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Esta estructura no lleva ficha de cauce.